ICES Advice to NASCO 2005

Walter Crozier
WGNAS Chair

General questions to ICES:

- 2004 catches, landings, unreported catches, catch and release; production of farmed Atlantic salmon and ranched Atlantic salmon
- Significant developments that might assist with management of salmon
- tag release data for 2004

Figure 2.1.1.1 Nominal catches of salmon in four North Atlantic regions, 1960-2004

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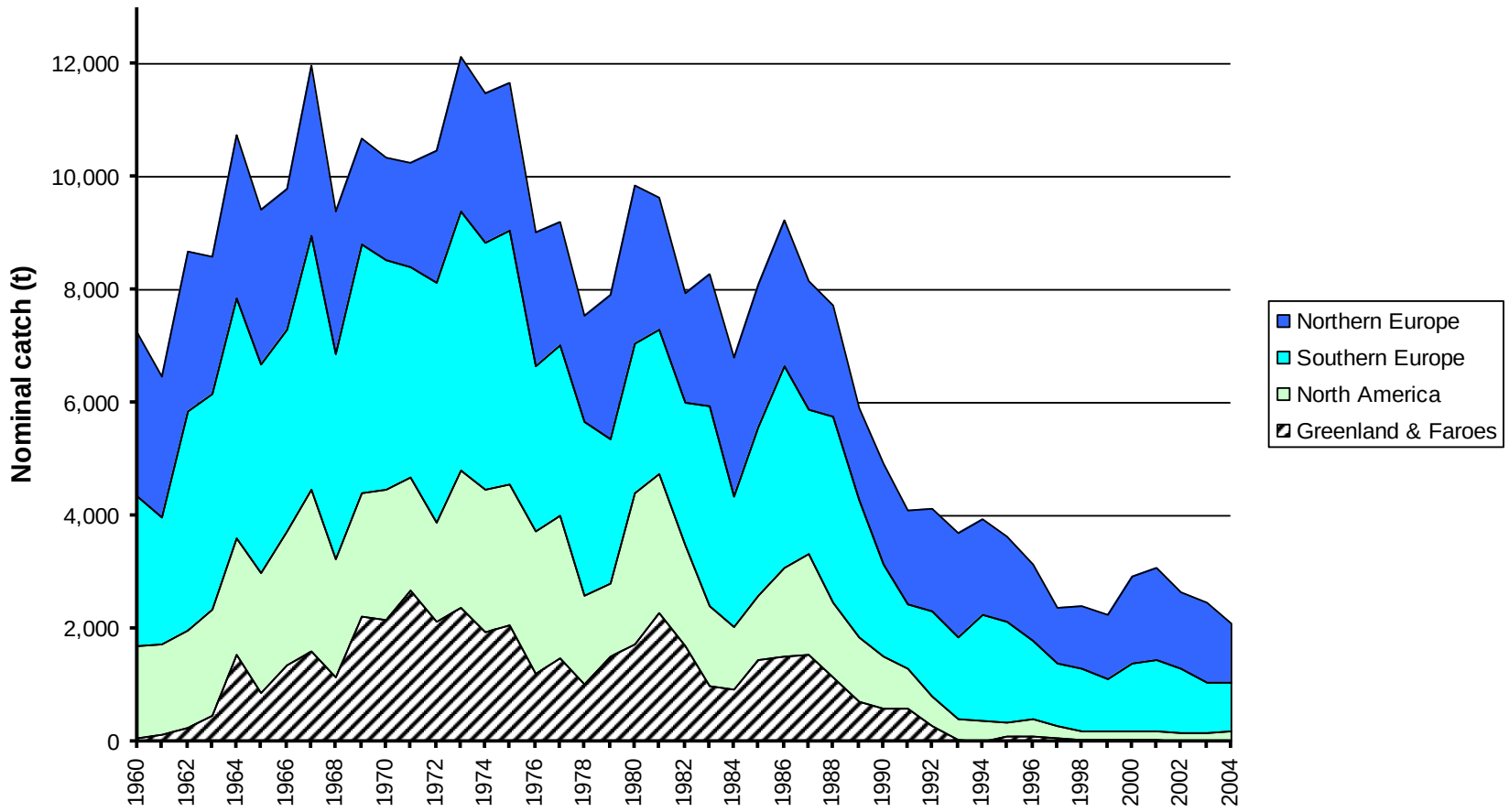
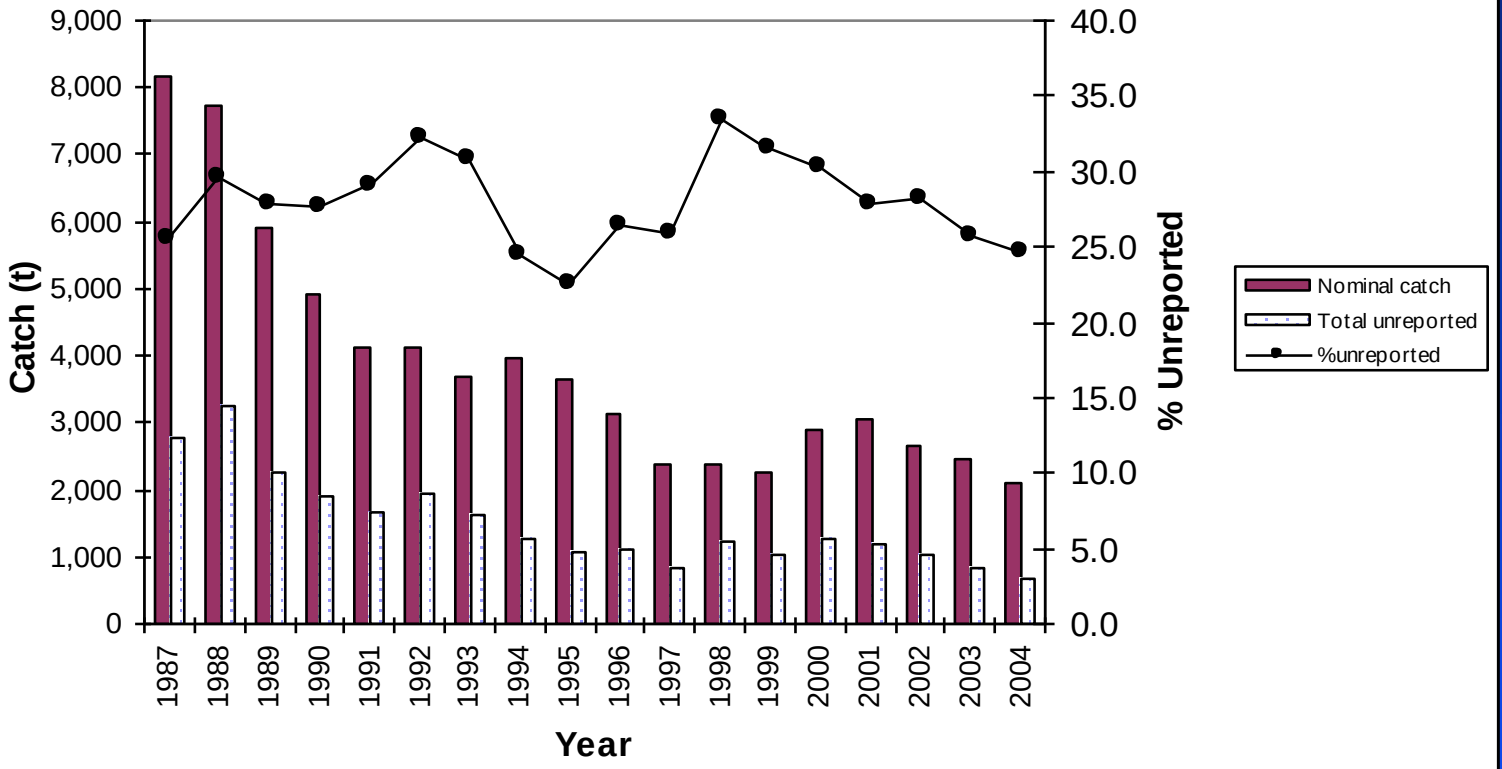


2004….2,099t

(357t below 2003, lowest in time series)

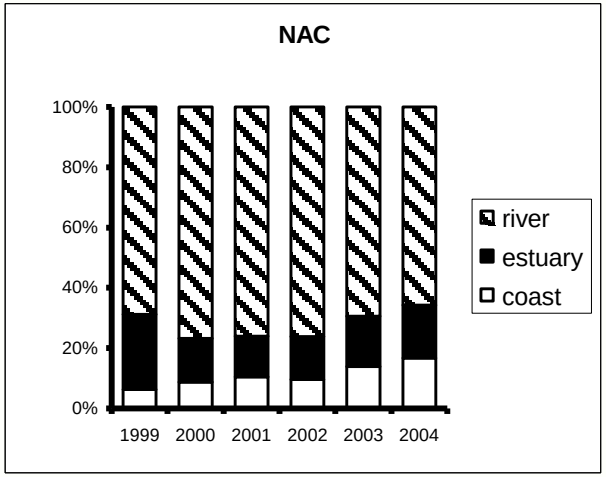
Figure 2.1.3.1 Nominal North Atlantic salmon catch, unreported catch and percentage unreported, expressed as % of total catch (nominal + unreported), in NASCO Areas, 1987-2004.

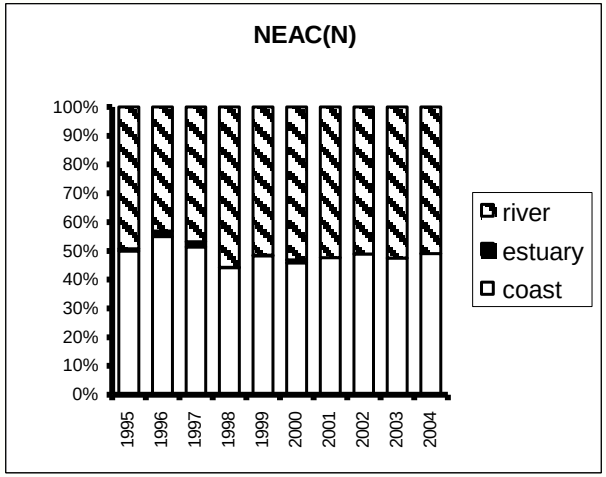


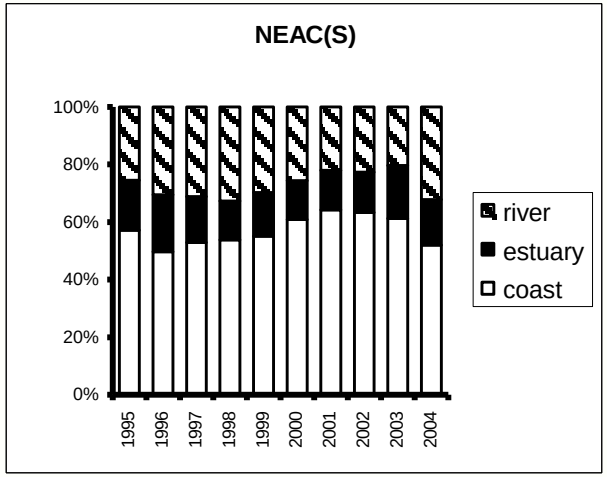
URC-686t (19% below 2003)

NEAC 574t; NA 101t, WG 10t

Figure 2.1.1.3 Percentages of nominal catch taken in coastal, estuarine and riverine fisheries for the NAC area (1999-2004) and for NEAC northern and southen areas (1995-2004).







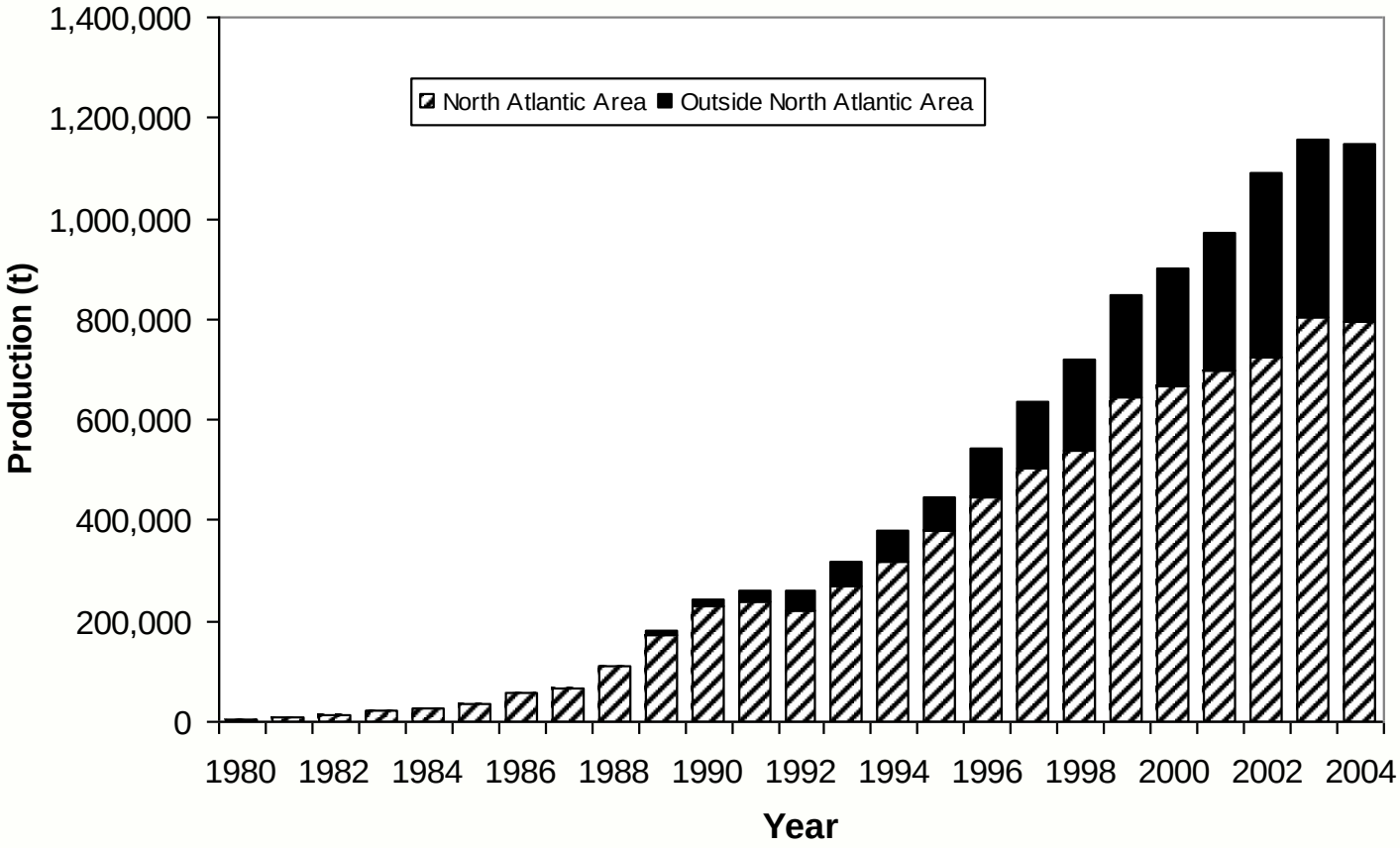
NAC 17% coastal

NEAC, 50% coastal

Rod catches: Catch and release 2004

- Canada 55%
- Iceland 16%
- Russia 76%
- UK (E&W) 48%
- UK Scotland 50%
- 144,000 salmon released (up 12% on 2003)
- Note:
  - Losses following catch & release must be accounted for in CL compliance estimation.

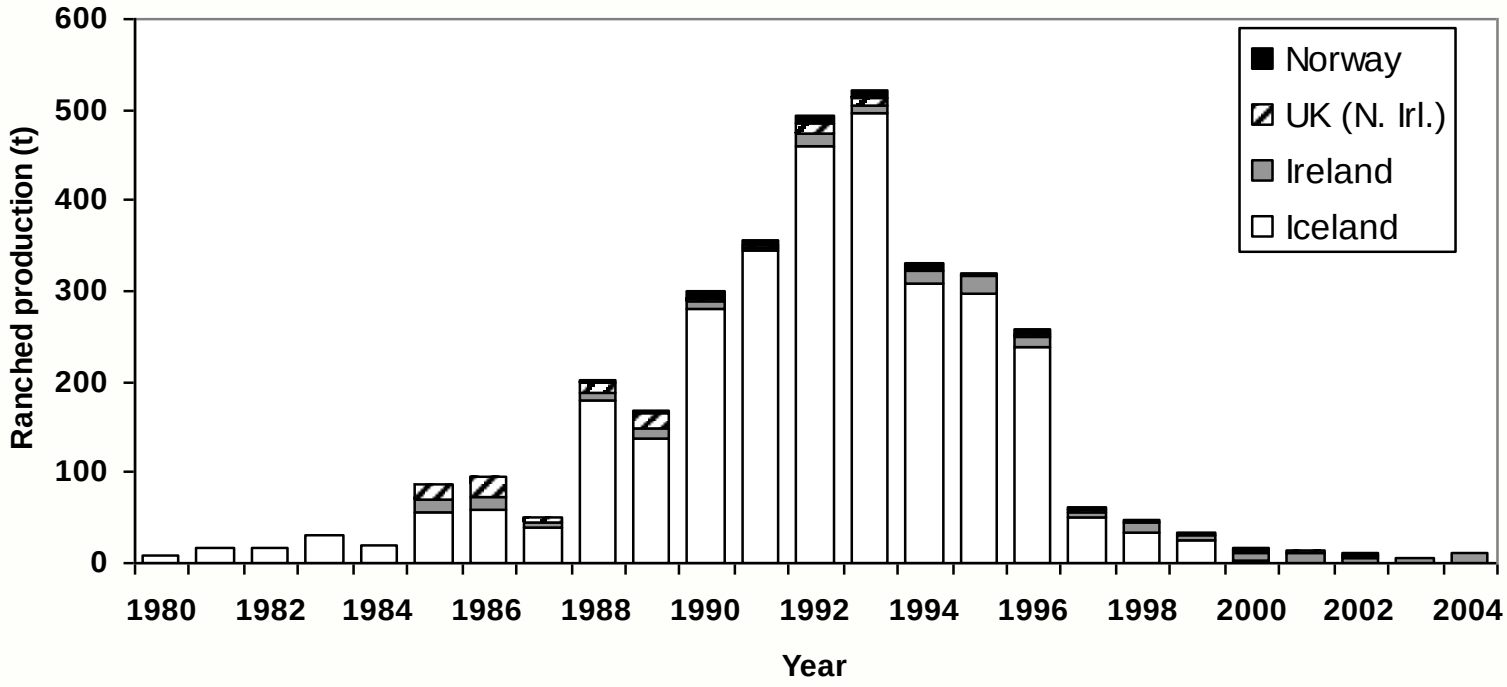
Figure 2.2.1.1. World-wide farmed Atlantic salmon production, 1980-2004.



