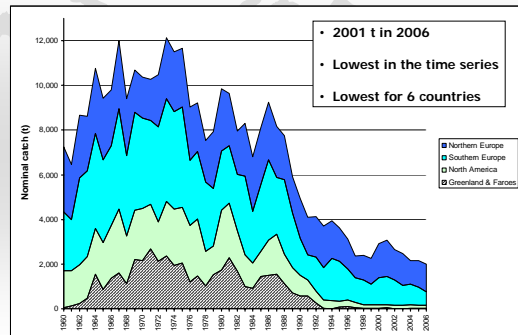


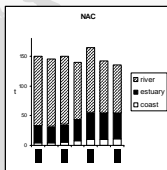
## ICES Scientific Advice to NASCO Atlantic salmon in the North Atlantic Area



## Nominal catches of salmon



## Nominal catches of salmon



Mixed stock fisheries, primarily coastal fisheries, present particular threats to stock status

### North American Commission

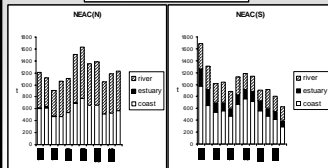
- Coastal fisheries are small, predominantly from aboriginal food fisheries

### Northern North-East Commission

- Fluctuating harvest, approximately 50:50
- No coastal harvest in Iceland or Finland

### Southern North-East Commission

- Large declines over time period
- Mostly in coastal fisheries



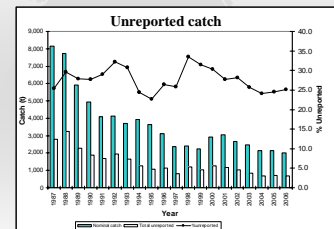
## Catch and Release & Unreported catches

### Catch and Release

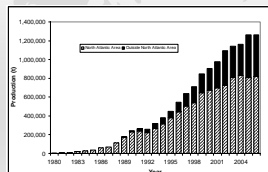
- Large differences by country
  - 18% (Iceland) to 82% (Russia)
  - Generally increasing over time
- ~154 000 fish released in 2006

### Unreported catches

- 670 t in 2006
  - 4% decrease
  - ~25% of reported
- 604 t - NEAC
- ~56 t - NAC
- 10 t - WG

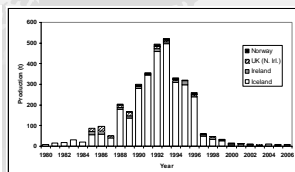


## Farming/Sea Ranching of Atlantic Salmon



### Farmed salmon

- North Atlantic wide - 817,000 t
- Worldwide - in excess of 1,200,000 t
- 630 times nominal catch



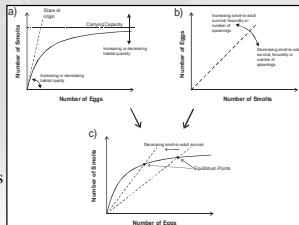
### Ranched salmon

- 9 t in 2006 - similar to 2005
- Iceland ceased operations in 1998

NASCO has asked ICES to report on significant, new or emerging threats to, or opportunities for, salmon conservation and management

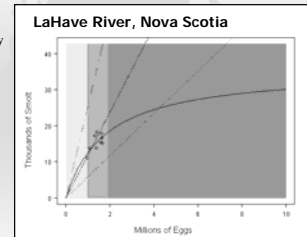
### Recovery potential of Bay of Fundy and Southern Upland salmon populations

- Equilibrium modelling approach (Beverton-Holt) to assess expected population response to various recovery activities
  - 2 part life cycle
    - eggs to smolts & smolts to eggs
  - 2 parameters
    - slope at origin and carrying capacity
- **Equilibrium** occurs at the abundance level where production of smolts from eggs is in balance with production of eggs by smolts
  - Assuming all rates and carrying capacity remain unchanged



### Recovery potential of Bay of Fundy and Southern Upland salmon populations

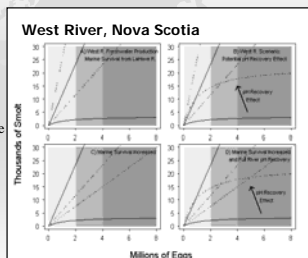
- Single threat examined
  - Marine survival
    - Freshwater survival is relatively good
- **low** marine survival
  - Population isn't viable
- **average** marine survival
  - Equilibrium at 50-100% of the conservation requirement
- **high** marine survival
  - Equilibrium at >100% of the conservation requirement



light shading - < 50% egg requirement  
medium shading - 50-100% egg requirement  
dark shading - > 100% egg requirement

### Recovery potential of Bay of Fundy and Southern Upland salmon populations

- Multiple threats examined
  - Acidification and marine survival
- pH recovery
  - Equilibrium below 50% of the conservation requirement
- Improved marine survival
  - Equilibrium well below 50% of the conservation requirement
  - May not be viable
- Improved marine survival and pH recovery
  - Equilibrium at >100% of the conservation requirement



### Recovery potential of Bay of Fundy and Southern Upland salmon populations

- Useful approach for evaluating the potential for recovery of salmon populations
- Case studies illustrate the limiting effect of recovery actions focused only on improving freshwater habitat

#### LaHave River

- Recent marine survival rates are high that if sustained, equilibrium is above conservation limits
- Freshwater recovery actions may or may not be effective

#### West River

- Freshwater habitat degradation (acidification) limits population growth even with increased marine survival
- Both threats need to be addressed

### Timing and nature of density dependence in Atlantic Province salmon populations

- **Density dependence** - regulation of population size by mechanisms controlled by population size (i.e. resource availability)
  - analyses for it are important for reference point estimation, assessment of extinction risk, evaluating recovery activity effectiveness
- Within freshwater and marine datasets no single pattern emerged
  - Carrying capacity for age 1 was highly variable
- Variability in timing of density dependence and carrying capacity highlights the need for population-specific data to establish reference points and/or planning recovery or enhancement activities
  - The populations with the 3 lowest age 1 carrying capacities are the southern most and are experiencing low marine survival
  - Freshwater production has the potential to limit population growth even with improved marine survival

### Monitoring interactions between aquaculture and wild fisheries in Norway

- Secondary effects of salmon sea lice may lead to underestimation of negative impacts on wild salmon stocks
- Sea lice infestation can be significantly reduced given effective regulations, enforcement and coordinated de-lousing by fish farmers
- Recapturing escaped farm salmon can be a resource intensive effort with a low probability of success
- With the proper baseline dataset, identifying the origin of escaped farm salmon can be conducted with high precision.

