

Council

#### NEA(16)10

Presentation of the ICES Advice to the North-East Atlantic Commission



## **REPORT OF ICES ADVISORY COMMITTEE** ON **NORTH ATLANTIC SALMON STOCKS** TO **NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION**

NEAC Area CNL(16)9



## **ICES ADVICE 10.2**

# With respect to Atlantic salmon in the North-East Atlantic Commission area:

- 1. Describe the key events of the 2015 fisheries
- 2. Review and report on the development of age-specific stock conservation limits
- 3. Describe the status of the stocks
- 4. Advise on source of uncertainty and possible bias in the assessment of catch options for the Faroes fishery resulting from the use of samples and data collected in the fishery in the 1980s and 90s. Should it be considered that biases are likely to compromise catch advice, advise on any new sampling required to improve assessments



## **ICES ADVICE 10.2**

# With respect to Atlantic salmon in the North-East Atlantic Commission area:

In the event that NASCO informs ICES that the Framework of Indicators (FWI) indicates that reassessment is required:

- Provide catch options or alternative management advice for 2016/17-2018/19 fishing seasons, 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
- 6. Update the Framework of Indicators used to identify any significant change in the previously provided multi-annual management



Northern NEAC	Southern NEAC
Finland	Ireland
Norway	France
Russia	UK (Scotland)
Sweden	UK (Northern Ireland)
Iceland (N-E regions)	UK (England & Wales)
	Iceland (S-W regions)

**DICES CIEM** 1. Key Events of Fisheries in 2015

- ➢ No fishery for salmon at the Faroes since 2000
- > No significant changes in fishing methods reported in 2015
- > Decline in fishing effort (nets & traps) over the time series
- > General reduction in catches since the 1980s, reflecting:
  - Decline in fishing effort (management measures)
  - Reduction in the size of stocks
- Exploitation rates on NEAC stocks among the lowest recorded
- Practice of Catch-and-Release continues to increase

## 1. Key Events of Fisheries in 2015

## Sweden

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- 2014 use of gillnets in water depths >3 m banned
- Restriction on use of gillnets in shallower water already in place
- > 2015 coastal fishery catch of zero for the first time on record

## > UK (Scotland)

- Spring conservation regulations introduced in 2015 underpin a range of voluntary and statutory measures
  - Start of the net fishing season was delayed until 1<sup>st</sup> April
  - ➢ Rod fishing was restricted to C&R until 31<sup>st</sup> March
- Conservation Measures to Control the Killing of Wild Salmon introduced in 2016
  - Killing beyond estuary limits prohibited
  - Killing in inland waters managed on annual basis
  - A Conservation Plan required irrespective of conservation status
  - Carcass tagging for net caught fish mandatory

1. Key Events of Fisheries in 2015

#### > UK (England and Wales)

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- 2015 counts on nine rivers highly variable, and differ from previous years, suggesting north-south differences
  - South: for 5 of 6 rivers returns above the recent 5-year average
  - > North: for 2 of 3 rivers returns at or close to lowest recorded
- 1SW salmon runs reported as poor in many areas
   2015 flows below the long-term average for much of the season
   Number of days fished in 2015 21% below previous five year mean

## 1. Nominal Catch (tonnes)

Year	NEAC South	NEAC North	NEAC
2015	226 (2)	865 (3)	1091 (3)
2014	216 (1)	738 (1)	954 (1)
2013	310 (5)	770 (2)	1081 (2)
		(#) ordered: low	est in time series



Decline in catches has been more pronounced in Southern NEAC

## 1. Exploitation rates (all fisheries)



- Weighted estimates based on national returns (output from NEAC Pre-Fisheries Abundance (PFA) run reconstruction model)
- Declines for both areas, greater decline in S.NEAC

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Age composition (%1SW):

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- Similar overall 1SW% in the catches of N. NEAC and S. NEAC
- ISW% have shown a slight reduction over the time series both areas
- Variability across countries increasing over the time series both areas
- ISW% in Iceland increased significantly since 2000
- Finland, Norway, Russia, Sweden, Spain decreased significantly since 2000

## 

## **1. Composition of Catches**

### Farmed fish in catches

- Generally low in most countries, with exceptions: Norway, Iceland and Sweden – similar levels to previous years
  - Estimated at <5% of Norwegian rod caught fish
  - Autumn samples from Norwegian rivers (<10% lowest in time series)</li>
  - 2015: 160 000 escapees reported from Norwegian farms (down from 283 000 in 2014)

## Ranching

Ranching for rod fisheries in two Icelandic rivers continued, reported as:

- Ranched salmon: 29.1t in 2015 (12.5t in 2014) in contrast to:
- Wild salmon: 102.6t in 2015 (46.5t in 2014) (all harvested)
- Swedish catches also split:
  - o Ranched salmon: 9.1t in 2015 (19.3t in 2014)
  - Wild salmon 8.6t in 2015 (10.6t in 2014) (all harvested)

Ranching occurs on a much smaller scale in other countries, but not separately reported



## **Catches of Russian salmon in northern Norway**

- WG previously reported on genetic investigations into stock composition of the northern Norway coastal fisheries (ICES, 2015)
- Proportions of Russian salmon in the catches varied widely (seasonally and spatially):
  - ~17% (2011–2012) in the coastal catches of Finnmark County
  - ~ 50% of all catch in the Varangerfjord, close to the border
- Russian salmon decreased over time within the season (e.g. Varangerfjord Russian salmon accounted for ~ 70% in May and ~ 20% in August)
- Work ongoing findings will inform management decisions and should enable improved and more targeted regulations



Catches of salmon originating form UK (Scotland) in UK (England and Wales) coastal net fisheries

- Genetic analysis being undertaken in UK (Scotland) and UK (England and Wales) to further resolve origin of fish in the coastal fishery (NE England)
- Samples from NE English rivers being screened and together with information from Scottish rivers will improve assignment of catch to river of origin
- Results will be used to update stock assessments at both national and finer scales
- A final report is expected in 2016

#### Life-history stage and origin of salmon caught as bycatch in Icelandic mackerel and herring fisheries

Scarce information on origin of salmon caught in Icelandic waters (closure of salmon fishing at sea in 1932)

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- Pelagic fishery, commenced in Icelandic waters 2010 – midwater trawls
- Fishing mostly takes place during summer, to the south and east of Iceland
- An opportunity to investigate lifehistory stage and origin of salmon caught



Red:S-NEAC origin:mainland Europe, UK, and IrelandGreen:N-NEAC origin:Scandinavia and Northern RussiaYellow:Icelandic originBlack:Black:assignment score <70%</td>

#### Life-history stage and origin of salmon caught as bycatch in Icelandic mackerel and herring fisheries

**1. Composition of Catches** 

#### **Results to date:**

CES

- > 186 salmon analysed (Olafsson *et al.,* 2015)
- 184 aged (scales, otoliths or both)
- Most individuals were in their first year at sea (72.8%)
- Freshwater age varied (1 to 5 years), average of 2.6 years
- Most common freshwater ages 2 years (42%) & 3 years (28%)
- Genetic assignment of 178 to their most likely population of origin:
  - ➤ 4 of Icelandic origin (2%)
  - > 121 (68%) S. NEAC (mainland Europe, the UK and Ireland)
  - ➤ 53 (30%) N. NEAC (Scandinavia and N. Russia)

#### Life-history stage and origin of salmon caught as bycatch in Icelandic mackerel and herring fisheries

1. Composition of Catches

#### **Results to date:**

CES

- No apparent seasonal component to distributions
- Sea to the south and east of Iceland indicated as important feeding & migratory areas – particularly for salmon originating from S.NEAC
- The lack of adult Icelandic fish close to Iceland is remarkable suggesting that salmon from Iceland are using different feeding grounds
- Sampling programme is ongoing, with samples from recent years yet to be analysed

## **2. Development of age-specific Stock conservation limits (CLs)**

River-specific CLs previously developed and in use in France, Ireland, UK(England & Wales), UK(N. Ireland) & Norway (2015)

#### **Progress setting river-specific CLs**

- UK (Scotland): method for assessing salmon stocks with respect to CLs developed (Marine Scotland Science, 2015). To be Implemented in 2016. Stocks to be managed at the salmon fishery district scale (109, with 17 Special Area of Conservation managed separately). Work is continuing to allow assessment at the river scale. Assessments will be carried out annually
- Iceland: Progressing: Currently wetted area of 30 rivers has been measured. Progress slow – requires field measurements for each river (no high resolution maps available). Juvenile surveys will be used to calculate relationship between spawning and recruitment and rod catch statistics to transfer CLs between rivers of similar origin and productivity



#### **Progress with setting river-specific CLs**

- Previously CLs set for 6 Norwegian tributaries in the River Teno system, and a spawning stock evaluation undertaken for five (Máskejohka, Lákšjohka, Válljohka, Árášjohka and lešjohka, Anon, 2015)
- Reference points defined using procedures previously described for Norwegian salmon rivers (Hindar *et al.*, 2007; Forseth *et al.*, 2013)
- CLs recently set for almost all tributaries and main stem section of the River Teno (Falkegård *et al.*, 2014). Though population specific status evaluations are not yet available for most of these (Anon, 2015)
- In 2016, the national assessment for Finland (River Teno) was undertaken with respect to river-specific CLs for the first time

## **2. Development of age-specific** stock conservation limits (CLs)

#### For assessments

- > Where available, river-specific CLs are summed to provide national CLs
- For other countries, an interim approach (hockey-stick stock-recruit model) is applied to estimate national CLs
  - Noting that: these national stock CLs are not appropriate for homewater fisheries management:
    - o relatively imprecise
    - $\circ$   $\,$  do not account for differences in status of individual river stocks
- National CLs are summed to develop N. and S. NEAC stock complex CLs by age group
- > These are used to provide management advice for distant water fisheries

## **2. Development of age-specific** stock conservation limits (CLs)

National	model CLs	River-spe	ecific CLs	CLs applied		
1SW	MSW	1SW	MSW	1SW	MSW	
		14,110	9,571	14,110	9,571	
5,826	1,652			5,826	1,652	
		61,937	72,558	61,937	72,558	
66,906	38,697			66,906	38,697	
		3,053	3,310	3,053	3,310	
				151,832	125,788	
	National 1 1SW 5,826 66,906	National model CLs         1SW       MSW         5,826       1,652         66,906       38,697	National model CLs         River-spectrum           1SW         MSW         1SW           5,826         1,652         14,110           66,906         38,697         61,937           3,053         3,053         61,933	National model CLs       River-specific CLs         1SW       MSW       1SW         1SW       14,110       9,571         5,826       1,652 $61,937$ 72,558         66,906       38,697 $3,053$ $3,310$	National model CLs       River-specific CLs       CLs approximation         1SW       MSW       1SW       MSW       1SW         14,110       9,571       14,110 <td< td=""></td<>	