N. Atlantic: 796,839t; up 13% on 5 year mean

World: 1,149,329t (550 x wild reported catch)

Figure 2.2.2.1. Production of ranched salmon (tonnes round fresh weight) as harvested at ranching facilities in the North Atlantic, 1980-2004.



12t in 2004, up 5t on 2003

Icelandic operations ceased in 1998

Significant developments towards the management of salmon:

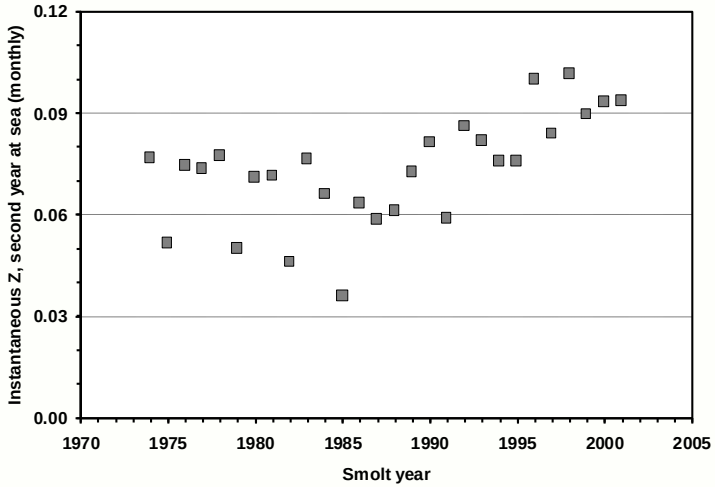
- Update on natural mortality at sea “M”
- Developing precautionary catch advice for Irish salmon fisheries
- Long-term projections for stock rebuilding
- Distribution, behaviour and migration of salmon

Natural mortality at sea:

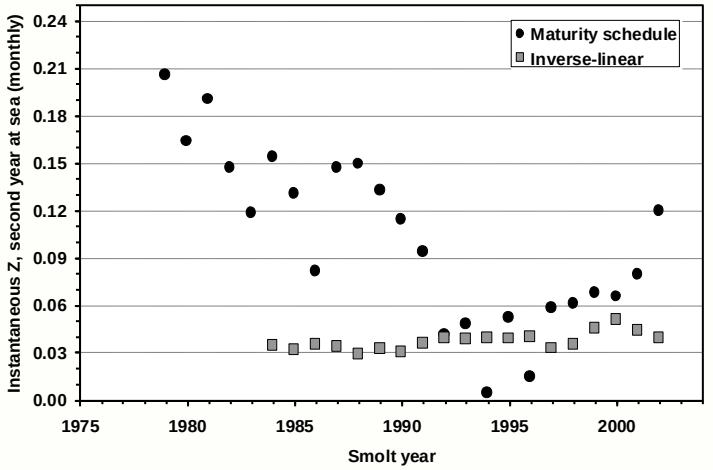
- Values used for "M" [integrated monthly mortality in second year at sea] are of critical importance in run-reconstruction models used to estimate Pre Fishery Abundance (PFA) of N. American and European stocks
- Value of 0.01/month was previously used by ICES (based on Doubleday et al., 1979)
- Reviewed estimation methods in 2002 and changed to 0.03/month, using evidence from 4 rivers. Additional data for NAC and NEAC hatchery and wild stocks. examined in 2003/04 supported this (11 rivers)
- In 2005, ICES reviewed further data from 15 NEAC and NAC stocks, to examine trends in "M" over time and among stocks:
  - Again concluded change to 0.03 was justified;
  - Noted differences among stocks and possible increase in "M" above 0.03 in recent years in some stocks

Update on natural mortality “M”

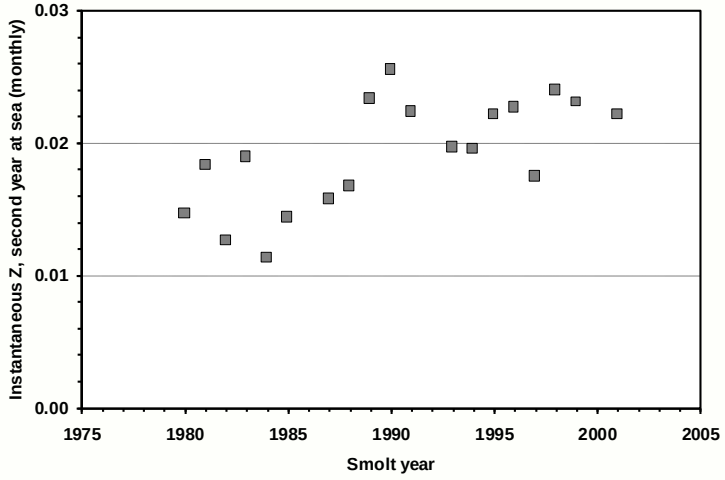
LaHave River (Canada)



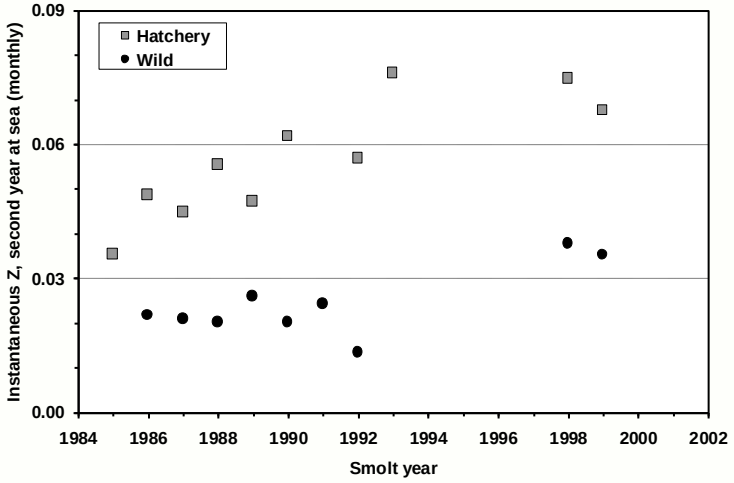
de la Trinite River (Canada)



Corrib River (Ireland)



River Bush (UK (Northern Ireland))



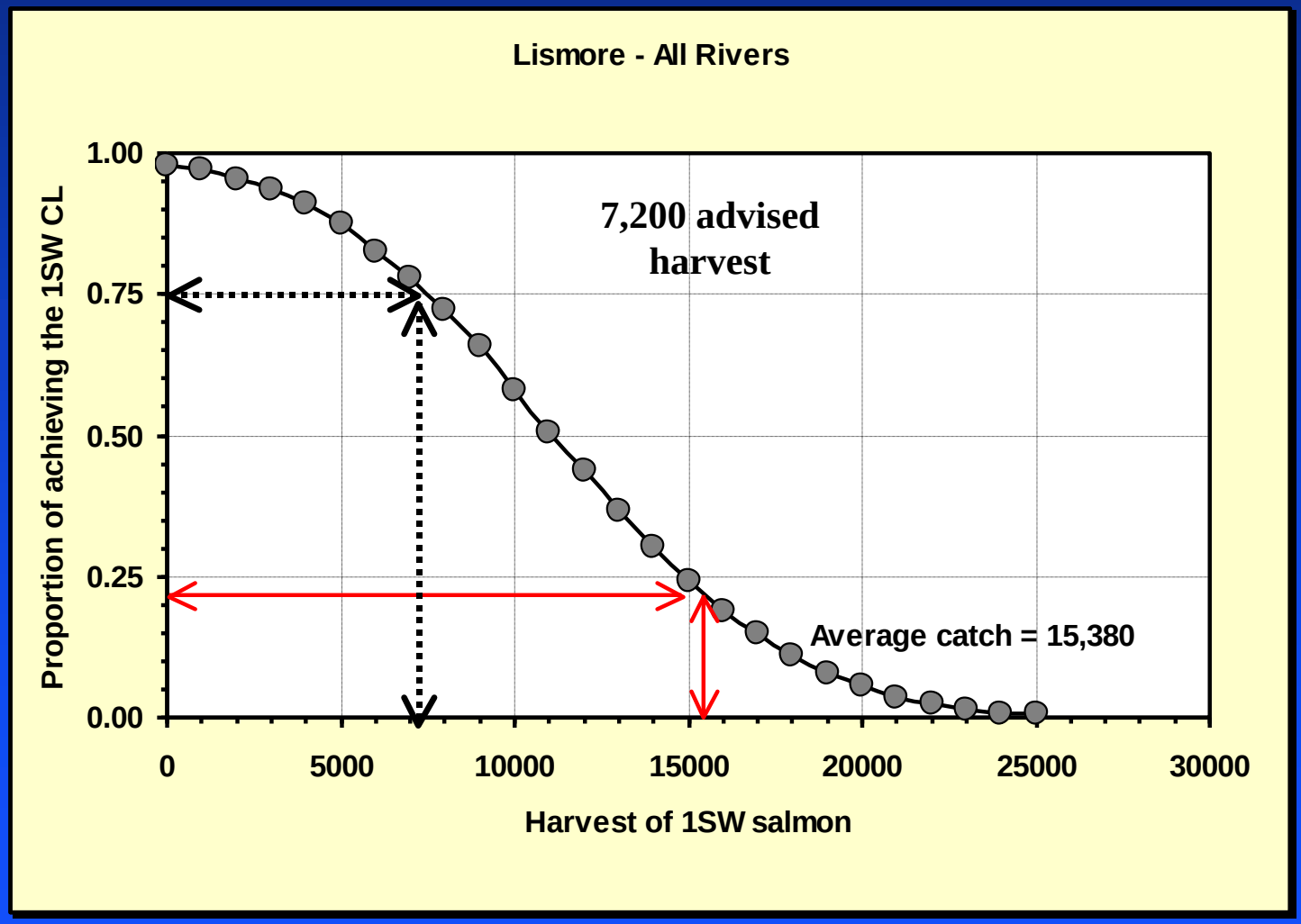
Developing precautionary catch advice for Irish salmon fisheries

- **Catch advice system amended/evolved in 2005:**
  - **Precautionary catch advice given at district level, against management objective of 75% probability of achieving CL for all rivers within the district**
  - **risk of not achieving fishery management objectives**
  - **uncertainty in biological characteristics and in biological reference points**
  - **Introduction of harvest control guidelines**

Developing precautionary catch advice for Irish salmon fisheries

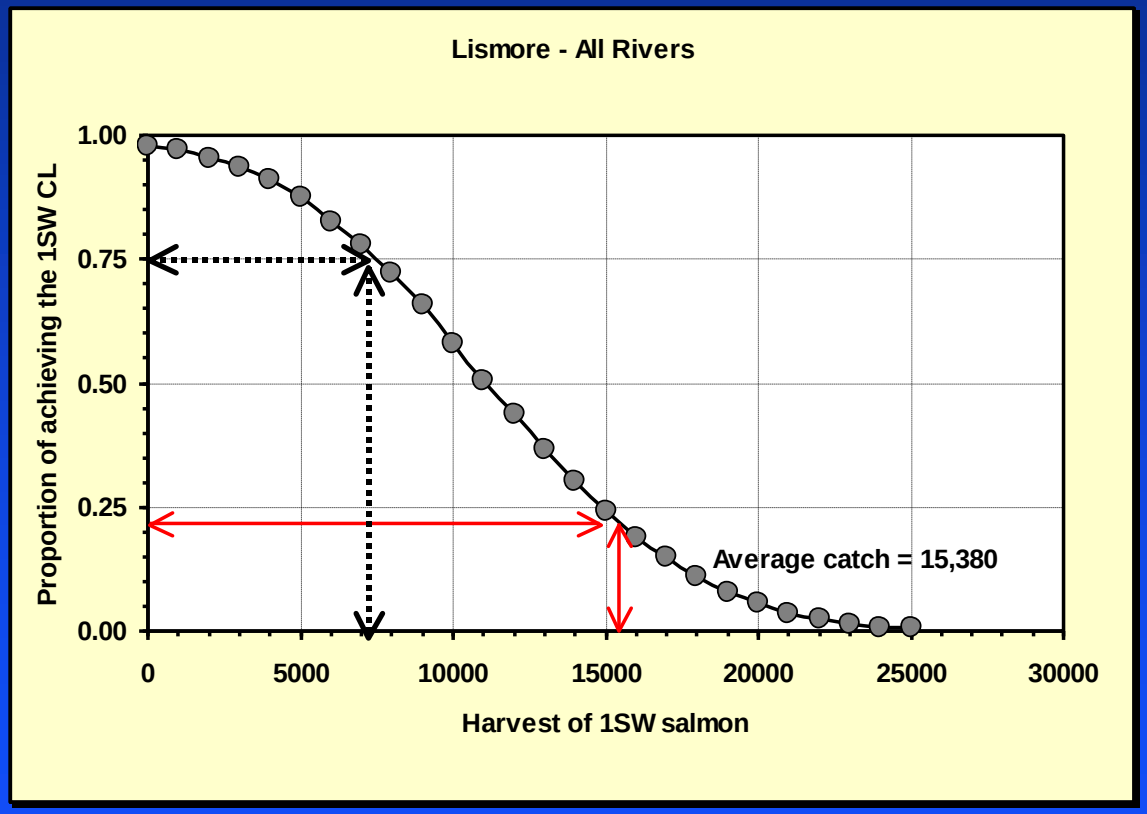
- **Elements:**
  - **River-specific CLs developed using Bayesian s/r approach…...presented last year**
  - **CLs adjusted to reflect 75% requirement:**
    - **for single river female escapement and**
    - **district simultaneous CL objective**
  - **Risk framework introduced for catch advice, based on recent average returns (2000-2004):**
    - **Range of potential harvests subtracted from random distributions of returns to give estimates of how often spawners will meet or exceed CLs.**
  - **Risk plots are generated, showing probability of meeting the CL at various harvest options.**

Developing precautionary catch advice for Irish salmon fisheries



Developing precautionary catch advice for Irish salmon fisheries

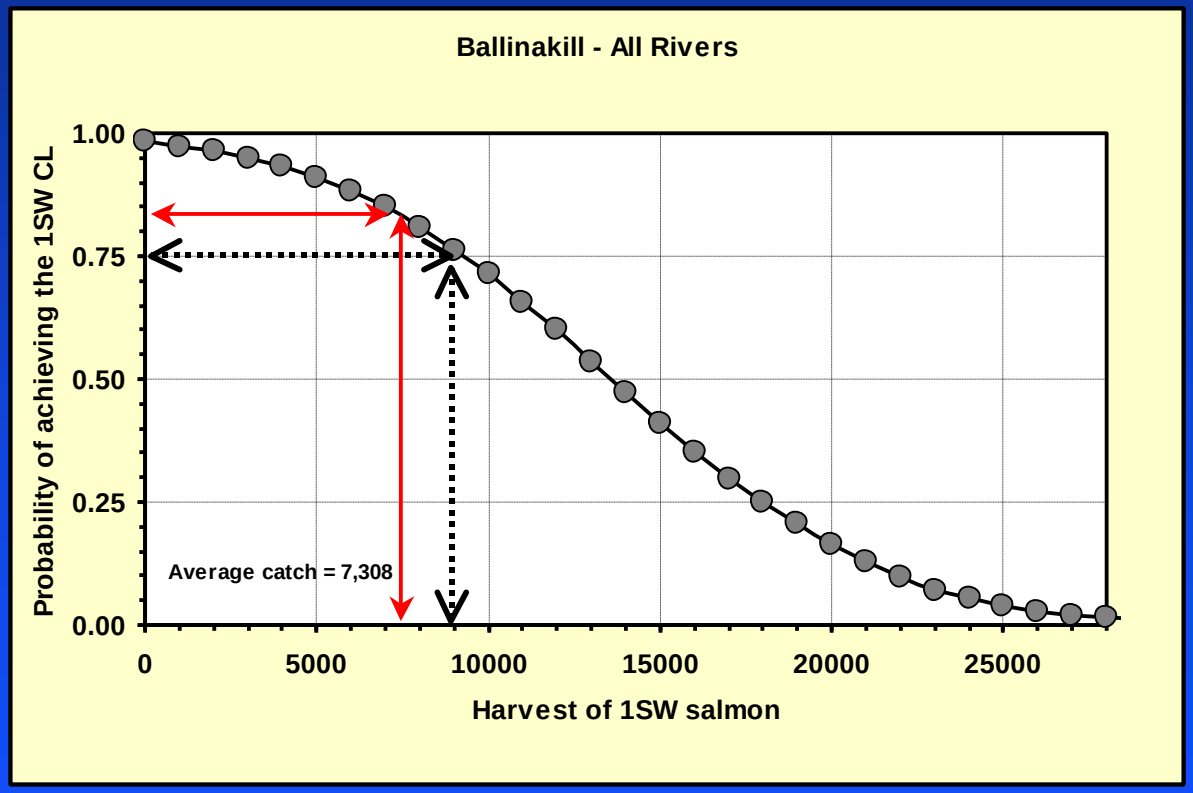
- Harvest control guidelines…..



