

Miljøkvalitet i Hardangerfjorden



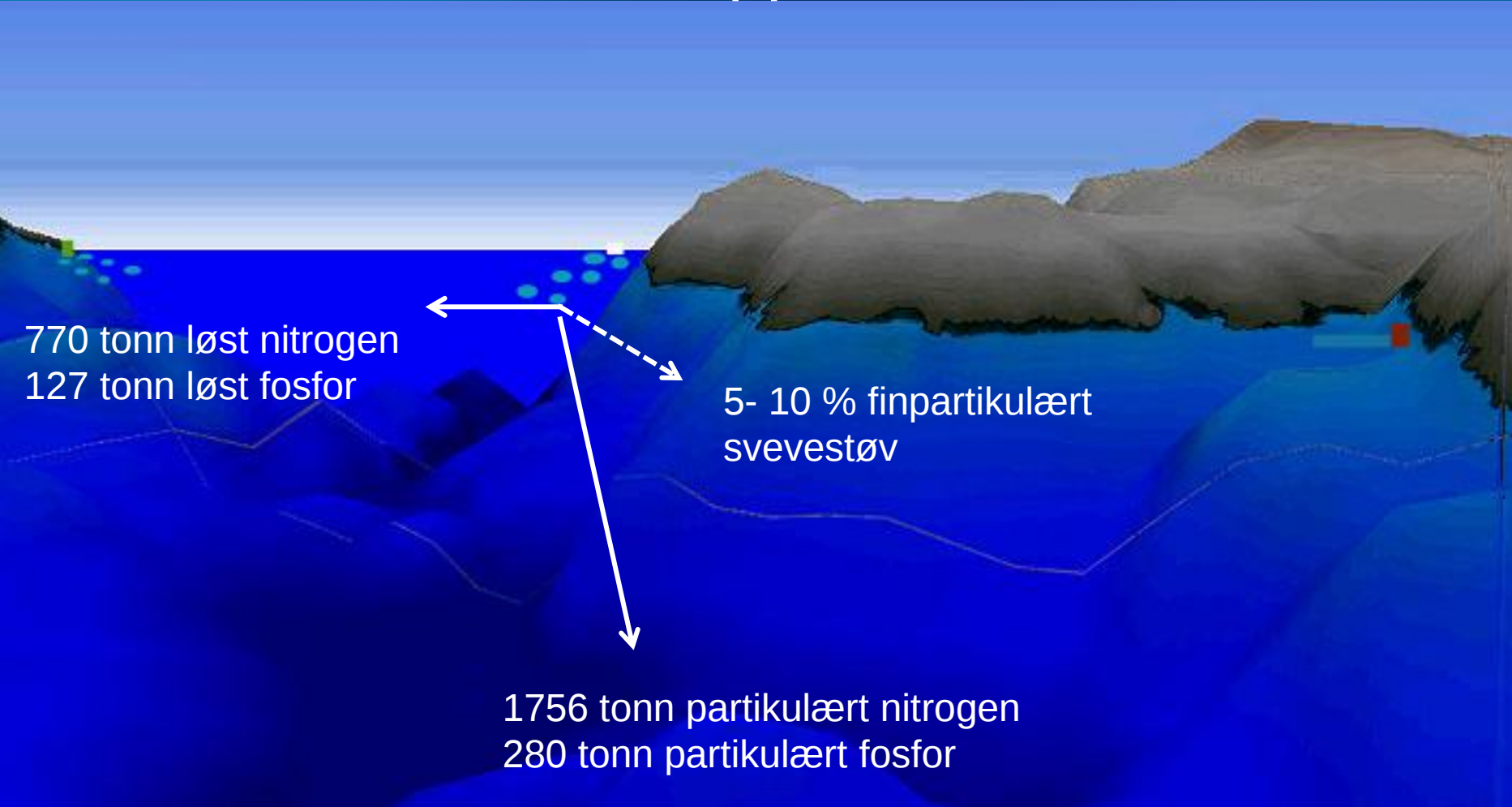
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Hardangerfjordseminaret 3. mai 2013



70 - 80.000 tonn laks og ørret produseres årlig

Hva slippes ut?