### Cessation of mixed stock fisheries in Irish coastal waters from 2007

To align with best international practice, comply with scientific advice from ICES, meet NASCO objectives and to afford greater protection to stocks designated under the EU Habitats Directive  
**the Irish Government decided to end the at sea mixed-stock fisheries in 2007**

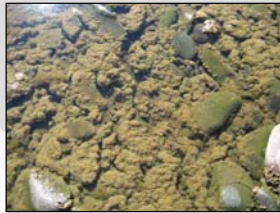
- Fisheries only on rivers shown to be meeting CLs
  - Catch level set to allow 75% probability of meeting CLs
  - 43 rivers in 2007
- Two estuarine fisheries remain
  - Catch option exceed a 75% chance of meeting all contributing CLs
- No identifiable surplus in 34 rivers
  - Catch and release permitted if they meet 65% of their CL
- On small rivers with no counter data or with rod catch < 10, no directed fishing (including catch and release)
  - 74 rivers in 2007

### Development of predictive models for returning salmon in Norway

- 1<sup>st</sup> attempt to develop predictive models for Norwegian salmon returns
  - All of Norway,
  - Southern, mid-, and northern Norway
  - River Drammen
- Forecasting 1SW salmon
  - Hydrographic variables, plankton production, the biomass and condition of pelagic marine fish species (i.e. **biomass of herring**), and salmon growth/survival indices (e.g. catches, estimated marine survival rates)
- 1SW predictions to forecast 2SW and 3SW returns
- Precision was variable (lowest in south, highest in north)

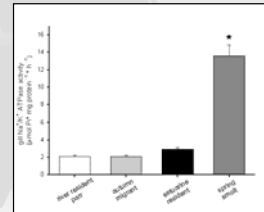
### Human activities impacting on aquatic diversity

- Didymosphenia geminata* (didymo or rock-snot)
  - 1<sup>st</sup> reported occurrence in Canada
  - Freshwater algae - attaches to rocks and can develop into large bottom covering mats
  - Non-toxic and impacts seemed to be restricted to aesthetics
  - Has since been identified in 7 or 13 rivers within Quebec (Matapedia River represents the only prolific occurrence)
- Reported in Iceland since 1994
  - No documented impacts on salmon/trout
- Inadvertent transfer is easily controlled



### Autumn downstream migration of juvenile Atlantic salmon in the UK - possible implications for the assessment and management of stocks

- ~2,500 autumn migrants (~26%)
- Physiologically different than residents
  - Increased salinity tolerance
  - Not sufficient for saltwater challenge
- Autumn migrants remain in lower river/estuary till spring
  - Displacement of life history strategy?
  - Differential survival?
    - Future monitoring will provide information
- Estuaries should be considered as habitat
- Implication for estimating migrating smolt abundance

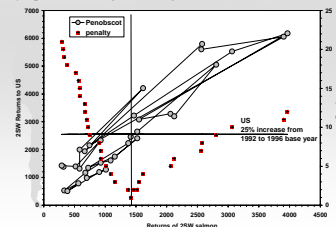


NASCO has asked ICES to provide a framework of indicators which would be used to identify any significant change in the previously provided multi-annual management advice for each Commission area

- ICES provided advice for 2006–2008 and preliminary FWI
- NASCO formed 3-year regulatory measures with 2<sup>nd</sup>/3<sup>rd</sup> years dependant on the acceptance of a finalized FWI
- Study Group on Establishing a Framework of Indicators of Salmon Stock Abundance (SGEFISSA)
  - November 2006 - Halifax, Canada
- ICES reviewed and updated their framework

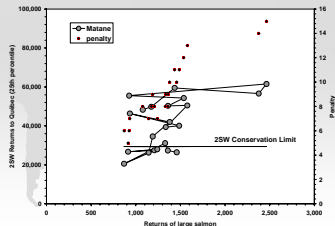
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- Relies on informative relationships between historical monitoring metrics and estimates of population abundance to derive current abundance estimates from contemporary metric values
- Abundance estimates are characterised as meeting or failing to meet fishery-specific management objectives



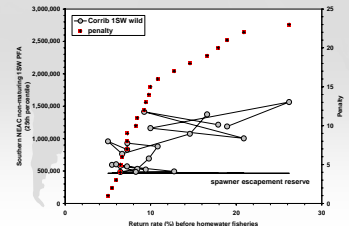
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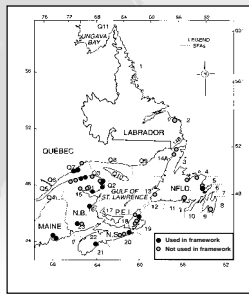
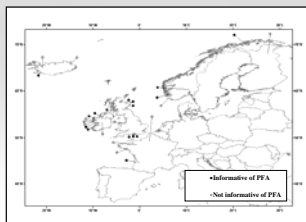
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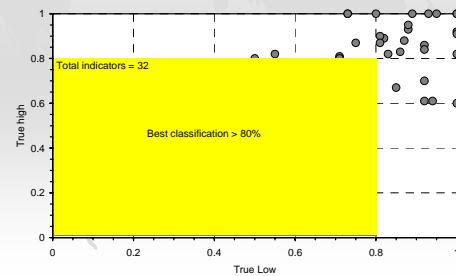
NASCO has asked ICES to provide a framework of indicators which would be used to identify any significant change in the previously provided multi-annual management advice for each Commission area