Reduction

Developing precautionary catch advice for Irish salmon fisheries

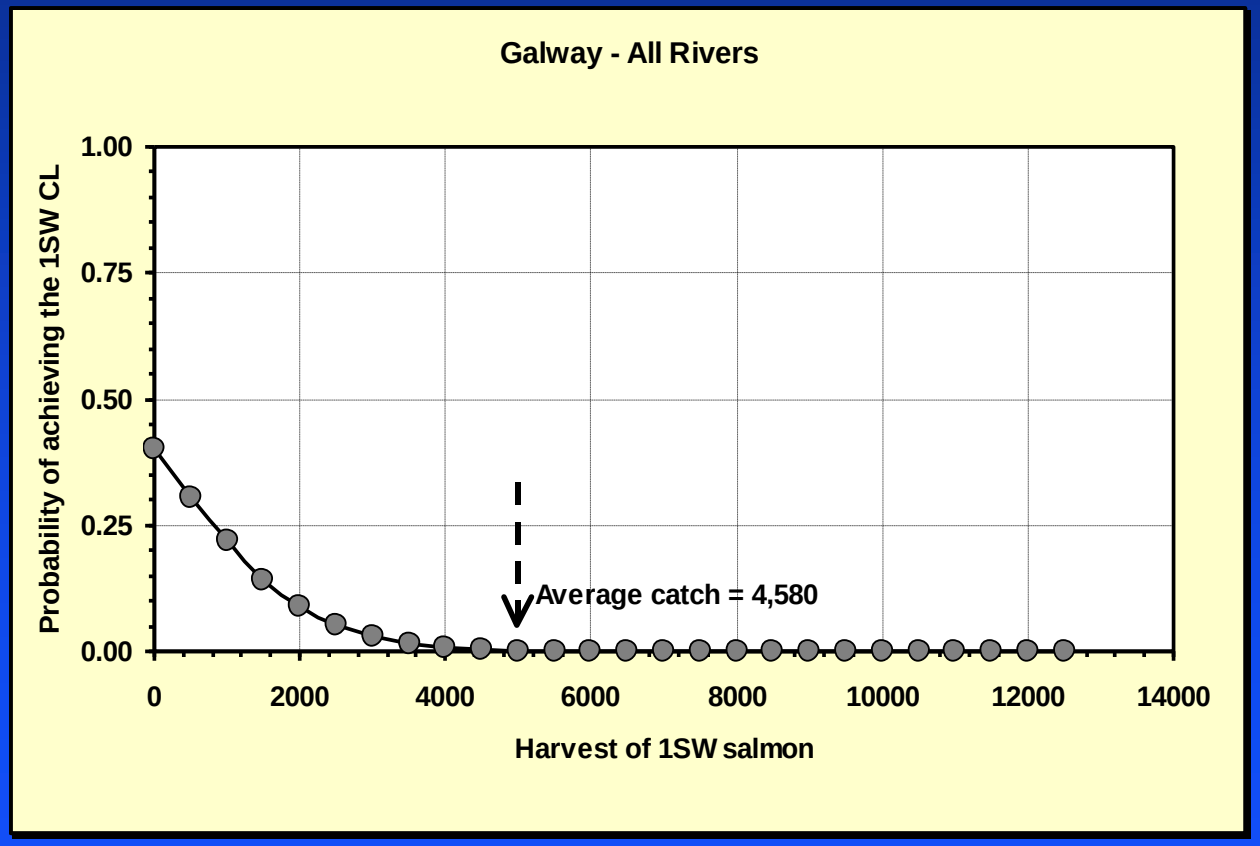
- Harvest control guidelines…..



no increase

Developing precautionary catch advice for Irish salmon fisheries

- Harvest control guidelines…..



no catch

Long-term projections for stock rebuilding

- In 2003/04 ICES modelled long term trajectories for stock rebuilding, for stocks with differing productive capacities, exploitation and starting point below CL.
- PVA modelling also carried out on stock complexes.
- Results showed that probability of rebuilding was low in many cases and main result of recent management measures may have been to slow, rather than reverse, the declines.
- Further work required, inc actual case studies:
  - medium to longer term look at PFA forecasting NAC stock complex (5-15 years)
  - implications of rebuilding for catch advice….real world example from Ireland

Long-term projections for stock rebuilding

- Long-term PFA projections for N. American salmon
- Several models presently used to describe relationship between lagged spawners and PFA for this stock. complex (some of which recognise a “phase” difference in historical PFA/LS)
- Relationship used to predict PFA_{NA} in current year, to provide catch advice for West Greenland.
- Medium (5 years) and long term (20 years) projections not developed to date.
- Would provide comparison with simple PVA results from last year and potentially lead to longer term catch advice capability.

PFA and lagged spawners.

- **Lagged spawners is an index of how spawners contribute to future PFA, reflecting the fact that each cohort of spawners contributes to PFA over several years ahead, depending on smolt migration age.**
  - **E.g. 2004 spawners in the R. Bush (UK, N. Ireland) will contribute to sNEAC PFA in 2007, 2008 and 2009.**
- **Pre-fishery abundance (PFA) of a stock complex is the number of fish from a smolt migration year estimated alive at sea on 1st January of the first sea winter.**
- **Historical PFA is estimated using run-reconstruction techniques, which sum catches and spawners backwards (for all sea ages) corrected for "m".**
  - **E.g . 2004 2SW catches/spawners and 2003 1SW catches/spawners give the 1st Jan. 2003 PFA for the smolt cohort that migrated in 2002.**
- **The historical relationship between spawners (lagged appropriately) and PFA, is used to forecast future PFA from the most recent lagged spawner value.**

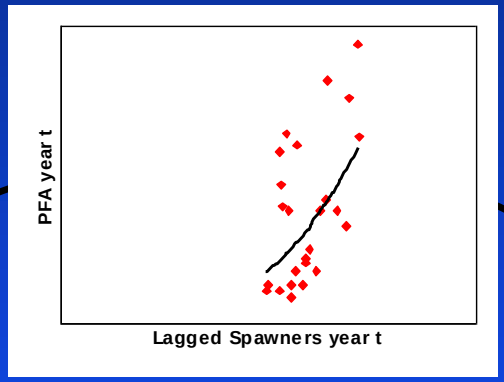
PFA
year t -1

Catch + Returns
years t -1 and t

Spawners
year t

(Observed Values)

Lagged Spawners
years t+3 to t+8



Lagged Spawners
Summed over SFAs
Projection year p

PFA
Projection year p

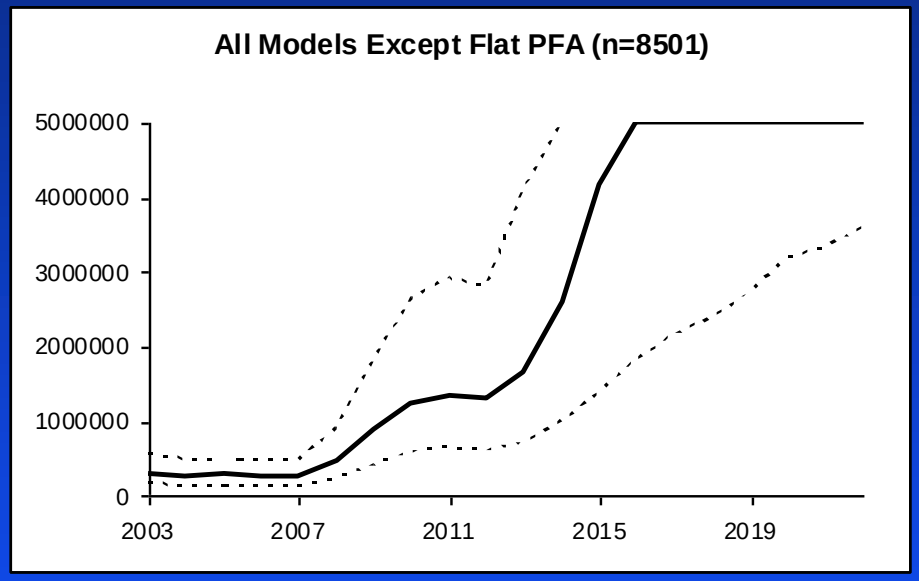
Allocate to SFAs
Apply Mortality
Lag to years p+4 to p+9

Long-term projections for stock rebuilding

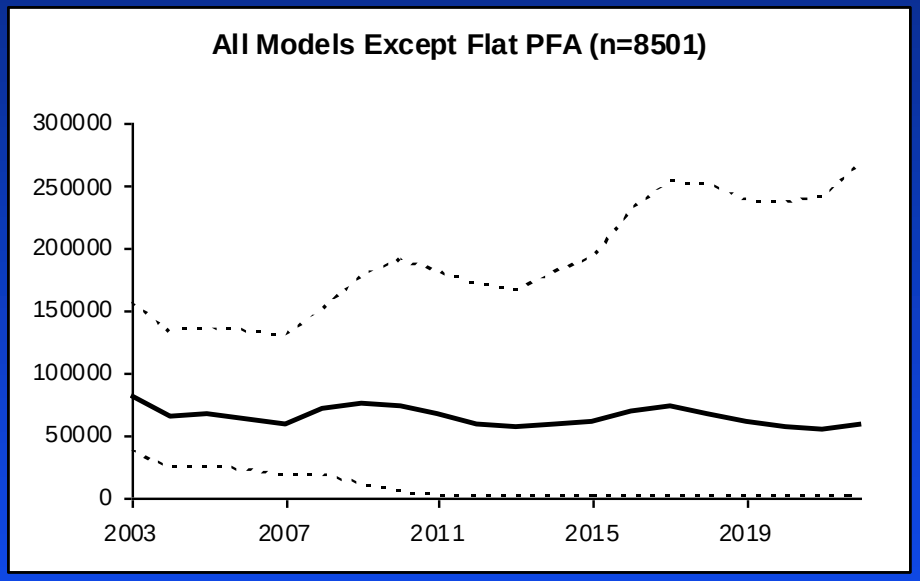
- Stochastic projections used in the cycle approach
- Median and 95% CL based on 10,000 simulations of historical PFA and LS values, and assumption of either high phase or low phase from selected model.

Scenario 1: No fishing on NAC stock complex:

High Phase Projections

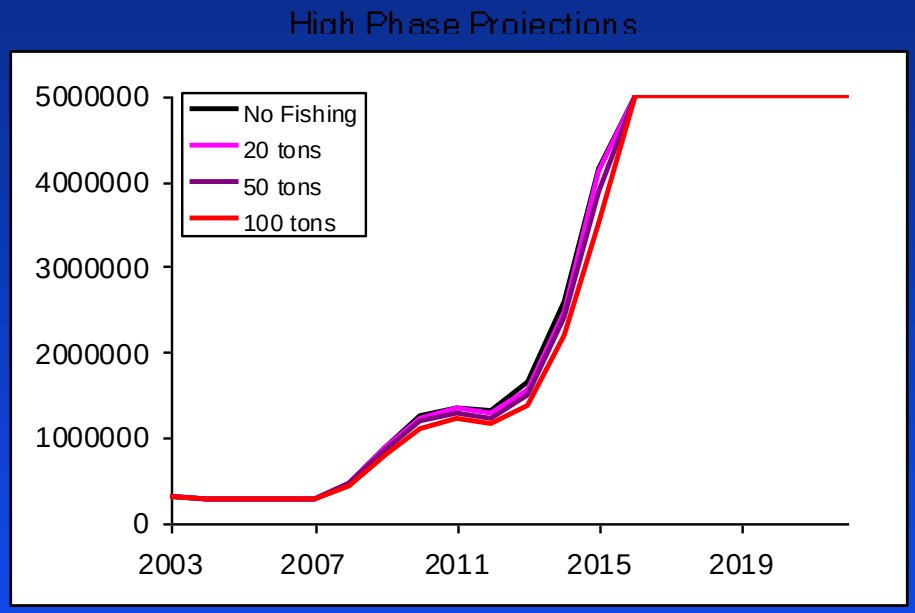


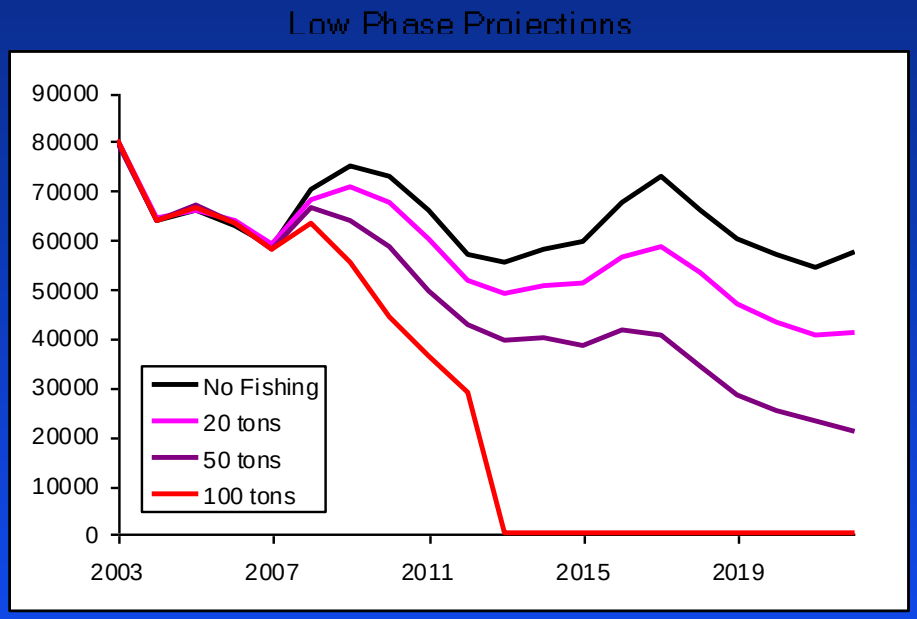
Low Phase Projections



Model type has impact on results, but phase of PFA/LS has most influence on outcome

Scenario 2: No fishing in NAC homewaters, but fishing at West Greenland (20, 50, 100t):





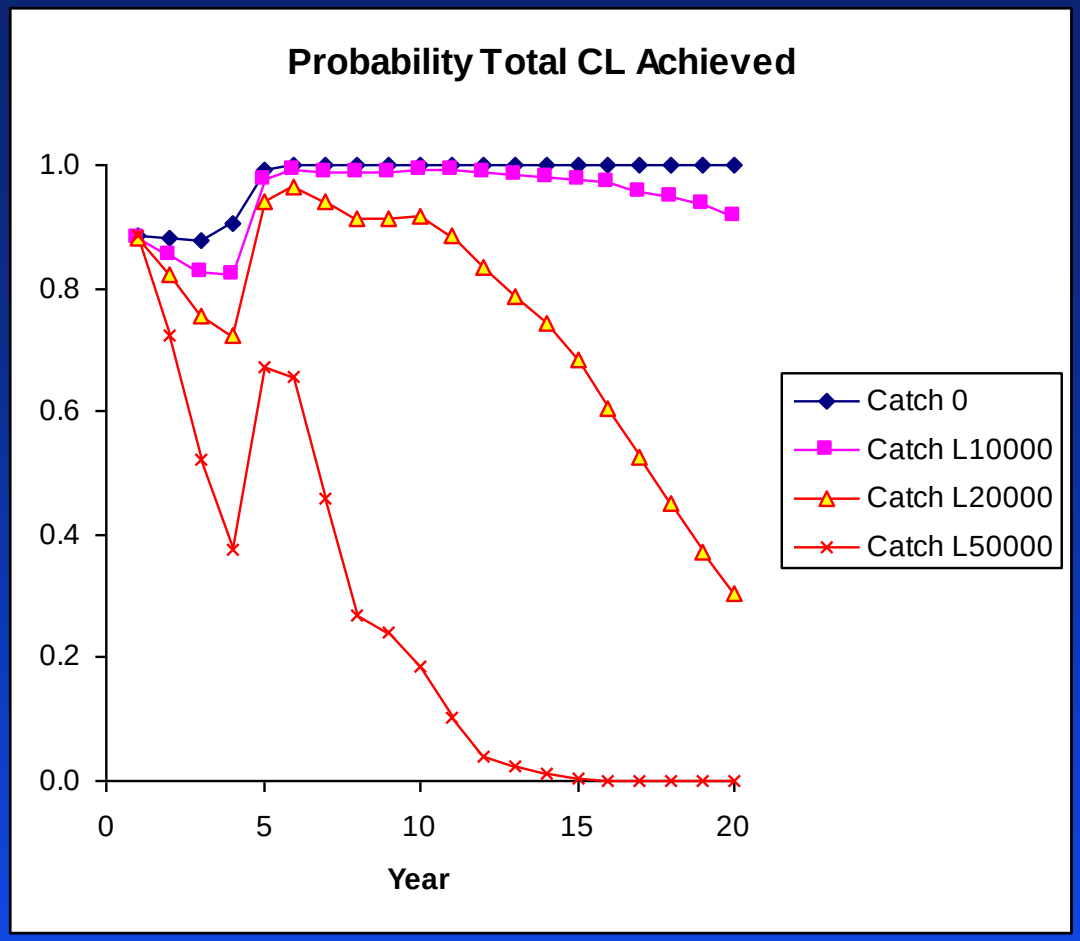
PFA from high phase remained similar to no fishing scenario, but, low phase projections had strong response to fishery at Greenland: 100t/year caused median PFA to decline to 0 by 2013….note, we are currently in the low phase.

Conclusions:

- Outcome depends most on phase used for projections.
- NA stock complex more resilient to fishing when phase is high (i.e. more recruits per spawner).
- However, in low phase (i.e. recent years), even moderate fishing gives significant risk of decline.
- Detection of phase change becomes an issue for catch advice……single good PFA year not enough.
- Message to managers:
  - With further refinement, method may allow longer term catch advice than presently available
  - NAC stock complex in low phase has significant risk of further decline even at moderate levels of fishing

Long-term projections for stock rebuilding

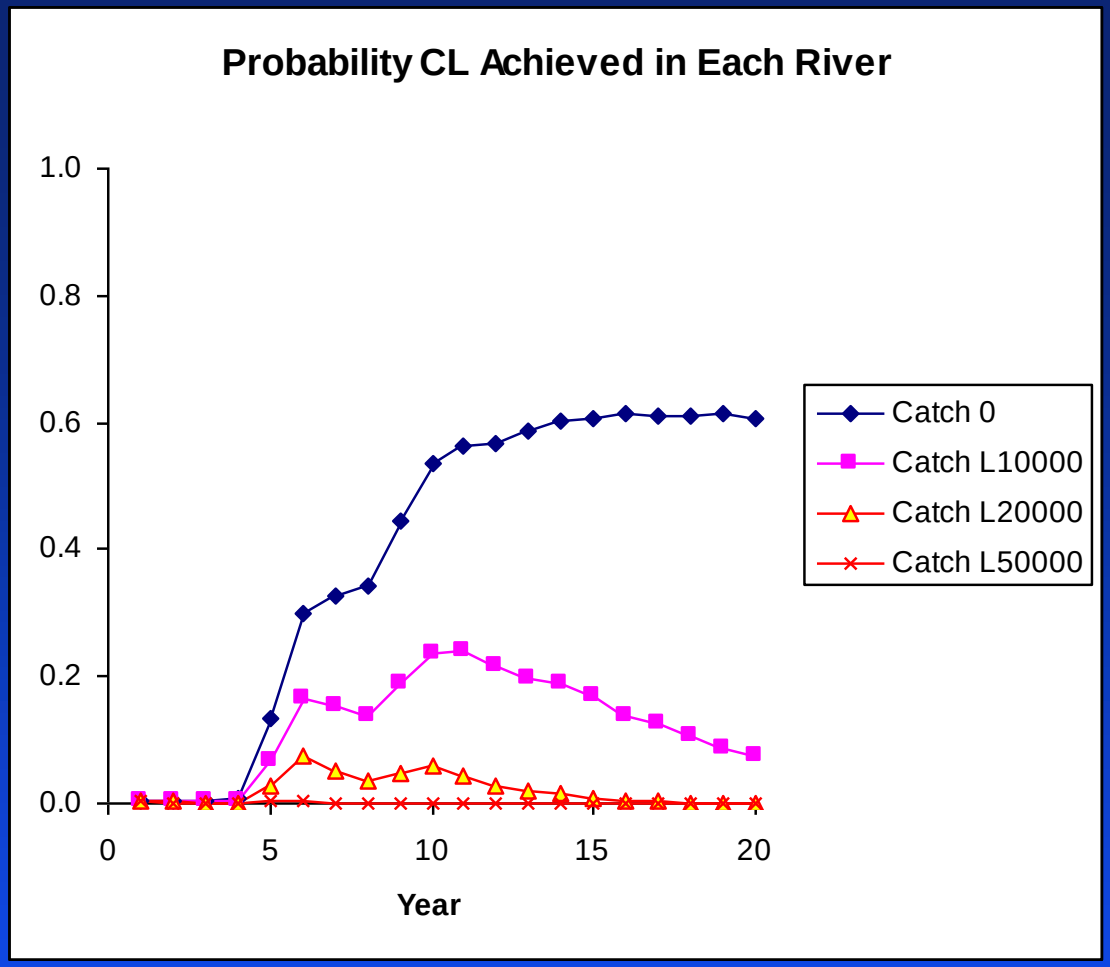
- Catch advice and projected CL attainment for an Irish salmon fishing district (14 rivers).
- Similar to stock rebuilding trajectories analyses of 03/04, but populated with real data:
  - Ricker s/r parameters (from Bayesian Hierarchical Approach)
  - river CL ranged from 63-13,000 fish
  - current catch level, as per 75% advice (15000)
  - initialised at 63% of CL in each river (where we are now)
  - projections run for 20 years, with no catch or linearly increasing catch, zero to 10000, 20000, or 50000 fish
- Two Scenarios:
  - Probability of achieving the district CL.
  - Probability of achieving the CL for each river simultaneously.