770 tonn løst nitrogen
127 tonn løst fosfor

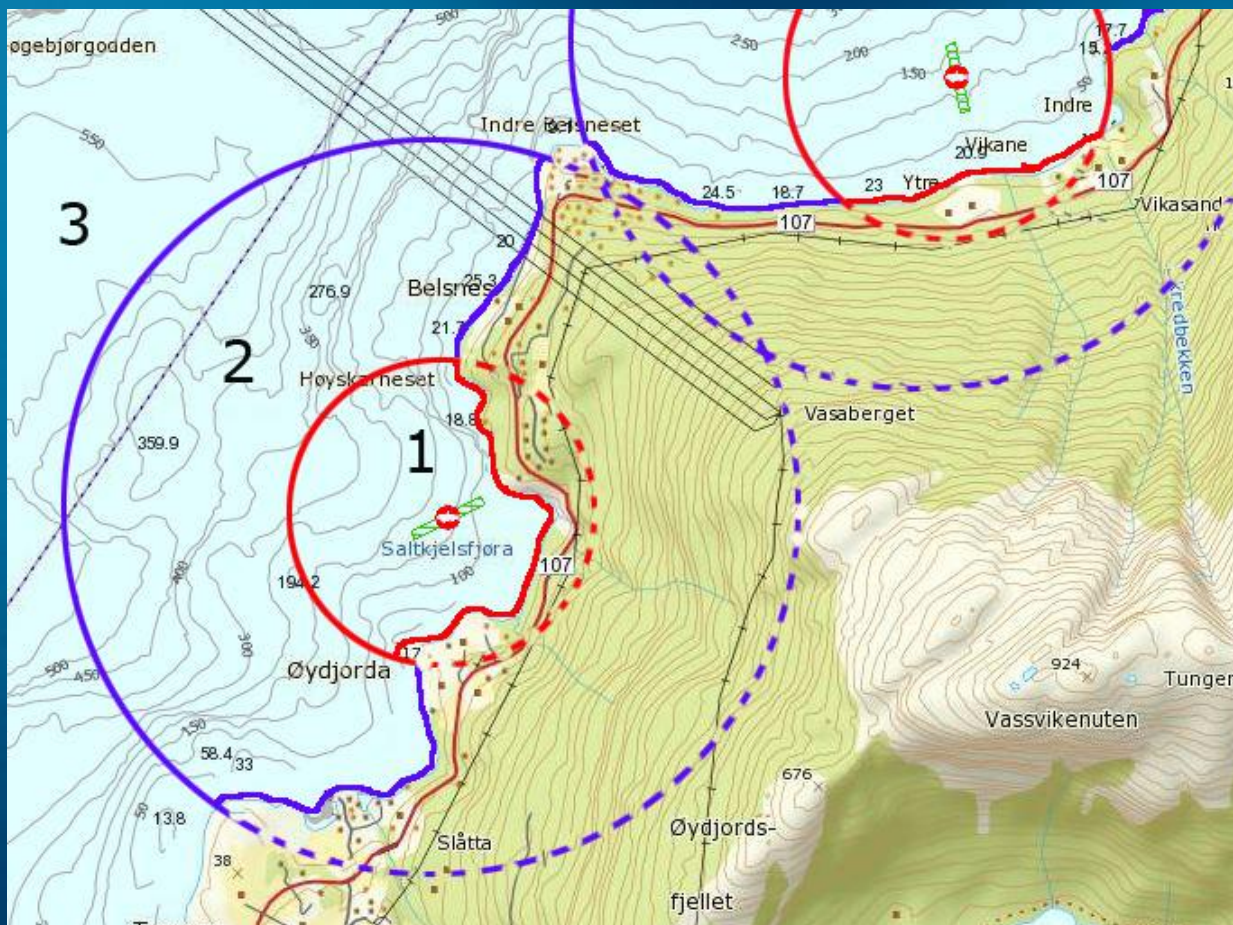
5- 10 % finpartikulært
svevestøv

1756 tonn partikulært nitrogen
280 tonn partikulært fosfor



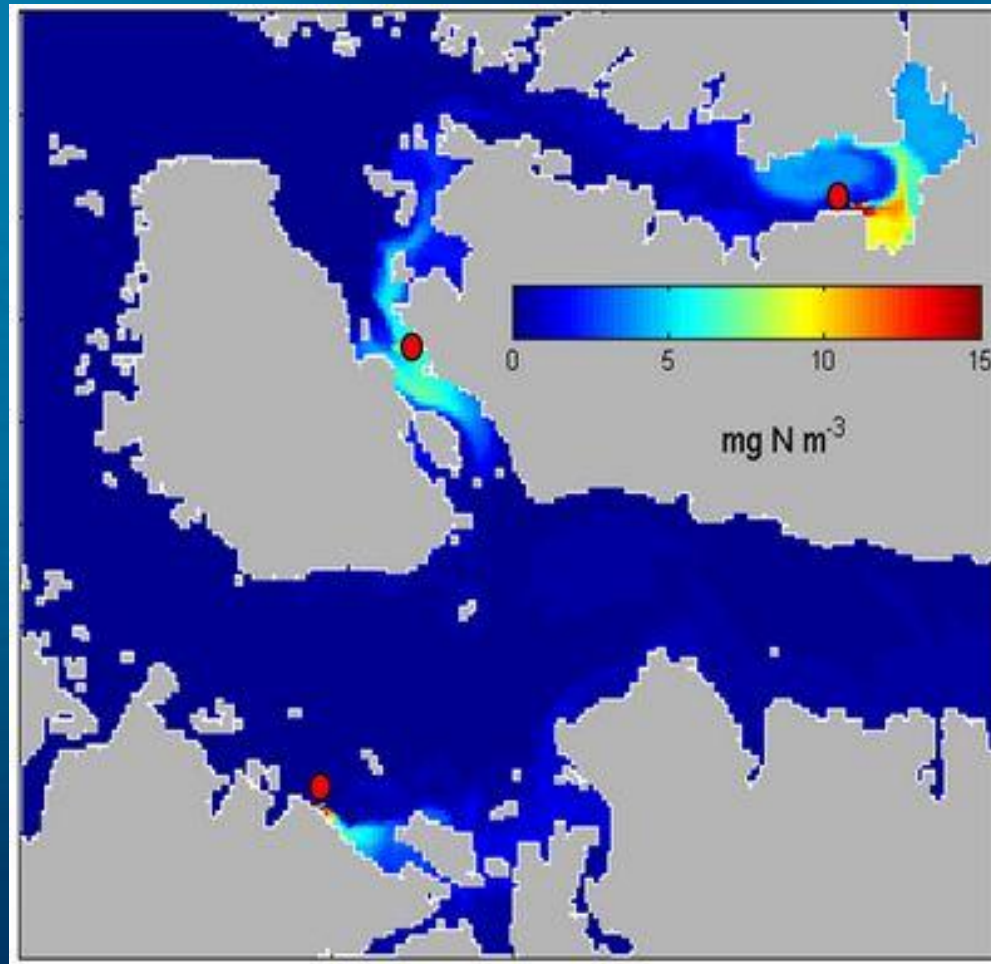
Lokal påvirkning/ influensområde

1000 m radius- utenfor skal det være minst god miljøkvalitet

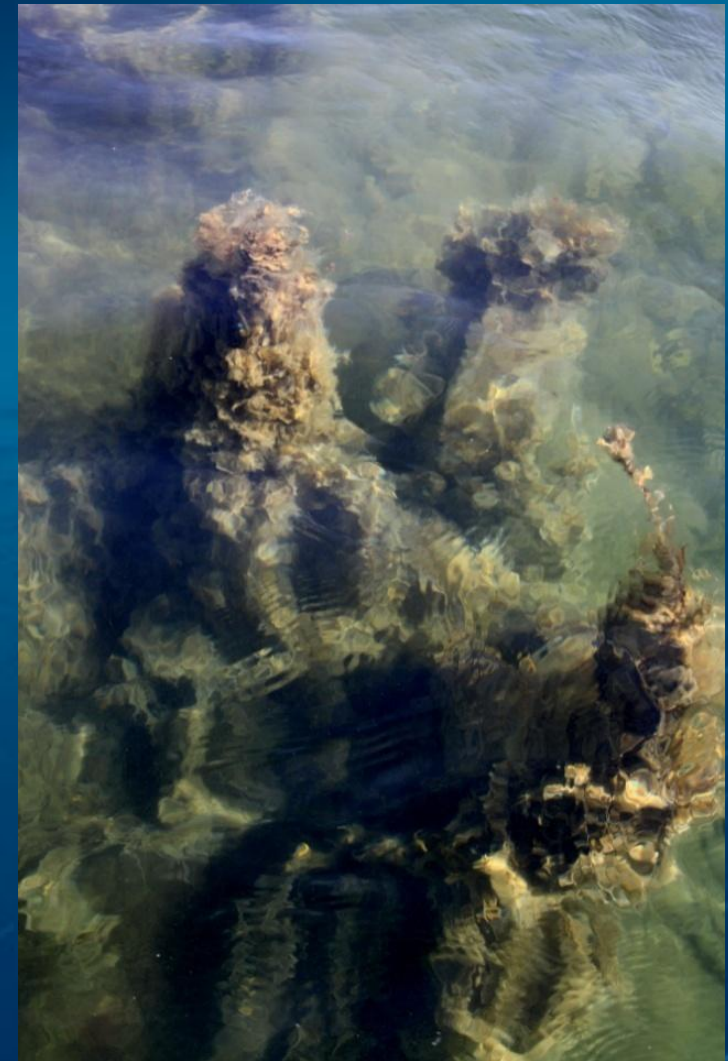


I strandsonen

Lite påvirkning på kysten, mer i fjordene særlig når anlegget ligger nær land



Mundheimsbukta



Lokal påvirkning Ålfjorden



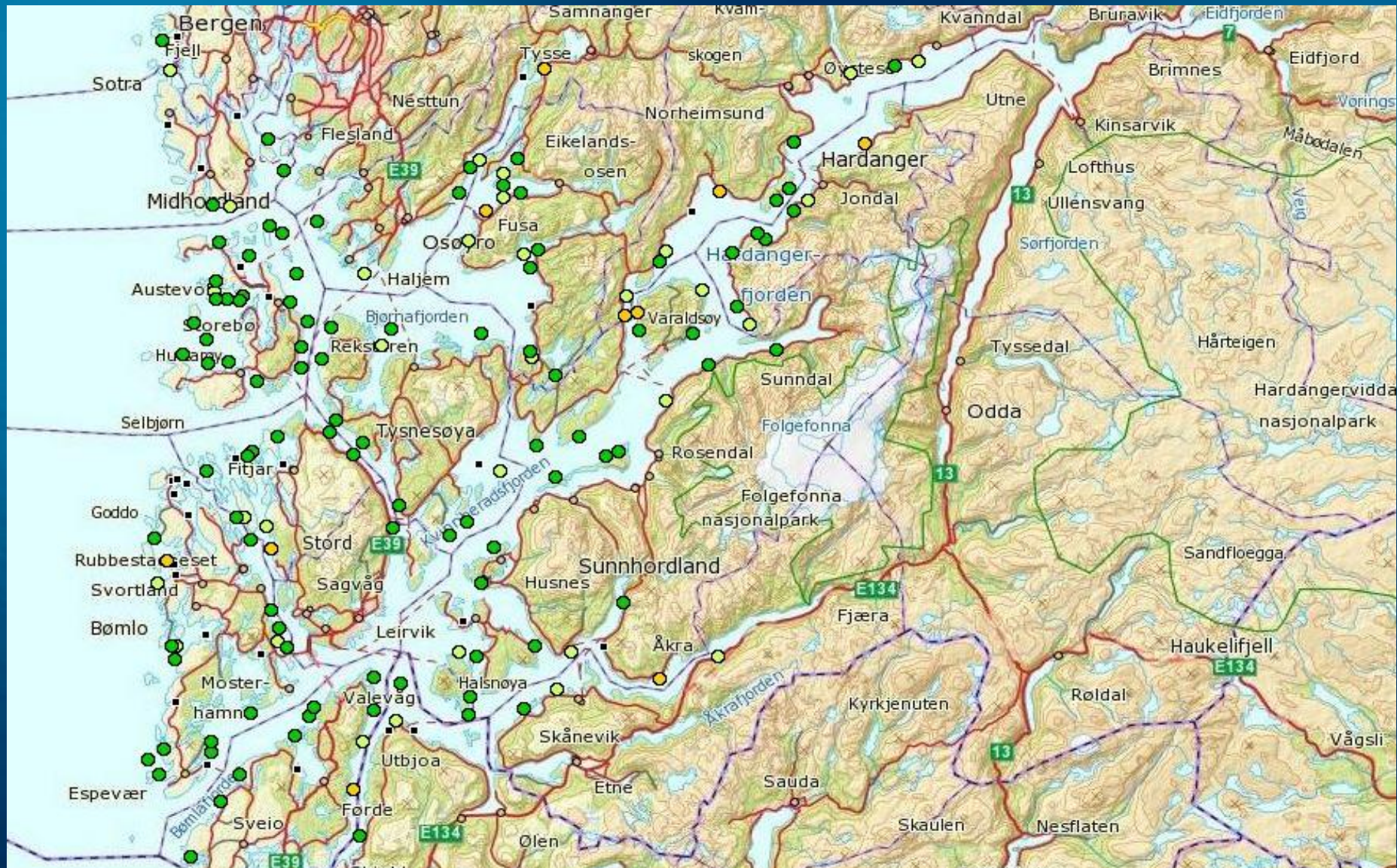
På bløtbunn

Meget God	God	Moderat	Dårlig	Meget Dårlig
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Station	Distance	Depth	Richness	Abundance	Diversity	Mean AMBI	SN	NQ11	EQR_NQ11	EQR_H'	nEQR_NQ11	nEQR_H'
Opp2	0	70	38	762	2.03	5.16	1.92	0.49	0.62	0.46	0.39	0.43
Opp2	0	70	8	1944	0.48	5.73	1.03	0.28	0.36	0.11	0.18	0.11
Opp3	275	700	9	12	3.08	2.38	2.41	0.65	0.83	0.70	0.63	0.62
Opp4	875	1200	27	91	4.24	3.38	2.19	0.64	0.82	0.96	0.63	0.95



Miljøtilstand ved anlegg i Hardanger pr. 1. mai 2013 (MOM B)



På hardbunn



Referansestasjon 1000 m fra anlegget



Ved anlegget



Sårbare og verdifulle naturressurser i influensssonen?