- Large number of datasets examined
- Datasets pooled according to management objective/stock complex groupings



NASCO has asked ICES to provide a framework of indicators which would be used to identify any significant change in the previously provided multi-annual management advice for each Commission area

- Retained indicator datasets had at minimum a 80% probability of identifying when the management objective would or would not be met based on historic performance



NASCO has asked ICES to provide a framework of indicators which would be used to identify any significant change in the previously provided multi-annual management advice for each Commission area

#### Greenland fishery

- Developed FWI (Excel) based on the contributing stock complexes with direct links to NASCO management objectives

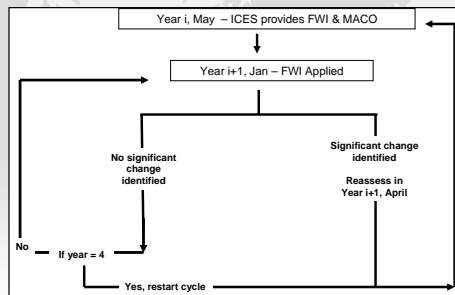
#### Faroese fishery

- No FWI
  - Lack of explicit management objectives
  - No indicator datasets met criteria
    - Southern NEAC non-maturing 1SW stock complex (potential MSW spawners) is hovering around SER
  - No sharing agreement harvestable surplus
  - Only 1 of 4 contributing stock complexes has a quantitative forecast model
    - Southern NEAC non-maturing stock complex (potential MSW spawners) is currently the limiting complex, but may not always be that way

#### West Greenland FWI spreadsheet

Overall Recommendations									
Stock Complex	Stock	Indicator	Probability of Exceeding	Indicator	Probability of Exceeding	Management Objective	Management Objective	Management Objective	Management Objective
Greenland	Greenland 1SW	100%	100%	100%	100%	100%	100%	100%	100%
	Greenland 2SW	100%	100%	100%	100%	100%	100%	100%	100%
	Greenland 3SW	100%	100%	100%	100%	100%	100%	100%	100%
	Greenland 4SW	100%	100%	100%	100%	100%	100%	100%	100%
	Greenland 5SW	100%	100%	100%	100%	100%	100%	100%	100%
Faroese	Faroese 1SW	100%	100%	100%	100%	100%	100%	100%	100%
	Faroese 2SW	100%	100%	100%	100%	100%	100%	100%	100%
	Faroese 3SW	100%	100%	100%	100%	100%	100%	100%	100%
	Faroese 4SW	100%	100%	100%	100%	100%	100%	100%	100%
	Faroese 5SW	100%	100%	100%	100%	100%	100%	100%	100%
Southern NEAC	Southern NEAC 1SW	100%	100%	100%	100%	100%	100%	100%	100%
	Southern NEAC 2SW	100%	100%	100%	100%	100%	100%	100%	100%
	Southern NEAC 3SW	100%	100%	100%	100%	100%	100%	100%	100%
	Southern NEAC 4SW	100%	100%	100%	100%	100%	100%	100%	100%
	Southern NEAC 5SW	100%	100%	100%	100%	100%	100%	100%	100%

## West Greenland FWI timeline



## Regulatory Timeline Scenarios

### Scenario 1

- 2007 - ICES provides FWI & MACO
  - FWI & MARM adopted
- 2008 - FWI applied
  - No significant change identified
  - MARM remain
- 2009 - FWI applied
  - No significant change identified
  - MARM remain
- 2010 - ICES provides FWI & MACO

### Scenario 2

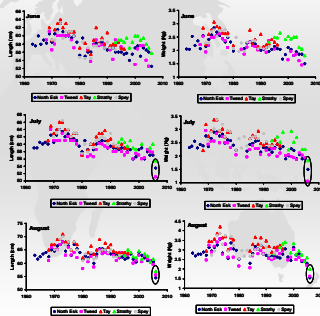
- 2007 - ICES provides FWI & MACO
  - FWI & MARM adopted
- 2008 (or 2009) - FWI applied
  - Significant change identified
  - ICES provides FWI & MACO

### Scenario 3

- 2007 - ICES provides FWI & MACO
  - FWI or MARM not adopted
- 2008 - ICES provides FWI & MACO

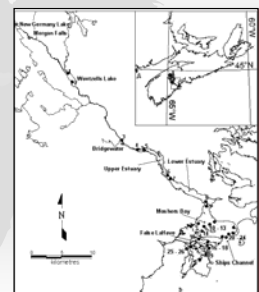
NASCO has asked ICES to examine associations between changes in biological characteristics of all life-stages of Atlantic salmon and variations in marine survival

- Evidence of shorter and lighter grilse in 2006 from UK (Scotland), southern Norway, Swedish, UK (England and Wales) and Ireland
- Evidence of decreased postsmolt growth
- Reduced growth correlated with reduced survival
- Suggest a southerly European phenomena



## Acoustic tracking of migrating Atlantic salmon kelts from the LaHave River, Nova Scotia, Canada

- Kelt tagging project
- Novel data on migration rate, diving behaviour and survival rate
- Opportunity to gain insights into the migration, behaviour and possibly survival rates to northern geographic areas



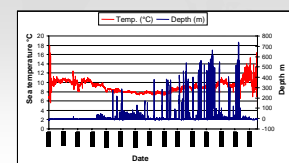
## Monitoring smolt migration in the River Rhine, Germany