High probability (>75%) of achieving district CL at zero catch and at catch increasing to 10000 fish.

Increasing catch to 20,000 maintained high probability, but only for a time, after which CL much less likely to be met.

Increase to 50,000 fish caused immediate and sustained decline in probability of district CL.



Probability of achieving simultaneous CL in all district rivers increased under zero catch, but was never higher than 65%.

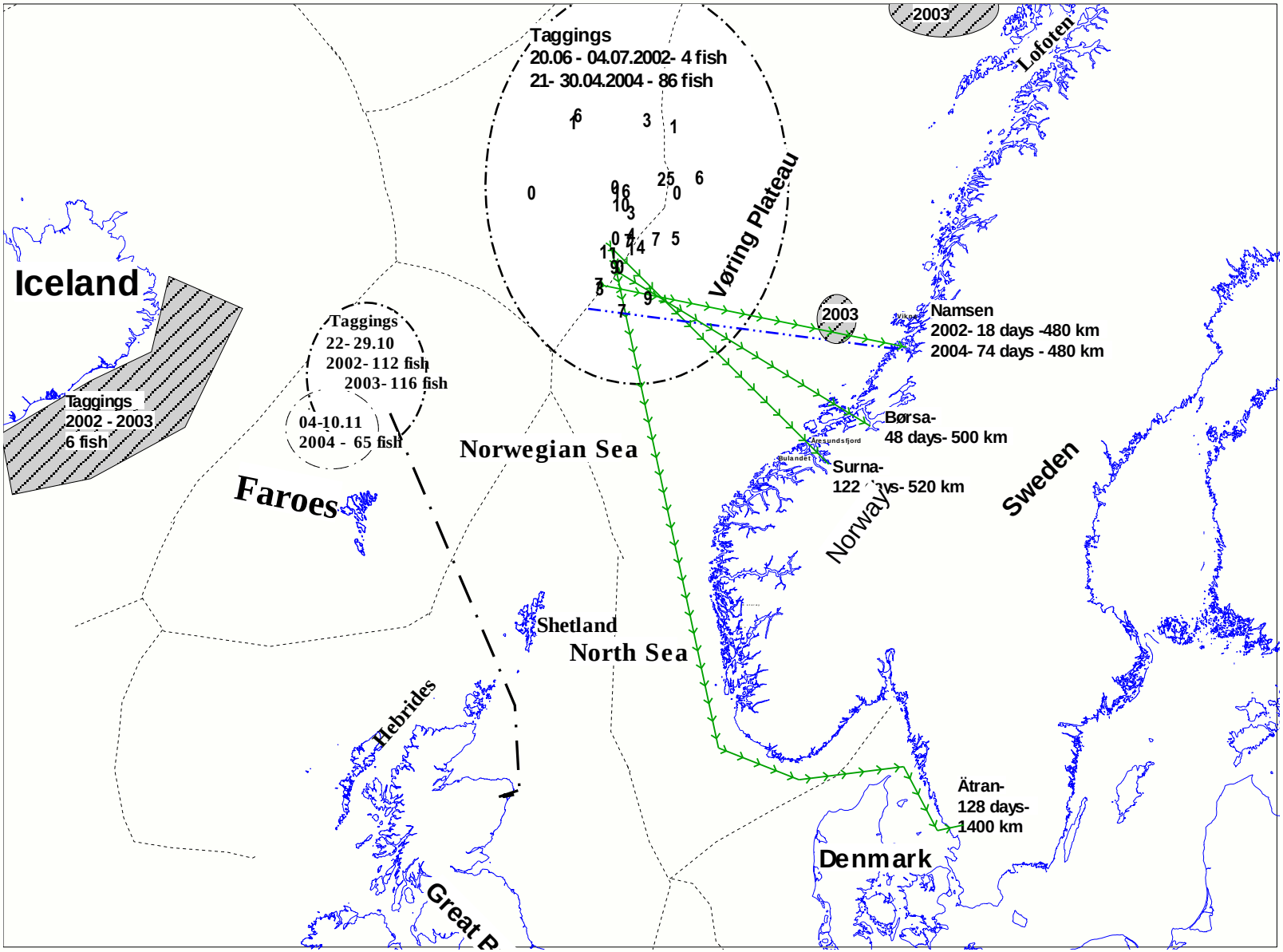
None of the catch options provides a high probability of meeting the CLs

Conclusions:

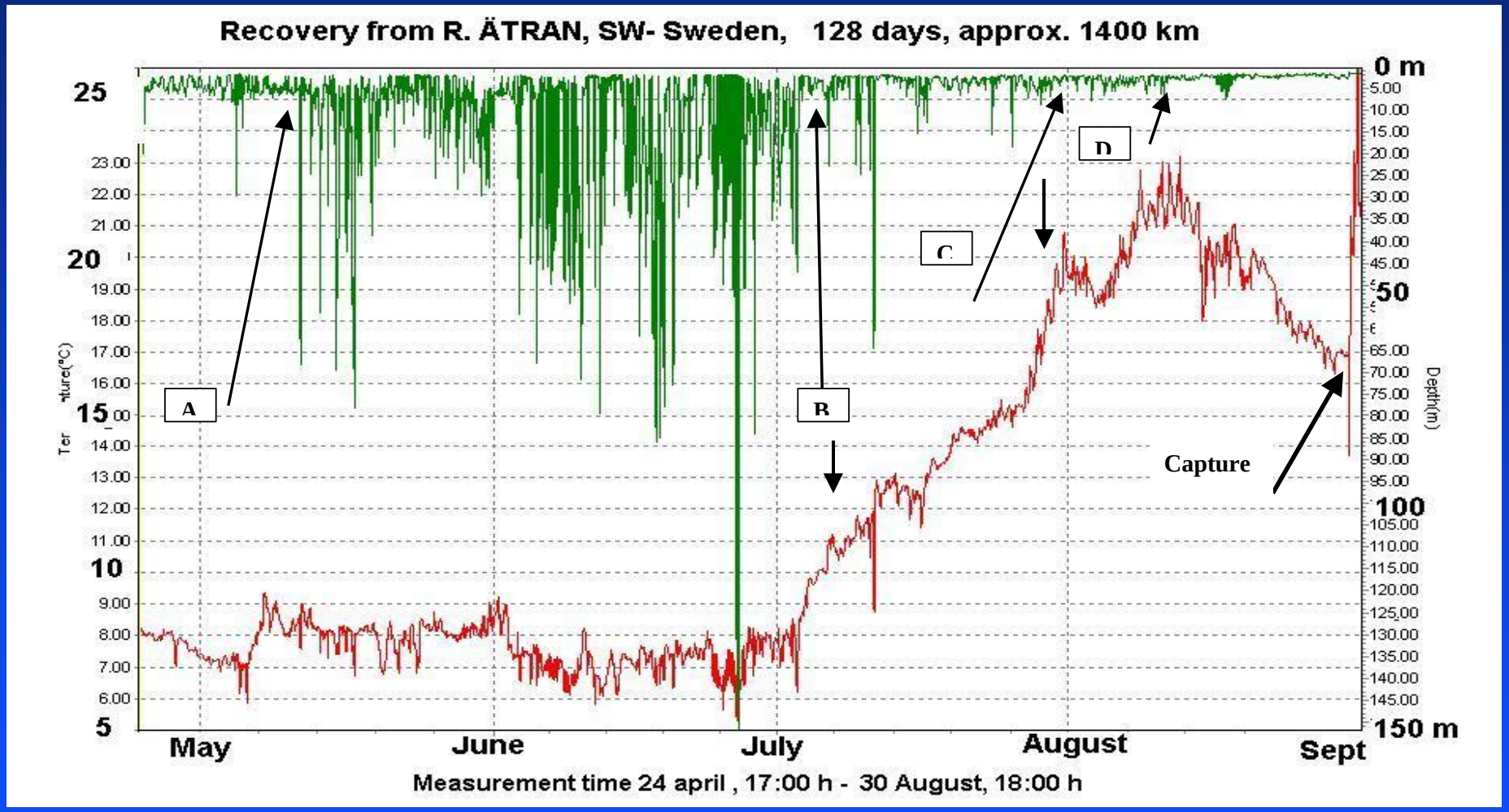
- Shows implications of being below CL (here 63%), and how catch levels impact ability of stocks to rebuild.
- Under district CL objective, surpluses in some rivers compensate for deficits in others, so easier to achieve CL.
- Attainment of CL in all rivers simultaneously is very difficult to achieve (but is a desirable management objective):
  - Simulations are very variable.
  - Also, small rivers are inherently more variable.
- As these are simulations, catch advice is best provided following annual assessment of returns and spawners.
  - However, may provide some guidance to managers in setting rebuilding objectives and examining harvest options, if suitable data are available to populate the model?

Distribution, behaviour and migration of salmon

- Inter-Nordic tagging study of pre-adult salmon at sea since 2002, to study:
  - Winter habitat preference
  - diurnal patterns of vertical migration (by-catch implications?)
  - spatial migration at sea and into rivers
- DST tags applied to 406 pre-adult and adult salmon in two areas of Norwegian sea, plus some SE Iceland
- By April 2005, 5 recaptures in rivers/estuaries from tagging in mid Norwegian Sea; 4 in mid Norway, 1 SW Sweden.


Taggings
20.06 - 04.07.2002- 4 fish
21- 30.04.2004 - 86 fish
Vøring Plateau
2003
Lofoten
Namsen
2002- 18 days -480 km
2004- 74 days - 480 km
Børsa-
48 days- 500 km
Surna-
122 days- 520 km
Iceland
Taggings
2002 - 2003
6 fish
Taggings
22- 29.10
2002- 112 fish
2003- 116 fish
04-10.11
2004 - 65 fish
Norwegian Sea
Faroes
Norway
Sweden
Shetland
North Sea
Hebrides
Great B
Ätran-
128 days-
1400 km
Denmark

Distribution, behaviour and migration of salmon



Distribution, behaviour and migration of salmon

- Depth/temperature profile shows:
  - 14-20 days inactivity after tagging
  - Feeding and migration period. Stays mostly 5-10 m upper layer, but with extensive diving activity to sometimes >200m.
  - Coastal migration (rising temperature)
  - River entry (diving ceases!)
- Conclusion: DSTs valuable tool for marine life history studies.

ICES Advice to NASCO 2005

NEAC COMMISSION AREA

Walter Crozier
WGNAS Chair

Questions to ICES:

- **describe 2004 fisheries and status of stocks**
- **any new information extent to which objectives of significant management measures introduced in recent years have been achieved**
- **further develop age-specific stock conservation limits where possible based upon individual river stocks**
- **provide catch options or alternative management advice, if possible based on forecasts of PFA for northern and southern stocks…..and advise on implications of these options for stock rebuilding**
- **provide an estimate of by-catch of salmon in pelagic fisheries**

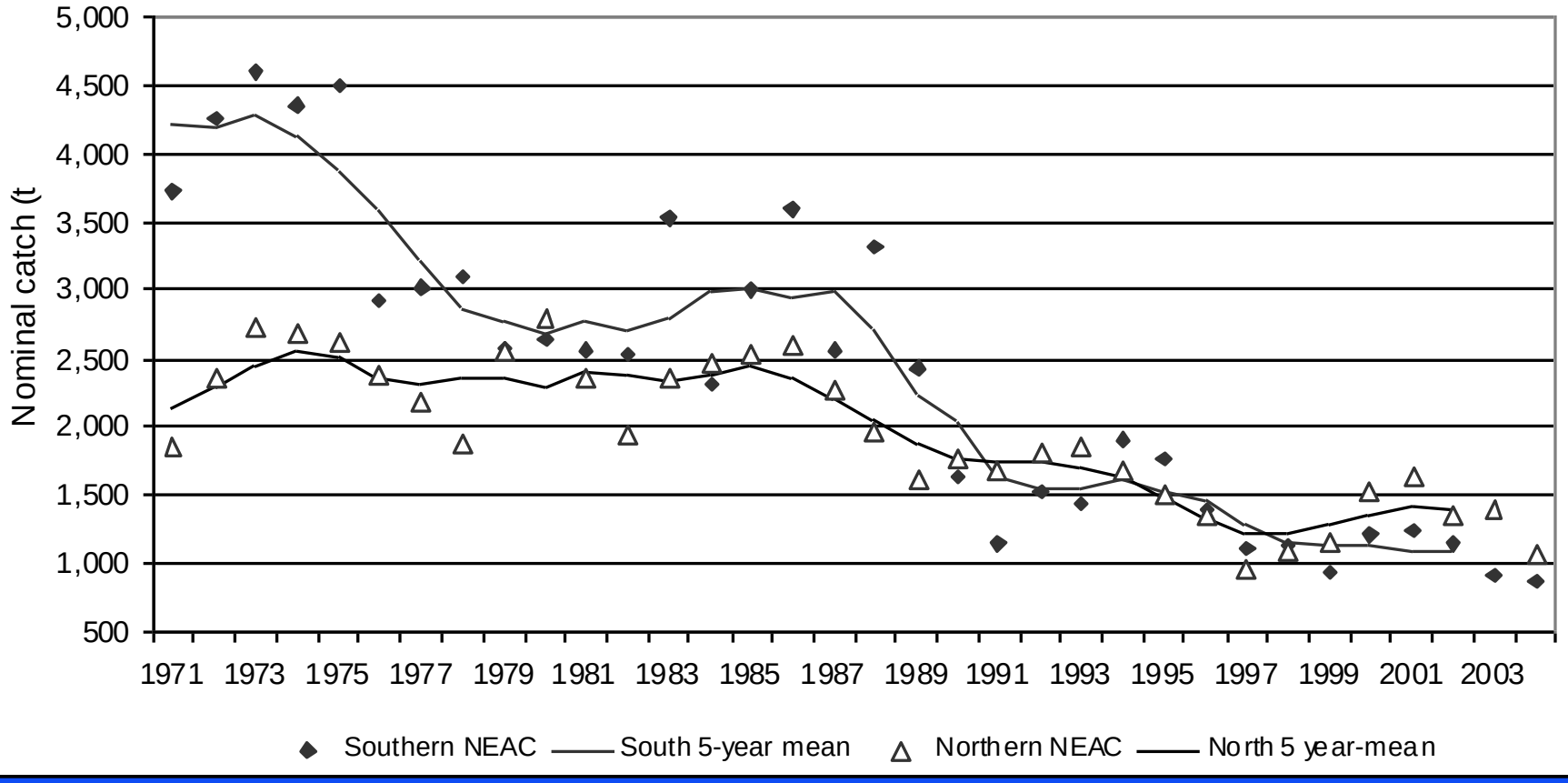
NEAC distant-water fisheries 2004

- No buyout arrangement since 1999: NASCO agreement in 2004 *"not to set a quota for the Faroe islands fishery for 2005"*
- No fishery for salmon at Faroes 2003/04 or so far in 2004/05
- No sample data available, except, some capture of salmon for DST project

NEAC homewater fisheries 2004

- 2004 catch 1,922, 17% down. on 2003
- =92% of total N. Atlantic catch
- sNEAC catch now lower than NEAC
- continued reductions in gear units used
- cpue not consistent
- 1SW proportion
  - nNEAC: 58%, below 5, 10 yr avg.
  - sNEAC: 60%, close to 5, 10 yr avg.
- Incidence of farmed salmon generally low (<2%), except Norway (around 30%)

Figure 3.9.4.1. Nominal catches of salmon and 5-year running means in the Southern and Northern NEAC Areas, 1971-2004.



NEAC homewater fisheries 2004: origin of catch.

- Analysis of CWT programmes in UK (E&W) and tag recovery programmes in Irish fisheries used to estimate the effects of Irish fisheries on salmon stocks returning to England & Wales:
- Levels of exploitation vary between years and between stocks (regions) and have on average generally declined following the introduction of management measures in the Irish fishery in 1997:
  - NE England 1% (0.5% after 1997 measures).
  - Welsh rivers 15-22% (2-10% after 1997 measures)
  - SW England 28% (12% after 1997 measures)
- Caution: based on individual monitored stocks, exploitation rates vary year on year and in some cases hatchery fish used to provide adequate tag returns for analysis.

Effects of management measures in recent years

- Faroes, no new measures to evaluate, as no quota set in recent years.
- Homewater fisheries:
  - ICES noted that management measures introduced in the last 5 years and the continuing overall general reduction in gear units employed have continued to reduce levels of exploitation on NEAC stocks.
  - Overall analysis is difficult, due to varied nature of measures, countries generally evaluate own measures……

Effects of management measures in recent years

- Homewater fisheries, Russia:
  - Several management changes (including prohibition of commercial fishing in some rivers), aimed at reducing fishing effort have contributed to decline in commercial catch. Mean commercial catch in last 5 years is 26% below 1995-99 mean.