Sjøfjær



Kamskjell/haneskjell



Gytefelt for torsk

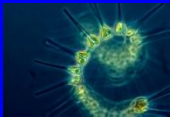


Ålegress



Verktøy for å vurdere regional påvirkning (Vannforskriften + KLIF 1997)

Planteplankton-
biomasse



Siktedyp
Næringssalt



Artsrikdom i
fjæresonen



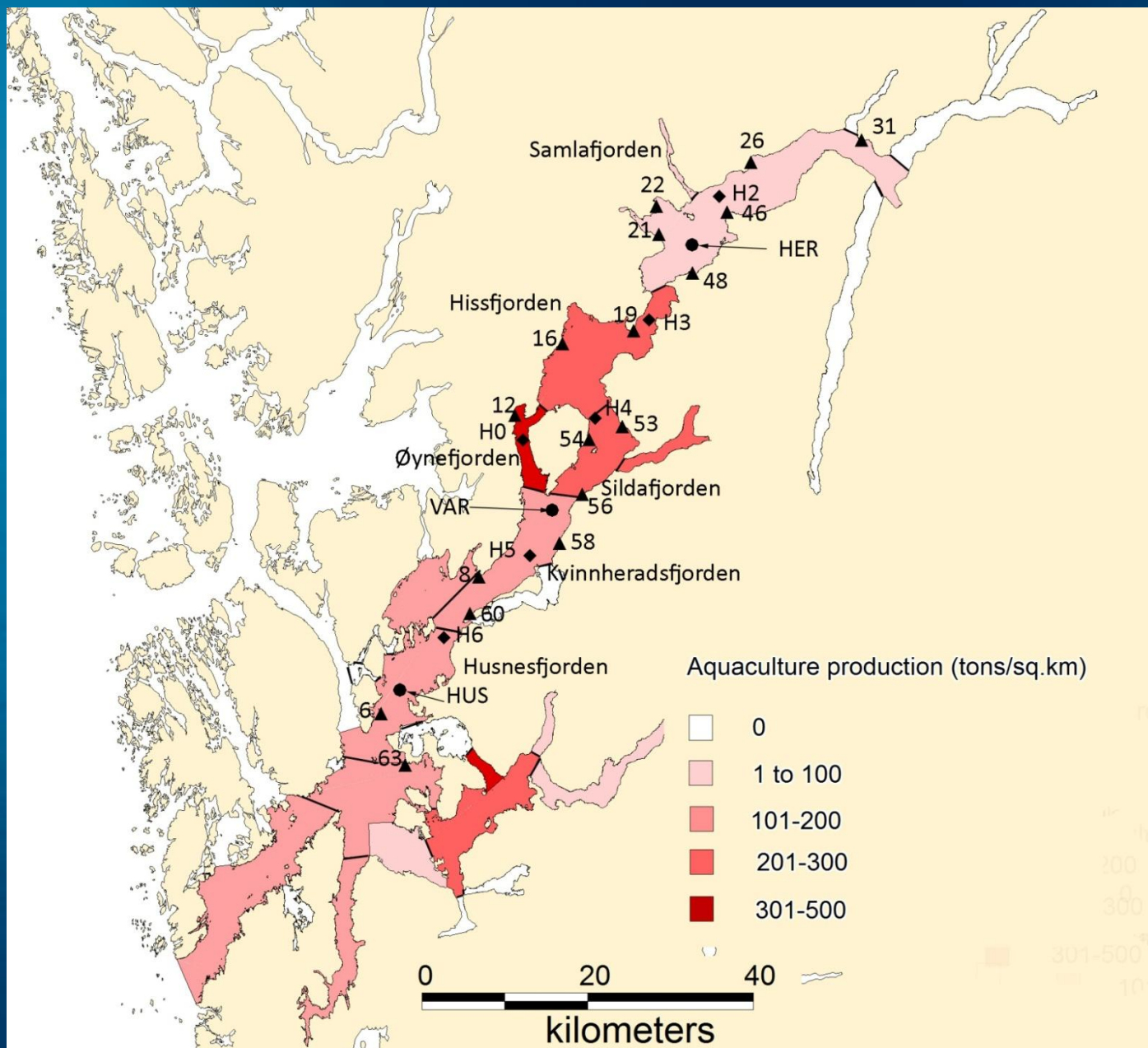
Skagerrak:
Nedre
voksegrenser

Artsrikdom i
bløtbunnsfauna



Oksygen i bunnvann

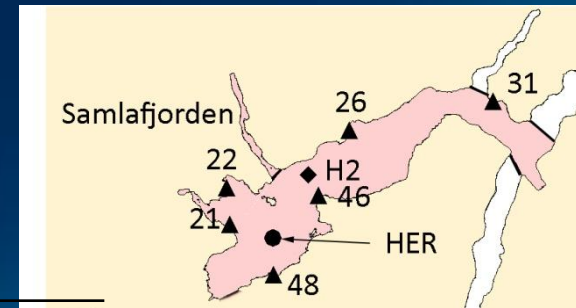




Samlafjorden

Location
Water body

H2-2
Samlafjorden



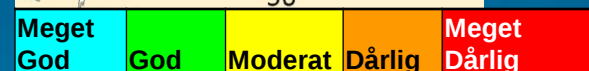
	Unit	Thresholds High status	Mean value	Status	Meget God	God	Moderat	Dårlig	Meget Dårlig
Summer									
Chlorophyll- <i>a</i>	µg/l	<2	1,03	High					
Nitrate	µmol/l	<0,85	0,33	High					
TOT-N	µmol/l	<17,85	11,20	High					
Phosphate	µmol/l	<0,13	0,06	High					
TOT-P	µmol/l	<0,39	0,34	High					
Winter									
Nitrate	µmol/l	<6,43	4,7	High					
TOT-N	µmol/l	<21,07	14,5	High					
Phosphate	µmol/l	<0,52	0,29	High					
TOT-P	µmol/l	<0,68	0,53	High					
Overall status			High						

Water body	Parameter	Locality	Value	SR	Abundance	EQR value	Status
Samlafjorden	Macroalgae	31 Nøstflot		14		0,788	Good
		26 Ålvik		21		0,856	High
		46 Samlaneset		28		0,830	High
		22 Aknes		24		0,837	High
		21 Øystese		25		0,815	High
		48 Solenes		25		0,845	High
	Benthic fauna	Herand		19	67	0.92	Good
	Oxygen*		4,17 ml l ⁻¹				Good
Overall status							Good



Hissfjorden, Sildafjorden og Øynefjorden

Hissfjorden	Macroalgae	19 Ljonestang.	27	0,810	High
		16 Skjerring	28	0,810	High
		54 Haukanes	29	0,845	High
Overall status					High
Sildafjorden	Macroalgae	53 Apalnes	26	0,830	High
		56 Svoldal	26	0,822	High
Overall status					High
Øynefjorden	Macroalgae	12 Mundheim	31	0,828	High
Overall status					High