- Smolt migration with NEDAP Trail system
  - Investigate migration routes and success in relation to the dammed Rhine delta
  - Before and after approach



## Data Storage Tags and tagging studies in Iceland

- 2005/06 hatchery smolts release with DST (depth and temperature)
- 5 returns in 2006
- Will provide considerable input to our understanding of salmon behaviour at sea



#### **Summary of the Workshop on the Development and Use of Historical Salmon Tagging Information from Oceanic Areas (WKDUHSTI)**

- Recent ICES Workshop that collated historical tag recoveries from across the North Atlantic
- Represents a significant opportunity to advance the state of knowledge of the marine distribution/migration of salmon
- Recommended a follow-up Workshop be held in 2007/08

#### **Report of the Working Group on the Application of Genetics in Fisheries and Mariculture (ICES 2007)**

**ToR - to review and provide recommendations on the application of state of the art Genetic Stock Identification methods, with particular emphasis on evaluating the precision of identifying the population of origin for individual Atlantic salmon**

#### **Excellent a to z summary:**

- Approaches, methods and software programs with practical examples
- Pros and cons of GSI
- Baseline and sample collection guidelines
- Assumptions
- Data quality issues
- Reference list

#### **Primary Recommendation**

As an overriding recommendation we are convinced that in most circumstances individual assignment can give valuable information for Atlantic salmon management and specifically identify the population of origin of individual Atlantic salmon with relatively high probabilities

#### **Overall Recommendation**

- Use it
- Bayesian approach preferred
- All contributing stock complexes/stock groupings should be represented in baseline
  - At minimum; 2 cohorts of 50 samples per cohort, 15 microsatellites re-sampled every 5-10 years
- Calibration between laboratories is required
- Need sufficient unknown samples
- Assess accuracy/precision through simulations
- Assign to river or river groupings
- Consider other emerging markers in future
  - Nuclear and mtDNA SNP's, novel microsatellites...
- Need for development of new statistical methods

NASCO has requested ICES to identify relevant data deficiencies, monitoring needs and research requirements taking into account NASCO's international Atlantic salmon research board's inventory of on-going research relating to salmon mortality in the sea

1. DFC organize a 2<sup>nd</sup> WKDUHSTI workshop
2. NASCO considers facilitating research using new and evolving technologies (e.g. acoustic tags, DST and popup tags)
3. DFC organize a review and standardization of circuli spacing techniques with particular consideration towards computer assisted image analysis techniques
4. NASCO Parties continue, extend and increase monitoring on individual river
5. DFC organize a Study Group to develop NEAC PFA models
6. Greenland Home Rule Government continue to provide fishing activity information
7. NASCO facilitate geographic sampling program for West Greenland



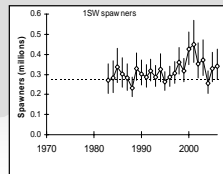
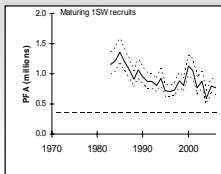


## ICES Scientific Advice to NASCO North-East Atlantic Commission



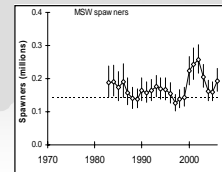
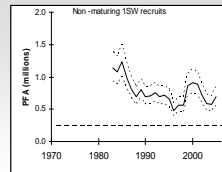
### Northern European maturing 1SW stocks

- PFA lower bound is above the SER indicating an exploitable surplus.
  - at full reproductive capacity prior to the commencement of distant water fisheries
- Spawner estimate lower bound is above the CL.
  - at full reproductive capacity after homewater fisheries have taken place
- In the absence of specific management objectives for this stock complex the precautionary approach is to fish only on maturing 1SW salmon from rivers where stocks have been shown to be at full reproductive capacity



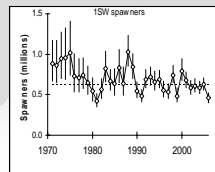
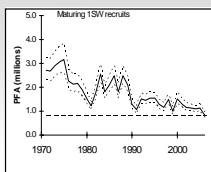
### Northern European non-maturing 1SW stocks

- PFA lower bound is above the SER indicating an exploitable surplus.
  - at full reproductive capacity prior to the commencement of distant water fisheries.
- Spawner estimate lower bound is above the CL.
  - at full reproductive capacity after homewater fisheries have taken place
- In the absence of specific management objectives for this stock complex the precautionary approach is to fish only on maturing 1SW salmon from rivers where stocks have been shown to be at full reproductive capacity



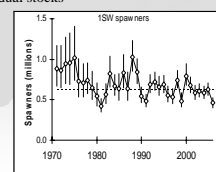
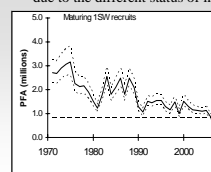
### Southern European maturing 1SW stocks

- PFA lower bound is below the SER
  - at risk of suffering reduced reproductive capacity prior to the commencement of distant water fisheries
- Spawner estimate midpoint and upper bound are below the CL.
  - is suffering reduced reproductive capacity after homewater fisheries have taken place



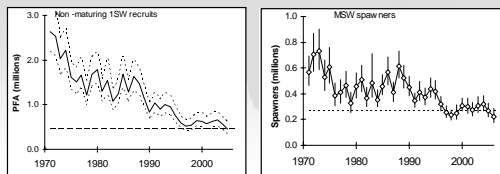
### Southern European maturing 1SW stocks

- In the absence of specific management objectives
  - precautionary approach is to fish only where stocks are at full reproductive capacity
- Reductions in exploitation are required
  - to increase the probability of the complex meeting conservation limits
- Mixed stock fisheries present particular threats to stock status
  - due to the different status of individual stocks