Effects of management measures in recent years

Homewater fisheries, Ireland:

- Measures introduced in 1997 with the objectives of reducing exploitation and increasing escapement, have resulted in a general decline in exploitation rate on wild salmon from 65% to 48%.
- Exploitation on salmon from UK(E&W) also reduced as noted earlier.
- Since 2002 a TAC based catch advice system has been operating at district level with objective of meeting or exceeding district CL. Commercial catches have fallen significantly, however the management objective has not yet been achieved in all the districts.

Effects of management measures in recent years

- ’Homewater fisheries, UK (N. Ireland):
  - Measures aimed at reducing exploitation included a voluntary buyout scheme for commercial nets in Fisheries Conservancy Board (FCB) area, which has has resulted in a reduction in nets licensed from 27 in 2000 to 6 for the 2004 season.
  - Bye-laws introduced in 2003 to further regulate angling.
  - Net catch in the FCB area fell from 23.4t in 2001 to 5.7t in 2004.

Effects of management measures in recent years

- Homewater fisheries, UK (Scotland):
  - Concerns about status of early running MSW salmon led to a voluntary delay to start of fishing by members of the Salmon Net Fishing Association since 2000.
  - Has resulted in 80% reduction in catch of MSW salmon by nets and fixed engines in Feb/Mch, compared to previous 5 year mean

Effects of management measures in recent years

- **Homewater fisheries, UK (England & Wales):**
  - **A range of local and national measures have been implemented in recent years to safeguard MDSW "Spring" fish and to phase out coastal mixed stock fisheries.**
  - **Spring salmon conservation measures are believed in 2004 to have increased escapement from net fisheries by around 1,200 salmon and by around 2,200 from rod fisheries.**
  - **Measures to reduce exploitation in coastal mixed stock fisheries (inc. compensation arrangements in the NE coastal fishery) have led to catches in these fisheries falling from an average of around 41,000 fish in 1988-92 to around 11,000 fish in 2003 and 2004.**

Effects of management measures in recent years

- **Homewater fisheries, France:**
  - **Measures introduced with objective of reducing exploitation on MDW fish in particular and increasing spawning escapement.**
  - **Sport and commercial fisheries in the Loire-Allier Basin closed since 1994, however other factors impeding recovery of population.**
  - **TACs introduced in Brittany and lower Normandy in 1996 reduced catches. MSW TACs have led to temporary closures on some rivers and have reduced catches.**
  - **In Adour-Gaves Basin measures introduced between 1999-2003 reduced some rod catches, but estuarine net caches have not been reduced.**

Conservation limits development

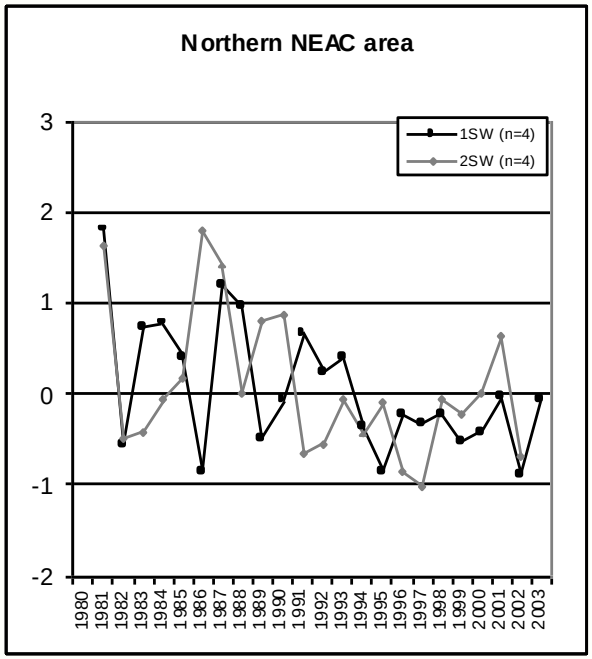
- Specific progress reported by:
  - UK (England & Wales)
    - New CL compliance system introduced in 2004 and CLs revised.
  - Ireland.
    - River-specific CLs first introduced in 2003, recently adjusted to reflect reflect requirement for higher probability of meeting required female:male ratio in each river and achieving CL simultaneously in all rivers in a district.

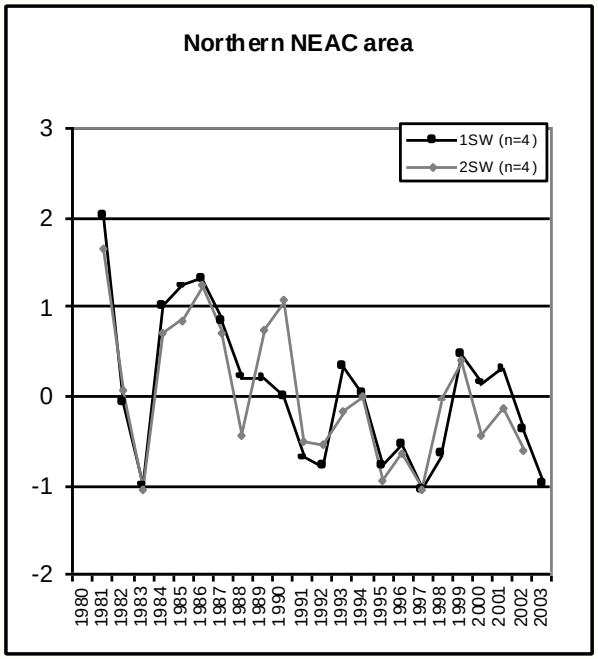
NEAC marine survival indices 2004

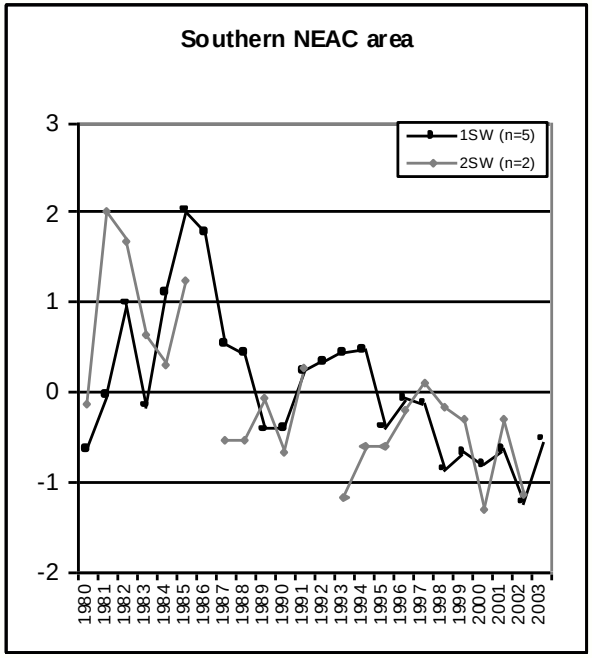
- Survival indices both areas show general decline over 10-20 years, esp. wild sNEAC smolts
  - Wild 1SW survival up on previous year, and relative to 5 year average.
  - 2SW survival rates down relative to previous year.
  - Hatchery-reared salmon survival uniformly down.

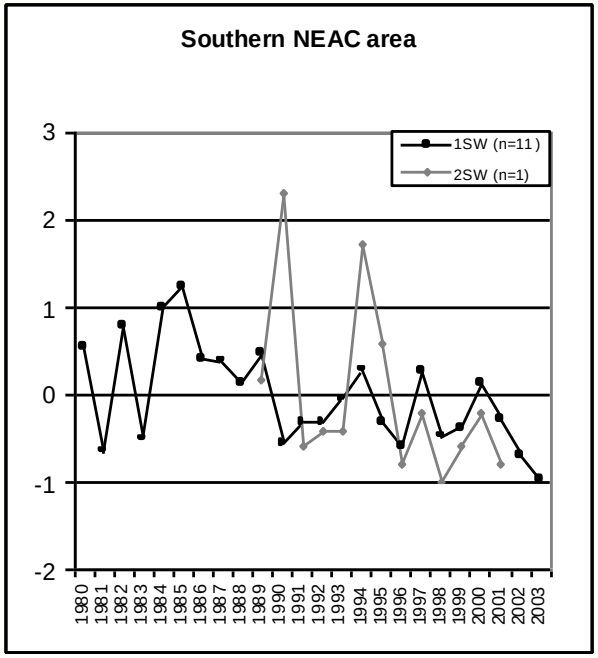
Wild

Hatchery









The NEAC pre fishery abundance (PFA) model

- PFA is number of 1SW recruits on 1st January in the first sea winter (stock status).
- Run-reconstruction model (based on catch, URC, exploitation rates, M=0.03/month).
- Model structure amended in 2005 to account for non-normal distribution of some outputs and to combine values within the Monte-Carlo simulations (<2% impact on PFA estimates).
- Improvement/updates to input data for 5 countries: France; Russia; Ireland; UK (E&W), UK (N. Ireland).

The NEAC pre fishery abundance (PFA) model

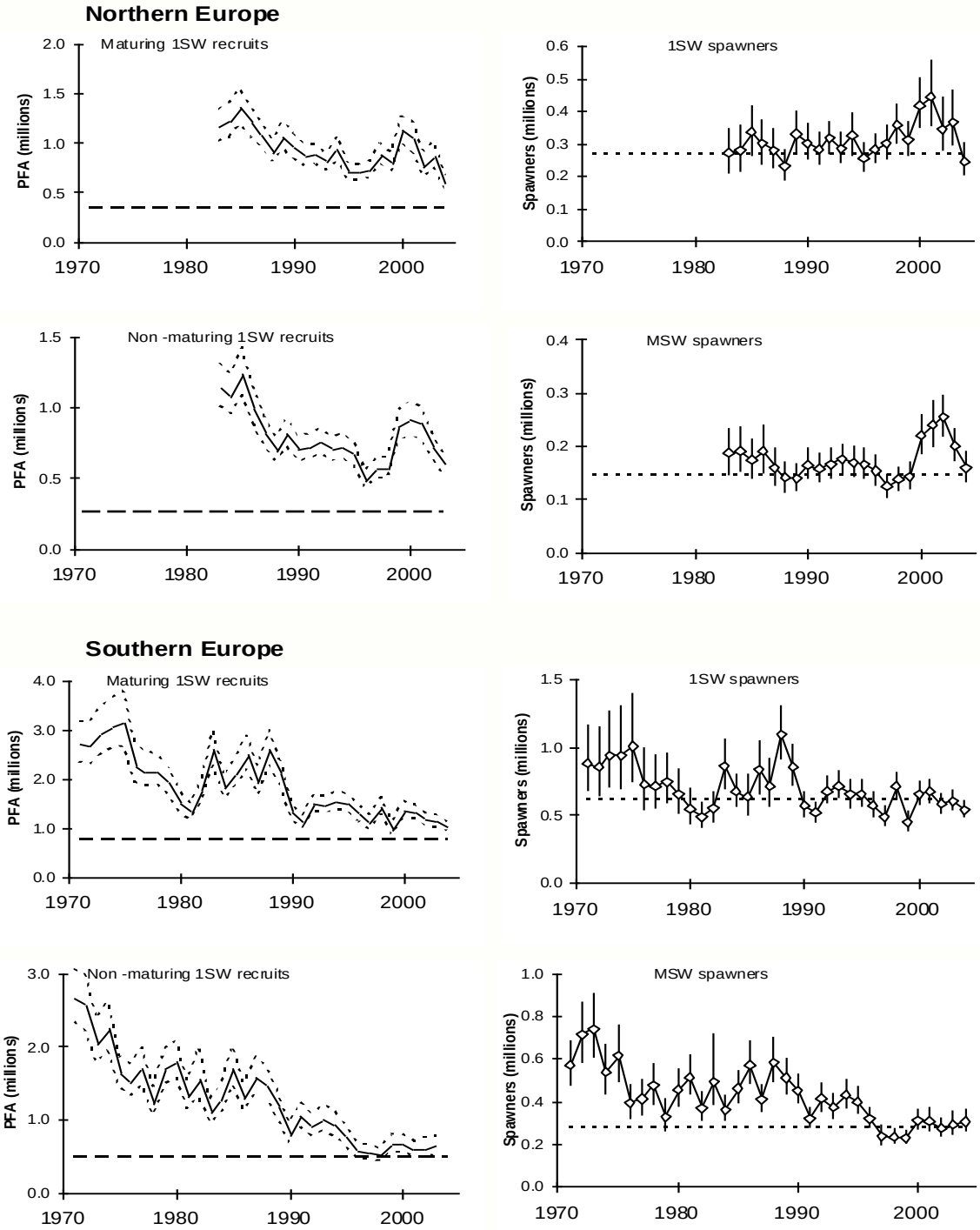
- PFA model gives historical status of stocks at stock complex level, based on summation of national data:
  - PFA vs Spawning Escapement Reserve (SER), and
  - spawners vs CL

The NEAC pre fishery abundance (PFA) model

- Evaluation of historical tag recapture information for Icelandic stocks resulted in decision that stocks from south and west of Iceland should be included in the sNEAC stock complex, while northern and Eastern Icelandic stocks would remain in the nNEAC grouping.
- Results in addition of around 10,700 non-maturing 1SW fish to the sNEAC stock complex.

PFA

spawners



Status assessment for NEAC stock complexes:

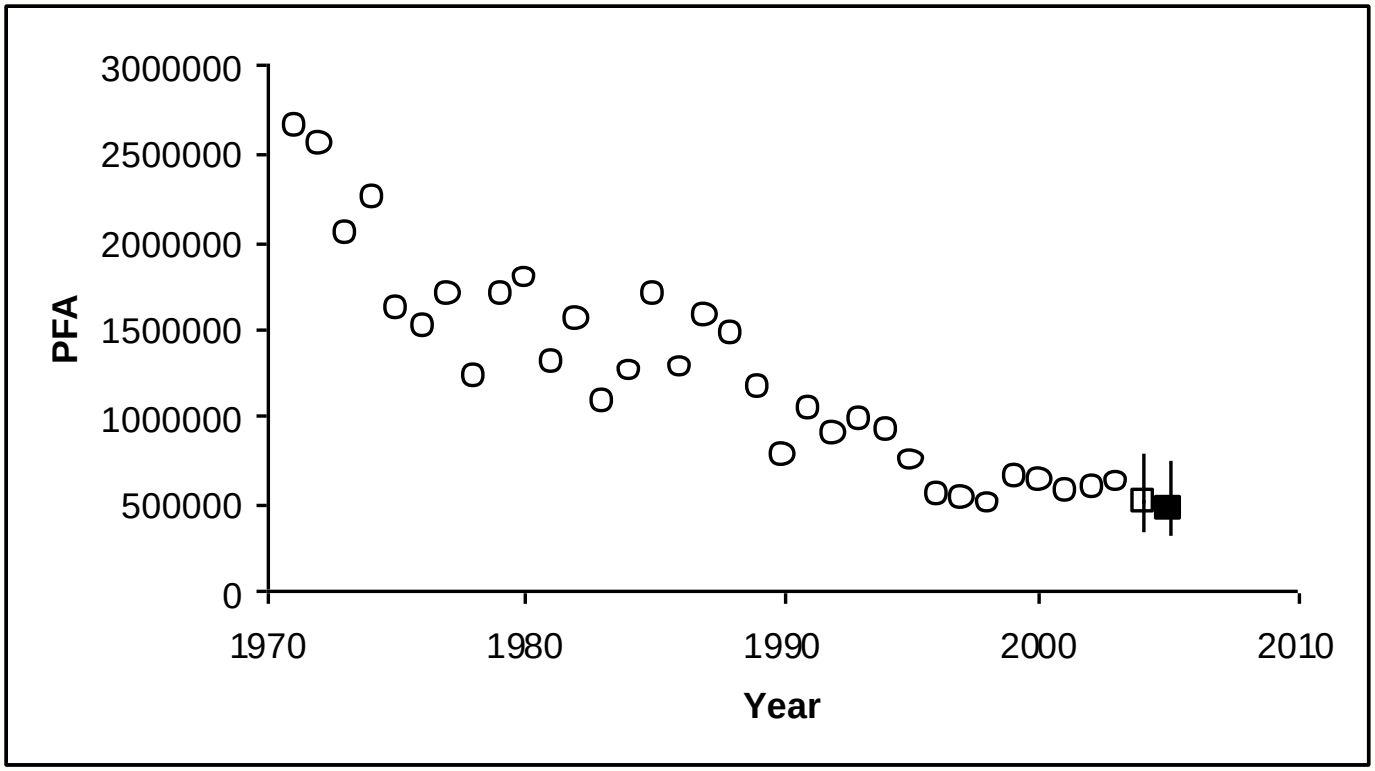
- ***ICES has interpreted stocks to be outside precautionary limits when the confidence limits of the most recent spawner estimate overlap the CL (S_{lim})……***
  - **nNEAC 1SW stock complex was estimated to be outside precautionary limits in 2004**
  - **nNEAC MSW stock complex was estimated to be outside precautionary limits in 2004**
  - **sNEAC 1SW and MSW stock complexes were estimated to be outside precautionary limits in 2004**
- **Therefore, for the first time, ICES considers all these stock complexes to be outside precautionary limits**

Forecasting PFA for NEAC stocks

- In order to develop quantitative catch options for NEAC stock complexes, forecasts of PFA are required for each stock complex and each sea age component.
- Currently only available for the MSW component of the southern European stock complex:
  - Model first developed in 2002 (from SALMODEL) to forecast PFA for sNEAC MSW stocks
  - variables: habitat; lagged spawners and year
  - revised in 2003 with year and lagged spawners; again best model for 2005 forecast

Figure 3.6.1.1 PFA trends and predictions (+/- 95% confidence intervals) for non-maturing 1SW European stock

Note: open square is 2004 update and blocked square is 2005 forecast



2004 forecast updated 524,000 (cf 489,000). Not strictly comparable….Iceland.

2005 forecast 486,000

2005 Catch advice for NEAC stock complexes:

- ICES considers that the national conservation limits are not appropriate for the management of homewater fisheries.
- However, these CLs combined into northern and southern stock groups may be used to give catch advice for distant water fisheries.

2005 Catch advice for NEAC stock complexes:

nNEAC 1SW stocks

- Overall exploitation of the stock complex should decrease, so that the CL can be consistently met.
- Since very few of these salmon have been caught outside homewater fisheries in Europe, even when fisheries were operating in the Norwegian Sea, management of maturing 1SW salmon should be based on local assessments of the status of river or sub-river stocks.
- Thus, the only fisheries on maturing ISW salmon should be on river stocks shown to be within precautionary limits.