**ICES** 

Southern NEAC	National model CLs		River-spe	ecific CLs	CLs applied		
Country	1SW	MSW	1SW	MSW	1SW	MSW	
France			17,400	5,100	17,400	5,100	
Iceland (S&W)	17,698	1,199			17,698	1,199	
Ireland			211,471	46,943	211,471	46,943	
UK (England & Wales)			54,812	30,203	54,812	30,203	
UK (NI)			19,998	3,237	19,998	3,237	
UK (Scotland)	248,080	186,281			248,080	186,281	
S. NEAC Total					569,460	272,964	

CLs used to estimate the Spawner Escapement Reserve (SER) - the CL adjusted for natural mortality between recruitment date (1<sup>st</sup> Jan) & time of return to home waters

**3. Conservation Limits & Stock Status** 

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Overview of ICES terminology for the assessment of stock status and advice where there are no specific management objectives:



## 3. Status of Stocks: Pre-Fishery Abundance (PFA)

- ✤ PFA = estimated abundance of salmon in first winter at sea (as of 1<sup>st</sup> Jan)
- Estimated for 1SW maturing (1SW) and 1SW non-maturing (MSW)
- Estimated by stock complex (N. NEAC & S. NEAC)

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- Both stocks have shown a general decline, interrupted by a short period of increased recruitment (1998 to 2003)
- Both stocks have been at full reproductive capacity prior to the commencement of distant water fisheries throughout time series





- ISW spawners have been at full reproductive capacity throughout the time series, lowest in 2007 – small improvement since
- MSW spawners at full reproductive capacity in most years (consistently since 2006), but at risk of suffering reduced reproductive capacity in some earlier years





## 3. Status of Stocks - Trends in PFA for Southern NEAC

- Marked declines for both age groups
- Maturing 1SW stock at full reproductive capacity over most of time period; and
- At risk of suffering reduced reproductive capacity for first time in 2009; suffering reduced reproductive capacity for first time in 2014
- Non-maturing 1SW stock at full reproductive capacity before 1996; and
- Since 1996, at risk of suffering reduced reproductive capacity in 6 years (or just above);
- Last 2 PFA years lowest in time series and suffering reduced reproductive capacity





# 3. Status of Stocks - Trends in Spawners for Southern NEAC

- Decline in both 1SW and MSW, but particularly MSW spawners
- ISW stock has been at risk of suffering reduced reproductive capacity or suffering reduced reproductive capacity for most of the time series
- MSW stock mainly at full reproductive capacity until 1997. Mainly at risk of, or suffering, reduced reproductive capacity since this time
- ➤ 2015: 1SW at risk of suffering reproductive capacity

MSW – suffering reproductive capacity



## 3. Status of Stocks – Country level

#### Summary of stock assessments for individual countries

Summary of stock assessments: individual countries prior to commencement of distant water fisheries (PFA) and for spawners: Maturing and Non-maturing 1SW salmon

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## National Compliance with river-specific CLs

Country	Maturi	ng 1SW	Non-mat	uring 1SW	Country	No.	No.	No.	%
	PFA	Spawners	PFA	Spawners		rivers	with CL	ass'ed	attaining CL
Southern NEAC					Southern NEAC				
UK (E&W)	Suffering	Suffering	Full	Full	UK (E&W)	64	64	64	19 %
UK (NI)	Full	Full	Full	Full	UK (NI)	15	10	9	44 %
UK (Scotland)	At risk	At risk	Suffering	Suffering	UK (Scotland)	398	0	0	NA
Ireland	Suffering	Suffering	Suffering	Suffering	Ireland	141	141	141	39 %
France	Suffering	Suffering			France (1SW)	42	33	30	90 %
France			Full	At risk	France (MSW)	42	33	30	73 %
Northern NEAC					Northern NEAC				
Russia	Full	Full	Full	Suffering	Russia	112	80	7	86 %
Finland/Norway	Full	At risk	Full	At risk	Finland/Norway	1	1	1	0 %
Norway	Full	Full	Full	Full	Norway	439	439	191	<b>50</b> %
Sweden	At risk	Suffering	Full	Full	Sweden	23	22	22	36 %
Iceland	Full	Full	Full	Full	Iceland	100	0	0	NA

#### 3. Status of Stocks - Marine Survival

Wild

Hatchery



- General decline in marine survival for 1SW fish
- MSW fish generally stable

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Broadly consistent with observed declines in PFA – returns

 Despite management measures aimed at reducing exploitation in recent years there has been little improvement in the status of stocks

**3. Overview of Status of Stocks** 

CES

 The continued low abundance of wild Atlantic salmon is mainly a consequence of continuing poor survival in the marine environment



Advise on the sources of uncertainties and possible biases in the assessment of catch options for the Faroes fishery resulting from the use of samples and data collected in the fishery in the 1980s and 90s

Should it be considered that biases are likely to compromise catch advice, advise on any new sampling which would be required to improve assessments

Caveats to this analysis:

Catch options are based on management assumptions (ICES, 2013) yet to be formally adopted by NASCO:

- Fishing season defined as October to May and not calendar year
- Share arrangement for the Faroes fishery is set at 0.084

ICES has advised that catch advice be based on 20 national units (1SW and MSW stocks in ten countries) – with the objective of achieving ≥95% probability of meeting CLs for each unit

Without formal decision, ICES provides advice based on:

- i) Four NEAC stock complexes (N-NEAC & S-NEAC by 1SW & MSW age classes)
- ii) 20 national management units (ten countries, and the two sea-age classes)

No account is taken of stocks in Denmark or Spain (owing to insufficient data)

ICES has noted that some management units are exploited at very low levels, though in the absence of a management decision on which units to included, all are included



#### **Uncertainties and biases – some definitions:**

#### Accuracy →

Closeness of a measurement to the true value, Combining:

- **Trueness** closeness of the average of a set of measurements to the true value
- Precision closeness of agreement among a set of measurements



Low accuracy: poor precision good trueness Low accuracy: good precision poor trueness

From the question, **uncertainty** and **bias** were taken to refer to **precision** and **trueness** respectively in the following analysis

#### PARAMETERS ESTIMATED FROM HISTORICAL DATA / SAMPLES

Mean weight of all fish caught

Proportion of 1SW in catch NB: Proportion MSW = 1 - proportion 1SW

Proportion of total catch discarded

Proportion of discards that die

**Proportion of farmed fish in catch** (multiplied by correction factor to account for a decline in prop.)

Proportion of 1SW fish not maturing

Mid-dates of the 1SW and MSW fisheries

Proportion of catch of North American origin

#### **Composition of catches**

#### **SOURCE OF DATA/SAMPLES:**

Sampling of commercial catches 1985/86 to 1990/91 seasons (ICES, 1997).

Sampling of commercial catches 1985/86 to 1990/91 seasons (ICES, 1992).

Sampling of commercial catches 1985/86 to 1990/91 seasons (ICES, 1992).

Expert judgement by observers on commercial fishing vessels in early 1980s.

Estimated proportion of farmed fish in catches at Faroes between 1980/81 and 1990/91 seasons (Hansen and Jacobsen, 2003); estimated proportion of farmed fish in catches in Norwegian coastal fisheries (ICES, 2011).

Experimental studies in early 1980s based on proportion of 1SW fish with raised vitellogenin in blood (ICES, 1994).

Estimates from total catches in 1983/84 to 1985/86 fishing seasons (ICES, 1985, 1986, 1987).

Genetic analysis of scale samples collected in 1993/94 and 1995/96 fishing seasons (ICES, 2015).

Stock complexes: Genetic analysis of scale samples collected in 1993/94 and 1995/96 fishing seasons (ICES, 2015).

National management units: PFA proportions applied to stock complex composition.

Parameter values were adjusted:

Trueness effects: increasing or decreasing the average



#### Precision effects: increasing or decreasing the spread of values



Precision of historical values may be affected by a range of factors:

- Sampling error (e.g. small sample sizes)
- Natural variability in biological characteristics (e.g. due to environmental conditions)
- Variation in distribution, and exploitation, of stocks in the fishery
- Variability in the way the fishery is prosecuted (e.g. due to weather)
- The trueness of values may be affected by biases in sampling programmes and systematic shifts in stock or fishery characteristics between that time and the present

The catch options assessment is based on the following equation & applied to each management unit:



This was run (20,000 simulations) to estimate probabilities of management units achieving their SERs if a 200t TAC had been allocated to the Faroes fishery, using the 2015 input data

Proportion of surplus values > zero determines the probability of management units achieving SER

Parameter values were adjusted (as previously explained) and the model re-run:

Giving proportional changes to probabilities of achieving SERs

Change from baseline probability with revised data input:

Sensitivity to changes			-			r busenne p	lobability	with revised		
in precision and		t unit	oability SERs	from 0%	mo 🍫	щo	om 0.1	om 2 x sd	ach 2 x sd	Russia, doublec
trueness:		anagemen	seline proh achieving	opportion VC minus 5	oportion fr VC plus 50%	oportion fr \C = 0	oportion fr VEAC) plus	oportion fr VEAC) plus	op. from e. gmt unit +	op's from F ance and g.&Wales
Parameters relating to:		<u> </u>	Ba of	A N	Pro	Pr	Prc S(h	Prc S(h	Ъre Ш	E E
<ul> <li>Stock composition in the catches Inc.:</li> <li>NAC</li> <li>NEAC</li> </ul>	N-NEAC S-NEAC	FR_1SW EW_1SW IR_1SW NI_1SW SC_1SW IC_1SW SW_1SW NO_1SW FI_1SW	39.6 42.1 45.4 66.8 71.5 99 93.2 97 62 87	0 0 -0.1 -0.1 -0.1 0 0 -0.1 0	0.0 0.0 0.1 0.0 0.1 0.0 0.0 0.0 0.0	-0.1 -0.1 -0.2 -0.2 -0.2 0.0 0.0 -0.1 -0.1 -0.1	0.1 0.2 0.3 0.3 0.3 -0.3 -0.3 -0.9 -0.6	0.0 0.0 0.1 0.0 0.1 -0.1 -0.1 -0.2 -0.1	0.0 0.1 0.0 0.0 -0.1 -0.1 -0.1 -0.1	0.5 1.1 -0.2 -0.2 -0.2 0.0 -0.1 -0.1 -0.1 -0.3 0.4
		av. all 1SW	70.4	0.0	0.0	-0.1	-0.1	0.0	0.0	0.4
	N-NEAC S-NEAC	FR_MSW EW_MSW IR_MSW NI_MSW SC_MSW IC_MSW SW_MSW NO_MSW FI_MSW RU_MSW av. all MSW	57.9 63 8.1 89.2 39 94.2 87 46.9 14.1 18.4 51.8	-1.5 -2.3 -0.3 -1.1 -2.3 -1.5 -2.6 -7.5 -2 -4.7 -2.6	1.5 2.3 0.3 1.1 2.5 1.2 2.5 7.9 2.6 5.9 2.8	-3.1 -4.5 -0.7 -2.2 -4.6 -3.2 -5.0 -14.1 -3.9 -8.2 -5.0	4.2 6.1 0.8 2.7 6.7 0.9 -2.7 -8.4 -2.4 -5.3 0.3	0.0 -0.1 0.0 -0.3 0.0 -3.4 0.0 0.2 0.2 0.2 0.0 -0.3	-0.1 -0.2 0.0 -0.3 0.1 -3.7 -0.2 0.4 0.4 0.4 0.8 -0.3	6.3 9.2 -0.3 -1.0 -2.1 -1.9 -3.5 -9.6 -2.4 32.5 2.7

