



WGC(15)11

Presentation of the ICES Advice to the West Greenland Commission

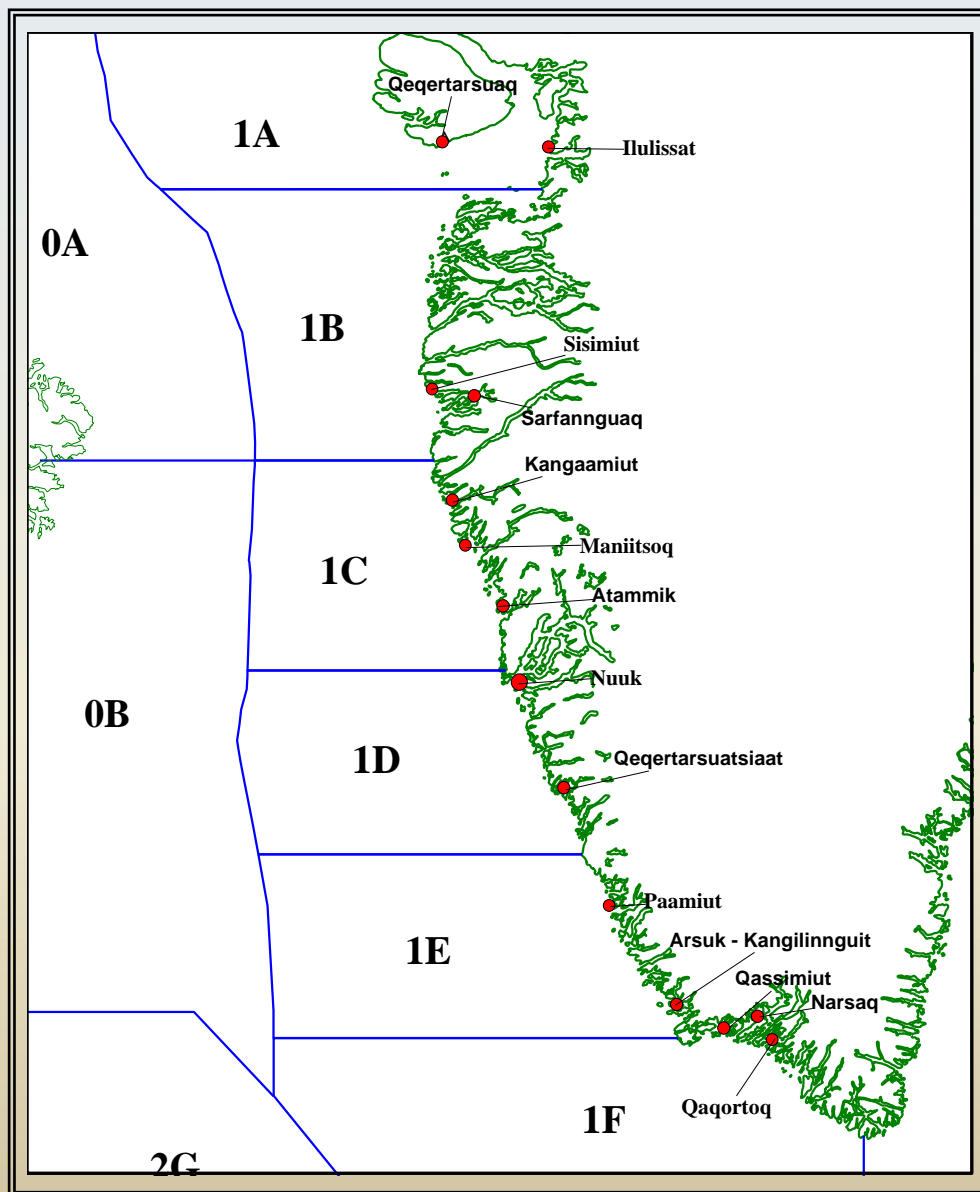
REPORT OF ICES ADVISORY COMMITTEE
ON
NORTH ATLANTIC SALMON STOCKS
TO
NORTH ATLANTIC SALMON
CONSERVATION ORGANIZATION
WGC Area
CNL(15)8

Advice generated by ICES in response to terms of reference from NASCO

10.4 With respect to Atlantic salmon in the West Greenland Commission area:

1. Describe the key events of the 2014 fisheries;
2. Describe the status of the stocks;
3. Provide catch options or alternative management advice for 2015-2017 with an assessment of risk relative to the objective of exceeding stock conservation limits, or pre-defined NASCO Management Objectives, and advise on the implications of these options for stock rebuilding;
4. Update the Framework of Indicators used to identify any significant change in the previously provided multi-annual management advice; and
5. Considering the available contemporary data on stock origin of salmon in the West Greenland fishery, estimate the catches by stock origin and describe their spatial and temporal distribution.

Atlantic salmon in the West Greenland Commission area



- Salmon from NAC and NEAC in their 2nd summer and autumn at sea go to W. Greenland to feed
- Most of the salmon are 1SW non-maturing fish, destined to become 2SW (or older) fish if not caught



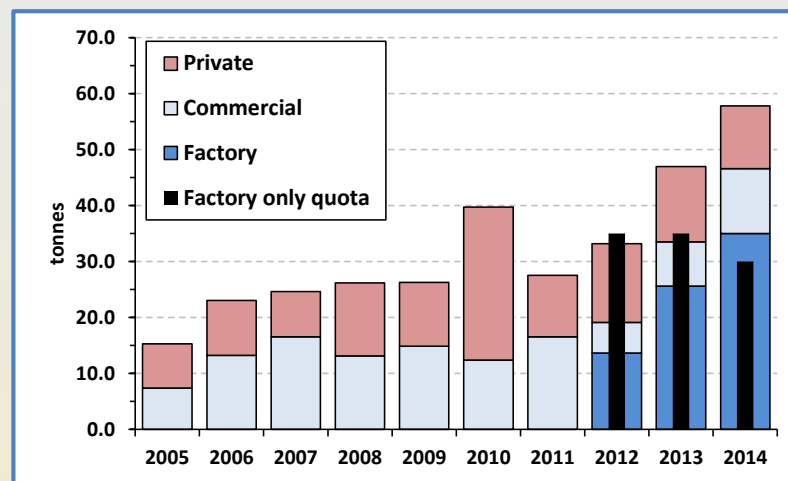
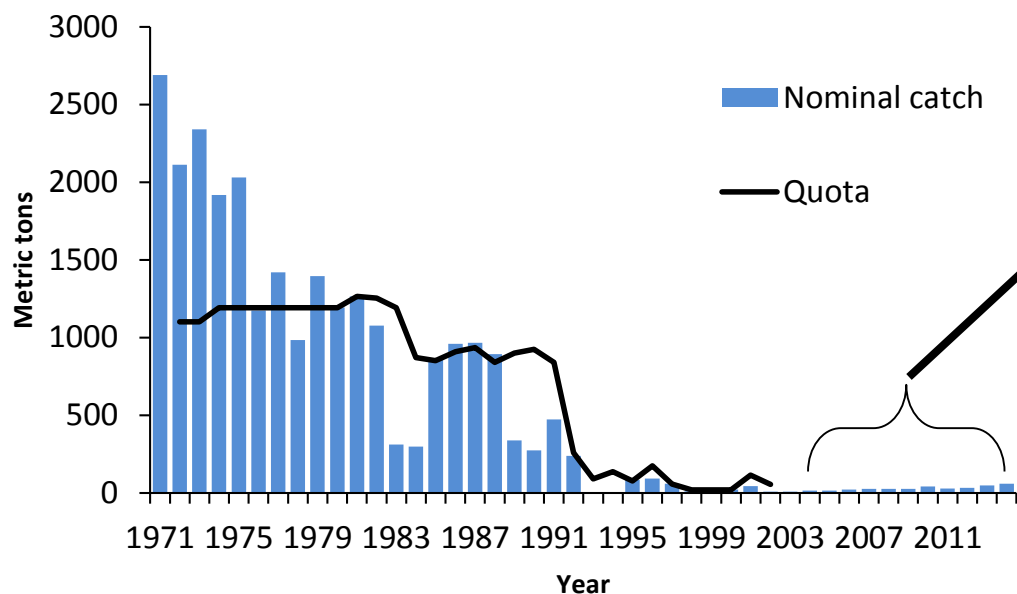
The West Greenland Fishery

- Fishing season in 2014 - 1 August to 31 October
- Fishery open to licensed fishermen (commercial / can use 20 nets) and unlicensed fishermen (private / use 1 net)
- Licensed fishers allowed to sell to hotels, institutions and local markets; unlicensed fishers for personal consumption
- Since 2012, licensed fishers also allowed to sell to factories. Greenland authorities initially set 35 t quota for factories (independent of other landings). Quota reduced to 30 t in 2014
- All catches must be reported to Greenland authorities (seasonal logbooks); factories report weekly on line
- Export ban continues - all fish sold within Greenland



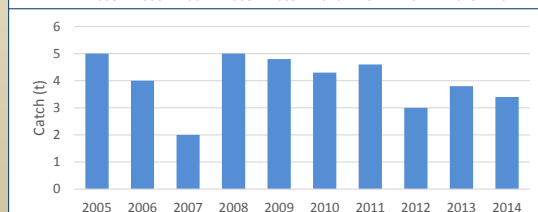
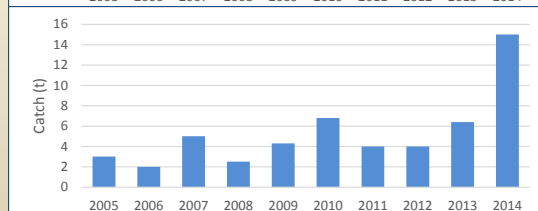
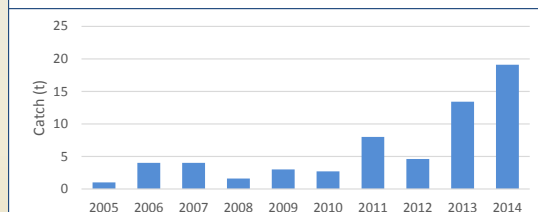
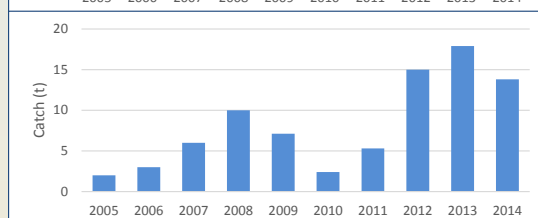
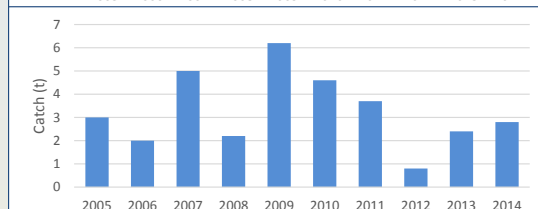
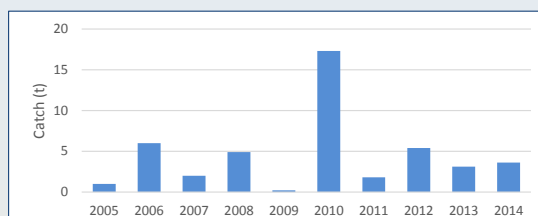
Key events of the 2014 fisheries