2005 Catch advice for NEAC stock complexes:

nNEAC MSW stocks

- ICES considers that the overall exploitation particularly in mixed stocks should immediately decrease so that the CL can be consistently met.
- The inclusion of farmed fish in the Norwegian data results in stock status being overestimated.
- Thus, the only fisheries on non-maturing 1SW salmon should be on river stocks shown to be within precautionary limits.

2005 Catch advice for NEAC stock complexes:

sNEAC 1SW stocks

- As this stock complex remains outside precautionary limits, reductions in exploitation are required for as many stocks as possible, to increase the probability of meeting CL for the stock complex.
- Furthermore, due to the different status of individual stocks within the stock complex, mixed stock fisheries represent particular threats to stocks below reproductive capacity (i.e. below CL).
- Thus, the only fisheries on maturing 1SW salmon should be on river stocks shown to be within precautionary limits.

2005 Catch advice for NEAC stock complexes:

sNEAC MSW stocks

- Quantitative prediction of PFA for this stock complex in 2005 (486,000) is close to present low levels (i.e. no increase in PFA is forecast).
- As this stock complex remains outside precautionary limits, reductions in exploitation are required for as many stocks as possible, to increase the probability of meeting CL for the stock complex.
- Furthermore, due to the different status of individual stocks within the stock complex, mixed stock fisheries represent particular threats to stocks below reproductive capacity (i.e. below CL).
- Thus, the only fisheries on maturing 1SW salmon should be on river stocks shown to be within precautionary limits.

Relevant factors to be considered in management:

- ICES considers that management should be based on assessments of the status of individual stocks.
- Fisheries on mixed stocks, either in coastal waters or in distant waters pose particular difficulties for management, as they cannot target only those stocks that are within precautionary limits.
- Conservation would best be achieved if fisheries can be targeted at stocks that have been shown to be within precautionary limits.
- Fisheries in estuaries and rivers are more likely to fulfil this requirement.

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- **Background:**
  - Reports over a number of years, of occurrence of salmon post-smolts and older fish intercepted in various pelagic fisheries in NE Atlantic, particularly trawl fisheries.
  - In 2002, ICES provided estimates of potential salmon by-catch in Norwegian Sea mackerel fishery, based on extrapolation of Norwegian salmon research trawl catch rates of mackerel and salmon (potentially up to 950k post-smolts).
  - Estimates subsequently viewed as unreliable by ICES, as extrapolation to commercial catch had significant uncertainties.

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

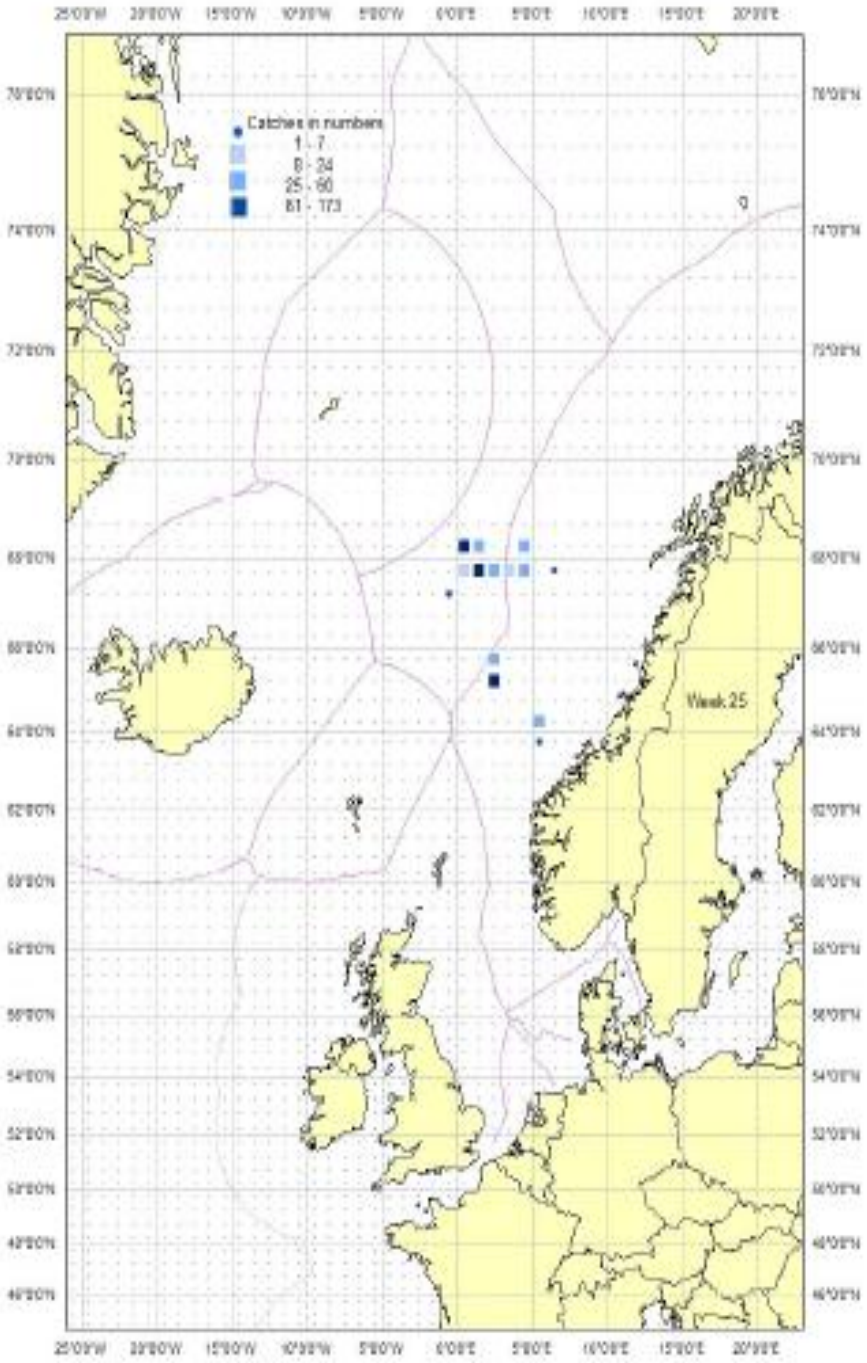
- **Background:**
  - **Attempts to revise estimates made in 2003 and 2004, using new data from Russian pelagic surveys and observer based scanning of mackerel catches at sea, however, lack of disaggregated catch data a big problem, so estimates not attempted.**
  - **Data deficiencies:**
    - **disaggregated catches of mackerel, herring and horse mackerel in IIa, Vb; VIa, b, VIIb, c, j, by division/standard week 16-36**
    - **disaggregated data on boats and gear types used to fish mackerel, herring and horse mackerel in IIa, Vb; VIa, b, VIIb, c, j, by division/standard week 16-36**

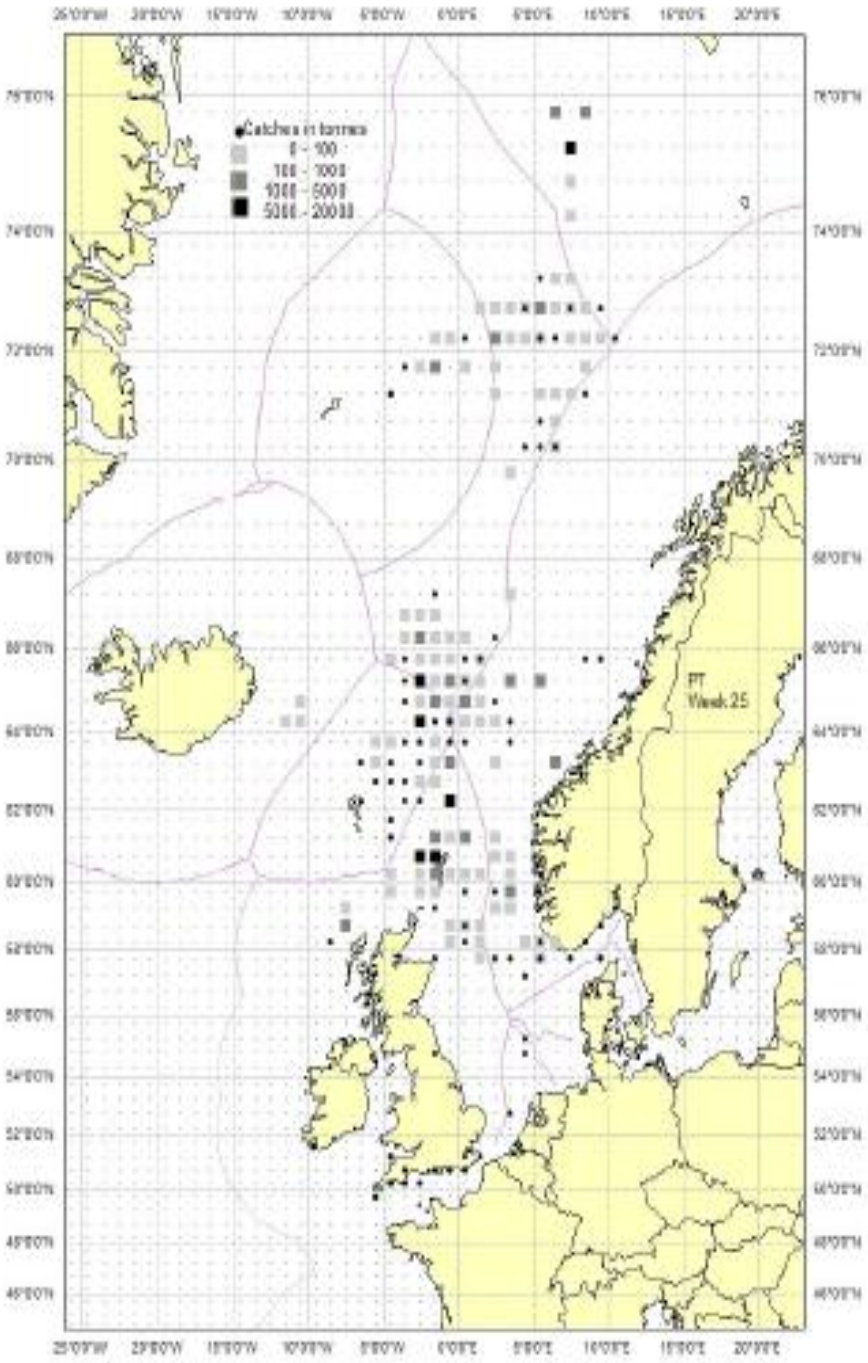
TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- 2005 progress towards developing estimates:
  - Disaggregated data now provided by several countries (week, rectangle, gear type).
  - Comprehensive disaggregated fishery database set up by ICES, covering 2000-2003. Data prior to that incomplete.
  - Data on post-smolt distribution (pooled over whole salmon research fishery time series) used to identify potential areas and times of overlap with pelagic fisheries.
  - Review of gear characteristics across gear types/fishing methods (see SGBYSAL report):
    - Norwegian salmon survey trawl
    - Norwegian pelagic survey trawl
    - Russian pelagic survey trawl
    - Russian pelagic commercial trawl

Developing estimates of salmon by-catch for mackerel fishery in the Norwegian Sea, using disaggregated trawl catches of mackerel from the 2000-2003 database:

- **Catch rate data:**
  - Use catch ratio (posts-smolts/tonne mackerel) derived in 2002-2003 from a) the Russian research trawls, or b) the observer based screening of commercial catches.
  - Catch ratios from Norwegian research surveys targeted at salmon not used, as gear type and fishing methods differ greatly from commercial fishery.
- **Two time periods selected:**
  - weeks 21-31 (total period of post-smolt records in the area)
  - weeks 26-28 (the peak period of post-smolt occurrence in the area)
- **Used commercial catches only from those rectangles where post-smolts have been recorded during the salmon surveys.**


Catches in numbers
1 - 7
8 - 24
25 - 60
61 - 173
Week 25


Catches in tonnes
0 - 100
100 - 1000
1000 - 5000
5000 - 20000
FT
Week 25

2001	Smolt catch rate/ t mackerel	Period weeks	Catch (t)	By-catch (n)
Russian research survey	5.93	21-31	26051	**154482**
Russian observer programme	0.002	21-31	26051	**52**
Russian research survey	5.93	26-28	6777	**40188**
Russian observer programme	0.002	26-28	6777	**14**

2002	Smolt catch rate/ t mackerel	Period weeks	Catch (t)	By-catch (n)
Russian research survey	5.93	21-31	21265	**126101**
Russian observer programme	0.002	21-31	21265	**43**
Russian research survey	5.93	26-28	7594	**45032**
Russian observer programme	0.002	26-28	7594	**15**

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- **Depending on catch rate source used, there is wide variation in estimates of potential by-catch:**
  - **Pelagic research trawls (40,188-154,482)**
  - **Observer programmes (14-52)**

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- Research survey probably overestimates, while observer based programmes probably underestimates; however, likely range of by-catch probably captured here.
- Not formal estimates for any fishery for any particular year, not part of assessment of NEAC salmon stocks or specific management advice.
- Best available estimates to answer NASCO TOR.
- ICES notes that the upper estimate of by-catch presented here (154,482) represents approximately 5% of the combined PFA for the NEAC stock complexes (10 year avg. 3.4 million).

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- Improvements possible (annual estimates?) with:
  - further observer based catch screening in this fishery
  - more data on salmon occurrence/migration at sea
  - Is there non-catch fishing mortality?
- Comparable salmon catch rate data do not exist for other pelagic fisheries of interest (herring and blue whiting).

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- As adult salmon have also been reported in the Russian pelagic surveys and observed-based catch screenings, ICES examined information on by-catch of adult salmon:
  - Example, using mackerel catches for weeks 21-32 in 2001 fishery.
  - Same two catch rate sources (Russian pelagic research surveys/commercial fleet).
  - Catches from overlapping rectangles where a difference of more than two weeks between adult salmon capture and week of recorded mackerel catch not applied.

TOR: to provide an estimate of the by-catch of salmon in pelagic fisheries

- By-catch of adult salmon:
  - Range of estimates:
    - 0-2,574 in ICES areas VIa, VIb, IVa.
    - 0-4,460 in ICES areas IIA, Va, Vb.
  - New information.
  - Same qualifiers as apply to post-smolts, plus adult distribution data less comprehensive than post-smolts.
  - Very preliminary estimates.
  - ICES recommends further investigation.

ICES Advice to NASCO 2005

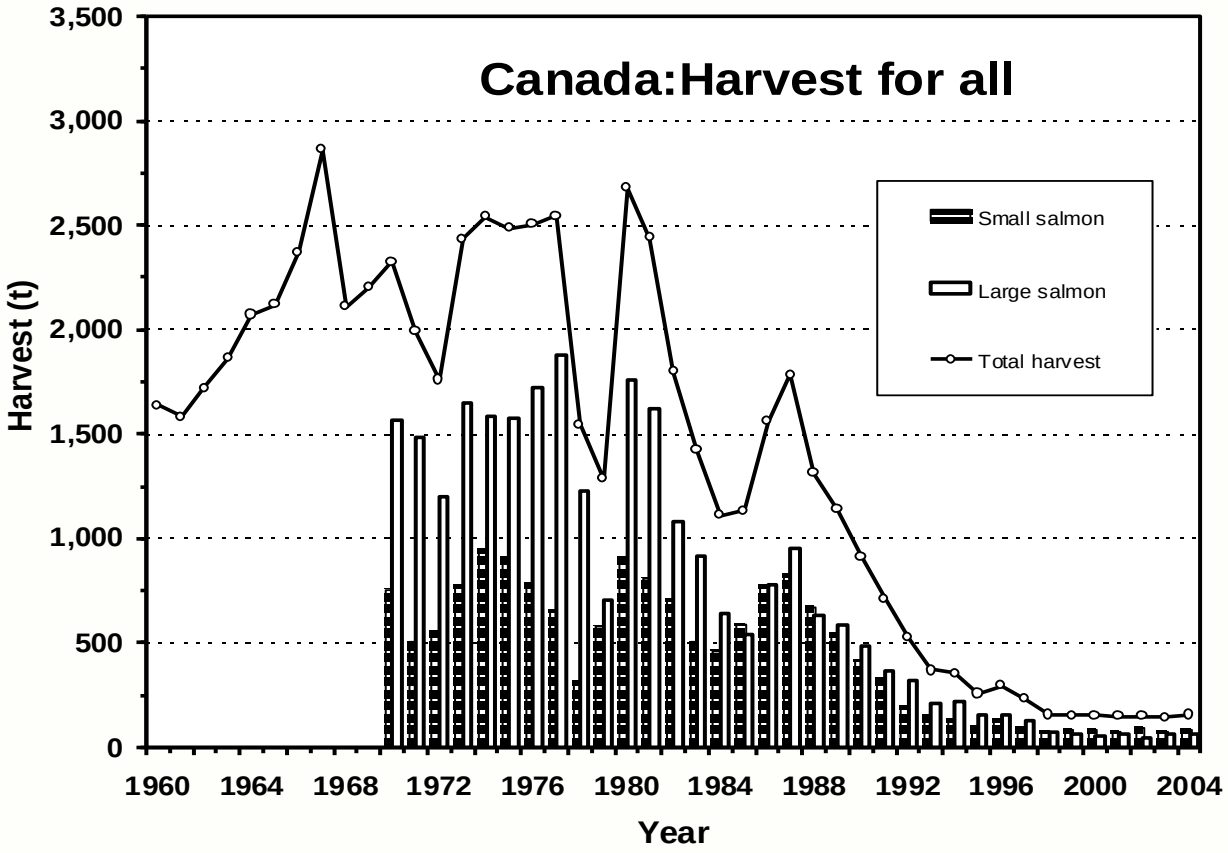
N. AMERICAN COMMISSION AREA

Walter Crozier
WGNAS Chair

Questions to ICES:

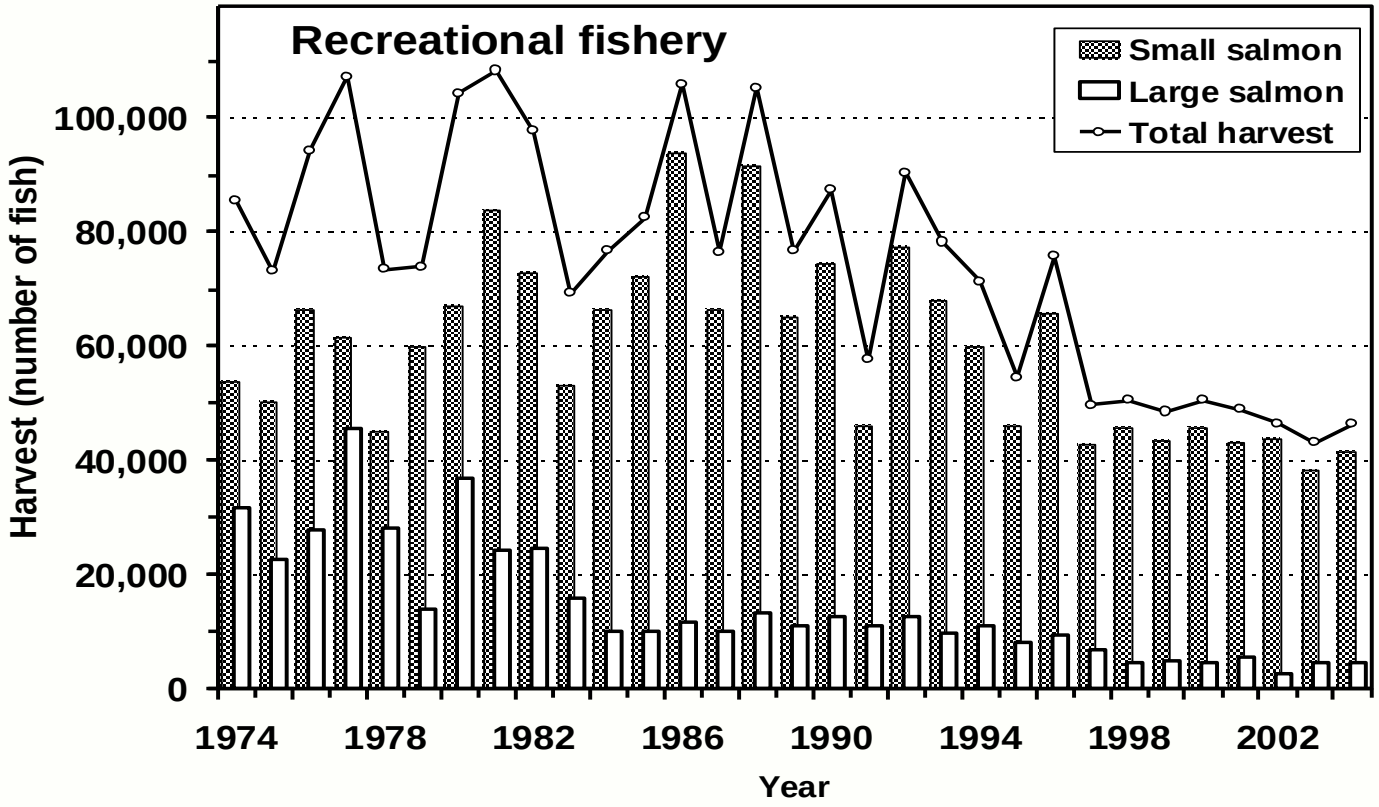
- describe 2004 fisheries and status of stocks
- any new information extent to which objectives of significant management measures introduced in recent years have been achieved
- update age-specific conservation limits, based on new information as available
- provide catch options or alternative advice and advise on the implications of these for stock rebuilding
- provide an analysis of any new biological and/or tag return data, to identify origin and biological characteristics of salmon caught at St Pierre & Miquelon

Figure 4.9.3.1. Harvest (t) of small salmon, large salmon, and combined for Canada, 1960-2004 by all users.



Harvest 2004; 159t (recreational, Aboriginal and Labrador residents), 13% higher than 2003

Figure 4.9.3.2. Harvest (number) of small and large salmon and both sizes combined in the recreational fisheries of Canada, 1974 to 2004.



2004 harvest: 46,377, 8% above 2003

Small up 9%, large down 3% from 2003

Note: catch and release total was 57,000 (55%) in 2004

Harvests 2004:

- USA no harvest 2004 (total est. returns 1,635).
  - URC est. 0t.
- St Pierre & Miquelon, 13 professional and 42 recreational fishers (gillnets) caught 2.8t (2003 2.9t).
  - No estimate of URC.

Composition and origin of the catch

- No reports of tagged fish from other areas in Labrador fisheries in 2004
- Returns to most rivers in Newfoundland, Gulf of St Lawrence and Quebec were exclusively wild salmon
- Hatchery-origin salmon, varying proportions, but most abundant in Bay of Fundy, Atlantic Nova Scotia and the USA
- Aquaculture escapees monitored in several rivers in Bay of Fundy and Maine in 2004:
  - Magaguadavic, 89%, St. Croix 29%
  - Dennys 0%, Union 0%, Narraguagus 0%
  - Occurrence highly variable, depending on proximity to farm sites and escape incidents

Status of NAC stocks 2004 (returns and spawners)

- Estimates of abundance by geographic area gives good picture of status:
  - 2SW returns
  - 2SW spawners
  - Compare to 2SW conservation limits
- 2SW returns and spawners up slightly on 2003 in Labrador, Newfoundland, Gulf and USA.
- In Quebec and Scotia-Fundy, returns were down relative to 2003.
- The only area to meet its 2SW CL in 2004 was Newfoundland.
- Returns of 1SW salmon increased in all areas (not shown)

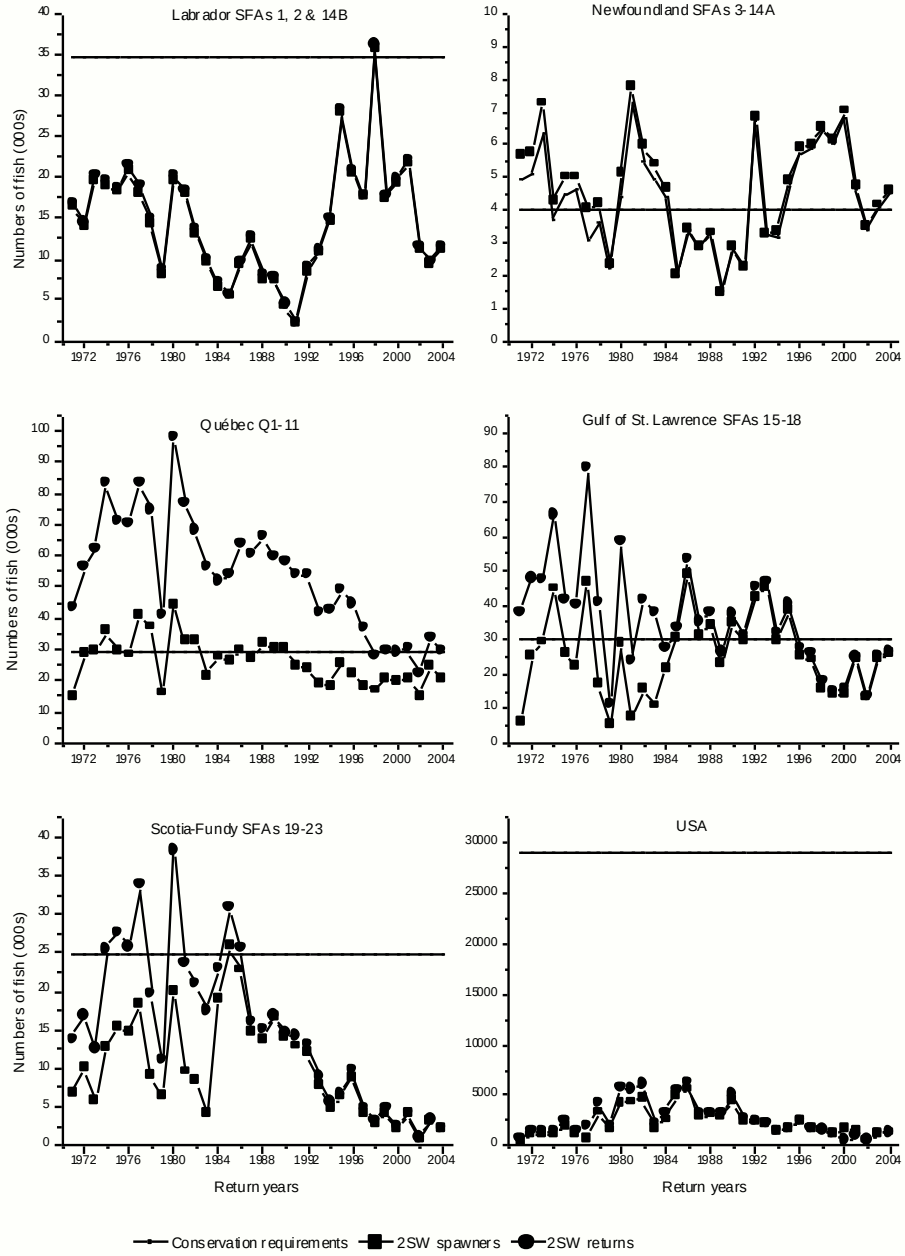
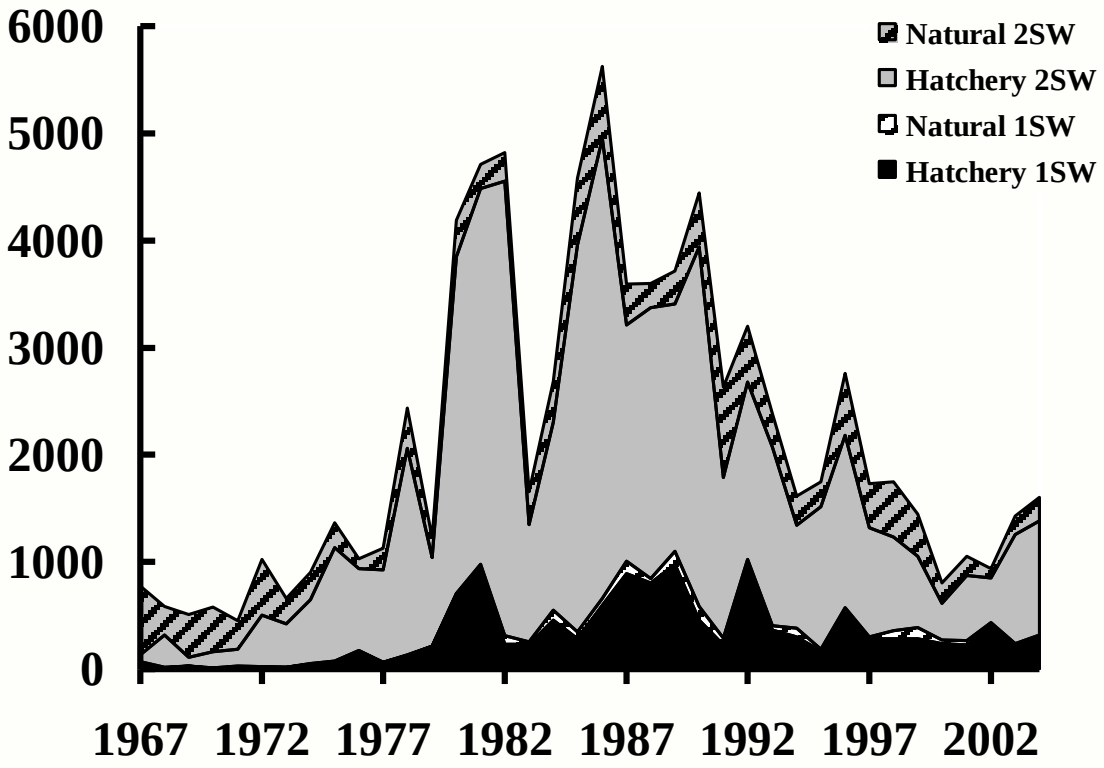

Labrador SFAs 1, 2 & 14B
Newfoundland SFAs 3-14A
Québec Q1-11
Gulf of St. Lawrence SFAs 15-18
Scotia-Fundy SFAs 19-23
USA
Numbers of fish (000s)
Return years
Conservation requirements
2SW spawners
2SW returns

Figure 4.9.4.2. Documented returns of Atlantic salmon to USA rivers, 1967 to 2004. Natural refers to fry stocked or wild individuals.

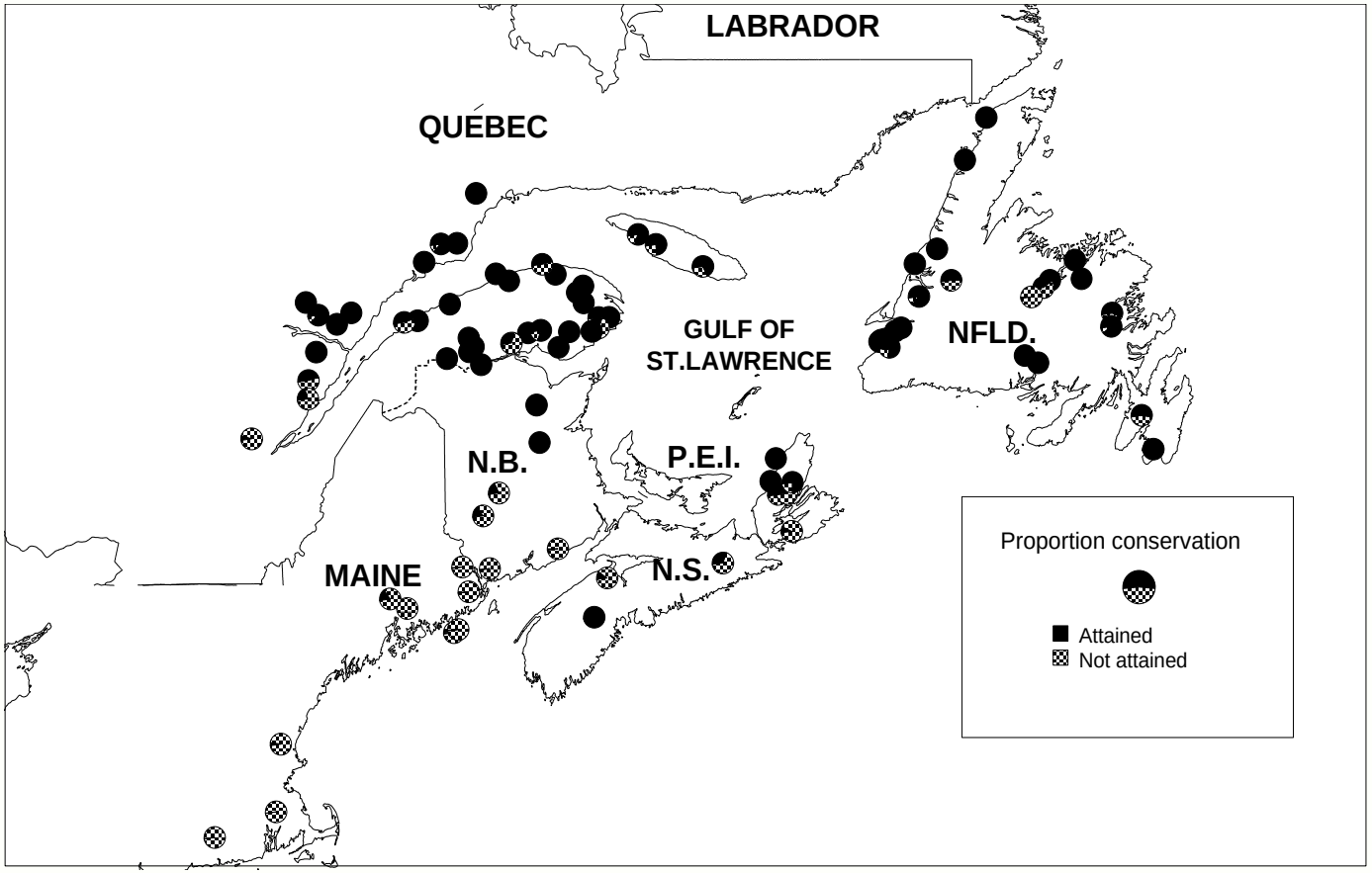


USA 1,635 spawners (all ages) in 2004, up 14% on 2003

Status of NAC stocks (egg deposition)

- River-specific conservation limits (87 assessed rivers)
  - exceeded or equalled in only 49%
  - <50% of required CL in 31% of rivers
  - In Canada, largest deficiencies noted in Bay of Fundy and Atlantic coast of Nova Scotia (75% of rivers below 50% of CL)
  - All USA rivers combined; 4% of CL (8 listed as endangered)

Figure 4.9.8.1 Proportion of the conservation requirement attained in assessed rivers of the North American Commission Area in 2004.



CL achieved in only 49% of rivers

<50% of CL in 31% of rivers

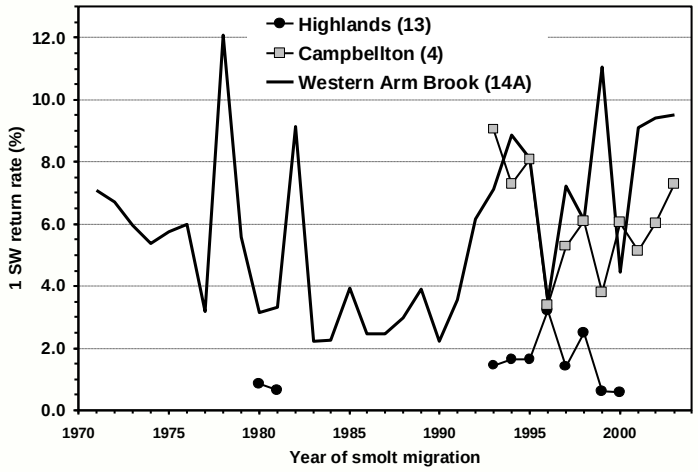
Age-specific conservation limits: update

- No changes to conservation limits in 2004
  - 2SW Canada 123,349
  - 2SW USA 29,199
  - Combined total 152,548

Marine survival indices:

- In 2004, estimated return rates for 1SW fish improved somewhat in 2 of 3 hatchery stocks, and 10 out of 11 wild stocks compared to 2003.
- By contrast, 2SW fish estimated return rates in 2004 decreased in 4 of 6 wild stocks and improved in 2 of 3 hatchery stocks compared to 2003.
- Measures of marine survival rates over time indicate that survival of North America stocks to home waters has not increased as expected as a result of fisheries changes. There have been no significant increasing trends in survival indices of any of the stock components since commercial closures in 1992.

Figure 4.9.9.1. Return rates (%) of wild smolts to return as 1SW salmon from the rivers in west and north Newfoundland (upper) and south Newfoundland (lower).