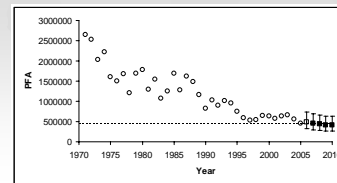
### Southern European non-maturing 1SW stocks

- PFA lower bound is below the SER
  - at risk of suffering reduced reproductive capacity prior to the commencement of distant water fisheries
- Spawner mid-point and lower bound are below the CL
  - is suffering reduced reproductive capacity after homewater fisheries have taken place



### Southern European non-maturing 1SW stocks

- PFA forecasts (2007-2010) remain below the SER
  - no fishing on this complex at West Greenland or Faroes
- In the absence of specific management objectives (*with the exception of West Greenland*)
  - precautionary approach is to fish only where stocks are at full reproductive capacity
- Reductions in exploitation are required
  - to increase the probability of the complex meeting conservation limits
- Mixed stock fisheries present particular threats to stock status
  - due to the different status of individual stocks



### Progress with setting river-specific conservation limits

#### Iceland

- Deriving river specific CLs from catch data, counter data, habitat mapping, wetted area and juvenile surveys
  - Preliminary results - highly variable spawning reference levels
- Next stage will explore if/how CLs can be transported to other rivers

#### UK (Scotland)

- Map based useable wetted area model for salmon is being refined
- Can be used to transport CLs among catchments

#### Norway

- Transporting estimated stock-recruitment relationships for some rivers to data poor rivers based on wetted area

### NASCO has requested ICES to describe the key events of the 2006 fisheries and the status of the stocks

#### Catches

- NEAC – 1846 t, decrease from 2005
  - 92% of North Atlantic catch
- Northern – 1228 t, 3% increase
- Southern – 618 t, 23% decrease
  - lowest in time series

#### Gear and effort

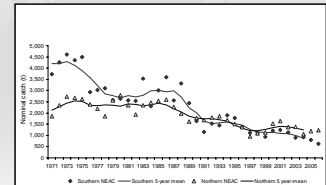
- No significant changes in gear
- General downward trend in effort with variable rod effort

#### Fishing at Faroes in 2005/2006

- No fishing since 2000

#### Significant events in NEAC homewater fisheries in 2006

- Ireland – further TAC reductions
- UK (E&W) further phase out of net fisheries



### NASCO has requested ICES to describe the key events of the 2006 fisheries and the status of the stocks

#### Catch per unit effort (CPUE)

- Southern - general
  - Decrease in net fisheries
  - Increase in rod
- Northern - general
  - Increase in net
  - Increase in many rod

#### Age composition of catches

- Country specific variations, but overall close to 5 and 10 year means

#### Farmed and ranched salmon in catches

- Remains low in most countries (<2% of catch)
- Except for Norway - coastal (33% in 2006), fjordic (19%) and rod (7%)

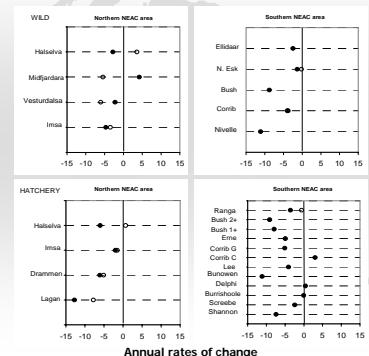
#### National origin of catches

- Irish fisheries - 31 tags non Irish tags were recovered from 5 countries

### NASCO has requested ICES to describe the key events of the 2006 fisheries and the status of the stocks

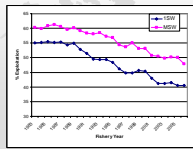
### Marine survival indices for NEAC stocks

- Overall annual decline (1-13%)





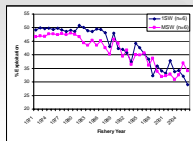
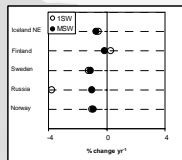
NASCO has requested ICES to describe the key events of the 2006 fisheries and the status of the stocks



#### Exploitation indices

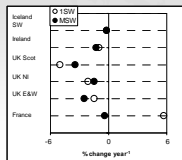
##### Northern NEAC

- 41% 1SW
- 48% MSW
- General decrease over time



##### Southern NEAC

- 29% 1SW
- 34% MSW
- General decrease over time



NASCO has requested ICES to provide any new information on the extent to which the objectives of any significant management measures introduced in recent years have been achieved

Most management measures introduced in recent years have aimed to reduce levels of exploitation on NEAC stocks, to increase freshwater escapement and in some cases to meet river specific CLs

Summary of national objectives, recent management measures and attainment of objectives is detailed within the report

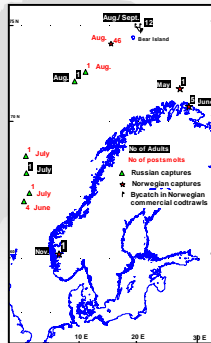
NASCO has requested ICES to provide estimates of by-catch and non-catch fishing mortality of salmon in pelagic fisheries with an assessment of impacts on returns to homewaters

#### SGBYSAL

- Dissolved and will be reformed when data becomes available
- Disaggregated fisheries data generally available but no dedicated postsmolt distribution studies

#### By-catch of salmon in non-targeted catches in 2006

- ICES continues to collate reports on salmon bycatch
- A few Russian and Norwegian reports noted



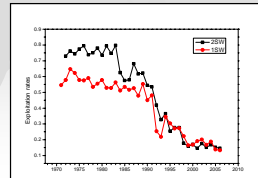
#### ICES Scientific Advice to NASCO North American Commission



#### Status of stocks/exploitation

- The 2006 estimated 2SW spawner midpoint for all six geographic areas, except Newfoundland, were below their conservation limit. Therefore,
  - All six geographic areas, except Newfoundland, are suffering reduced reproductive capacity
  - Newfoundland is at risk of suffering reduced reproductive capacity
- PFA forecasts (2006–2009) non-maturing 1SW are substantially lower than the 2SW CL
- No catch options (2007–2010) for the composite NA stock complex
- River-specific management suggested