- Reported catch of 57.8 t (0.1 t in E. Greenland)
- 2014 catch increased by 23% on 2013 (46.9 t)
- Catch breakdown - factory landings (35.0 t); private consumption (11.2 t); commercial (11.6 t)
- Factory quota exceeded by 5 t
- Unreported catch of 10 t

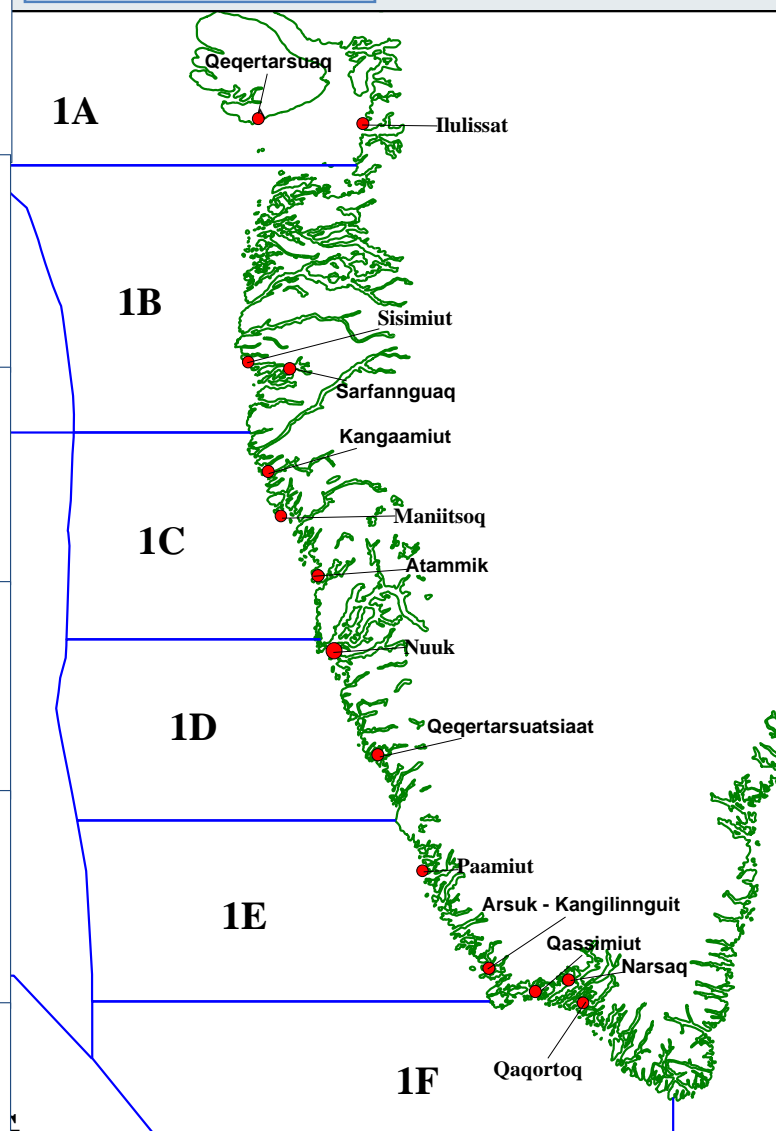


Catch distribution in 2014

- ☐ Highest catch in 2014 in 1D (19.1 t)
- ☐ Large increase in Div 1E
- ☐ In 2014, factories took fish in:
 - 1C (3 communities)
 - 1D (2 communities)
 - 1E (1 community)



Y-axis scales differ



Effort and Landings

- 669 reports from 114 fishers in 2014 (533 reports from 95 fishers in 2013)
- In recent years (except 2006 & 2011), in at least one Division where samplers present, more fish observed than reported as being landed
- In 2014 there were discrepancies in 1 NAFO area. The total discrepancy was 0.6 t and the adjusted catch (used in assessments) was 58.3 t

Year		1A	1B	1C	1D	1E	1F	Total
2006	Reported	5427	2611	3424	4731	2636	4192	23 021
	Adjusted							
2007	Reported	2019	5089	6148	4470	4828	2093	24 647
	Adjusted						2252	24 806
2008	Reported	4882	2210	10024	1595	2457	4979	26 147
	Adjusted				3577		5478	28 627
2009	Reported	195	6151	7090	2988	4296	4777	25 496
	Adjusted				5466			27 975
2010	Reported	17263	4558	2363	2747	6766	4252	37 949
	Adjusted		4824		6566		5274	43 056
2011	Reported	1858	3662	5274	7977	4021	4613	27 407
	Adjusted							
2012	Reported	5353	784	14 991	4564	3993	2951	32 636
	Adjusted		2001				3694	34 596
2013	Reported	3052	2359	17 950	13 356	6442	3774	46 933
	Adjusted		2461				4408	47 669
2014	Reported	3626	2756	13 762	19 123	14 979	3416	57 662
	Adjusted						4036	58 282

Telephone Survey of Licensees

- 321 professional fishermen obtained a licence in 2014
- 207 fishers (including 11 non-professional) 'interviewed'
- 80% of respondents fish for salmon every year
- Most fishers use 1-2 gill nets
- 109 licensed fishers only fish for private consumption
- Of those interviewed, 119 licensed fishers (57%) reported making catches in 2014, but had not reported these to GFLK
- Approximately 66% of harvest associated with these reports attributable to 8 fishers, as most had harvested small amounts
- Provisional results only - estimates preliminary & require further investigation
- Comparison of reported catch and interviews provided no evidence of systematic bias in reporting (i.e. over- or under- reporting)
- Some evidence of small by-catch in other gears (e.g. pound nets, long lines)
- Many fishers felt salmon abundant off WG. Suggestions that fishery should extend into Nov (especially in north) and desire for increased opportunity for factory landings. Some reports of abandoned nets.

International Sampling Programme

- ❑ Sampling programme initiated by NASCO in 2001, continued in 2014 to provide information needed for assessments
- ❑ Samplers from USA, Canada, Ireland, UK (Scotland), and UK (England & Wales) supported by Greenland Institute of Natural Resources
- ❑ Samples collected at 4 sites: Sisimiut (1B), Maniitsoq (1C), Paamiut (1E) & Qaqortoq (1F). Sampling extended from August to October
- ❑ Arrangements also made to sample at 4 factories (2 in 1C, 1 in 1D & 1E)
- ❑ Unable to sample at Nuuk (difficulties with access to fish) and no sampling in E. Greenland
- ❑ 1,013 salmon observed by samplers & further 276 sampled at factories – total fish seen = 1,289 (~8% by weight of reported landings)
- ❑ Of the 1289 fish seen:
 - 925 sampled for biological characteristics
 - 150 only checked for adipose clip
 - 214 documented but not examined



Biological characteristics of the catch

River Age

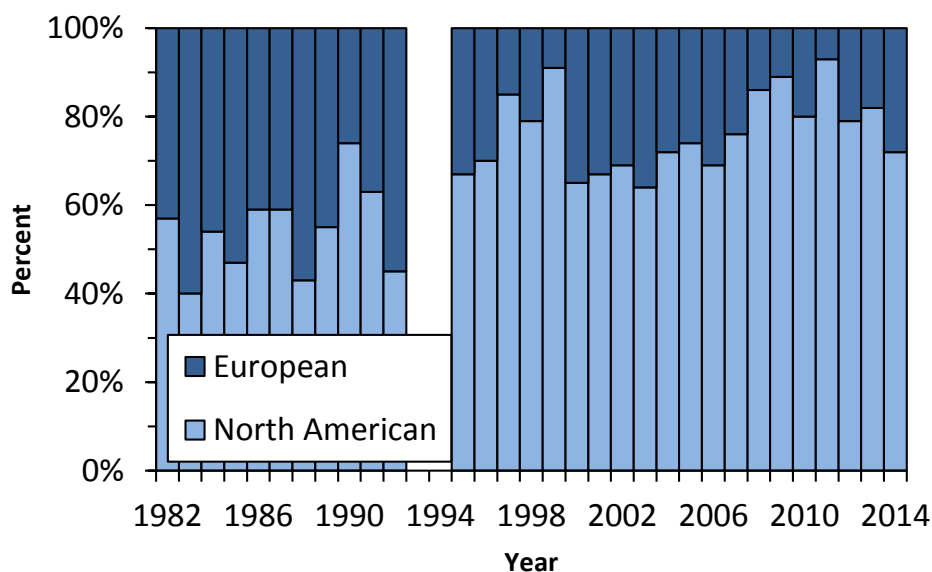
- North American salmon up to river age six, 92% of ages 2 to 4
- European salmon ranged from 1 to 4, 92% of ages 2 to 3

Sea Age

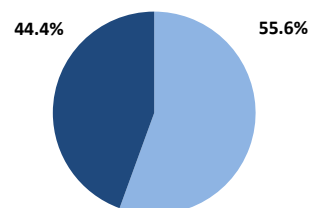
- Predominantly 1SW salmon (N. American samples 91%; European samples 96%)

Continent of Origin

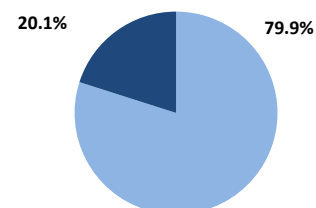
- Genetic analysis (920 samples genotyped): 71.7% NAC; 28.3% NEAC



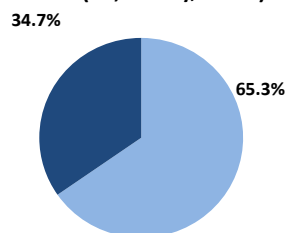
Paamuit (1E, non-factory, n=99)



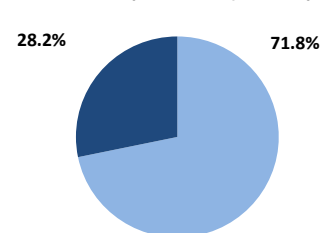
Maniitsoq (1C, non-factory, n=249)



Arsuk (1E, factory, n=150)