Sensitivity to changes	Change from baseline probability with revised data input:									
in precision and	ruit	lbility ERs	0	us 2 x	ation x 3	= 0.6	= 1.0	0 =	= 0.5	
trueness:	anagement ı	aseline proba achieving SE	scard rate =	scard rate pl 	andard devia discard rate	sc mortality	sc mortality	op.Delayed -	op.Delayed :	
Parameters relating to.	Σ	Ba of	Di	Di	Sto	Ō	Ō	Pr	Pr	
Discard rate	FR_1SW EW_1SW IR_1SW	39.6 42.1 45.4	0.9 1.8 1.9	-1.0 -2.1 -2.4	-0.8 -1.4 -1.7	0.2 0.3 0.5	-0.2 -0.4 -0.6	-0.3 -0.6 -0.8	0.4 0.7 0.8	
<b>SI I</b> / <b>I</b> /	NI_1SW	66.8 71 5	2.5	-2.8	-1.8 2 1	0.6	-0.7	-1.0	1.1	
Discard mortality	<u>3C_13W</u>	99	0.2	-2.5	-2.1	0.3	-0.0	-0.8	0.9	
	SW 1SW	93.2	0.2	-0.2	-0.1	0.1	-0.1	-0.1	0.1	
	NO 1SW	97	0.2	-0.3	-0.3	0.1	-0.1	-0.1	0.1	
<ul> <li>Delayed maturation</li> </ul>	FI_1SW	62	0.6	-0.9	-0.7	0.1	-0.2	-0.3	0.3	
of 1SW fish	RU_1SW	87	0.7	-0.6	-0.4	0.2	-0.1	-0.2	0.4	
	av. all 1SW	70.4	1.1	-1.3	-0.9	0.3	-0.3	-0.4	0.5	
	FR MSW	57.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	EW_MSW	63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	IR_MSW	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	NI_MSW	89.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	SC_MSW	39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	IC_MSW	94.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	SW_MSW	87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	NO_MSW	46.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	FI_MSW	14.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	RU_MSW	18.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	🖉 av. all MSW	51.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

- Sensitivity to changes in precision and trueness:
- Parameters relating to:
- Weight composition of catches
- Age composition of catches
- Timing of the fishery

Farm escapees

	-	Change from baseline probability with revised data input:										
Management unit	Baseline probability of achieving SERs	Mean weight plus 2 x s.d.	Mean weight minus 2 x s.d.	S.d. of weight halved	S.d. of weight x 5	Prop. 1SW plus 2 x s.d.	Prop. 1SW doubled	Mid-dates + 1 month	Farm correction = 0.53	Farm correction = 0.73	S.d. of farm prop. halved	S.d. of farm prop. doubled
	20 C	0.1	0.1	0.0	0.2	0.6	0.2	0.0	0.0	0.0	0.0	0.0
FR_ISW	39.6	0.1	-0.1	0.0	-0.2	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0
EVV_ISVV	42.1	0.2	-0.3	0.0	-0.4	-1.2	-0.5	-0.1	-0.1	0.1	0.0	0.0
IR_ISVV	45.4	0.3	-0.5	0.0	-0.4	-1.4	-0.6	-0.1	-0.1	0.1	0.0	0.0
	00.8 71 5	0.5	-0.5	0.0	-0.5	-1.0	-0.7	-0.1	-0.1	0.1	0.0	0.0
<u>3C_13W</u>	99	0.3	-0.4	0.0	-0.4	-1.4	-0.0	-0.1	-0.1	0.0	0.1	0.0
SW/ 1SW/	93.2	0.1	0.0	0.1	0.0	-0.2	-0 1	0.0	0.0	0.1	0.1	0.0
NO 15W	97	0.1	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0
FL 1SW	62	0.0	-0.1	0.0	-0.2	-0.5	-0.3	-0.1	-0.1	0.0	0.0	0.0
RU 1SW	87	0.1	-0.1	0.1	-0.1	-0.3	-0.1	0.0	0.0	0.1	0.0	0.0
av. all 1SW	70.4	0.2	-0.2	0.0	-0.2	-0.8	-0.3	-0.1	-0.1	0.1	0.0	0.0
FR_MSW	57.9	1.3	-1.7	0.0	-1.2	0.7	0.3	-0.4	-0.4	0.4	0.0	0.0
EW_MSW	63	2.0	-2.6	0.0	-1.5	1.1	0.4	-0.6	-0.7	0.6	0.0	0.0
IR_IVISW	8.1	0.2	-0.4	0.0	-0.3	0.2	0.1	-0.1	-0.1	0.1	0.0	0.0
	89.2	1.0	-1.3	0.0	-0.7	0.6	0.2	-0.2	-0.3	0.3	-0.1	0.0
	55 01 2	2.Z	-2.0	0.1	-1.2	1.2	0.0	-0.5	-0.6	0.8	0.0	0.1
	94.2 87	1.1 2 3	-1.0 -2.9	-0.1	-1.2 -1 0	0.0	0.5	-0.4	-0.4	0.5	0.0	-0.1
	46.9	2.3 6.9	-2.5	0.1	-3.4	3.7	1.6	-2 0	-2.2	2.1	-0.2	-0.1
FL MSW		2.3	-2.3	0.1	-0.4	1.2	0.5	-0.5	-0.6	0.7	0.1	0.2
RU MSW	18.4	5.2	-5.3	0.0	-0.6	2.7	1.2	-1.2	-1.5	1.5	-0.2	0.2
av. all MSW	51.8	2.5	-3.0	0.0	-1.3	1.3	0.6	-0.7	-0.8	0.8	0.0	0.0

Ranges chosen:

CES

to cover the extent of potential variation in trueness & precision

## Simulations indicate that improved trueness / precision would have negligible effects on assessment results

4. Need for new sampling

- More up-to-date estimates could be obtained by conducting a research fishery in the Faroes. Though this would need to cover the spatial and temporal extent of any expected fishery over multiple years
- New surveys may improve trueness of values, but alternative methods are available to correct those currently used

The following steps should be undertaken to improve inputs before any research fishery is undertaken:

4. Need for new sampling

CES

Variable	Recommended action
Mean weight	Correction based on changes in weights (1SW & MSW) of salmon caught in home waters: 1980s to the present
Age composition	Adjustments based on changes in ratios of estimated maturing: non-maturing for management units
Proportion maturing	No adjustment required
Stock composition	Genetic analysis of historical scale samples from the fishery
Discards	Input from managers on how discards may be handled
Mid-date of fishery	Input from managers on when any fishery may operate

Any fishery authorized at Faroes in the future should incorporate a comprehensive sampling and data collection programme



## 5. Catch options & management advice

In the event that NASCO informs ICES that the Framework of Indicators (FWI) indicates that reassessment is required:

NASCO has asked ICES to provide catch options or alternative management advice for the 2016/17 to 2018/19 fishing seasons, 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 for 2016/17 to 2018/19 were generated using forecast models:

- Combined sea age models for S. NEAC & N. NEAC
- Maturing & non-maturing PFA modelled simultaneously
- Same approach used at the stock complex level and country level

## 5. Catch options & management advice

#### Northern NEAC PFA Forecast

forecasts

Forecast years: 2015 – 2019

Decline in PFA for maturing 1SW – 2014 value among the lowest 8 in time series

ICES

- Non-maturing PFA relatively stable
- 2015 forecasts predicted to be similar to 2014 values (increased variability)
- Small increases to 2016, followed by declines to 2019
- >95% probabilities of meeting SERs, except in 2019 (maturing & non-maturing)



## 5. Catch options & management advice

Southern NEAC PFA Forecast

Forecast years: 2015 - 2019

- Declines in PFA for both maturing & non-maturing PFA
- 2014 values lowest in time series
- Small increases predicted in the first forecast year (2015)
- Subsequent declines

ICES

<95% probabilities of meeting SERs in all forecast years



forecasts

## **5. Probabilities of meeting SERs: Stock complexes**

Probabilities of forecast PFA exceeding SER – 2015 to 2019:

- S. NEAC 1SW maturing 31 62%
- S. NEAC 1SW non-maturing 28 49%
- N. NEAC 1SW maturing 94 100%
- N. NEAC 1SW non-maturing 94 100%

	Southe	rn NEAC		Northerr	NEAC				
1SW:	Maturing	Non-maturing		Maturing	Non-maturing				
SER	724 023	465 465		192 348	216 422				
PFA Year	Probability of forecast PFA meeting SER								
2015	0.622	0.493		0.999	0.999				
2016	0.515	0.422		0.997	0.997				
2017	0.410	0.351		0.986	0.989				
2018	0.324	0.286		0.958	0.965				
2019	0.310	0.281		0.935	0.943				

Reproductive capacity: At full At risk of suffering reduced Suffering reduced

## 5. Probabilities of meeting SERs

#### countries

#### **N. NEAC Countries**

ICES

TEM

#### Maturing Finland Iceland-NE Norway Russia Sweden SER 17 175 7199 3948 78 888 85 138 **PFA Year** Probability of PFA meeting or Exceeding SER 2015 0.951 0.947 0.999 0.921 0.878 2016 0.896 0.880 0.998 0.889 0.907 2017 0.845 0.794 0.986 0.860 0.821 2018 0.827 0.708 0.964 0.751 0.844 2019 0.800 0.736 0.950 0.662 0.838 **Non-Maturing** Finland Iceland-NE Russia Sweden Norway SER 16 4 9 5 2847 121 319 69 971 5791 **PFA Year** Probability of PFA meeting or Exceeding SER 2015 0.865 0.986 0.9990.928 0.977 2016 0.802 0.955 0.998 0.884 0.978 2017 0.742 0.901 0.989 0.852 0.927 2018 0.735 0.932 0.840 0.967 0.739 2019 0.706 0.850 0.955 0.650 0.922

#### At full / At risk of suffering reduced reproductive capacity

## 5. Probabilities of meeting SERs

## countries

#### **S. NEAC Countries**

ICES

TEN

#### At risk of suffering / Suffering reduced reproductive capacity

Maturing	France	Iceland-SW	Ireland	UK (E&W)	UK (NI)	UK (Scot)
SER	22 499	21 870	269 344	69 812	24 526	315 972
PFA Year		Pro	bability of P	FA meeting S	ER	
2015	0.266	0.784	0.251	0.213	0.733	0.742
2016	0.331	0.557	0.274	0.205	0.713	0.626
2017	0.360	0.337	0.261	0.199	0.565	0.548
2018	0.377	0.637	0.186	0.169	0.569	0.472
2019	0.356	0.400	0.234	0.260	0.542	0.397
Non-Maturing	France	Iceland-SW	Ireland	UK (E&W)	UK (NI)	UK (Scot)
SER	9479	2067	78 490	52 051	5461	317 917
PFA Year		Pro	bability of P	FA meeting S	ER	
2015	0.703	0.923	0.097	0.933	0.884	0.356
2016	0.694	0.797	0.157	0.841	0.828	0.335
2017	0.676	0.645	0.175	0.749	0.699	0.315
2018	0.658	0.776	0.144	0.645	0.690	0.286
2019	0.620	0.638	0.187	0.719	0.655	0.247