- Exploitation in NAC fisheries
  - From 80% to 17% for 2SW salmon
  - From 60% to 17% for 1SW salmon



## Status of stocks/exploitation

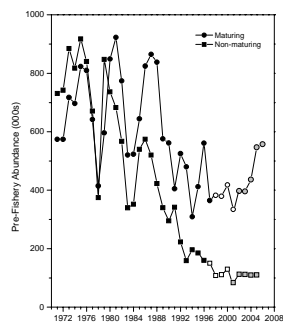
### Pre-fisheries abundance

#### Maturing 1SW salmon

- 2006 maturing PFA estimate
- 2% increase

#### Non-maturing 1SW salmon

- 2005 non maturing PFA estimate
- 5<sup>th</sup> lowest in time series
- 2006-2009 PFA<sub>NA</sub> forecast remains ~115 000



NASCO has requested ICES to describe key events of the 2006 fisheries and the status of the stocks

#### NAC total harvest of 132 t

- Overall 5% decreased
  - 7% decrease small salmon
  - 2% increase large salmon
- Unreported (56 mt)
  - Estimates are incomplete

#### USA

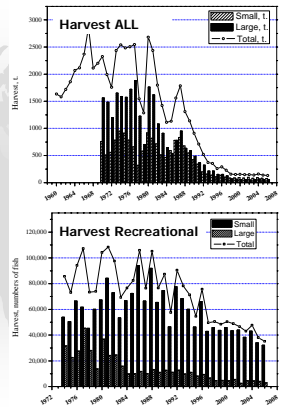
- No fisheries, zero harvest

#### Saint-Pierre and Miquelon

- 3.5 mt – highest in the time series

### Canadian Catches in 2006

- Aboriginal peoples' food fisheries
  - 58.9 t (11% increase)
- Residents fishing for food in Labrador
  - 2.6 mt
- Recreational fishers
  - 32 171 small fish - 5% below 2005
  - 3000 large fish - 27% below 2005



NASCO has requested ICES to describe key events of the 2006 fisheries and the status of the stocks

#### Estimates of total adult abundance by geographic area (1SW)

##### Labrador

- 3% decrease – 2<sup>nd</sup> highest in time series

##### Newfoundland

- 19% increase over 5-yr mean

##### Québec

- 19% increase and equal to 5-yr mean

##### Gulf

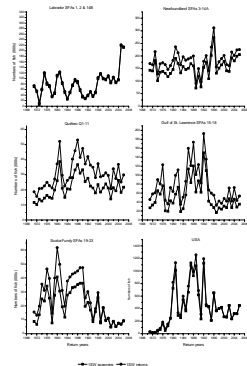
- 23% increase and equal to 5-yr mean

##### Scotia Fundy

- 34% increase and 6<sup>th</sup> lowest

##### USA

- 13% increase



NASCO has requested ICES to describe key events of the 2006 fisheries and the status of the stocks

#### Estimates of total adult abundance by geographic area (2SW)

##### Labrador

- 2% increase and 1% < 5-yr mean
- 40% 2SW CL

##### Newfoundland

- 26% increase and 13% > 5-yr mean
- 112% 2SW CL

##### Québec

- 9% decrease and <12% 5-yr mean
- 65% 2SW CL

##### Gulf

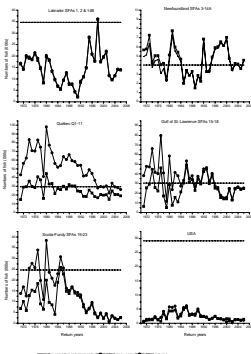
- Similar to 2005 and 11% > 5-yr mean
- 81% 2SW CL

##### Scotia Fundy

- 58% increase but still among lowest
- 10% 2SW CL

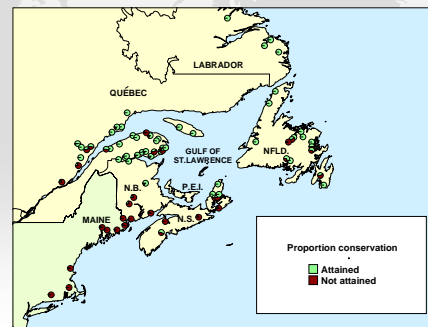
##### USA

- Increased and increase over 5-yr mean
- 6% 2SW CL



NASCO has requested ICES to describe key events of the 2006 fisheries and the status of the stocks

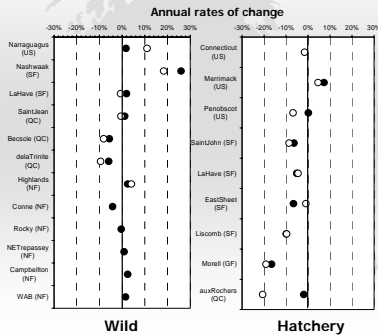
#### Egg depositions in 2006 (all spawners)



**NASCO has requested ICES to describe key events of the 2006 fisheries and the status of the stocks**

**Marine survival indices for NAC stocks**

- Overall annual decline (1-20%)
- Some increases, mostly NF



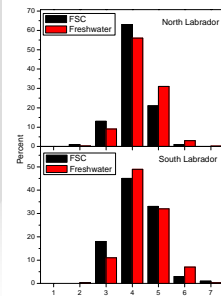
**NASCO has asked ICES to provide a comprehensive description of coastal fisheries including timing and location of harvest, biological characteristics (size, age, origin) of the catch, and potential impacts on non-local salmon stocks**