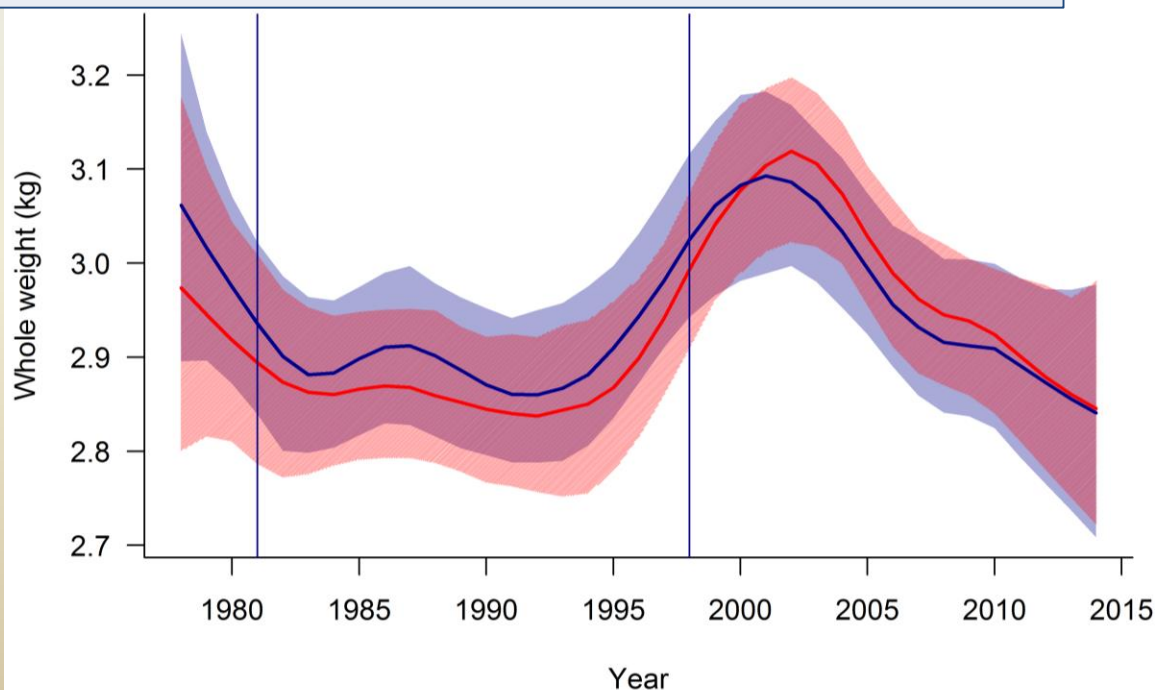
Attamik (1C, factory, n=124)



Biological characteristics – weight of 1SW salmon

- Biological characteristics collected at W Greenland since 1969
- Mean weight appeared to decline from high values in 1970s to low (1990-95) before increasing again.
- However, these data not adjusted for sampling period (fish growing quickly) – so, new model developed to examine trends in mean whole weight

Weight of a 65cm salmon on the 20th of August for N. American (red) and European (blue) origin fish

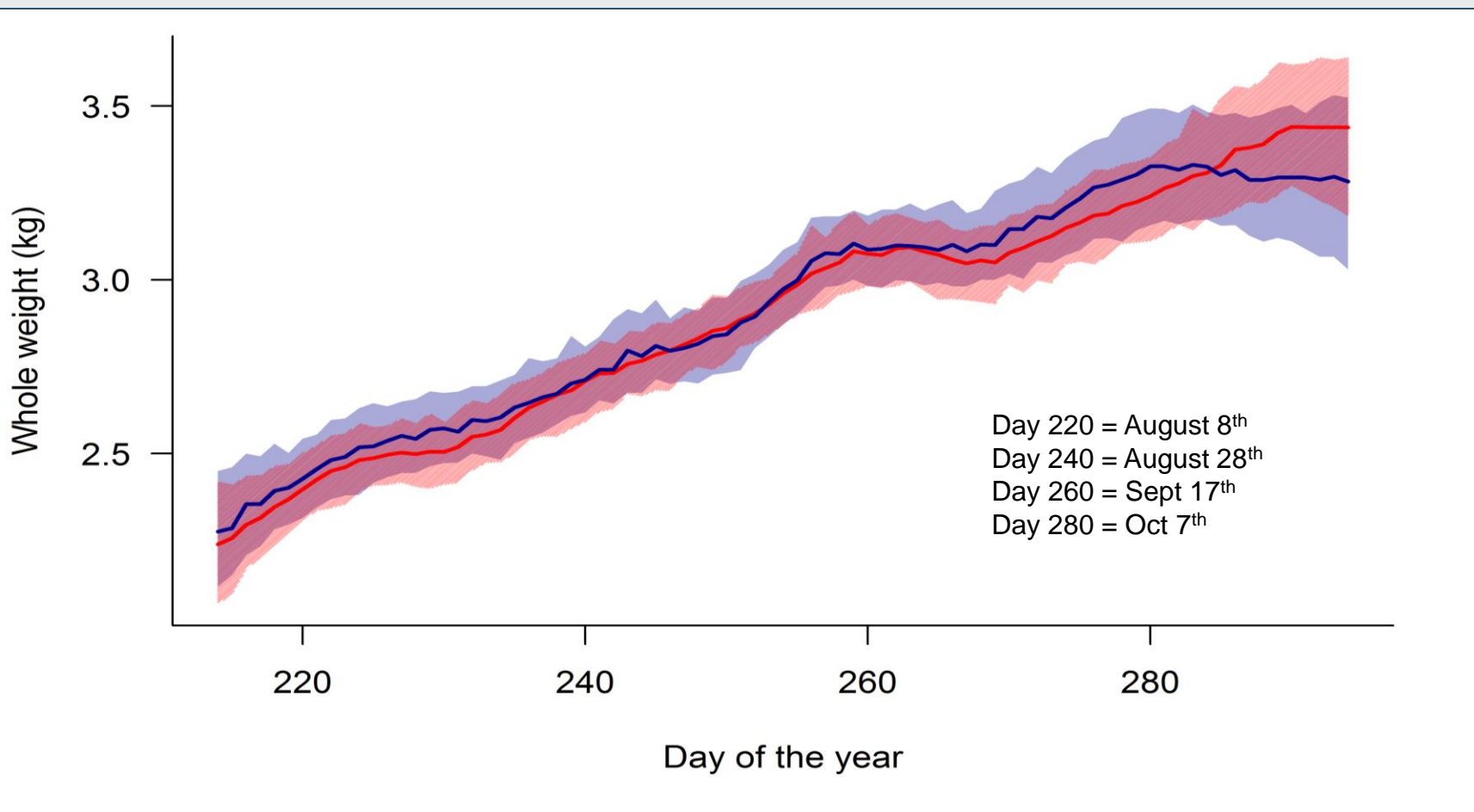


Vertical bars represent major changes in the methods used to sample the harvest:

- Prior to 1982 samples obtained randomly from research surveys
- 1983-1998 samples from fish processing plants (catch sometimes catch sorted by size)
- Post 1999 samples obtained randomly from open air markets

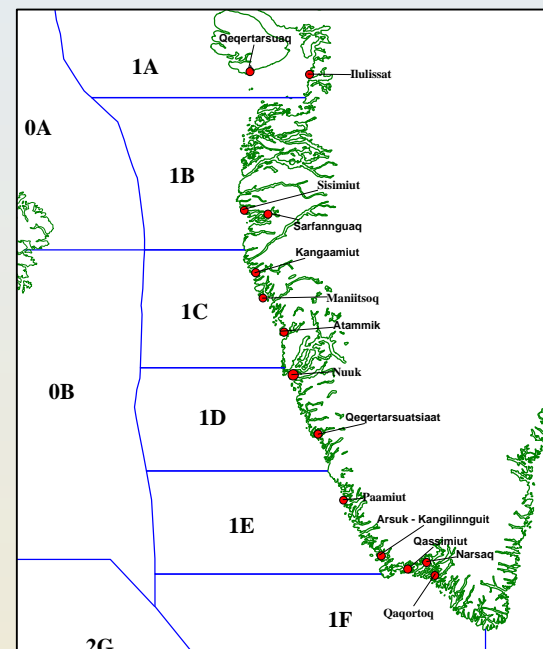
Biological characteristics – weight of 1SW salmon

Trend in whole weight for maiden 1SW fish of N. American origin (red) and European origin (blue) through the fishing season (1st August to 30th October)



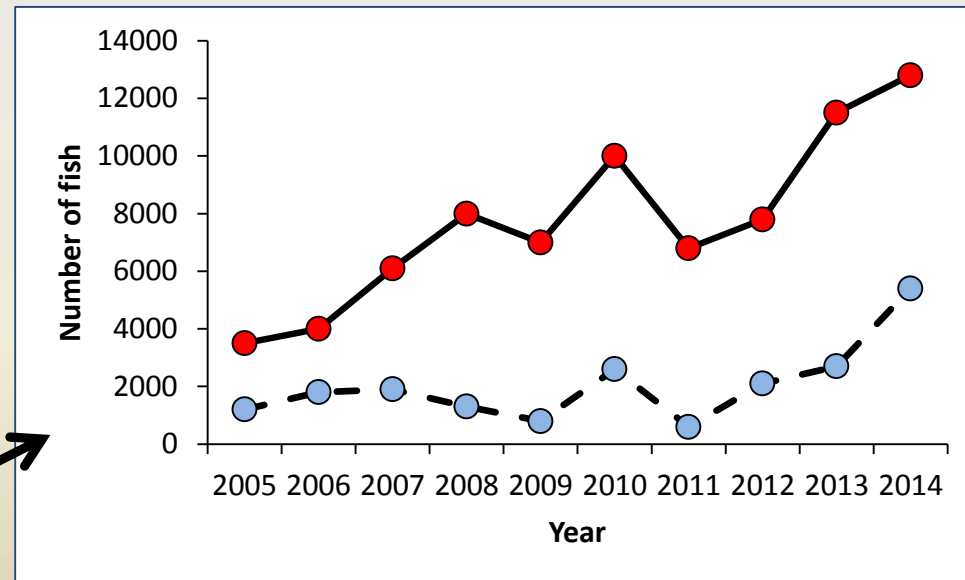
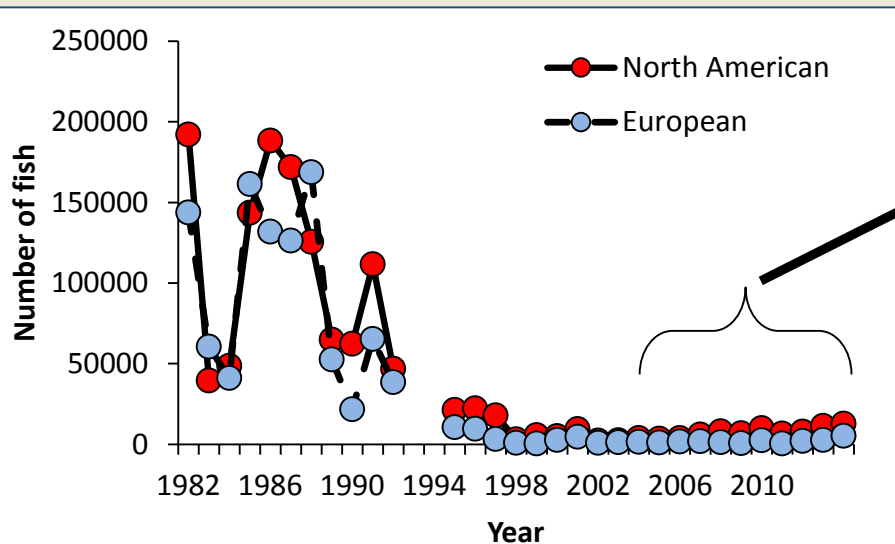
Tag recoveries in 2014

- 8 adipose fin-clipped salmon observed by samplers, none carried tags
- 1 tag recovered during sampling programme
- Further 21 tags returned to Nature Institute
- Of the 21 tags:
 - 2 from 2014 fishing season
 - 1 from 2013 fishing season
 - 18 from previous seasons