- Based on method used for W. Greenland fishery, involves estimating the uncertainty in meeting defined management objectives at different catch levels (TAC options)
- A number of decisions required by managers to enable risk framework to be finalised. Specifically:
  - Season (Jan Dec or Oct May) to which any TAC should apply
  - Share arrangement for the Faroes fishery (i.e. the proportion of any harvestable surplus within the NEAC area available to Faroes through the TAC)
  - Choice of management units for NEAC stocks
  - Specification of management objectives



#### **ICES recommendations:**

#### Season

Managed on the fishing season operating from Oct to June Catch advice provided on this basis

#### Share allocation

Allocation of 8.4% applied to the Faroes (based on the 1984-1988 period) in the absence of other proposals

#### Management Units

Catch options tables provided (two sea-age groups) for:

- i. Two stock complexes and;
- ii. Ten NEAC countries

#### Management Objectives

A 95% probability of CL attainment for each stock complex individually (Simultaneous attainment probability to be used as a guide)



## **5. Faroes Catch Options**

#### N. NEAC stock complexes

High probability (>95%) of achieving CLs for TACs (maturing & non-maturing) at Faroes of up to:

- ~ 60t in 2016/17
- ~ 40t in 2017/18 seasons
- No TAC will exceed SER in 2018/19

#### S. NEAC stock complexes

Both have less than 95% probability of achieving SERs in each year and at every TAC option

Therefore, there are no catch options that ensure >95% probability of each stock complex achieving its SER

Non give >22% probability (zero TAC 2016/17) of simultaneous attainment of all CLs in all stock complexes

Catch options	TAC option	NEAC-N-	NEAC-N-	NEAC-S-	NEAC-S-	All complexes
for 2016/17	(t)	1SW	MSW	1SW	MSW	simultaneous
	0	99%	100%	40%	41%	22%
	20	99%	99%	40%	38%	20%
	40	99%	98%	39%	34%	18%
	60	99%	96%	39%	31%	16%
	80	99%	93%	38%	28%	14%
	100	99%	88%	38%	25%	12%
	120	99%	82%	37%	23%	10%
	140	99%	75%	37%	20%	8%
	160	99%	67%	36%	19%	7%
	180	99%	60%	36%	17%	6%
	200	99%	52%	35%	15%	4%

Catch options	TAC option	NEAC-N-	NEAC-N-	NEAC-S-	NEAC-S-	All complexes
for 2017/18	(t)	1SW	MSW	1SW	MSW	simultaneous
	0	96%	99%	32%	35%	16%
	20	96%	98%	32%	32%	14%
	40	96%	95%	31%	29%	13%
	60	96%	92%	31%	26%	11%
	80	96%	86%	30%	24%	10%
	100	96%	81%	30%	22%	8%
	120	96%	74%	30%	20%	7%
	140	96%	67%	29%	18%	6%
	160	96%	60%	29%	16%	5%
	180	96%	53%	29%	15%	4%
	200	96%	47%	28%	13%	3%

Catch options	TAC option	NEAC-N-	NEAC-N-	NEAC-S-	NEAC-S-	All complexes
for 2018/19	(t)	1SW	MSW	1SW	MSW	simultaneous
	0	94%	97%	31%	28%	12%
	20	94%	94%	30%	26%	11%
	40	94%	89%	30%	24%	10%
	60	94%	83%	29%	21%	8%
	80	94%	76%	29%	20%	7%
	100	94%	69%	29%	18%	6%
	120	94%	62%	28%	16%	5%
	140	94%	55%	28%	15%	4%
	160	94%	49%	28%	14%	3%
	180	94%	43%	27%	13%	3%
	200	94%	37%	27%	12%	2%

Catch options:

#### 2016-17

## **5. Faroes Catch Options**

ICES

Flatness of **1SW** stock risk curves indicates the risk to these MUs is affected very little by harvest at Faroes

Mostly because the exploitation rate on these stocks component in the fishery is very low



10% 0%

> 0 20 40

60

80 100 120 140 160

TAC Option (t)

 All complexes simultaneous

180 200



## 5. Faroes Catch Options – exploitation rates

- Exploitation rates on maturing 1SW fish is very low
- Values for the Faroes fishery only (i.e. taking account of share allocation)
- Total exploitation rate (assuming full exploitation of homewater allocation) would be ~12 times higher

Catch options	TAC option	NEAC-N-	NEAC-N-	NEAC-S-1SW	NEAC-S-
for 2016/17	(t)	1SW	MSW		MSW
season:	0	0.0%	0.0%	0.0%	0.0%
	20	0.0%	0.6%	0.1%	0.4%
	40	0.0%	1.2%	0.1%	0.8%
	60	0.0%	1.8%	0.2%	1.2%
	80	0.0%	2.3%	0.2%	1.6%
	100	0.0%	2.9%	0.3%	1.9%
	120	0.1%	3.5%	0.3%	2.3%
	140	0.1%	4.1%	0.4%	2.7%
	160	0.1%	4.7%	0.4%	3.1%
	180	0.1%	5.3%	0.5%	3.5%
	200	0.1%	5.8%	0.6%	3.9%

Catch options	TAC option	NEAC-N-	NEAC-N-	NEAC-S-1SW	NEAC-S-
for 2017/18	(t)	1SW	MSW		MSW
season:	0	0.0%	0.0%	0.0%	0.0%
	20	0.0%	0.6%	0.1%	0.4%
	40	0.0%	1.2%	0.1%	0.9%
	60	0.0%	1.8%	0.2%	1.3%
	80	0.0%	2.5%	0.3%	1.7%
	100	0.1%	3.1%	0.3%	2.2%
	120	0.1%	3.7%	0.4%	2.6%
	140	0.1%	4.3%	0.4%	3.0%
	160	0.1%	4.9%	0.5%	3.5%
	180	0.1%	5.5%	0.6%	3.9%
	200	0.1%	6.2%	0.6%	4.3%

Catch options	TAC option	NEAC-N-	NEAC-N	NEAC-S-1SW	NEAC-S-
for 2018/19	(t)	1SW	MSW	r	MSW
season:	0	0.0%	0.0%	0.0%	0.0%
	20	0.0%	0.7%	0.1%	0.5%
	40	0.0%	1.4%	0.1%	1.0%
	60	0.0%	2.1%	0.2%	1.5%
	80	0.0%	2.8%	0.3%	2.0%
	100	0.1%	3.5%	0.3%	2.5%
	120	0.1%	4.2%	0.4%	3.0%
	140	0.1%	4.9%	0.5%	3.4%
	160	0.1%	5.6%	0.5%	3.9%
	180	0.1%	6.3%	0.6%	4.4%
	200	0.1%	7.0%	0.7%	4.9%

## 5. Faroes Catch options - NEAC countries

## Maturing 1SW

ICES

CIEM

Probabilities of country stocks achieving SERs in 2016/17 vary between 18% & 99%

Little effect of increasing Faroes TAC options

Probability of simultaneous attainment in all 10 complexes (zeroTAC): 2016/17 ~ 0.2% 2017/18 ~ 0.1% 2018/19 ~ 0.1%

		N.	NEA	C			S.NEAC								
Catch options for	TAC option (t)	Russia	Finland	Norway	Sweden	Iceland	Scotland	N. Ireland	Ireland	England & Wales	France	All 1SW MUs simultaneous			
2016/17	0	86%	85%	99%	82%	60%	55%	56%	26%	20%	36%	0.2%			
season:	20	86%	85%	99%	82%	60%	55%	56%	26%	20%	36%	0.2%			
	40	86%	85%	99%	82%	59%	54%	56%	26%	19%	36%	0.2%			
	60	86%	85%	99%	82%	59%	54%	55%	26%	19%	36%	0.2%			
	80	86%	84%	99%	82%	59%	54%	55%	25%	19%	36%	0.2%			
	100	86%	84%	99%	82%	58%	53%	54%	25%	19%	36%	0.2%			
	120	86%	84%	99%	82%	58%	53%	54%	25%	19%	36%	0.2%			
	140	86%	84%	99%	82%	58%	52%	53%	25%	19%	35%	0.2%			
	160	86%	84%	99%	82%	58%	52%	53%	25%	18%	35%	0.2%			
	180	85%	84%	99%	82%	57%	52%	53%	24%	18%	35%	0.1%			
	200	85%	84%	98%	82%	57%	51%	52%	24%	18%	35%	0.1%			

Catch	TAC	Pussia	Einland	Norman	Guadan	Icoland	Geotland	N. Iroland	Incland	England	Franco	All 1SW MUs
options for	option (t)	Kussia	rinianu	Norway	Sweden	Icelaliu	Scottanu	IN. Helallu	Ireland	& Wales	rrance	simultaneous
2017/18	0	75%	83%	97%	84%	76%	47%	57%	19%	17%	38%	0.1%
season:	20	75%	83%	96%	84%	76%	47%	56%	19%	17%	38%	0.1%
	40	75%	83%	96%	84%	76%	46%	56%	19%	17%	38%	0.1%
	60	75%	83%	96%	84%	76%	46%	56%	18%	16%	37%	0.1%
	80	75%	83%	96%	84%	75%	46%	55%	18%	16%	37%	0.1%
	100	75%	83%	96%	84%	75%	45%	55%	18%	16%	37%	0.1%
	120	75%	83%	96%	84%	75%	45%	54%	18%	16%	37%	0.1%
	140	75%	82%	96%	84%	75%	45%	54%	18%	16%	37%	0.1%
	160	75%	82%	96%	84%	75%	45%	54%	18%	16%	37%	0.1%
	180	74%	82%	96%	84%	74%	44%	53%	17%	16%	37%	0.1%
	200	74%	82%	96%	84%	74%	44%	53%	17%	16%	37%	0.1%