Location		H3-2			H4-2		H0	
Water body		Hissfjorden			Sildafjorden		Øynefjorden	
	Unit	Thresholds	Mean	Status	Mean	Status	Mean	Status
High status								
Summer								
Chlorophyll- <i>a</i>	µg/l	<2	1,01	High	1,18	High	1,15	High
Nitrate	µmol/l	<0,85	0,31	High	0,31	High	0,3	High
TOT-N	µmol/l	<17,85	11,03	High	12,07	High	11,93	High
Phosphate	µmol/l	<0,13	0,07	High	0,06	High	0,05	High
TOT-P	µmol/l	<0,39	0,30	High	0,36	High	0,30	High
Winter								
Nitrate	µmol/l	<6,43	4,7	High	4,6	High	4,7	High
TOT-N	µmol/l	<21,07	13,8	High	13,80	High	13,20	High
Phosphate	µmol/l	<0,52	0,3	High	0,29	High	0,29	High
TOT-P	µmol/l	<0,68	0,56	High	0,58	High	0,57	High
Overall status				High	High		High	



Kvinnheradsfjorden

Location
Water body

H5-3
Kvinnherads-
fjorden



	Unit	Thresholds High status	Mean value	Status
Summer				
Chlorophyll- <i>a</i>	µg/l	<2	0,97	High
Nitrate	µmol/l	<0,85	0,32	High
TOT-N	µmol/l	<17,85	9,90	High
Phosphate	µmol/l	<0,13	0,05	High
TOT-P	µmol/l	<0,39	0,33	High
Winter				
Nitrate	µmol/l	<6,43	4,5	High
TOT-N	µmol/l	<21,07	12,8	High
Phosphate	µmol/l	<0,52	0,28	High
TOT-P	µmol/l	<0,68	0,58	High
Overall status			High	

Meget
God

God

Moderat

Dårlig

Meget
Dårlig

Kvinnheradsfjorden	Macroalgae	58 Løfallstrand	33	116	0,812	High
		8 Steinesnes	28		0,818	High
		60 Skorpa	31		0,802	High
	Benthic fauna	Varaldsøy	28		0.95	High
Overall status						High



Husnesfjorden

Location
Water body

H6-2
Husnesfjorden

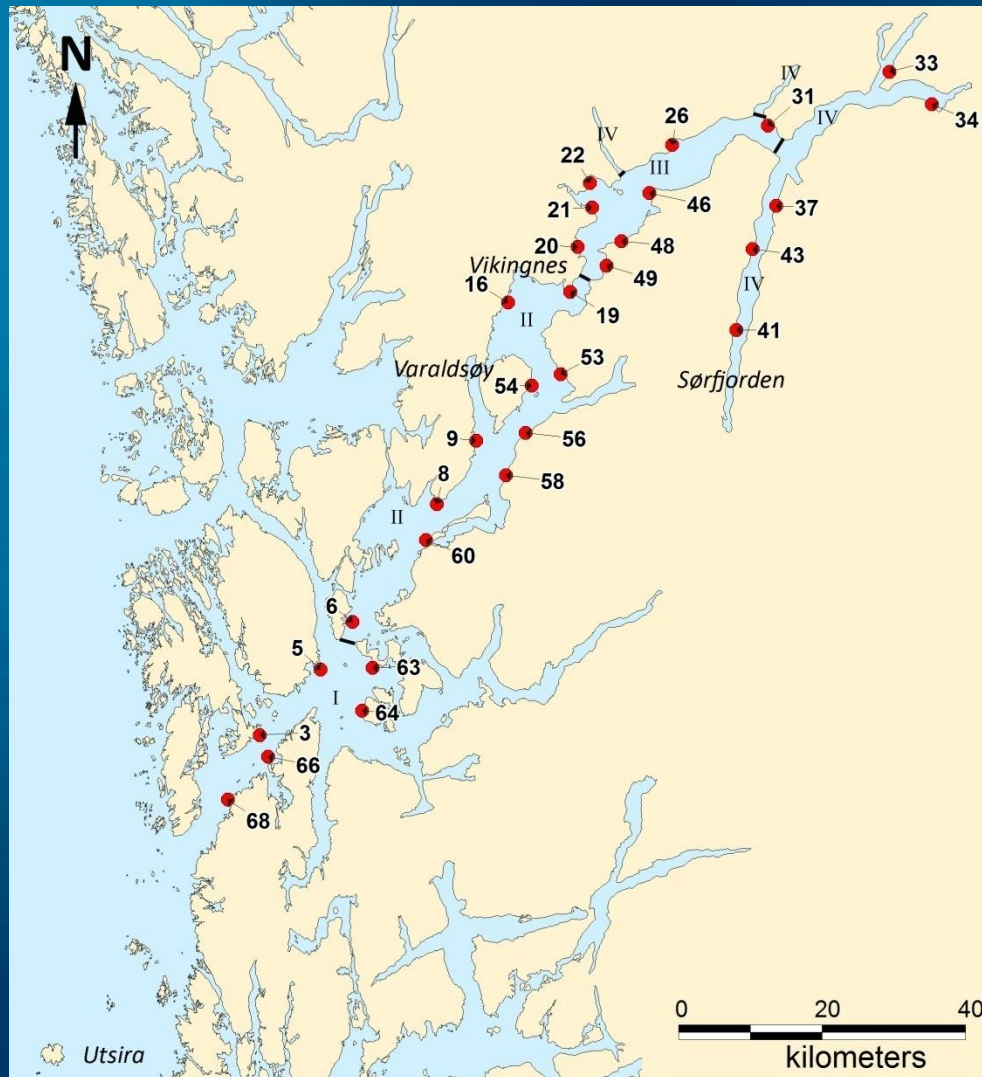


Unit		Thresholds	Mean	Status	Meget God	God	Moderat	Dårlig	Meget Dårlig
		High status	value						
Summer									
Chlorophyll- <i>a</i>	µg/l	<2	1,03	High					
Nitrate	µmol/l	<0,85	0,31	High					
TOT-N	µmol/l	<17,85	12,33	High					
Phosphate	µmol/l	<0,13	0,06	High					
TOT-P	µmol/l	<0,39	0,35	High					
Winter									
Nitrate	µmol/l	<6,43	4,6	High					
TOT-N	µmol/l	<21,07	14,30	High					
Phosphate	µmol/l	<0,52	0,29	High					
TOT-P	µmol/l	<0,68	0,57	High					
Overall status				High					
Husnesfjorden	Macroalgae	6 Huglo	28	0,844	High				
		63 Klosterfjord	29	0,819	High				
	Benthic fauna	Husnes	28	117	0.95	High			
	Oxygen*			5.68 ml l ⁻¹	High				
Overall status				High					