Number of salmon caught at WG

- Number of salmon caught at WG in 2014:
 - 12,800 from NAC
 - 5,400 from NEAC
- Among lowest in full time series, but highest for NAC & NEAC since 1997



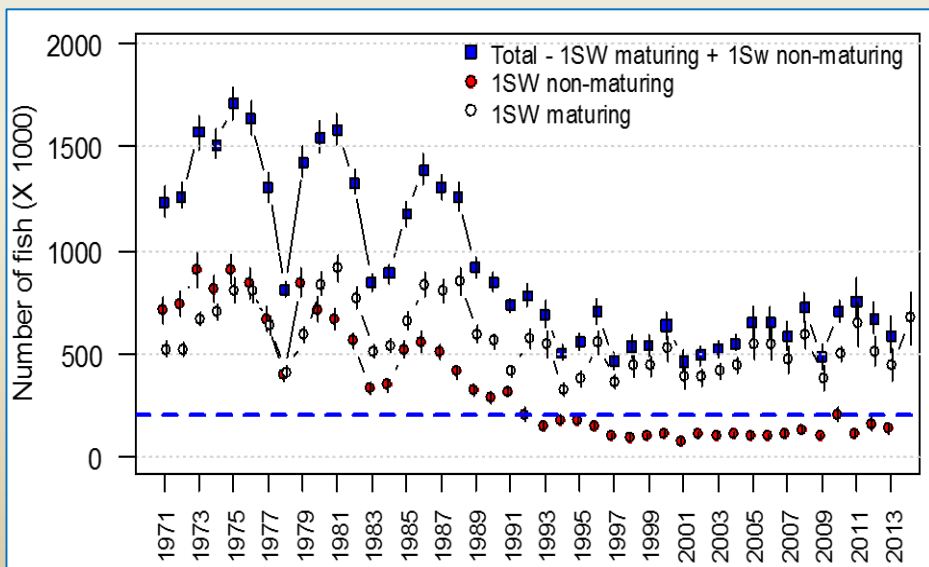
Stock Status

- ❑ For West Greenland, stock status of 1SW non-maturing salmon (destined to be 2SW salmon) from North America and the Southern NEAC MSW complex are relevant

- ❑ Stock status summarised in terms of:
 - Recruitment (PFA)
 - Spawners
 - Exploitation rates

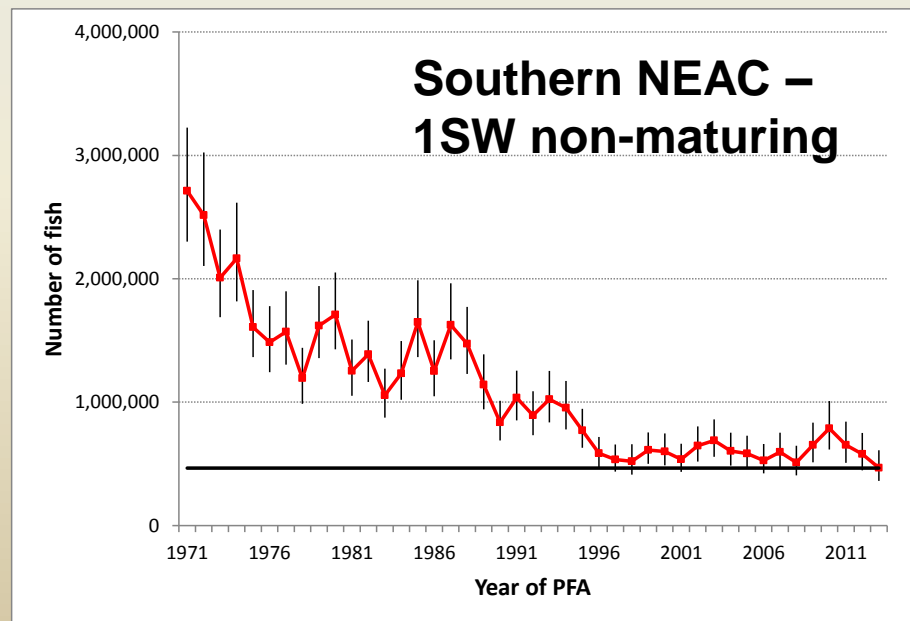
NAC

- PFA of non-maturing 1SW salmon suggests continued low abundance
- PFA in 2013 decreased by 13% from 2012; remains among lowest in 43-year time series



Southern NEAC

- PFA of non-maturing 1SW complex has declined to low levels since 1996
- PFA in 2013 lowest in 43-year time series



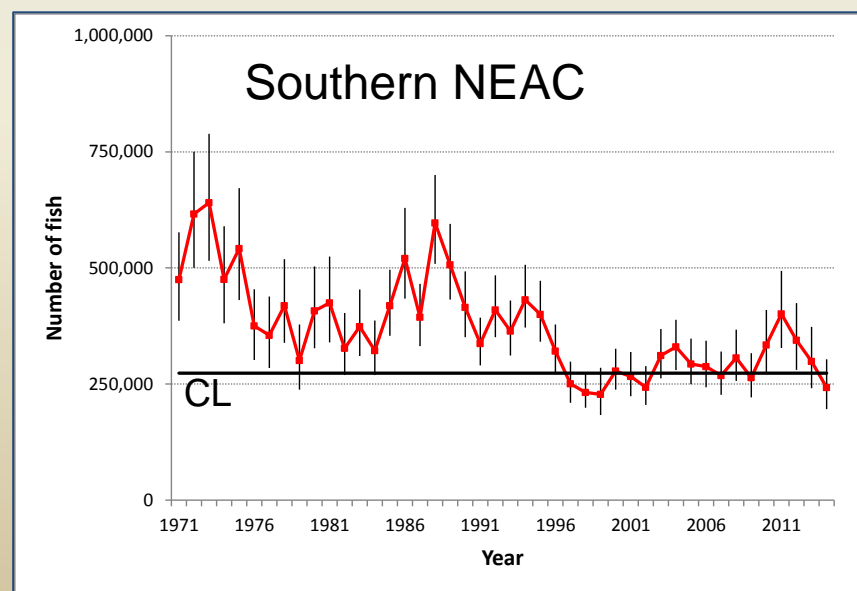
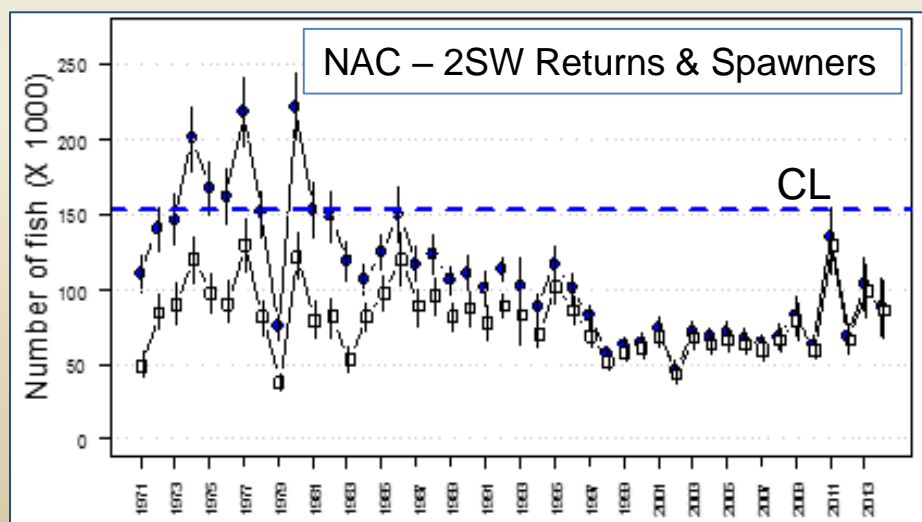
Stock Status - Spawners

NAC

- 2SW spawner estimates below CLs in 4 of the 6 regions in 2014 (not Labrador, Nfld) and for NAC overall for the entire time series
- Many river stocks failing to meet CLs, particularly in Scotia-Fundy and USA

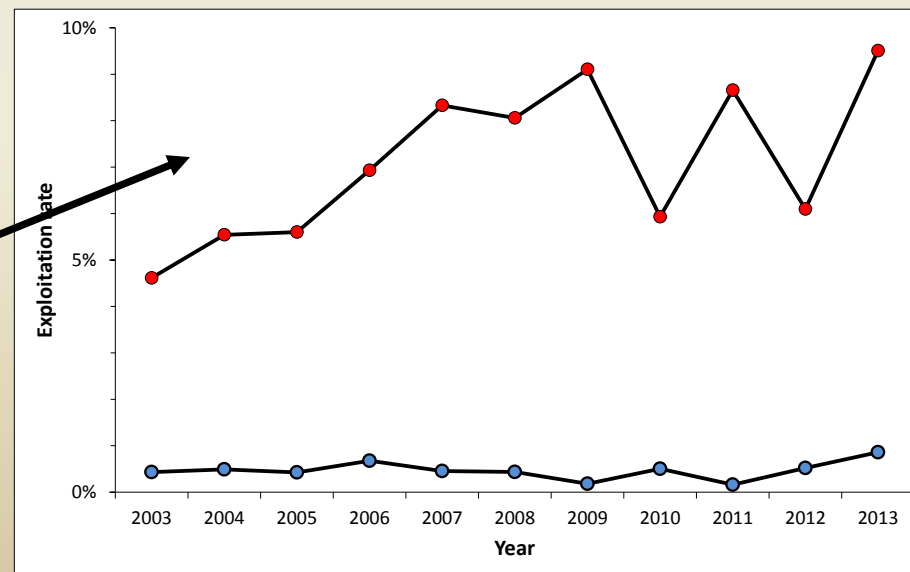
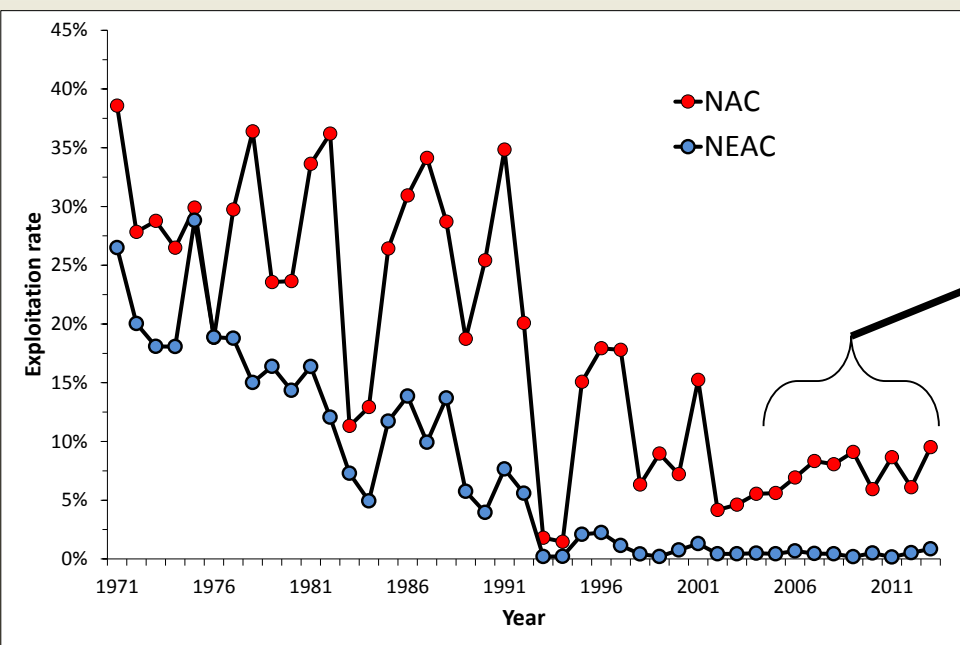
Southern NEAC