- In Canada, all Aboriginal Peoples have a constitutional right to harvest for food social and ceremonial purposes (FSC)
- Four subsistence fisheries harvesting salmonids in Labrador in 2006
  - Nunatsiavut Government
  - Innu Nation
  - Labrador residents
  - Labrador Métis Nation
- Fishing gear is multifilament gillnets set in estuarine waters, however some are set in coastal areas/bays
- Catch statistics are based on log book reports and fisheries guardians
- Timing and location details in report

**NASCO has asked ICES to provide a comprehensive description of coastal fisheries including timing and location of harvest, biological characteristics (size, age, origin) of the catch, and potential impacts on non-local salmon stocks**

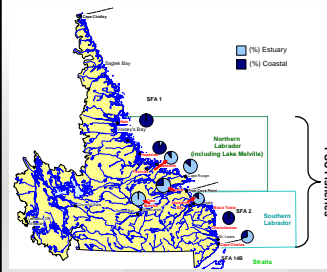
**Results of sampling from Labrador FSCs**

- Opportunistic sampling in 2006 (n=336)
  - 86% 1SW, 8% 2SW and 6% ps
- River ages compared to freshwater samples
  - No difference between distributions
  - Lack of age 1 and 2 suggest southern NAC stocks not contributing
  - Presence of age 5-7 suggest Labrador stocks contributing



**Coastal versus estuary landings**

- 2000-2005**
  - all FSC catches (i.e. all Labrador harvests, except for Lake Melville) were determined as coastal
- 2006**
  - Local expert knowledge surveyed to provide proportions by area



Year	Weight (kg)			Percentages (kg)		Previous methods Percentages (kg)	
	Estuarine	Coastal	Total	Estuarine	Coastal	Estuarine	Coastal
2000	13,278	2,335	15,613	85	15	38	62
2001	13,497	2,792	16,288	83	17	26	74
2002	13,987	3,585	17,572	80	20	23	77
2003	17,485	4,522	22,008	79	21	20	80
2004	24,862	6,787	31,649	79	21	23	77
2005	25,303	6,611	31,914	79	21	35	65
2006	23,169	7,073	30,242	77	23	30	70



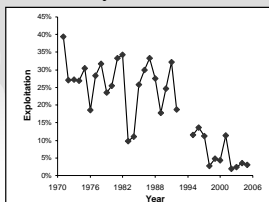
**ICES Scientific Advice to NASCO  
Atlantic salmon in the  
West Greenland Commission**



### Status of stocks/exploitation

- The stock complex at West Greenland to be below conservation limits and thus **suffering reduced reproductive capacity**

- Exploitation rates in the last four years have averaged around 3%



### Status of stocks

#### Newfoundland

- At risk of suffering reduced reproductive capacity (112% of 2SW CL)

#### Labrador

- Suffering reduced reproductive capacity (40% of 2SW CL)

#### Québec

- Suffering reduced reproductive capacity (65% of 2SW CL)

#### Gulf of St. Lawrence

- Suffering reduced reproductive capacity (86% of 2SW CL)

#### Scotia-Fundy

- Suffering reduced reproductive capacity (10% of 2SW CL)

#### USA

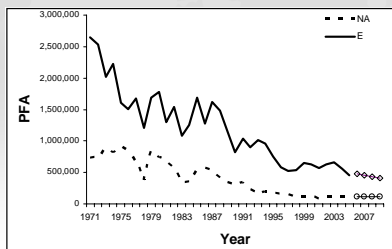
- Suffering reduced reproductive capacity (6% of 2SW CL)

#### Southern European non-maturing 1SW (MSW)

- Suffering reduced reproductive capacity (82% of 2SW CL)

### Pre-fishery abundance forecasts (2007-2009)

- North American and European stock complexes remain among the lowest in time series
- Forecast values remain low



### Management advice

**None of the stated management objectives would allow a fishery at West Greenland to take place in 2007, 2008, or 2009**

- Given zero marine fishing mortality in 2007-2009
  - <3% probability of meeting CL in 4 northern NA regions
  - <1% probability of 10% increase to 2 southern NA regions
  - 64%, 56% and 47% probability (respectively) of meeting the southern NEAC MSW CL
- 36%, 30% and 34% probability of lower returns in 2007-2009 (respectively) compared to mean 2002-2006 returns

### NASCO has requested ICES to describe the events of the 2006 fishery and status of the stocks

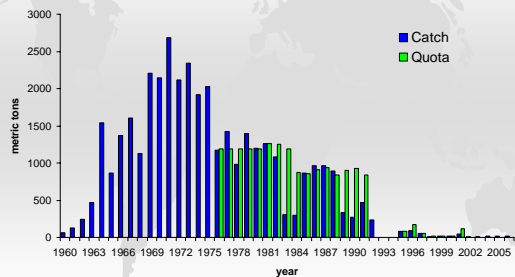
- **April 2006**
  - 2002 KNAPK-NASF Agreement continued
  - Suspension of all fishing for Atlantic salmon within Greenland territorial waters - except for an internal use only fishery
- **May 2006**
  - ICES recommends zero quota
- **June 2006**
  - NASCO agrees to restrict fishery to that used for of internal consumption (~20 mt)
  - Greenlandic Authorities set commercial quota to nil
    - Sale for export forbidden
  - West Greenland Fishery Sampling Agreement (WGC(06)06)
- **August – October 2006**
  - Internal fishery and International sampling effort

### NASCO has requested ICES to describe the events of the 2006 fishery and status of the stocks

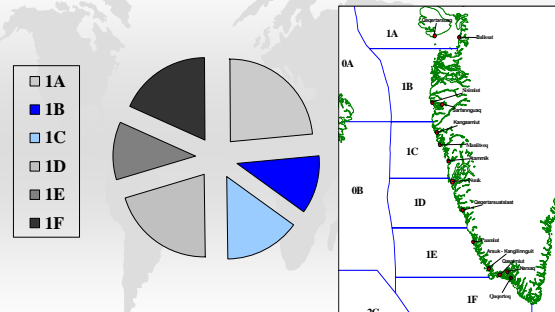
#### Catch and effort in 2006

- 20.7 mt reported
- Distributed across all divisions
- High reported landings in last week (44) of season
  - Possibly due to TV campaign
- Estimated unreported catch of 10mt