Algevegetasjonen i fjorden

1955/1960 – 2008-2010



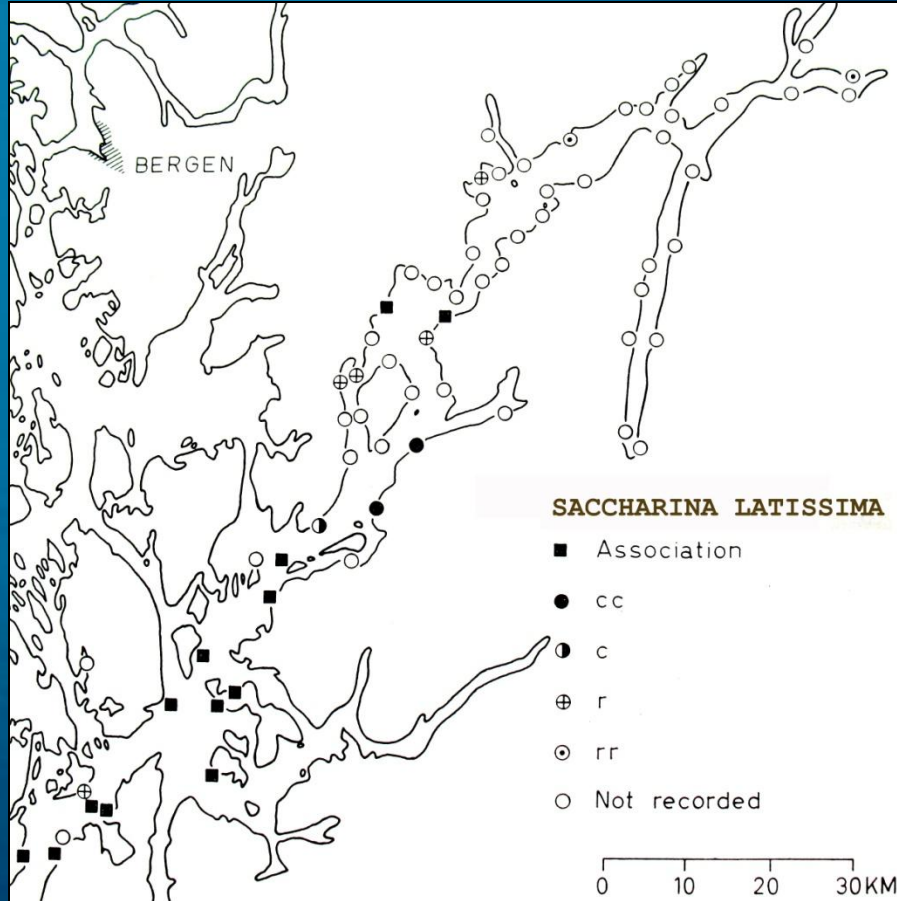
Husa et al. in press

Utbredelse og dybdeintervall av habitatbyggende arter (tang og tare) er som før i fjorden

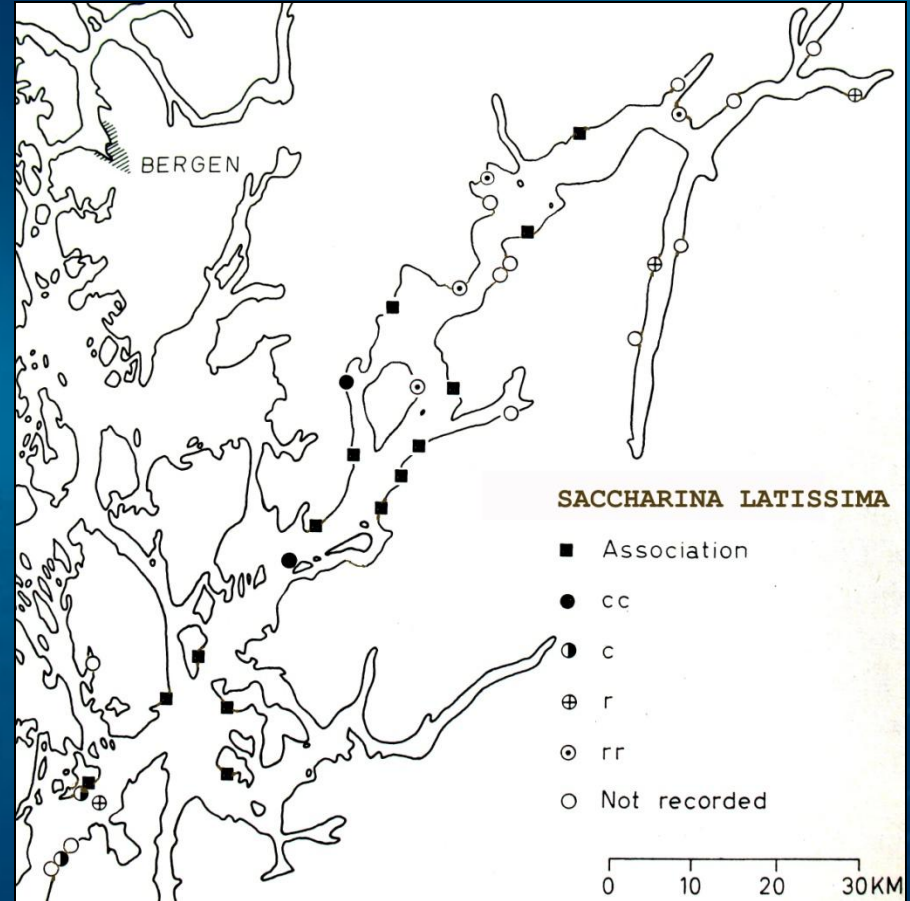
Kråkebollene bestemmer
nedre voksegrenser for alger