- Decline in MSW spawners
- Since 1997, mostly either suffering or at risk of suffering reduced reproductive capacity
- Below CL in 2014
- Within all countries, many individual river stocks not meeting CLs



Stock Status – Exploitation Rate

- Exploitation rates derived by dividing recorded harvest at WG by PFA for the corresponding year for each complex [N.B. latest estimate for 2013]
- 2013 exploitation rate for NAC was 9.5%, an increase on 2012 (6.1%) [Peak value in 1971 of 39%]
- 2013 exploitation rate for NEAC was 0.9%, a slight increase from 2012 (0.5%), but among the lowest in the time series [Peak value in 1975 of 29%]



Summary of Stock Status

- ❑ Five of the seven stock complexes exploited at W. Greenland are below CLs
- ❑ North American 2SW spawner estimates in 2014 were below their CLs for 4 of the 6 regions (not Labrador or Newfoundland) and S. NEAC MSW stock complex at risk of suffering reduced reproductive capacity prior to the commencement of distant water fisheries
- ❑ Within each of the NA areas there are varying numbers of individual river stocks which are failing to meet CLs, particularly in the southern areas of Scotia-Fundy and the USA
- ❑ In Scotia-Fundy and USA there are numerous populations in danger of extirpation and receiving special protection under federal legislation
- ❑ 2SW spawners in 5 of the 6 countries in S. NEAC are at risk of suffering or suffering reduced reproductive capacity
- ❑ Numerous stocks from S. NEAC jurisdictions are below CLs

Catch options & management advice

NASCO has asked ICES to provide catch options or alternative management advice for 2015-2017 with an assessment of risks relative to the objective of exceeding stock conservation limits, or pre-defined NASCO Management Objectives, and advise on the implications of these options for stock rebuilding.

Catch options

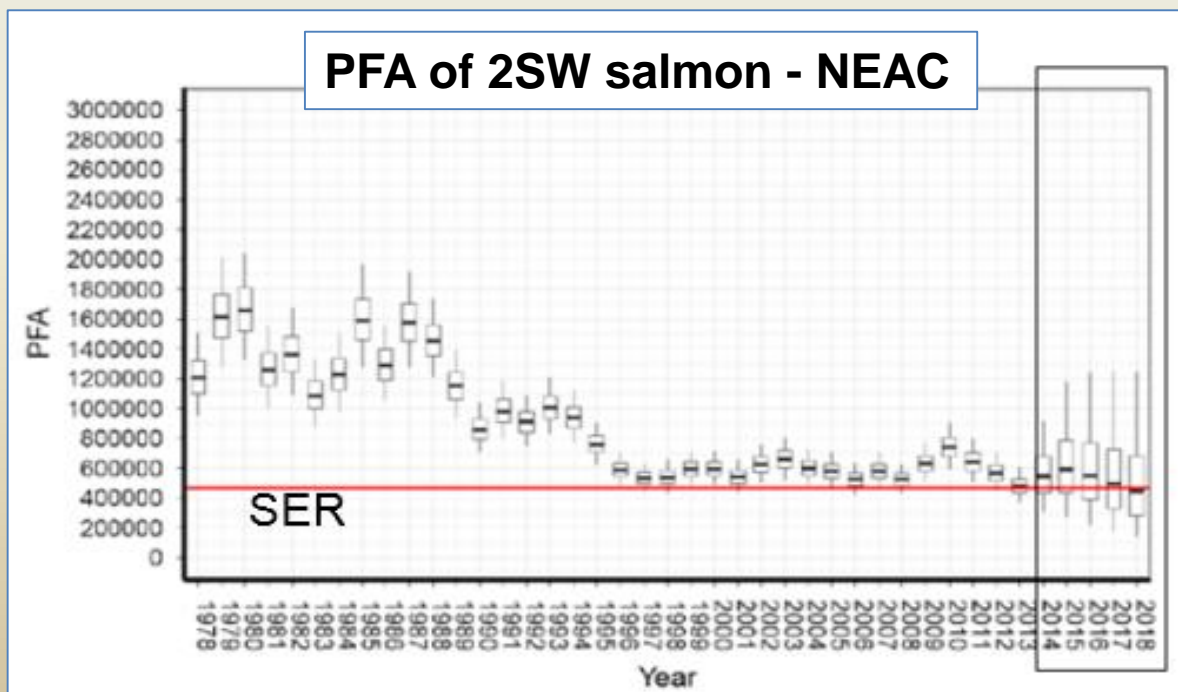
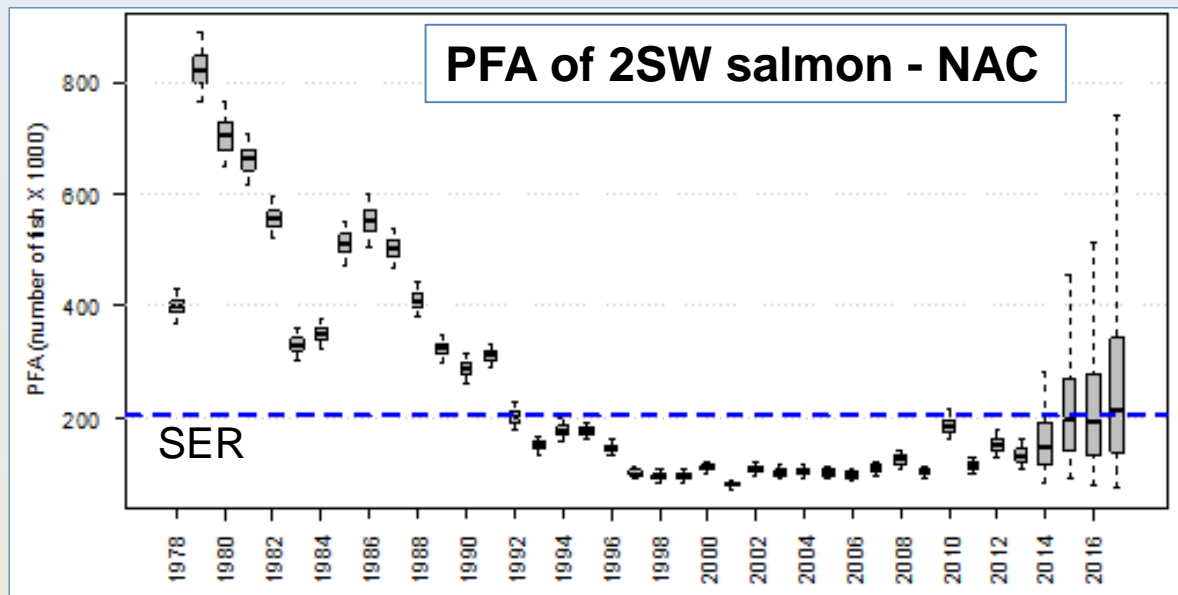
- ❑ Catch advice based on models used by WGNAS since 2003
- ❑ Relies on PFA and CLs (or alternative mgmt. objectives) in NAC & NEAC
- ❑ Risks of WG fishery to NAC & NEAC developed in parallel and combined into single catch options table
- ❑ Management objective for W Greenland is for >75% probability of simultaneous attainment of the 6 MOs for N America & S. NEAC

NAC & NEAC management objectives

Area	Objective	Number of fish
USA	2SW proportion of recovery criteria	4,549
Scotia-Fundy	25% increase from 2SW returns during 1992 to 1997 (baseline)	10,976
Gulf	2SW conservation limit	30,430
Quebec	2SW conservation limit	29,446
Newfoundland	2SW conservation limit	4,022
Labrador	2SW conservation limit	34,746
S. NEAC	MSW conservation limit	273,360

PFA Forecasts

- <95% probability of meeting SERs in both NAC and S. NEAC in all forecast years



Catch Options Table

Probabilities of meeting region-specific MOs for catch options from 0 - 100 t, & all MOs simultaneously.

In the absence of any fishery:

- ☐ None of the stated MO's would allow a mixed-stock fishery at WG in 2015, 2016 or 2017.
- ☐ V. low probability that returns to S-F or US sufficient to meet stock rebuilding objectives
- ☐ **Zero probability of meeting the seven management objectives simultaneously**

2015	Lab	N'fld	Que	Gulf	Sc-F	US	S. NEAC	All
0	0.85	0.64	0.18	0.49	0.01	0.01	0.71	0
10	0.83	0.62	0.17	0.46	0.01	0.01	0.71	0
20	0.81	0.60	0.15	0.45	0.01	0.01	0.71	0
30	0.80	0.58	0.14	0.43	0.01	0.01	0.70	0
40	0.78	0.56	0.13	0.41	0.01	0.01	0.70	0
50	0.76	0.54	0.12	0.39	0.01	0.01	0.70	0
60	0.74	0.52	0.11	0.37	0.01	0.01	0.70	0
70	0.72	0.49	0.09	0.35	0.01	0.01	0.69	0
80	0.70	0.46	0.09	0.33	0.01	0.01	0.69	0
90	0.68	0.44	0.08	0.31	0.01	0.01	0.69	0
100	0.66	0.42	0.07	0.30	0.01	0.01	0.69	0
2016	Lab	N'fld	Que	Gulf	Sc-F	US	S. NEAC	All
0	0.74	0.55	0.30	0.56	0.01	0.00	0.63	0
10	0.73	0.53	0.29	0.55	0.01	0.00	0.63	0
20	0.71	0.51	0.27	0.52	0.01	0.00	0.63	0
30	0.69	0.49	0.25	0.51	0.01	0.00	0.62	0
40	0.67	0.47	0.24	0.49	0.01	0.00	0.62	0
50	0.65	0.45	0.22	0.47	0.01	0.00	0.62	0
60	0.64	0.43	0.21	0.45	0.01	0.00	0.62	0
70	0.62	0.41	0.19	0.43	0.01	0.00	0.62	0
80	0.60	0.39	0.18	0.42	0.01	0.00	0.62	0
90	0.58	0.37	0.17	0.40	0.01	0.00	0.61	0
100	0.56	0.35	0.15	0.39	0.01	0.00	0.61	0
2017	Lab	N'fld	Que	Gulf	Sc-F	US	S. NEAC	All
0	0.85	0.41	0.29	0.32	0.01	0.00	0.55	0
10	0.84	0.39	0.28	0.31	0.01	0.00	0.55	0
20	0.82	0.38	0.26	0.30	0.01	0.00	0.54	0
30	0.81	0.37	0.25	0.28	0.01	0.00	0.54	0
40	0.80	0.35	0.24	0.27	0.01	0.00	0.54	0
50	0.78	0.34	0.22	0.26	0.01	0.00	0.54	0
60	0.77	0.32	0.21	0.25	0.01	0.00	0.54	0
70	0.75	0.31	0.21	0.24	0.01	0.00	0.54	0
80	0.73	0.30	0.19	0.23	0.01	0.00	0.53	0
90	0.72	0.29	0.18	0.23	0.01	0.00	0.53	0
100	0.70	0.27	0.17	0.22	0.01	0.00	0.53	0