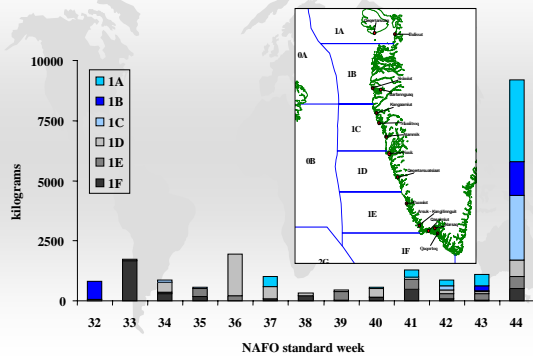
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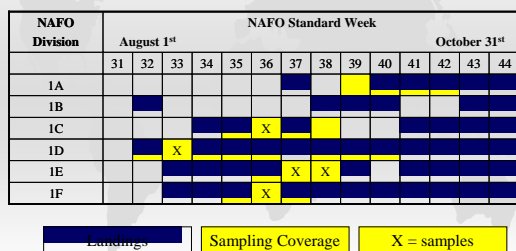
### NASCO has requested ICES to describe the events of the 2006 fishery and status of the stocks



### 2006 International Sampling Program

- 8 Samplers
  - 2 USA, 2 Canada, 1 UK(England & Wales), 1UK(Scotland), 1 Ireland and 1 Denmark
- 5 out of 6 NAFO Divisions sampled
- 10 out of 13 NAFO weeks sampled
  - ~120 sampling days
- 1,253 fish handled (1,209 sampled)
  - 25% of total catch (by weight)
  - Length, weights
  - 1,203 scale samples – 1,194 genetic samples
  - 119 disease samples (ISAv)
  - 99 stomach samples

### 2006 Spatial and Temporal Sampling Coverage



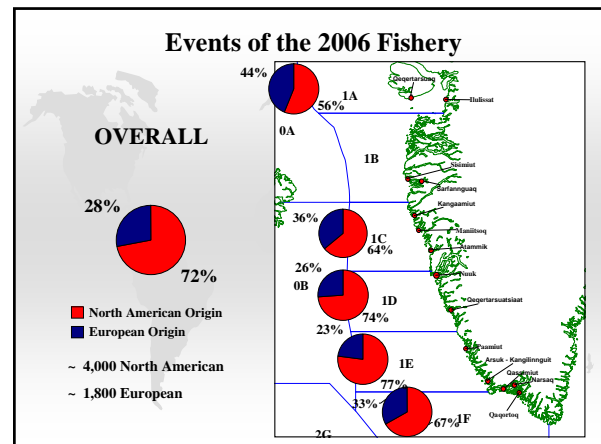
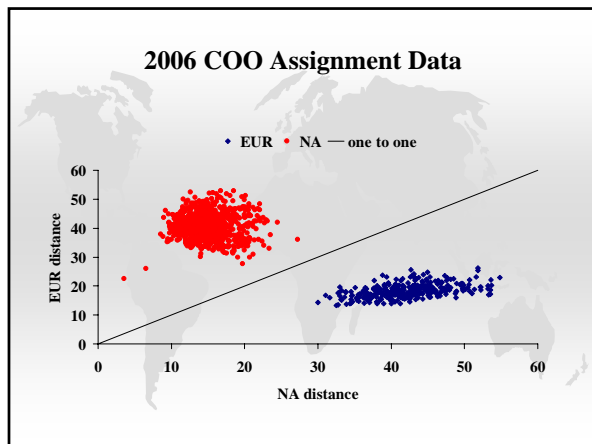
### Over Sampling of Reported Catch

NAFO Division	2002 Landings		2003 Landings		2004 Landings		2005 Landings	
	Reported	Adjusted	Reported	Adjusted	Reported	Adjusted	Reported	Adjusted
1A	14	14	619	619	3,476	3,476	1,166	1,166
1B	78	78	17	17	611	611	2,811	2,811
1C	2,100	2,100	1,621	1,782	3,516	3,516	2,018	2,018
1D	3,752	3,752	648	2,709	2,433	4,929	681	2,730
1E	1,417	1,417	1,274	1,274	2,609	2,609	2,646	2,646
1F	1,661	2,408	4,516	5,912	2,068	2,068	4,465	4,465
Total	9,022	9,769	8,694	12,312	14,712	17,209	13,786	15,835

2006 Landings		
NAFO Division	Reported	Adjusted
1A	4,889	4,889
1B	2,352	2,352
1C	3,085	3,085
1D	4,262	4,262
1E	2,375	2,375
1F	3,777	3,777
Total	20,740	20,740





### Disease (ISAv only) Screening

- 119 disease samples obtained
  - Fish purchased from fishermen
  - Assayed by RTPCR for ISAv only
  - Cell culture is impractical

ISA virus infected fish with internal hemorrhages

ISA virus infected fish with external hemorrhages

**All test results were negative**

### 2006 Tag Recoveries (n=10)

- 4 Carlin
  - USA (Penobscot – 1996)
  - Canada (Miramichi (3))
- 4 Streamer
  - Canada (Restigouche, Miramichi (2), Margaree)
- 1 Visual Implant Elastomer
  - USA (Dennys)
- 1 CWT
- Spain (Tea)

### Special Acknowledgements

Staff from the Greenland Nature Institute

Participants in the West Greenland Program

Knapik