Sukkertare før og nå



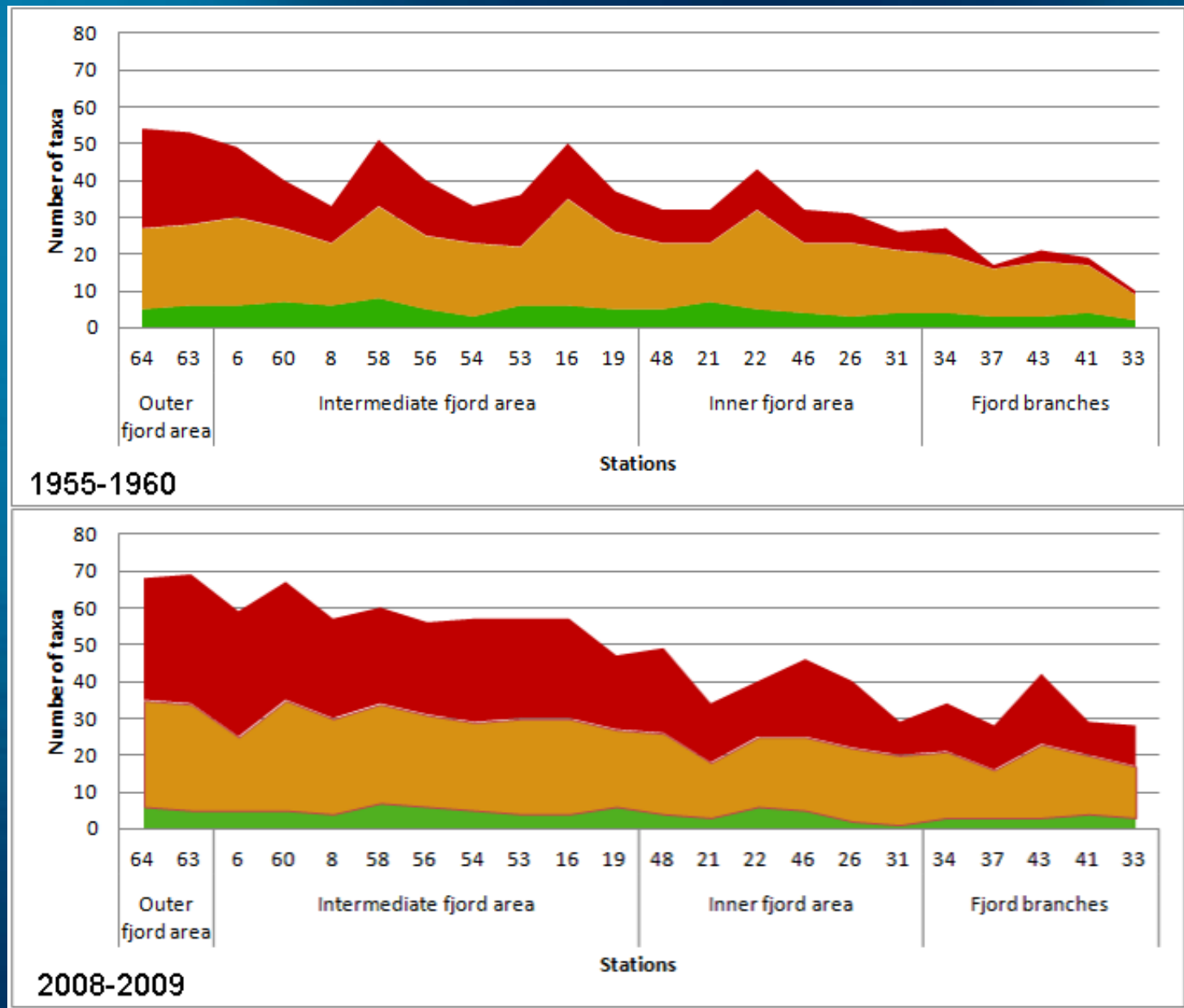
1955-1960



2008-2009

(basert på videotransekt, vannkikkert, dykkere og trekantskrap)