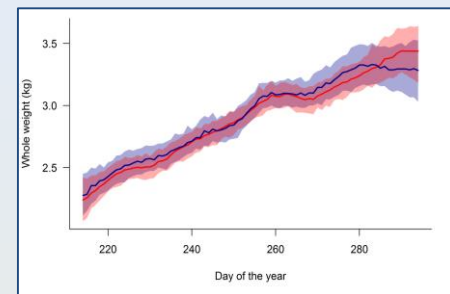
Catch Advice

- ❑ In the absence of any fishing in 2015 to 2017, there is less than 75% probability that the numbers of 2SW salmon returns will be above the management objectives, simultaneously, for the 6 regions of N America and S. NEAC.**
- ❑ Therefore, in line with the objectives agreed by NASCO, ICES advises that there are no mixed-stock fisheries options at West Greenland for 2015 to 2017.**

Relevant factors to be considered in management:

- ❖ ICES advises that when the MSY approach is applied, fishing should only take place on salmon from rivers where stocks have been shown to be at full reproductive capacity.**
- ❖ Because of the different status of individual stocks within stock complexes, mixed-stock fisheries present particular threats and pose particular difficulties for management as they target all stocks present, whether or not they are meeting CLs.**
- ❖ The management of a fishery should ideally be based upon the status of all river stocks exploited in the fishery.**

Other management considerations

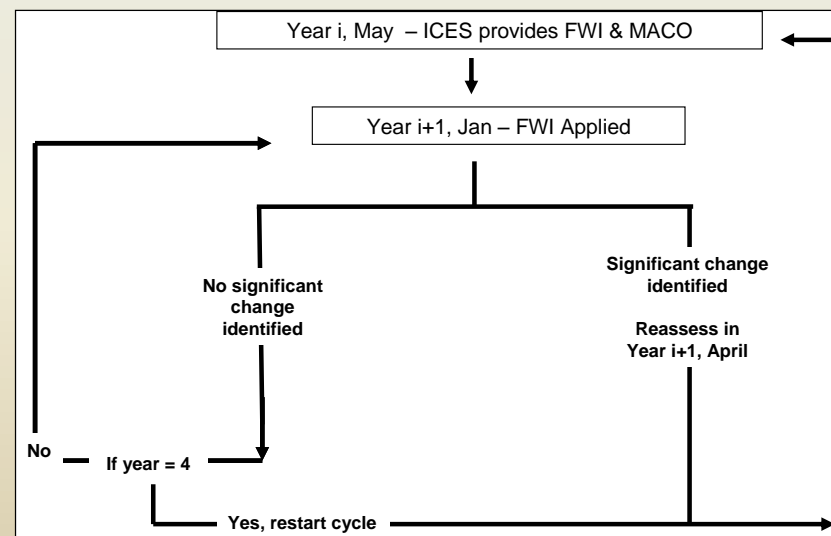


- Salmon feeding at WG grow rapidly over the August to October period.
- For a fixed catch option in terms of weight, a fishery prosecuted later in the season could result in fewer fish being harvested (in numbers of fish) which may result in a decreased exploitation rate.
- If stocks are equally available over the entire fishing season, then reduced exploitation rates would be of benefit to stocks which are at particularly low abundances, as the probability of capture of fish in the fishery is contingent upon the exploitation rate.
- The benefits or risks to specific stocks of any changes in fishing season will depend upon the relative distribution of the stocks in the fishery area during the fishing season.
- Such details are presently not known for the large number of stocks contributing to the fishery at W. Greenland.

Framework of Indicators (FWI)

NASCO has asked ICES to update the Framework of Indicators used to identify any significant change in the previously provided multi-annual management advice.

- FWI originally developed by ICES and accepted by NASCO in 2007
- FWI was applied for first time in 2008, subsequently updated in 2009 & 2012 in support of multi-annual regulatory measures
- FWI applied in January to provide check on previous catch advice
- If significant change identified, then ICES would provide updated catch advice; otherwise existing advice continues to apply
- FWI uses various indicator data sets (counts, return rates)



Developments in 2015

- Values of the indicator variables for the most recent years added to time series
- Indicators assessed against appropriate variable of interest (e.g. PFA) to determine whether they meet inclusion criteria and are considered 'informative'
- FWI spreadsheet updated – indicator variables added / revised and functions for evaluating the indicator score updated
- 23 indicators from 14 different rivers retained for NAC area
- No indicator variables included for S. NEAC as they have yet to meet qualifying criteria

Framework of Indicators (FWI)

Retained indicator variables

Origin	Wild	Wild	Wild	Wild	Hatchery	Hatchery	
Type of data	Return	Return	Survival	Survival	Survival	Survival	
Size/age group	Small / 1SW	Large/ MSW	Small / 1SW	Large / 2SW	Small / 1SW	Large / 2SW	Total
Labrador							0
N'fld							0
Québec	2	8	1	1			12
Gulf	1	2					3
Scotia-Fundy	2	3			1	1	7
USA		1					1
Total	5	14	1	1	1	1	23

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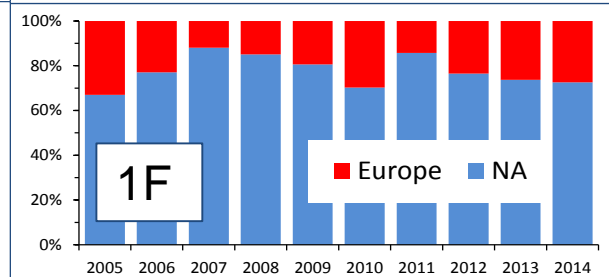
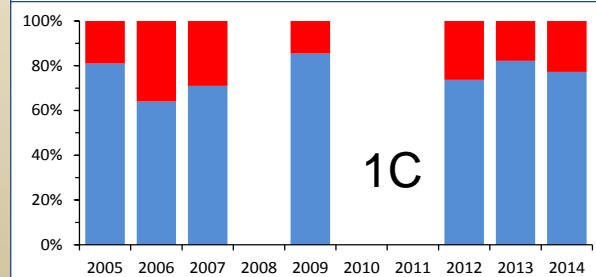
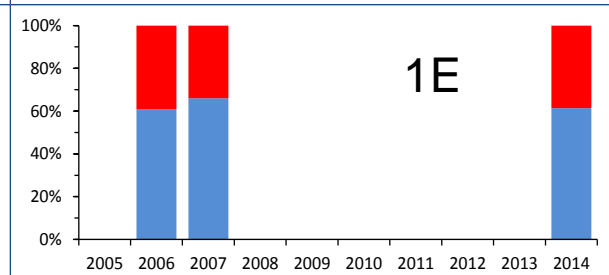
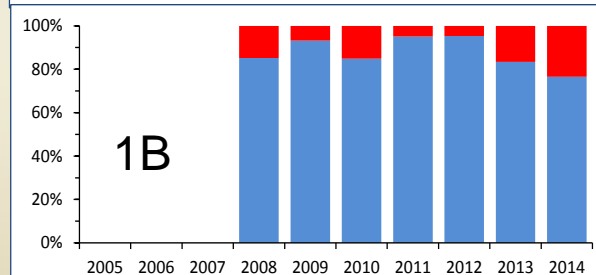
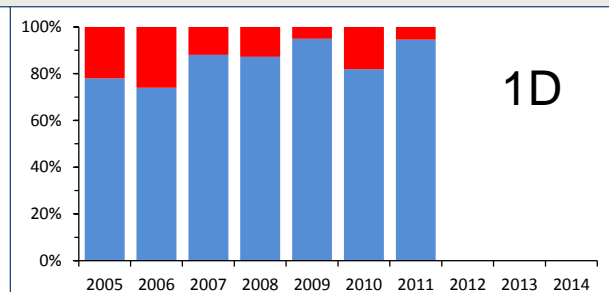
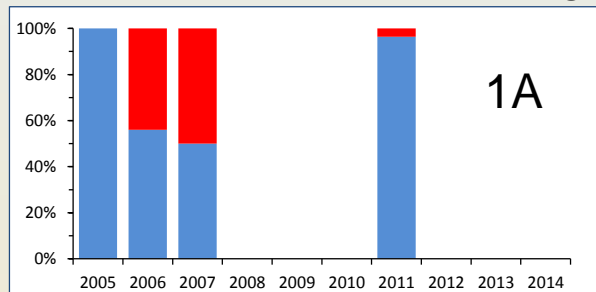
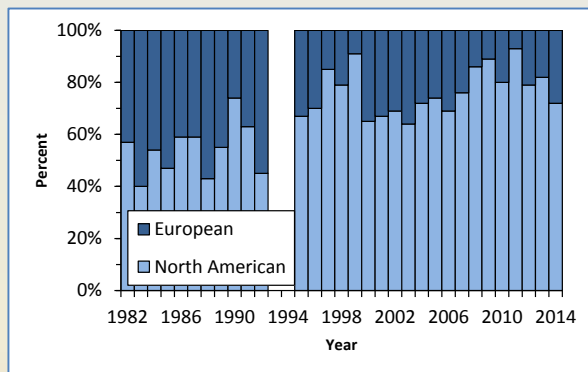
**Considering the available
contemporary data on stock origin of
salmon in the West Greenland fishery,
estimate the catches by stock origin
and describe their temporal and spatial
distribution**

Continent of Origin – temporal & spatial changes

- CoO contributions at W. Greenland vary annually but have increased for N. America over time series (1982 on):