Catch	TAC	<b>D</b>	F1.1	N	C 1	T 1 1	C 1 1	N. Tasland	T1	England	<b>F</b>	All 1SW MUs
options for	option (t)	Russia	Finland	Norway	Sweden	Iceland	Scotland	IN. Ireland	Ireland	& Wales	France	simultaneous
2018/19	0	66%	80%	95%	84%	63%	40%	54%	23%	26%	36%	0.1%
season:	20	66%	80%	95%	84%	63%	39%	54%	23%	26%	36%	0.1%
	40	66%	80%	95%	84%	63%	39%	53%	23%	26%	36%	0.1%
	60	66%	80%	95%	84%	62%	39%	53%	23%	25%	36%	0.1%
	80	66%	80%	95%	84%	62%	38%	53%	23%	25%	35%	0.1%
	100	66%	80%	95%	84%	62%	38%	52%	23%	25%	35%	0.1%
	120	66%	80%	95%	84%	62%	38%	52%	23%	25%	35%	0.1%
	140	65%	80%	95%	84%	62%	38%	52%	22%	25%	35%	0.1%
	160	65%	80%	95%	84%	61%	37%	51%	22%	25%	35%	0.1%
	180	65%	80%	95%	84%	61%	37%	51%	22%	25%	35%	0.1%
	200	65%	79%	95%	84%	61%	37%	51%	22%	24%	35%	0.1%

## 5. Faroes Catch options - NEAC countries

## Non-maturing 1SW (MSW)

ICES

TEM

Probabilities of country stocks achieving CLs in 2015/16 vary between 11% &100%

Decreasing probabilities for increasing TAC options at Faroes

Probability of simultaneous attainment in all 10 complexes (zeroTAC): 2016/17 ~ 1.8% 2017/18 ~ 1.2% 2018/19 ~ 0.6%

		Ν.	NEA	С				S.	NEA	С		
Catch options for 2016/17	TAC option (t)	Russia	Finland	Norway	Sweden	Iceland	Scotland	N. Ireland	Ireland	England & Wales	France	All MSW MUs simultaneous
season:	0	89%	80%	100%	98%	98%	33%	83%	16%	84%	69%	1.8%
	20	81%	72%	100%	97%	96%	31%	81%	15%	82%	67%	1.2%
	40	72%	64%	99%	96%	95%	29%	80%	15%	79%	66%	0.8%
	60	63%	56%	98%	95%	92%	27%	79%	14%	77%	64%	0.5%
	80	53%	49%	96%	94%	90%	25%	77%	14%	75%	63%	0.3%
	100	44%	44%	93%	93%	87%	23%	76%	13%	72%	61%	0.2%
	120	36%	39%	90%	92%	84%	21%	74%	13%	70%	60%	0.1%
	140	30%	34%	87%	91%	81%	20%	73%	12%	68%	58%	0.0%
	160	24%	30%	83%	89%	78%	18%	72%	12%	65%	57%	0.0%
	180	19%	27%	78%	88%	75%	17%	70%	12%	63%	56%	0.0%
	200	15%	24%	73%	86%	71%	16%	69%	11%	61%	54%	0.0%

Catch options	TAC	Bussie	Einland	Norm	Courdan	Tesland.	C and an d	N. Isolon d	Incloud	England	Energy	All MSW MUs
for 2017/18	option (t)	Kussia	riniand	Norway	Sweden	Iceland	Scotland	N. Ireland	Ireland	& Wales	гтапсе	simultaneous
season:	0	85%	75%	99%	93%	93%	31%	70%	17%	75%	68%	1.2%
	20	78%	67%	98%	91%	90%	29%	69%	17%	73%	66%	0.8%
	40	71%	60%	96%	89%	87%	28%	67%	17%	70%	65%	0.5%
	60	62%	53%	93%	87%	84%	26%	65%	16%	67%	64%	0.3%
	80	55%	48%	90%	85%	80%	24%	64%	16%	65%	62%	0.2%
	100	47%	43%	86%	84%	76%	22%	62%	15%	63%	61%	0.1%
	120	41%	38%	82%	82%	73%	21%	60%	15%	60%	60%	0.1%
	140	35%	35%	78%	80%	69%	19%	59%	15%	58%	59%	0.1%
	160	30%	31%	73%	78%	66%	18%	58%	14%	56%	58%	0.0%
	180	25%	28%	68%	76%	62%	17%	56%	14%	54%	56%	0.0%
	200	21%	26%	64%	74%	59%	16%	55%	14%	52%	55%	0.0%

Catch options	TAC	Bussie	Einland	Namuan	Coursilon	Tealan d	Castland	N. Insland	Incloud	England	Energy	All MSW MUs
for 2018/19	option (t)	Kussia	riniand	Norway	Sweden	Iceland	Scotland	N. Ireland	Ireland	& Wales	гтапсе	simultaneous
season:	0	74%	74%	97%	93%	93%	28%	69%	14%	64%	66%	0.6%
	20	65%	67%	94%	92%	91%	27%	68%	14%	62%	65%	0.4%
	40	56%	61%	91%	90%	88%	25%	66%	14%	59%	63%	0.2%
	60	48%	55%	87%	89%	85%	24%	64%	13%	56%	62%	0.1%
	80	42%	50%	82%	87%	83%	22%	63%	13%	54%	61%	0.1%
	100	35%	46%	78%	86%	80%	21%	62%	13%	51%	60%	0.1%
	120	30%	42%	73%	84%	77%	19%	60%	13%	49%	59%	0.0%
	140	25%	39%	68%	83%	74%	18%	59%	12%	47%	58%	0.0%
	160	21%	36%	63%	81%	71%	17%	58%	12%	45%	57%	0.0%
	180	18%	33%	58%	80%	69%	16%	57%	12%	43%	56%	0.0%
	200	15%	31%	53%	78%	66%	15%	56%	11%	41%	55%	0.0%



5. Catch advice

CES

- Therefore, in the absence of specific management objectives, ICES advises there are no mixed-stock fisheries options on the NEAC complexes at the Faroes in the fishing seasons 2016/2017 to 2018/2019
- In the absence of any fisheries in these seasons, probabilities of individual countries meeting their CLs range from 17% to 99% for maturing 1SW salmon and 14% to 100% for salmon maturing as MSW

## Relevant factors to be considered in management:

5. Catch advice

CES

- 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
- The management of a fishery should ideally be based upon the status of all river stocks exploited in the fishery

Larger numbers of N. American fish than previously thought may have been caught at the Faroes in the past. N. American fish are not taken into account in current catch advice pending a decision from NASCO on how they wish this to be undertaken **6. NEAC Framework of Indicators (FWI)** 

NASCO has asked ICES to update the FWI used to identify any significant change in the provided multi-annual management advice

- FWI applied in January: to provide a check on catch advice
- If a significant change is identified:
   Request ICES to provide updated catch advice, otherwise existing advice continues to apply



- > Approach modified in 2013 with inclusion of a rule
  - ➢ In case of an open fishery: a 2-sided test should be applied
  - In case of a closed fishery: a 1-sided test is appropriate.

The rationale – if the fishery is closed, no reason to reassess if the FWI suggests the PFA forecast is an overestimate



FWI based on regression relationships between various indicator data sets (e.g. counts, return rates) and forecast PFA



## **6. NEAC Framework of Indicators (FWI)**

#### Progress in 2015

> FWI updated:

#### Criteria for inclusion:

- At least 10 data points
- $r^2$  of the regression > 0.2 (between indicator & PFA)
- regression significant at 0.05 probability level
- data available in mid January

#### Current set includes:

- N. NEAC 6 1SW indicators 5 MSW indicators
- S. NEAC 6 1SW indicators 10 MSW indicators
- FWI available for use in 2017 and 2018 to identify any significant change in the provided multi-annual management advice
- Noting that...