Antall taxa på 22 stasjoner i Hardangerfjorden 1955-1960 og i 2008-2009

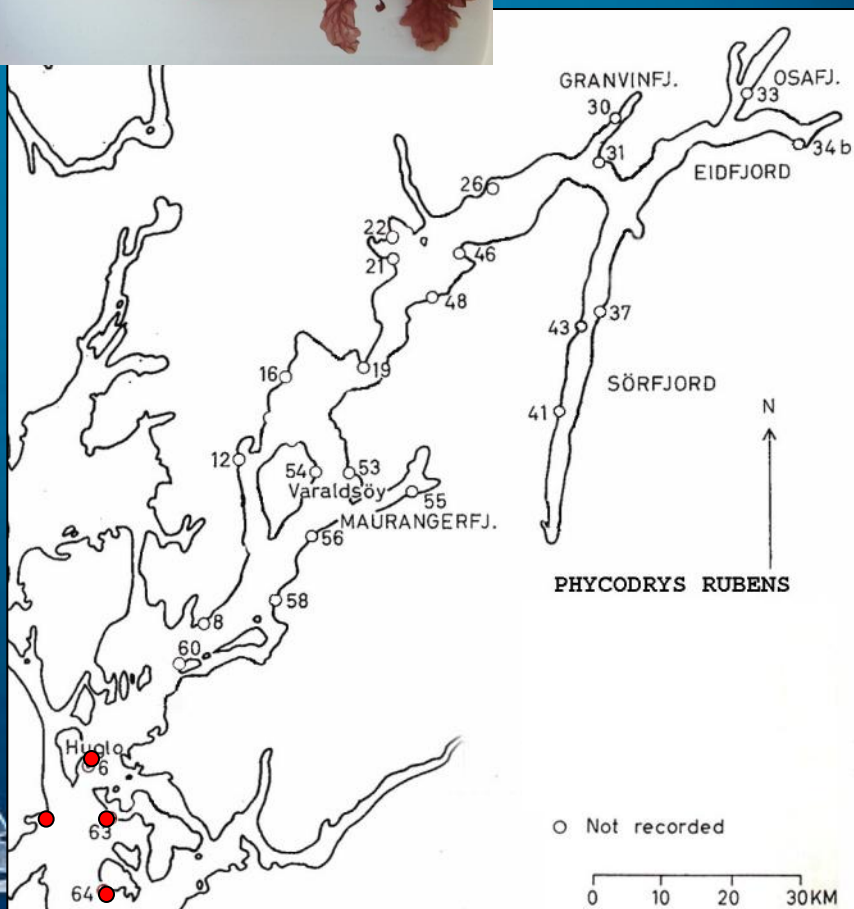




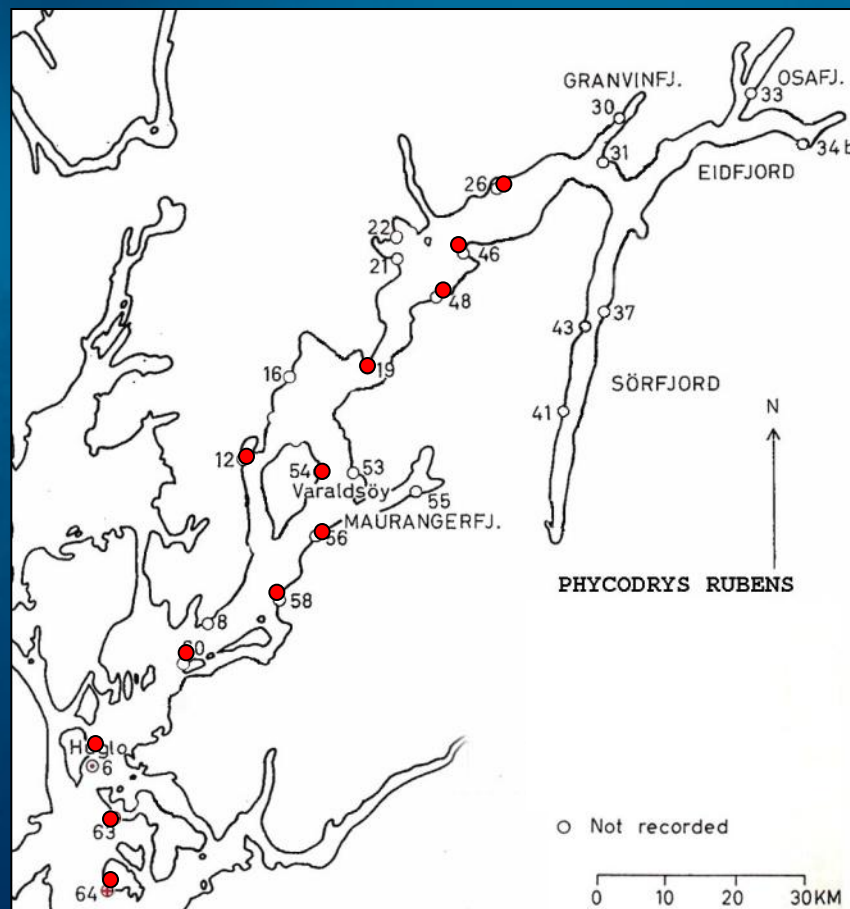
Phycodrys rubens-Eikeving

Salinitetsgrenser: 33 to 16.5‰

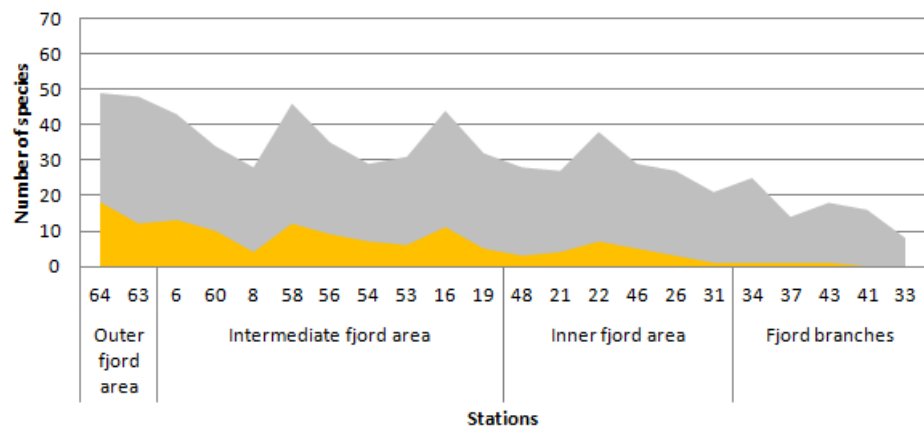
1955-1956:



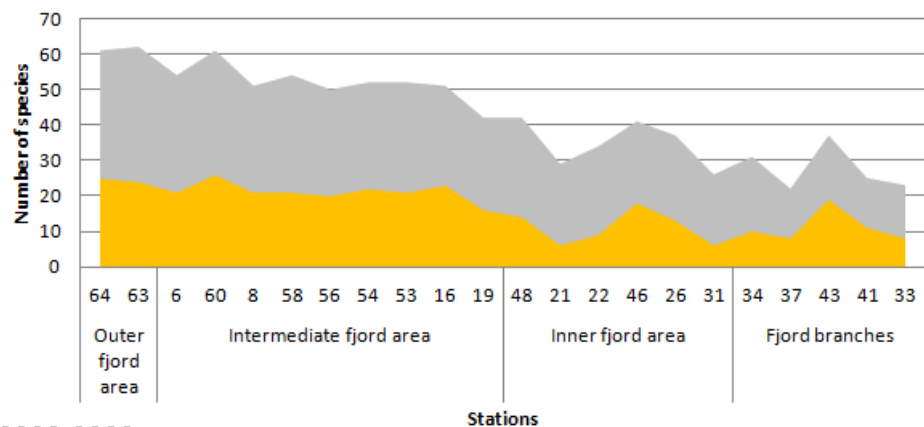
2008-2009:



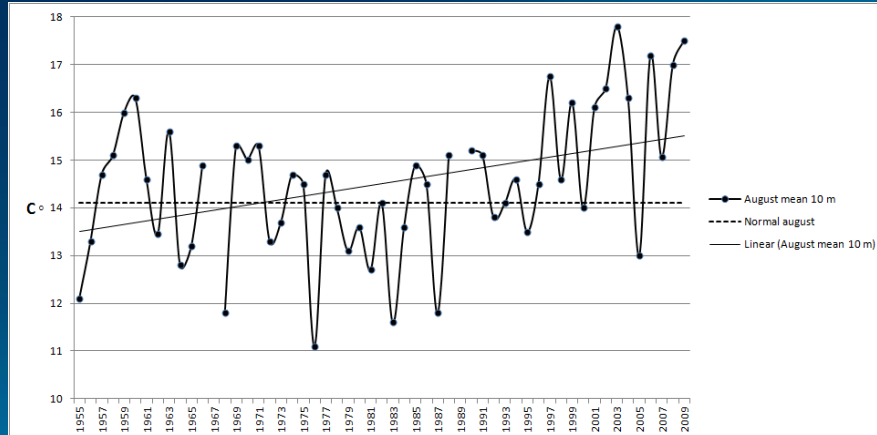
Antall varmekjære arter I Hardangerfjorden i 1955-1960 og i 2008-2009



1955-1960



2008-2009



Middeltemperaturer på 10 m dyp i august på Utsira



Mye trådformede alger mange steder i Hardangerfjorden særlig i midtre del



Overvåkning Hordaland

(Hordaland fylkeskommune, Fylkesmannen i Hordaland, frivillige oppdrettsselskap)

Oppstart mai 2013



Bunnedyrstasjoner + O2



Næringssalt og plankton



Makroalger



An underwater photograph showing a variety of marine life. In the center, there is a large, vibrant green, leafy seaweed plant. To its left, there are darker green, more elongated seaweed leaves. Below the central plant, there is a dense, reddish-brown coral or sponge-like structure. The background is a deep blue water column with light filtering down from the surface, creating a shimmering effect. The overall scene is a healthy underwater ecosystem.

Takk for
oppmerksomheten!

Foto: Erling