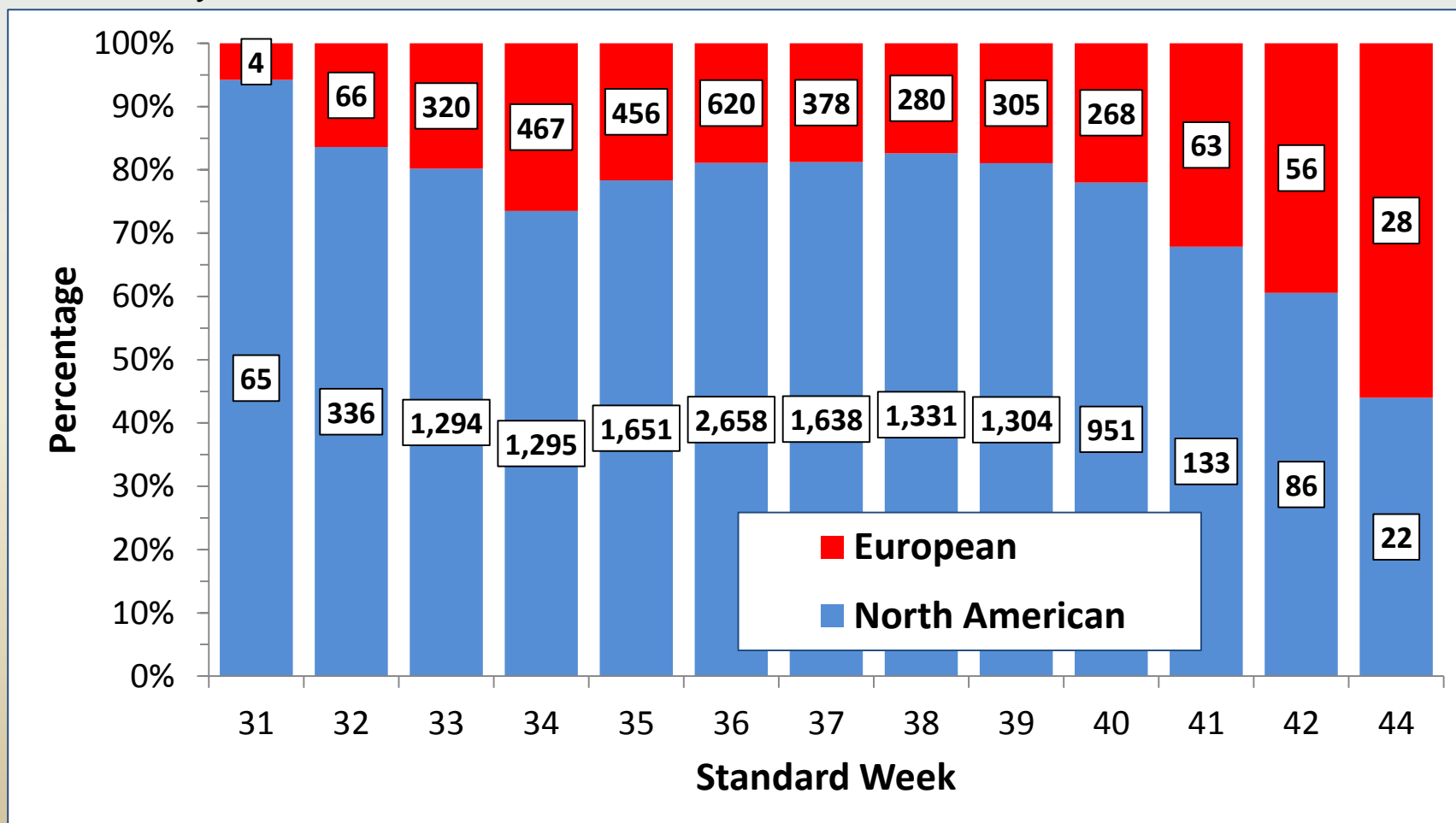
52% in 1980s; 71% in 1990s; 74% in 2000s & 81% since 2010

- Spatial trends within fishery difficult to discern as data not available for all NAFO Divisions in all years – resource limitations with sampling



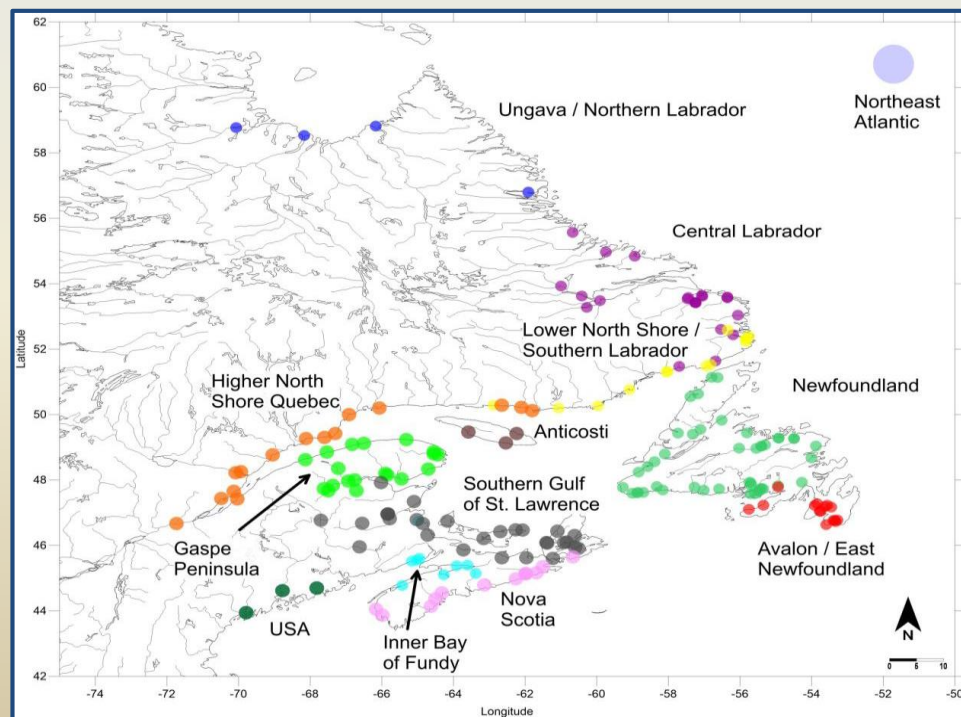
Continent of Origin – temporal & spatial changes

- Indication of increasing proportion of European fish as season progresses – 18% in August & 34% in October
- However, small sample size at start and end of season and potential bias – samples not uniformly distributed across all NAFO Divisions and standard weeks of season



Stock origin at West Greenland

- The stock composition and variation in composition of salmon harvested at WG can now be explored using genetic identification techniques.
- 12 regional groups can be reliably identified in eastern NA and 14 groups in Europe
- The regional groups do not correspond directly to the regions used by ICES to characterize stock status and to provide catch advice
- Tissue samples collected at WG typed to CoO. NA samples then compared against regional baselines for 2011-2014; European samples against regional baselines for 2002 & 2004-12



Stock origin at West Greenland- NAC

- The 14 regional groups do not correspond directly to the six regions used by ICES to characterize stock status and to provide catch advice

REGION	REGIONAL GROUP	GROUP ACRONYM
Quebec Labrador Quebec Gulf Scotia-Fundy USA Newfoundland	Ungava / Northern Labrador	UNG
	Labrador Central	LAB
	Quebec / Labrador South	QLS
	Quebec	QUE
	Anticosti	ANT
	Gaspé Peninsula	GAS
	Gulf of St. Lawrence	GUL
	Nova Scotia	NOS
	Inner Bay of Fundy	FUN
	USA	US
	Newfoundland	NFL
	Avalon	AVA

% composition at W. Greenland

North American origin fish

❖ Largest contributions from Labrador, Gulf & Gaspé Peninsula

❖ Consistent between years / NAFO areas

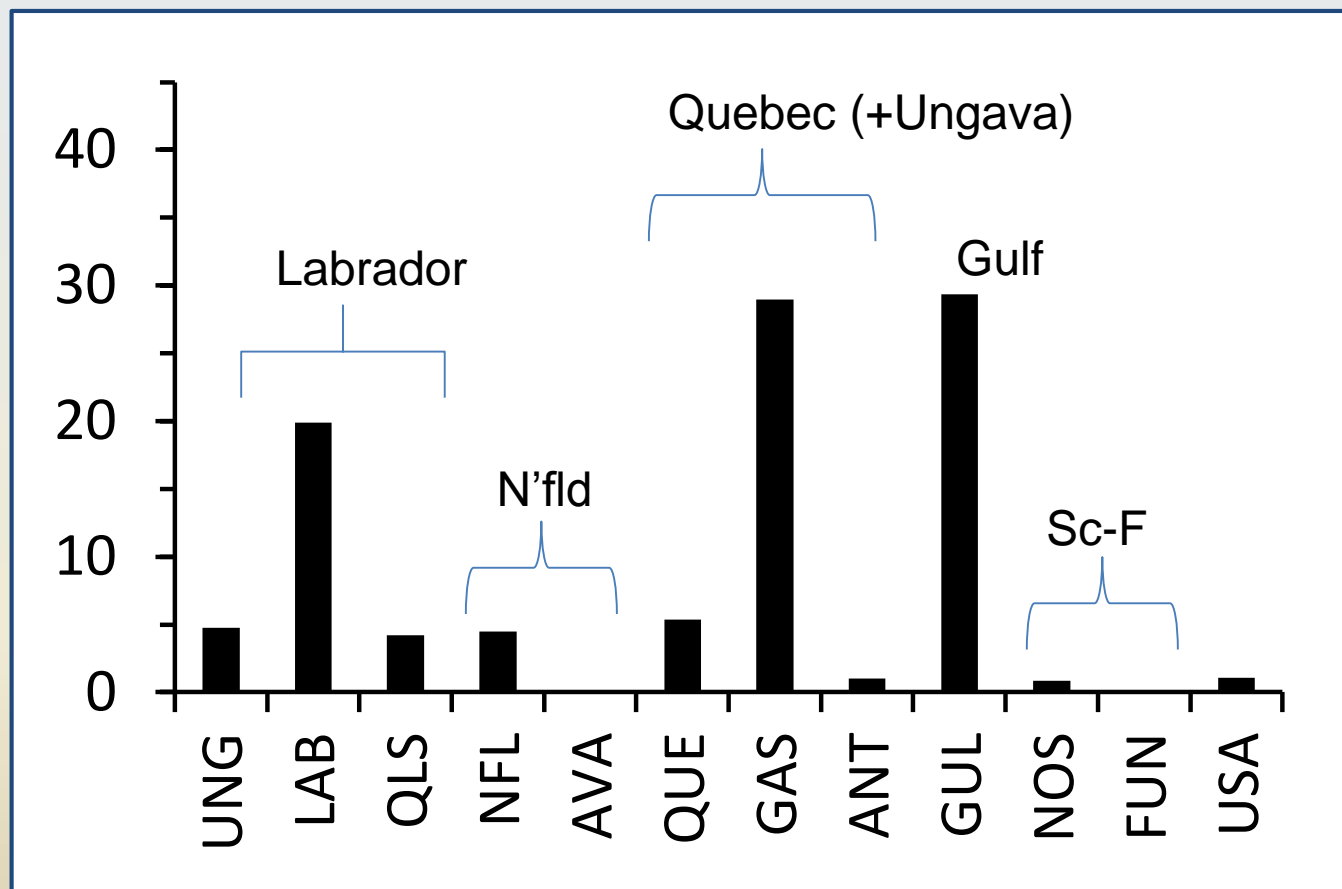
NA region	Division 1A				Division 1B				Division 1C			
	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014
UNG	1	-	-	-	2	5	9	3	-	9	7	3
LAB	15	-	-	-	17	23	20	34	-	16	17	22
QLS	1	-	-	-	0	5	4	11	-	2	7	1
NFL	15	-	-	-	6	1	2	6	-	10	5	5
AVA	0	-	-	-	0	0	0	1	-	0	0	0
QUE	19	-	-	-	7	8	5	0	-	5	7	7
GAS	31	-	-	-	28	23	25	25	-	20	21	41
ANT	1	-	-	-	2	1	0	6	-	1	1	0
GUL	14	-	-	-	35	30	34	12	-	35	34	20
NOS	2	-	-	-	0	2	0	0	-	0	1	1
FUN	0	-	-	-	0	1	0	0	-	1	0	0
USA	0	-	-	-	3	0	1	1	-	1	0	1
NA region	Division 1D				Division 1E				Division 1F			
	2011	2012	2013	2014	2011	2012	2013	2014	2011	2012	2013	2014
UNG	2	-	-	-	-	-	-	-	0	0	7	7
LAB	13	-	-	-	-	-	-	-	23	23	28	25
QLS	0	-	-	-	-	-	-	-	6	2	1	5
NFL	5	-	-	-	-	-	-	-	2	8	5	6
AVA	0	-	-	-	-	-	-	-	0	0	0	0
QUE	10	-	-	-	-	-	-	-	1	7	0	6
GAS	39	-	-	-	-	-	-	-	31	34	27	20
ANT	1	-	-	-	-	-	-	-	0	2	1	0
GUL	28	-	-	-	-	-	-	-	35	19	30	30
NOS	2	-	-	-	-	-	-	-	0	3	0	1
FUN	0	-	-	-	-	-	-	-	0	0	0	0
USA	2	-	-	-	-	-	-	-	2	1	0	1