FWINEAC	2017		Indicato	rs sugg	est:		PF	A forec	ast OK	or ove	restimated	
Indicators for Northern NE	AC 1SW PFA								Reassess in	n year 201	?	
									Outside 75%	% conf.lim.	Outside 75% c	onfidence limits
	Insert data from					Median PFA						
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0	2016 here	N reg	Slope	Intercept	r	in 2016	12.5%ile	87.5%ile	below	above	below	above
2 Support W 15W NO PFA est	255200	32	0.000012	-004/9./1	0.95	630816	230946.47	31/314.40	-1	-1	Uninformative	NO
3 Survivals H 1SW NO Imsa	15	33	0.0000012	-1.12	0.30	630616	-0.16	5.55	0	-1	Uninformative	NO
4 Counts all NO Øvensåa (1SW)	3215	17	0.002353	574.91	0.27	630816	1004.81	3114.11	-1	1	NO	YES
5 Counts all NO Nausta (15W)	1744	18	0.002012	-34.97	0.28	630816	333.48	2134.62	-1	-1	NO	NO
6 Catch rT&N 1SW FI	8255	17	0.0139136	1689.7437	0.39	630816	1851.30	19081.99	-1	-1	NO	NO
							Sum o	fscores	-4	-4	the Property designed.	the distance of the sec
											PFA forecast is an overestimation.	PFA forecast is underestimatic
ndicators for Northern NE	AC MSW PFA								Reassess in	n year 201	?	
									Outside 75	% conf.lim.	Outside 75	% conf.lim.
	Insert data from	Niroa	Choo	Internet	2	Median PFA	10 59(3)	97 59/30	holow	ohoun	holow	ahara
1 PEA-MSW-CoastNorway	2016 here 211073	N reg	0.358088	-14199.06	0.87	631049	12.5%#	246560.65	Delow -1	above -1	NO	NO
2 Orkla counts	6131	17	0.013501	-3554.83	0.57	631049	3071.09	6859.07	-1	-1	NO	NO
3 Counts all NO Nausta	1744	18	0.003915	-1315.88	0.34	631049	294.82	2014.50	-1	-1	NO	NO
4 Returns all 2SW NO PFA est	166963	22	0.2436223	1221.1683	0.49	631049	88946.43	220971.12	-1	-1	NO	NO
5 Catch W rT&N 2SW FI	3562	17	0.0068946	-1388.331	0.32	631049	103.49	5821.54	-1	-1	NO	NO
											PFA forecast is an overestimation.	PFA forecast is underestimation
ndicators for Southern N	EAC 1SW PFA								Reassess in	n year 201	?	
	Insert data from					Median PFA			Outside 75	% conf.lim.	Outside 75	% conf.lim.
	2016 here	N reg	Slope	Intercept	r <sup>2</sup>	in 2016	12.5%ile	87.5%ile	below	above	below	above
1 Ret. W 1SW UK(E&W) Itchen M	359	28	0.000283	8.58	0.23	724326	-37.02	464.44	0	-1	Uninformative	NO
2 Ret. W 1SW UK(E&W) Frome M	156	43	0.000540	-25.75	0.37	724326	-172.41	902.87	0	-1	Uninformative	NO
A Super MULTSW UK(SC.) NORTH ESK M	0/11	35	2 15 25 05	4017.16	0.61	724320	0003.04	12100.57	-1	-1	NU	NO
5 Ret Freshw 1SW LIK(NI) Bush	1387	41	0.000684	450.65	0.30	724326	165.10	1726.39	-1	-1	NO	NO
6 Ret. W 1SW UK(E&W) Dee M	5000	24	0.0035444	-418.4296	0.31	724326	425.69	3871.99	-1	1	NO	YES
							Sum o	fscores	-3	-4		
											Indicators do not	Indicators do n
											suggest that the	suggest that the
											overestimation.	underestimatio
											2	
Indicators for Southern NI	EAC MSW PFA								Reassess in	n year 201	•	
Indicators for Southern NI	EAC MSW PFA					Martian PEA			Reassess in Outside 75	6 conf.lim.	Outside 75	% conf.lim.
Indicators for Southern NI	EAC MSW PFA	Nreg	Slope	Intercept	r <sup>2</sup>	Median PFA in 2016	12.5%ile	87.5%ile	Reassess in Outside 75 <sup>e</sup> below	h year 201 % conf.lim. above	Outside 75	% conf.lim. above
Indicators for Southern NI	EAC MSW PFA Insert data from 2016 here 25	N reg	Slope 0.000034	Intercept 3.21	r <sup>2</sup> 0.47	Median PFA in 2016 459472	12.5%ile 5.81	87.5%ile 31.69	Reassess ii Outside 75 <sup>s</sup> below -1	n year 201 % conf.lim. above -1	Outside 75	% conf.lim. above NO
1 Ret. W 25W UK[Sc.] Baddoch NM 2 Ret. W 25W UK[Sc.] Girnoch NM	EAC MSW PFA Insert data from 2016 here 25 60	N reg 28 44	Slope 0.000034 0.000037	Intercept 3.21 8.50	r <sup>2</sup> 0.47 0.43	Median PFA in 2016 459472 459472	12.5%ile 5.81 -3.68	87.5%ile 31.69 54.37	Reassess in Outside 75 below -1 0	n year 201 % conf.lim. above -1 1	Outside 75	% conf.lim. above NO YES
1 Ret. W 25W UK(Sc.) Baddoch NM 2 Ret. W 25W UK(Sc.) Gandoch NM 3 Ret. W 15W UK(Sc.) Girnoch NM 3 Ret. W 15W UK(Sc.) North Eak NM	EAC MSW PFA Insert data from 2016 here 25 60 8211	N reg 28 44 35	Slope 0.000034 0.000037 0.007469	Intercept 3.21 8.50 6670.32	r <sup>2</sup> 0.47 0.43 0.46	Median PFA in 2016 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71	87.5%ile 31.69 54.37 13825.63	Reassess in Outside 75 below -1 0 -1	n year 201 % conf.lim. above -1 1 -1	Outside 75	% conf.lim. above NO YES NO
Indicators for Southern NI 1 Ret. W 25W UK(Sc.) Baddoch NM 2 Ret. W 25W UK(Sc.) North Ski NM 3 Ret. W 15W UK(Sc.) North Ski NM 4 Ret. W MSW UK(Sc.) North Ski NM 4 Ret. W MSW UK(Sc.) North Ski NM	EAC MSW PFA Insert data from 2016 here 25 60 8211 120	N reg 28 44 35 28 29	Slope 0.000034 0.000037 0.007469 0.000095	Intercept 3.21 8.50 6670.32 51.90	r <sup>2</sup> 0.47 0.43 0.46 0.09	Median PFA in 2016 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38	87.5%ile 31.69 54.37 13825.63 206.87 502.49	Reassess in Outside 75° below -1 0 -1	n year 2013 % conf.lim. -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative NO Uninformative NO	% conf.lim. NO YES NO NO YES
Indicators for Southern NI 1 Ret. W 25W UK[Sc.] Baddoch NM 2 Ret. W 25W UK[Sc.] Girnoch NM 3 Ret. W 15W UK[Sc.] North Eis NM 4 Ret. W M5W UK[E&W] Itchen NM 5 Ret. W 15W UK[E&W] Itchen NM 5 Ret. W 15W UK[E&W] Itchen NM	EAC MSW PFA Insert data from 2016 here 255 60 8211 120 524	N reg 28 44 35 28 28 28	Slope 0.000034 0.000037 0.007469 0.000095 0.000353 0.000353	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21	Median PFA in 2016 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34	87.5%ile 31.69 54.37 13825.63 206.87 502.49 896.88	Reassess ii Outside 75 below -1 0 -1 0 -1	n year 2011 % conf.lim. -1 -1 1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative NO Uninformative	% conf.lim. NO YES NO NO YES NO
Indicators for Southern NI 1 Ret. W 2SW UK(Sc.) Baddoch NM 2 Ret. W 2SW UK(Sc.) Gronoch NM 3 Ret. W 1SW UK(Sc.) North Esk NM 4 Ret. W MSW UK(ESW) Tohom NM 5 Ret. W 1SW UK(ESW) Tomon NM 6 Ret. W 1SW UK(ESW) Tomon NM	EAC MSW PFA Insert data from 2016 here 25 60 8211 120 524 104 156	N reg 28 44 35 28 28 28 43 43	Slope 0.000034 0.000037 0.007469 0.000095 0.000353 0.000353 0.000666	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23	87.5%ile 31.69 54.37 13825.63 206.87 502.49 886.88 946.97	Reassess ii Outside 75' below -1 0 -1 0 -1 0 0 0 0 0	n year 2011 % conf.lim. -1 1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative NO Uninformative	% conf.lim. NO YES NO NO YES NO NO NO
1 Ret: W 2SW UK[Sc.] Baddoch NM 2 Ret: W 2SW UK[Sc.] Ginnoch NM 3 Ret: W 2SW UK[Sc.] Ginnoch NM 3 Ret: W SW UK[Sc.] North Exe NM 4 Ret: W SW UK[EXW] Itchen NM 5 Ret: W SW UK[EXW] Frome NM 7 Ret: W SW UK[EXW] Frome NM 7 Ret: W SW UK[EXW] Frome NM	EAC MSW PFA Insert data from 2016 here 25 60 8211 120 524 104 158 17	N reg 28 44 35 28 28 43 43 43	Slope 0.000034 0.000037 0.007469 0.0000953 0.000353 0.000779 0.000666 0.000094	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19	87.5%ile 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07	Reassess ii Outside 75' below -1 0 -1 0 -1 0 0 0 0 0 0	n year 2011 % conf.lim. -1 1 -1 -1 -1 1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative NO Uninformative Uninformative Uninformative	% conf.lim. NO YES NO NO YES NO NO NO NO
1 Ret. W 2SW UK(Sc. ) Baddoch NM 2 Ret. W 2SW UK(Sc. ) Ginoch NM 3 Ret. W 2SW UK(Sc. ) Ginoch NM 8 Ret. W 1SW UK(EAW) I Ichoen NM 4 Ret. W MSW UK(EAW) I Ichoen NM 6 Ret. W 1SW UK(EAW) Frome NM 6 Ret. W 1SW UK(EAW) Frome NM 8 Catch V MSW UK(EAW) Frome NM 8 Catch V MSW UK(EAW) Frome NM 9 Catch V MSW UK(EAW) Frome NM 9 Catch V MSW I UK E Illidar NM 9 Catch V MSW I UK I III I I I I I I I I I I I I I I	EAC MSW PFA Insert data from 2016 here 25 60 8211 120 524 114 156 17 257 257	N reg 28 44 35 28 43 43 43 44 40	Slope 0.000034 0.000037 0.007469 0.00095 0.000353 0.000779 0.000666 0.000094 0.000144	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25 58.98	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86	87.5%ile 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07 259.70	Reassess in Outside 75' below -1 0 -1 0 -1 0 0 0 0 0 0 0 0	h year 2011 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative Uninformative Uninformative Uninformative Uninformative	% conf.lim. NO YES NO NO YES NO NO NO NO
1 Ret: W 25W U(K5.) Baddoch NM 2 Ret: W 25W U(K5.) Gladdoch NM 2 Ret: W 25W U(K5.) Glanoch MM 4 Ret: W M5W U(K5.) Glanoch MM 6 Ret: W M5W U(K5W) Ifchen NM 6 Ret: W M5W U(K5W) Ifchen NM 7 Ret: W M5W U(K5W) Ifchen NM 7 Ret: W M5W U(K5W) Ifchen MM 9 Ret: Freshw 25W U(K) Bab 9 Ret: Freshw 25W U(K) Bab	AC MSW PFA Insert data from 2016 here 25 60 6211 1210 524 104 156 177 257 99	N reg 28 44 35 28 43 43 43 43 44 40 35	Slope 0.000034 0.000037 0.007469 0.000095 0.000353 0.000779 0.000666 0.000094 0.000144 0.000144	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25 58.98 4586.9979	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23 0.21	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86 3042.31	87.5%/ile 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07 73.07 259.70 9479.53	Reassess in Outside 75' below -1 0 -1 0 -1 0 0 0 0 0 0 0 1	n year 201 % conf.im. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative YES	% conf.lim. NO YES NO NO YES NO NO NO NO NO NO
I Ret: W 2SW UK(Sc.) Baddoch NM     Ret: W 2SW UK(Sc.) Gimoch NM     Ret: W 2SW UK(Sc.) Gimoch NM     Ret: W 2SW UK(Sc.) North Esk NM     Ret: W 2SW UK(Sc.) North Esk NM     Ret: W 2SW UK(ScW) Thome NM     Ret: W 2SW UK(ScW) Thome NM     Catch W MSW UK(EAW) Thome NM     Catch W MSW UKE Bildar NM     Ret: M 2SW UK(Sc.) North Esk NM     To Ret: W 2SW UK(Sc.) North Esk NM	AC MSW PFA Insert data from 2016 here 25 60 8211 120 524 104 106 117 257 99	N reg 28 44 35 28 43 43 43 44 40 35	Slope 0.000034 0.007469 0.000353 0.000353 0.000353 0.000353 0.000056 0.000054 0.000054 0.000054	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25 58.98 4586.9979	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23 0.21	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86 3042.31 Sum o	87.5%ile 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07 73.07 73.07 9479.53 f scores	Reassess in Outside 75° below -1 0 -1 0 -1 0 0 0 0 0 0 0 0 0 1 -2	n year 201 % conf.im. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative	% conf.lim. NO YES NO YES NO YES NO NO NO NO NO NO NO
Indicators for Southern NI 1 Ret. W 25W UK5-3 Badds-ch MM 2 Ret. W 25W UK5-3 Comech NM 3 Ret. W 15W UK5-3 Comech NM 3 Ret. W 15W UK5-3 North Fax NM 4 Ret. W 15W UK5RW1 fichern NM 6 Ret. W 15W UKERW1 Fioren SM 7 Ret. W 15W UKERW1 Fioren SM 7 Ret. W 15W UKERW1 Fioren SM 8 Ret. Freshw 25W UKN1 Blach 10 Ret. Freshw 25W UKN1 Blach	AC MSW PFA Insert data from 2016 here 8211 120 524 104 106 107 257 99	N reg 28 44 35 28 43 43 43 44 40 35	Slope 0.000034 0.000037 0.000095 0.000095 0.000094 0.000094 0.000144 0.000144	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25 58.98 4586.9979	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23 0.21	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86 3042.31 Sum o	87.5%/ile 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07 259.70 9479.53 f scores	Reassess in 2015 10 10 10 10 10 10 10 10 10 10 10 10 10	n year 201 % conf.im. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative YES Indicators do not	% conf.lim. above NO YES NO YES NO NO NO NO NO NO NO NO NO NO
1 Ret. W 25W UK(5c) Baddoch NM 2 Ret. W 25W UK(5c) Grench NM 2 Ret. W 25W UK(5c) Grench NM 4 Ret. M 5W UK(2c) Grench SA M 4 Ret. M 5W UK(2c) Urbin NA 6 Ret. W 35W UK(2c) Urbin NA 6 Ret. W 35W UK(2c) Urbin NA 6 Ret. W 25W UK(2c) Urbin NA 9 Ret. Frauha 25W UK(3c) Home NA 9 Ret. Frauha 25W UK(3c) North Ex NM	EAC MSW PFA	N reg 28 44 35 28 28 43 43 43 43 44 40 35	Slope 0.00034 0.00035 0.00035 0.00035 0.00035 0.00035 0.00035 0.00034 0.000144 0.0036431	Intercept 3.21 8.50 6670.32 51.90 89.89 32.17 113.77 -26.25 58.98 4586.9979	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23 0.21	Median PFA in 2016 459472 459472 459472 459472 459472 459472 459472 459472 459472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86 3042.31 Sum o	87.5%//e 31.69 54.37 13825.63 206.87 502.49 896.68 946.97 7.3.07 259.70 9479.53 \$ scores	Reassess in 2014	n year 201 % conf.im. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Winformative NO Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative	% conf.lim. above NO YES NO NO NO NO NO NO NO NO NO NO
1 etc. W 330 UKGC   Bardson MU 2 etc. W 330 UKGC   Bardson MU 2 etc. W 330 UKGC   Smich NH 3 etc. W 330 UKGC   Smich NH 3 etc. W 330 UKGC   Smich NH 5 etc. W 330 UKGC W   Ichen NH 6 etc. W 330 UKGC   Worth Eak NH 8 etc. Freshw 230 UKGKW   From NH 8 etc. Freshw 230 UKGKW   From NH 8 etc. Freshw 230 UKGK   Smich Eak NH	EAC MSW PFA	N reg 28 44 35 28 28 43 43 43 44 40 35	Slope 0.000034 0.000037 0.007469 0.000095 0.000053 0.000779 0.000666 0.000044 0.000144	Intercept 3.21 8.50 6670.32 51.90 88.89 32.17 113.77 -26.25 58.98 4586.9979	r <sup>2</sup> 0.47 0.43 0.46 0.09 0.21 0.48 0.39 0.57 0.23 0.21	Median PFA in 2016 4559472 4559472 4559472 4559472 4559472 4559472 4559472 4559472	12.5%ile 5.81 -3.68 6378.71 -15.53 1.38 -116.34 -107.23 -39.19 -9.86 3042.31 <b>Sum o</b>	87.5%de 31.69 54.37 13825.63 206.87 502.49 896.88 946.97 73.07 259.70 9479.53 f scores	Reassess is in Outside 75' below -1 0 -1 0 -1 0 -1 0 0 0 0 0 0 1 1 -2	n year 201 % conf.im. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	Outside 75 below NO Uninformative NO Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative Uninformative PFA forecast is an overestimation.	% conf.lim. NO YES NO NO YES NO NO NO NO NO NO NO PFA forecast is underestimatic