% Composition at W. Greenland

All NAFO Division, all years

NAC overall

- 3 regional groups account for >90% of NA fish at WG:
 - Quebec (i.e. UNG, QUE, GAS, ANT) 40%
 - GoSL (GUL) 29%
 - Labrador (i.e. LAB, QLS) 24%
- Smaller contributions from:
 - N'fld (i.e. NFL, AVA) 4.5%
 - S-F (NOS, FUN) 1%
 - USA 1%



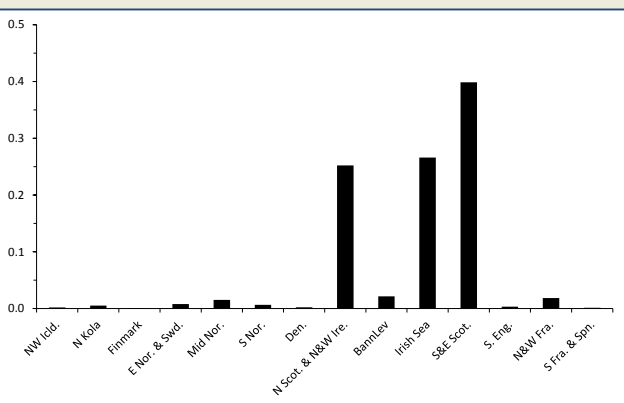
Catch composition - NAC origin fish

➤ Estimated using individual year assignments with average for all 4 years

Acronym	Region name	2011	2012	2013	2014	Average (% of total)
NA origin estimated catch		6,800	7,800	11,500	12,800	9,725
UNG	Ungava-N. Labrador	320	369	541	609	459 (5%)
LAB	Central Labrador	1,350	1,558	2,291	2,543	1,935 (20%)
QLS	Lower N. Shore – S. Labrador	286	327	476	538	406 (4%)
NFL	Newfoundland	304	349	511	564	431 (4%)
AVA	Avalon-E. N'fld	0	0	1	1	0 (0%)
QUE	Higher N. Shore Quebec	360	414	606	683	515 (5%)
GAS	Gaspé	1,973	2,256	3,324	3,706	2,814 (29%)
ANT	Anticosti	68	77	113	125	95 (1%)
GUL	S. G of SL	1,993	2,284	3,382	3,746	2,851 (29%)
NOS	Nova Scotia	54	62	93	104	78 (1%)
FUN	Inner Bay of Fundy	1	1	1	1	1 (0%)
USA	USA	72	81	120	134	101 (1%)

Stock origin at W. Greenland- NEAC

- Estimated contributions of European origin regional groups to European catches at W. Greenland based on samples from 2002 and 2004 to 2012
- Three regional groups make up over 90% of NEAC fish at WG: N. Scotland / N&W Ireland (25%); Irish Sea (27%) & S&E Scotland (40%)
- Scotland largest contributor overall (almost 70%)



Acronym	Region name	Overall
NW Icd.	Iceland NW	0.2%
N Kola	N. Kola	0.5%
Finnmark	Finnmark	0.0%
E Nor. & Swd.	E. Norway & Sweden	0.8%
Mid Nor.	Mid Norway	1.5%
S Nor.	S. Norway	0.6%
Den.	Denmark	0.2%
N Scot. & N&W Ire.	N. Scotland + N. & W. Ireland	25.2%
BannLev	Bann (NI) & Leven (Scot)	2.2%
Irish Sea	Irish Sea	26.6%
S&E Scot.	S. & E. Scotland + NE England	39.9%
S. Eng.	S. England	0.3%
N&W Fra.	N. & W. France	1.8%
S Fra. & Spn.	S. France & Spain	0.1%

Catch composition - NEAC origin fish

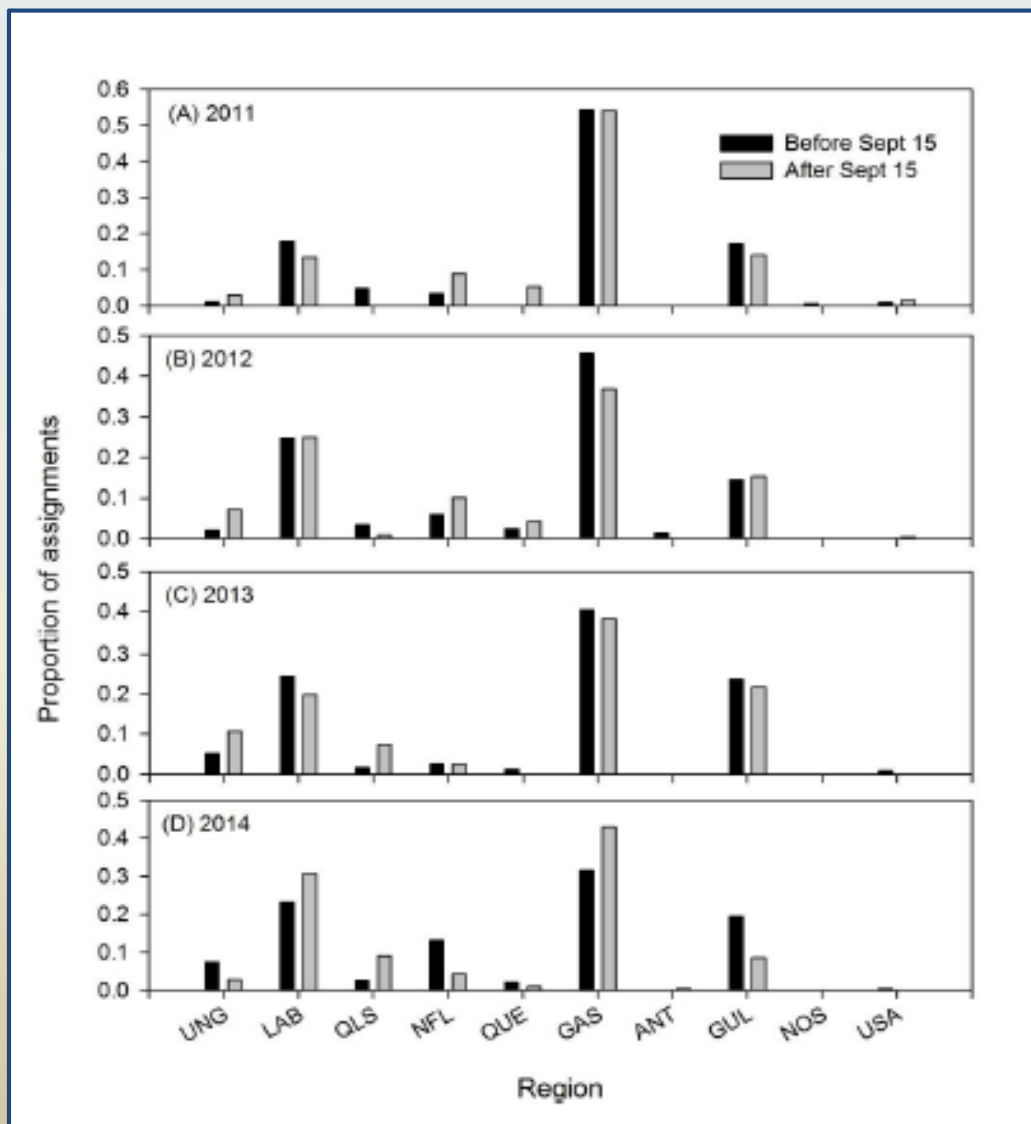
➤ Catches estimated on the basis of individual year assignments

Year	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012
Estimated NEAC catch	1,000	1,500	1,200	1,800	1,900	1,300	800	2,600	600	2,100
NW Icl.	2	3	2	3	3	2	1	5	1	4
N Kola	5	8	6	9	10	7	4	13	3	11
Finnmark	0	1	1	1	1	1	0	1	0	1
E Nor. & Swd.	8	12	9	14	15	10	6	20	5	16
Mid Nor.	15	23	18	27	29	20	12	39	9	32
S Nor.	6	10	8	12	12	8	5	17	4	13
Den.	2	3	3	4	4	3	2	6	1	5
N Scot. & N&W Ire.	252	378	302	454	479	328	202	655	151	529
BannLev	22	32	26	39	41	28	17	56	13	45
Irish Sea	266	399	319	479	505	346	213	691	160	558
S&E Scot.	399	598	478	717	757	518	319	1,036	239	837
S. Eng.	3	5	4	6	6	4	3	8	2	7
N&W Fra.	18	28	22	33	35	24	15	48	11	39
S Fra. & Spn.	1	2	2	2	3	2	1	4	1	3

W. Greenland stock origin – temporal changes within season

NAC

- Samples compared before and after 15 September
- Stock origin contributions consistent between the two time periods
- No similar analysis possible for NEAC samples



Recommendations

- ❑ ICES recommends further analysis of the data collected in 2015 from fishers in the West Greenland fishery following a phone survey, and continuation of this survey programme in future years. Information gained on the level of total catches for this fishery will provide for a more accurate assessment of the status of stocks and assessment of risk with varying levels of harvest.
- ❑ ICES recommends that efforts to improve the Greenland catch reporting system continue and that detailed statistics related to catch and effort should be made available to ICES for analysis.
- ❑ ICES recommends a continuation and expansion of the broad geographic sampling programme at West Greenland (multiple NAFO divisions including factory and non-factory landings) to more accurately estimate continent and region of origin and biological characteristics of the salmon caught in the mixed stock fishery.

Advice generated by ICES in response to terms of reference from NASCO

**Supporting information and details in the report of the ICES
Working Group on North Atlantic Salmon available at:**

<http://www.ices.dk/publications/library>

Acknowledgements

**Members (24) of participating countries (10) to the Working
Group on North Atlantic Salmon, 17-26 March 2015,
Moncton, Canada**

WGC sub-group chair: Tim Sheehan (USA)