## **6. NEAC Framework of Indicators (FWI)**

### Progress in 2015

#### Noting that...

The 2016 re-assessment was **triggered by Northern MSW** stock indicators suggesting forecasts had been under-estimated

However, it was not the Northern stocks which were restricting the fishery, but the southern stocks. So improved Northern stocks would not have resulted any possible fishery

Therefore ICES have provided an alternative FWI, in which only the limiting stocks are assessed: so this 2016 version is based on only southern stocks

## ICES recommend this is the version used by NASCO in the future

FWI is applicable for the next two years (2017 and 2018)

To synchronize the Greenland and Faroes re-assessment/FWI cycle – full catch advice could be requested in 2018 (assuming no reassessment necessary in 2017) and a new FWI, to start a new three-year-cycle

FWINEAC	2017		Indicators suggest:			PFA forecast OK or overestimated						
ndicators for Northern N	EAC 1SW PE	^							Pasemeri	n un ar 201	72	
indicators for Northern N	EAC 13WFF	•							Outside 75	% conf.lim.	Outside 75% a	confidence limits
	Insert data from					Median PFA						
	2016 here	N reg	Slope	Intercept	ŕ	in 2016	12.5%ile	87.5%ile	below	above	below	above
1 Returns all ISW NO PFA est	255260	32	0.574829	-88479.71	0.95	630816	230948.47	317314.48	-1		NO	NO
2 Survivals W 15W NO Imsa 3 Survivals H 15W NO Imsa	2.9	32	0.000012	-3.75	0.46	630816	-0.32	8.01	0		Uninformative	NO
4 Counts all NO Øvensåa (1SW)	3215	17	0.002353	574.91	0.27	630816	1004.81	3114.11	-1	,	NO	YES
5 Counts all NO Nausta (1SW)	1744	18	0.002012	-34.97	0.28	630816	333.48	2134.62	.1	-1	NO	NO
6 Catch rT&N 1SW FI	8255	17	0.0139136	1689.7437	0.39	630816	1851.30	19081.99	-1	-1	NO	NO
							Sum c	f scores	-4	-4	Indicators do not	Indicators do n
											suggest that the PFA forecast is an	suggest that the PFA forecast is
											overestimation.	underesimatio
ndicators for Northern N	EAC MSW PF	A							Reassessi	n year 201	77	
	Insert data from					Median PFA			Outside 75	% conf.lim.	Outside 7	5% conf.lim.
	2016 here	N reg	Slope	Intercept	1	in 2016	12.5%ile	87.5%ile	below	above	below	above
1 PFA-MSW-CoastNorway	211073	32	0.358088	-14199.06	0.87	631049	176983.63	248560.65	-1	-1	NO	NO
2 Orkla counts	6131	17	0.013501	-3554.83	0.57	631049	3071.09	6859.07	-1		NO	NO
3 Counts all NO Nausta 4 Performanti 2014 NO 054 est	1744	18	0.003915	-1315.88	0.34	631049	294.82	2014.50	1		NO	NO
5 Catch W rT&N 2SW FI	3562	17	0.0068946	-1388.331	0.32	631049	103.49	5821.54			NO	NO
o calci witan zawn							Sum o	f scores	-5	-5		
											Indicators do not	Indicators do n
											PFA forecast is an	PFA forecast is
											overestimation.	underestimatio
indicators for Southern I	NEAC 1SW PF	A							Reassess i	n year 201	7?	
ndicators for Southern I	NEAC 1SW PF	A				Marian DFA			Reassess in Outside 75	n year 201 % conf.lim.	7? Outside 7	5% conf.lim.
ndicators for Southern I	Insert data from 2016 here	A N reg	Slope	Intercept	r	Median PFA in 2016	12.5%ile	87.5%ile	Reassess in Outside 75 below	n year 201 % conf.lim. above	7? Outside 7 below	5% conf.lim. above
1 Ret. W 15W UK(E&W) Itchen M	Insert data from 2016 here 359	N reg	Slope 0.000283	Intercept 8.58	r <sup>2</sup> 0.23	Median PFA in 2016 724326	12.5%ile -37.02	87.5%ile 464.44	Reassess in Outside 75 below 0	n year 201 % conf.lim. above -1	7? Outside 7 below Uninformative	5% conf.lim. above NO
1 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Frome M	Insert data from 2016 here 359 156	A N reg 28 43	Slope 0.000283 0.000540	Intercept 8.58 -25.75	r <sup>2</sup> 0.23 0.37	Median PFA in 2016 724326 724326	12.5%ile -37.02 -172.41	87.5%ile 464.44 902.87	Reassess in Outside 75 below 0 0	n year 201 % conf.lim. above -1 -1	7? Outside 7 below Uninformative Uninformative	5% conf.lim. above NO NO
1 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Frome M 3 Ret. W 15W UK(Sc.) North Esk M	Insert data from 2016 here 359 156 8211	A N reg 28 43 35	Slope 0.000283 0.000540 0.006730	Intercept 8.58 -25.75 4017.16	r <sup>2</sup> 0.23 0.37 0.61	Median PFA in 2016 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84	87.5%ile 464.44 902.87 12100.57	Reassess in Outside 75 below 0 0 -1	n year 201 % conf.lim. above -1 -1 -1	7? Outside 7 below Uninformative NO	5% conf.lim. above NO NO NO NO
1 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Frome M 3 Ret. W 15W UK(Sc). North Esk M 4 Surv. W 15W UK(Sc). North Esk M	LINEAC 1SW PF Insert data from 2016 here 359 156 8211 10.8	A N reg 28 43 35 27	Slope 0.000283 0.000540 0.006730 2.153E-05	Intercept 8.58 -25.75 4017.16 -10.18085	r <sup>2</sup> 0.23 0.37 0.61 0.56	Median PFA in 2016 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24	87.5%ile 464.44 902.87 12100.57 15.07	Reassess in Outside 75 below 0 -1 0	n year 201 % conf.lim. -1 -1 -1	77 Outside 71 Delow Uninformative NO Uninformative NO	5% conf.lim. NO NO NO NO
1 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 3 Ret. W ISW UK(E&W) Frome M 4 Surv. W ISW UK(NI) Bush M 5 Ret. Freshw ISW UK(NI) Bush M 5 Ret. Freshw ISW UK(NI) Bush M	VEAC 1SW PF Insert data from 2016 here 369 156 8211 10.8 1387 500	N reg 28 43 35 27 41	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684	Intercept 8.58 -25.75 4017.16 -10.18085 450.65	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26	Median PFA in 2016 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.60	87.5%ile 464.44 902.87 12100.57 15.07 1726.39 3871 99	Reassess in Outside 75 below 0 0 -1 0 -1	n year 201 % conf.lim. -1 -1 -1 -1 -1	7? Outside 7 Uninformative Uninformative NO Uninformative NO	5% conf.lim. NO NO NO NO NO YES
1 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 3 Ret. W ISW UK(Sc.) North Esk M 4 Surv. W ISW UK(Sc.) North Esk M 4 Surv. W ISW UK(N) Bush M 5 Ret. Freshw ISW UK(N) Bush 6 Ret. W ISW UK(E&W) Dee M	VEAC 1SW PF Insert data from 2016 here 359 156 8211 10.8 1387 5000	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.39 3871.99 <b>f scores</b>	Reassess in Outside 75 below 0 -1 -1 -1 -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	7? Outside 7 Uninformative Uninformative NO Uninformative NO NO	5% conf.lim. NO NO NO NO NO YES
I Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Itchen M 3 Ret. W 15W UK(E&W) Frome M 4 Surv. W 15W UK(Sc.) North Esk M 4 Surv. W 15W UK(NI) Bash M 6 Ret. Fresht SUW UK(NI) Bash M 6 Ret. W 15W UK(E&W) Dee M	VEAC 1SW PF Insert data from 2016 here 369 156 8211 10.8 1387 5000	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.39 3871.99 f scores	Reassess in Outside 75 below 0 -1 0 -1 -1 -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -4	77 Outside 71 Delow Uninformative NO Uninformative NO NO Indicators do not suggest that the	5% conf.lim. above NO NO NO NO YES Indicators do n support that the
1 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 3 Ret. W ISW UK(E&W) Frome M 3 Ret. W ISW UK(E&W) Frome M 4 Swr.W ISW UK(N) Bush M 5 Ret. Freshw ISW UK(R&W) Dee M	Insert data from 2016 here 359 156 8211 10.8 1387 5000	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.39 3871.99 <b>f scores</b>	Reassess in Outside 75 below 0 0 -1 0 -1 -1 -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1	77 Outside 71 below Uninformative Uninformative NO NO Indicators do not suggest that the PFA forecast is an	8% conf.lim. above NO NO NO NO YES Indicators do n suggest that th 1 PFA forecast is
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I Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Frome M 3 Ret. W ISW UK(E&W) Frome M 4 Surv. V USW UK(NI) Bush M 4 Surv. V ISW UK(NI) Bush M 6 Ret. Pethyl SVW UK(E&W) Dee M	IEAC 1SW PF Insert data from 2016 here 309 156 8211 10.8 1387 5000	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684 0.00035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.33 3871.99 f scores	Reassess in Outside 75 below 0 0 -1 0 -1 -1 -1 -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1	7? Outside 7 below Uninformative Uninformative NO Uninformative NO NO Indicators do not suggest that the PRA forecast is an overestimation.	8% conf.lim. NO NO NO NO YES Indicators do n suggest that th PFA forecast is: underestimatio
1 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Frome M 4 Surv. W 15W UK(E&W) Tome M 4 Surv. W 15W UK(N) Bash M 6 Ret. Festh V5W UK(N) Dee M 6 Ret. W 15W UK(E&W) Dee M	IEAC 1SW PF Insert data from 2016 here 359 156 8211 10.8 1387 5000	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.153E-05 0.000684 0.00035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	2 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.33 3871.99 f scores	Reassess in Outside 75 below 0 -1 -1 -1 -3 Reassess in	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	7? Outside 7 below Uninformative NO Uninformative NO NO NO Indicators do not sugges that the PFA forecast is an overestimation.	8% conf.lim. NO NO NO NO YES Indicators do n suggest that th PPA forecast is i underestimatio
1 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Forme M 3 Ret. W ISW UK(E&W) Forme M 4 Surv. V ISW UK(NI) Bush M 6 Ret. Fesh VSW UK(IK) Bush M 6 Ret. Fesh VSW UK(IK) Bush M 6 Ret. W ISW UK(E&W) Dee M	Insert data from 2016 here 309 156 8211 10.8 1387 5000 NEAC MSW PI	N reg 28 43 35 27 41 24	Slope 0.000283 0.000540 0.006730 2.1536-05 0.000684 0.0035444	8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ile 464.44 902.87 12100.57 15.07 1726.39 3871.99 f scores	Reassess in Outside 75 below 0 0 -1 0 -1 -1 -1 -3 Reassess in Outside 75	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	77 Outside 77 Delow Uninformative Uninformative Uninformative NO NO Indicators do not suggest that the PA forecast is an overestimation. 77 Outside 77	5% conf.lim. NO NO NO NO NO YES Indicators do n suggest that th PFA forecast is. underestimatio
1 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Itchen M 2 Ret. W ISW UK(E&W) Frome M 8 EW. VISW UK(E&W) Frome M 4 Surv. W ISW UK(NI) Bush M 6 Ret. Freshw SSW UK(IV) Bush M 6 Ret. Freshw SSW UK(E&W) Dee M	IBAC 1SW PF	A N reg 28 43 35 27 41 24 FA	Slope 0.000283 0.006730 2.1538-05 0.000684 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	2 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c	87.5%ie 464.44 902.87 12100.57 15.07 1726.39 3871.99 f scores	Reassess in Outside 75 below 0 0 -1 -1 -1 -3 Reassess in Outside 75 below	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	77 Cutside 71 Below Uninformative Uninformative NO Uninformative NO Indicators do not suggest that the PFA forecast is an overestimation. 77 Outside 77 Dotside 77 Below	5% conf.lim. NO NO NO NO YES Indicators do n suggest that th PFA forecast is. underestimatio
1 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Itchen M 2 Ret. W 15W UK(E&W) Frome M 3 Ext. W 15W UK(E&W) Frome M 4 Surv. W 15W UK(NI) Bash M 5 Ret. Fesh W 15W UK(NI) Bash M 5 Ret. Fesh W 15W UK(E&W) Dee M	Insert data from 2016 here 2016 here 2019 10.8 1387 5000 NEAC MSW PI Insert data from 2016 here 25	N reg 28 43 35 27 41 24 FA N reg 28 28	Slope 0.000283 0.000540 0.006740 2.153E-05 0.000684 0.0035444 Slope 0.00034	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 <b>Sum c</b> 12.5%ile 5.81	87.5%ile 464.44 902.87 12100.57 15.07 1726.33 3871.99 f scores 87.5%ile 31.69	Reassess in Outside 75 below 0 0 -1 0 -1 -1 -3 Reassess in Outside 75 below -1	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	77 Cutside 77 below Uninformative Uninformative Uninformative NO Uninformative NO Uninformative NO Indicators do not suggest that the PFA forecast is an overestimation. 77 Cutside 77 below NO	5% conf.lim. above NO NO NO NO YES Indicators.do n suggest that th PFA forecast is underestimatio 5% conf.lim. above NO
I Ret: W 35W UK(E&W) Itchen M 2 Ret: W SUK UK(E&W) Itchen M 2 Ret: W SUK UK(E) North E&M 4 Surv. W SUK UK(E), North E&M 4 Surv. W SUK UK(E), North E&M 6 Ret: Yew W SWK UK(E), North E&M 6 Ret: W SWK UK(E), North E&M Ret: W SWK UK(E), Baddoch MM	Insert data from 2016 here 2016 here 309 156 8211 10.6 1387 5000 VEAC MSW PI Insert data from 2016 here 25 60	<ul> <li>N req 28 43 35 27 41 24</li> <li>FA</li> <li>N reg 28 44</li> </ul>	Slope 0.000283 0.000540 2.1538-05 0.000644 0.0035444 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296 Intercept 3.21 8.50	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31	Median PFA in 2016 724326 724326 724326 724326 724326 724326 724326 724326 724326 724326 724326 724326 724326 724326	12.5%ile -37.02 -172.41 5683.84 -4.24 185.10 425.69 <b>Sum c</b> 12.5%ile 5.81 -3.68	87.5%ile 464.44 902.87 12100.57 1756.33 3871.99 f scores 87.5%ile 31.69 54.37	Reassess in Outside 75 below 0 0 -1 0 -1 -1 -1 -3 Reassess in Outside 75 below -1 0	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	77 Cutside 71 below Uninformative NO Uninformative NO Indicators do not suggest that the PFA forecast is an oversetimation. 77 Cutside 71 below NO Uninformative NO	5% conf.lim. above NO NO NO NO YES Indicators do n suggest that th PFA forecast is underestimatio 9% conf.lim. above NO YES
Ret. W 35W UK(E&W) Itchen M 2 Ret. W 35W UK(E&W) Itchen M 2 Ret. W 35W UK(E&W) Frome M 4 Surv. W 35W UK(F), North E& M 4 Surv. W 35W UK(F), North E& M 6 Ret. W 35W UK(F), North E& M 6 Ret. W 35W UK(E&W) Dee M 1 Ret. W 35W UK(E, ) Baddoch NM 7 Ret. W 35W UK(E, ) Baddoch NM 7 Ret. W 35W UK(E, ) Gimon NM	Insert data from 2016 here 399 156, 8211 1387 5000 VEAC MSW PI Insert data from 2016 here 25 60 8211	<ul> <li>N req 28 43 35 27 41 24</li> <li>FA</li> <li>N reg 28 44 35</li> </ul>	Slope 0.000283 0.006730 2.1538-05 0.000684 0.0035444 Slope 0.000024 0.000024 0.000024	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296 Intercept 3.21 8.500 6670.32	r <sup>2</sup> 0.23 0.37 0.61 0.26 0.31 r <sup>2</sup> 0.47 0.43 0.44	Median PFA in 2016 724326 7245772 7459772	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 <b>Sum c</b> 12.5%ile 5.81 -3.88 6378.71	87.5%ile 464.44 902.87 12100.57 1726.39 3871.99 f scores 87.5%ile 31.68 54.37 13625.63	Reassess in           Outside 75           below           0           -1           -3           -1           -3           Outside 75           below           -1           -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	77 Cutside 7 below Uninformative NO Uninformative NO Uninformative NO Indicators do not suggest that the PA forecast is an overestimation. 77 Cutside 7 below NO Uninformative NO	5% confilm. NO NO NO NO NO NO NO VES Indicators do re suggest that the PFA forecast is, under stimatic \$% confilm. above NO YES NO NO NO NO NO NO NO NO NO NO
I Ret. W 1SW UK(E&W) Itchen M     Ret. W 1SW UK(E&W) Itchen M     Ret. W 1SW UK(E&W) Frome M     Ser. W 1SW UK(E&W) Frome M     Ser. V 1SW UK(E&W) K(W) Bush M     Ser. Freshw 3SW UK(W) Bush M     Ret. W 1SW UK(E&W) Dee M	VEAC 1SW PF Insert data from 2016 here 309 156 8211 10.08 1387 5000 VEAC MSW PI Insert data from 2016 here 25 60 8211 120	<ul> <li>N req 28 43 35 27 41 24</li> <li>FA</li> <li>N reg 28 44 35 28</li> </ul>	Siope 0.000283 0.000540 0.006730 2.1536-054 0.00035444 0.0035444 0.0035444 0.0035444	Intercept 8.58 -25.75 4017.16 -10.18085 450.65 -418.4296 Intercept 3.21 8.50 6670.32 51.90	r <sup>2</sup> 0.23 0.37 0.61 0.56 0.26 0.31 r <sup>2</sup> 0.47 0.43 0.46 0.09	Median PFA in 2016 724326 7245772 7455772 7455772	12.5%ile -37.02 -172.41 5683.84 -4.24 165.10 425.69 Sum c 5.81 -3.68 6378.71 -15.53	87.5%ile 464.44 902.87 12100.57 15.070 1726.39 3871.99 f scores 87.5%ile 31.69 54.37 13826.63 206.87	Reasess in Outside 75 below 0 0 -1 -1 -1 -3 Reasess in Outside 75 below -1 0 -1 0 -1 -1 -1 -1 -3	n year 201 % conf.lim. -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 	77 Cusside 77 below Uninformative NO Uninformative NO	9% conf lim. above NO NO NO NO NO NO NO NO NO NO
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# 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:

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

#### Acknowledgements

Members (23) of participating countries (10) to the Working Group on North Atlantic Salmon, 30 March–8 April 2016, in ICES HQ, Copenhagen, Denmark

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