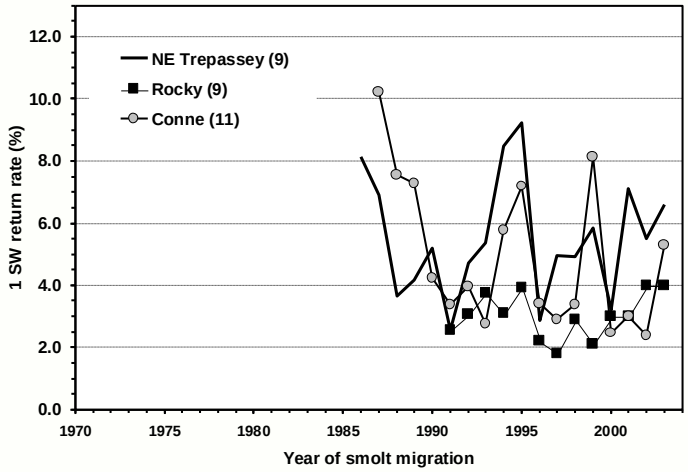
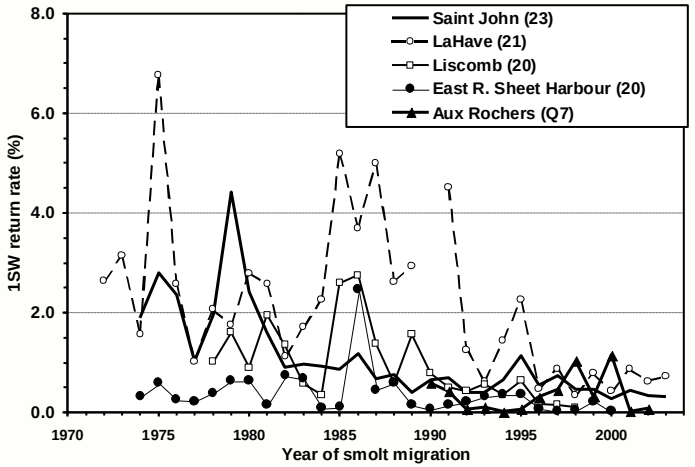


Figure 4.9.9.3. Return rates (%) to the river as 1SW (top) and 2SW (bottom) salmon of hatchery released smolts from eastern Canada.



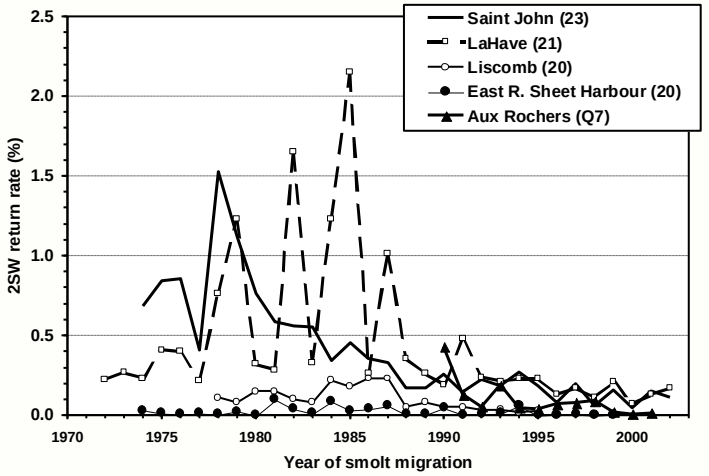


Figure 4.9.9.2. Return rates (%) of wild smolts to return as 1SW salmon (top panels) and 2SW salmon (bottom panels) from rivers in the Maritime provinces (left panels) and Quebec (right panels).

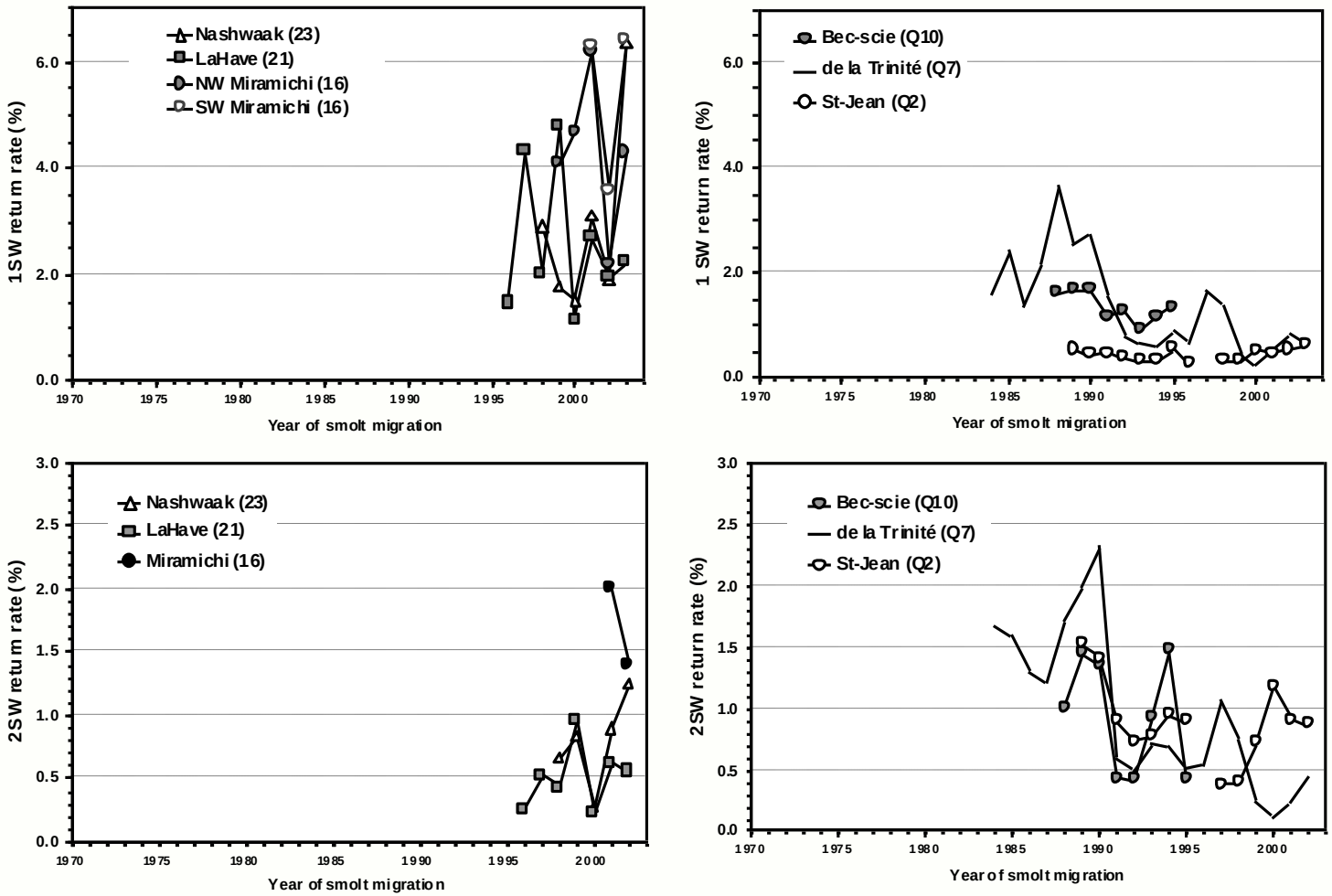
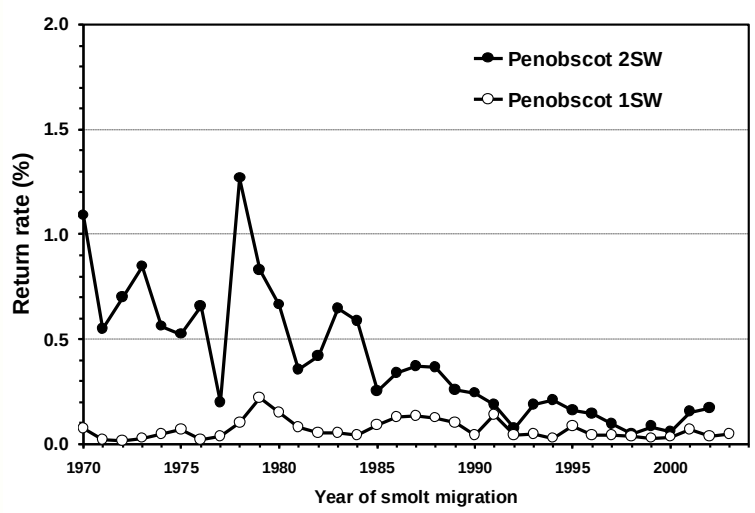
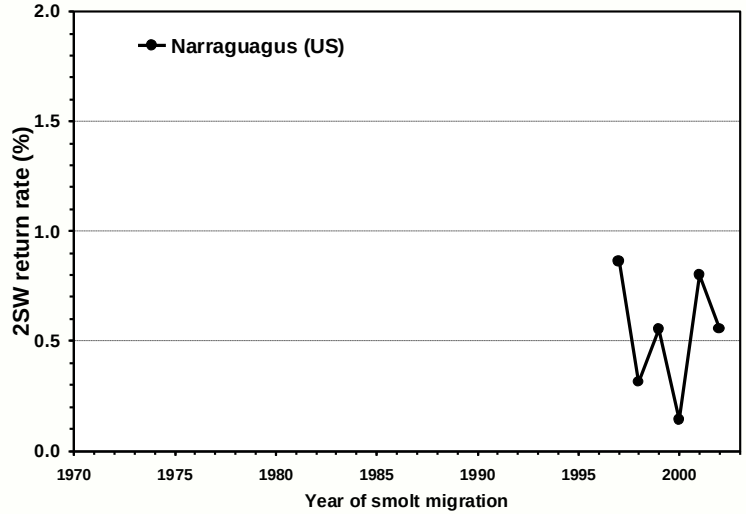


Figure 4.9.9.4. Return rates (%) to the river of hatchery released smolts from the Penobscot River (top) and of wild smolts from the Narraguagus River (bottom), Maine (USA).

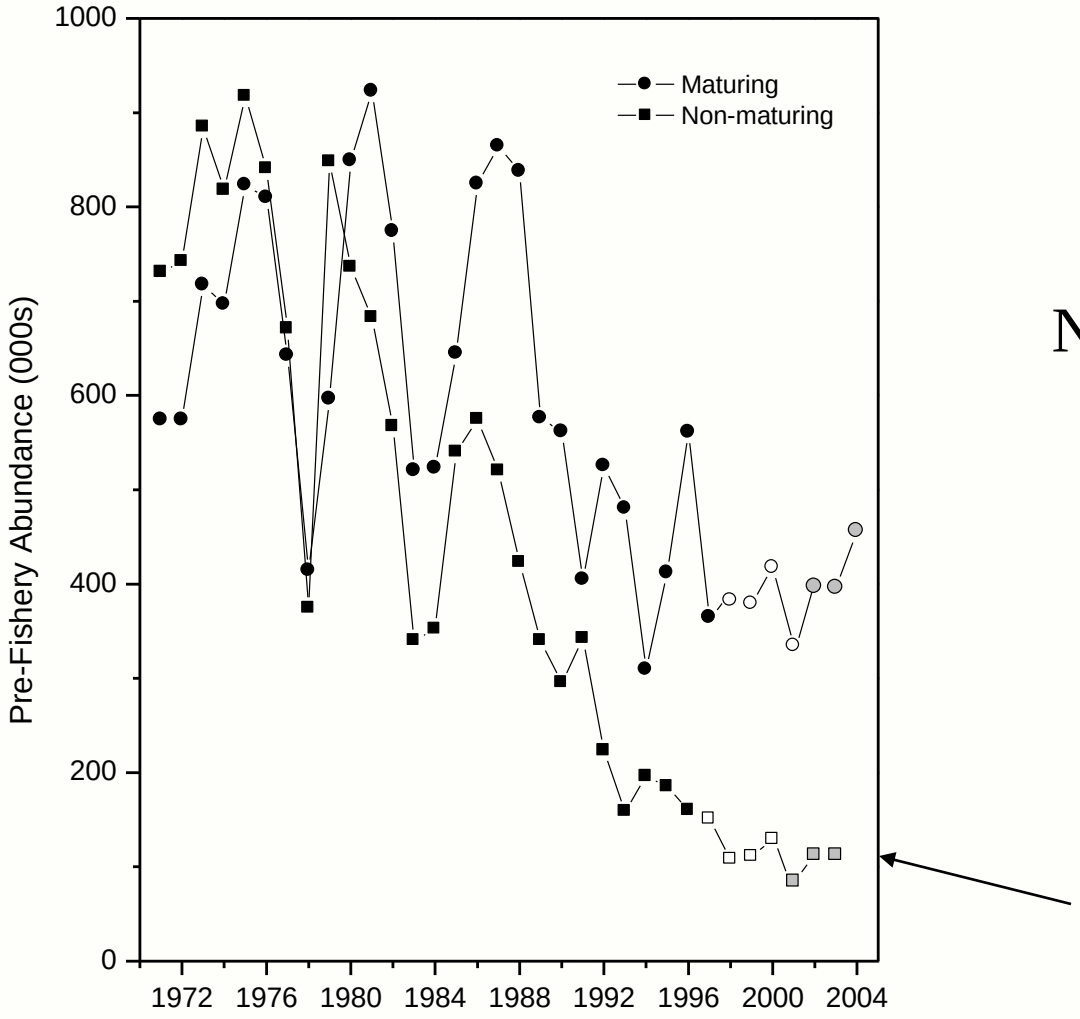




Status of NAC stocks (Run-reconstruction estimates of Pre Fishery Abundance)

- N. American run-reconstruction model used to estimate PFA for maturing and non maturing salmon for each cohort (thus, latest PFA for non-maturing 1SW is 2003)
- 1SW non-maturing in 2003 was estimated at 112,410, very similar to 2002 value (112,282).
- However, 5th lowest in 32 year time series and far below 917,300 in 1975)
- 1SW maturing in 2004 was estimated at 456, 002; 15% higher than 2003 (395,831)
- ICES remains concerned about these trends, esp non-m 1SW

Fig. 4.9.7.1. Prefishery abundance estimate of maturing and non-maturing salmon in North America. Open symbols are for the years that returns to Labrador were assumed as a proportion of returns to other areas in North America and grey symbols are returns estimated from returns per unit of drainage area.



Note Labrador returns estimation update..

Non-m PFA 2003, 112,410 (close to 2002 value)

Labrador:

- Basis for estimates of returns and spawners to Labrador prior to 1998 was catch data from angling and commercial fisheries.
- In 1998, commercial fisheries closed, so time series stopped.
- From 1998 on, returns and spawners estimated using proportional raising factors developed from historical PFA time series.
- In 2005, ICES utilised new data from counting facilities on 4 Labrador rivers since 2001 to estimate returns and spawners, by extrapolation using accessible drainage area
- Minimal difference between methods, hence, new drainage area method adopted from 2002 on.

Summary status of stocks:

- Based on the generally improved 1SW returns in 2004, some modest increase is expected for large salmon in 2005, though return rates for 2SW in monitored stocks remain historically low.
- An additional concern is the low abundance levels of many salmon stocks in rivers in eastern Canada, particularly in the Bay of Fundy and Atlantic coast of Nova Scotia.
- Most salmon rivers in the USA are hatchery-dependent and remain at low levels compared to conservation requirements.
- Despite major changes in fisheries management, returns have continued to decline in the southern areas and many populations there are currently threatened with extirpation.

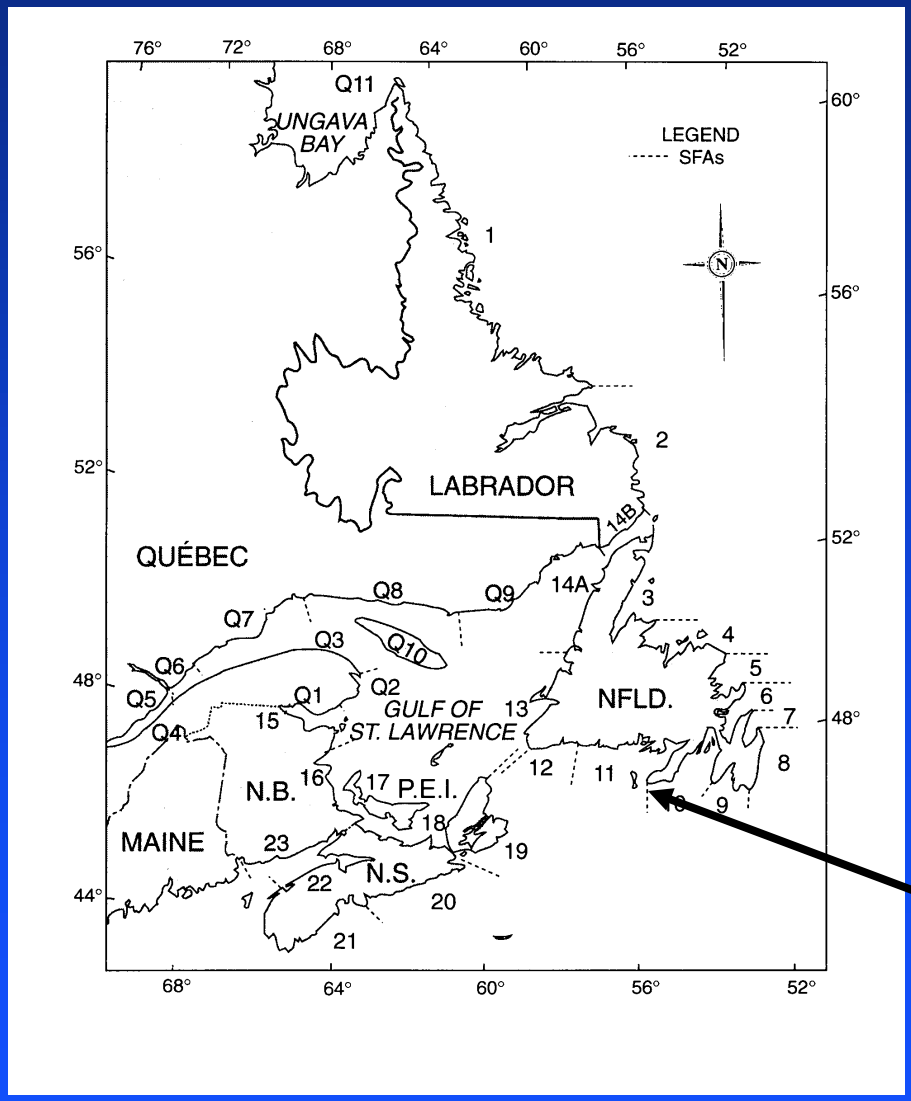
Advice on management:

- In 2004, the overall conservation limit (S_{lim}) for 2SW salmon was met only in Newfoundland, therefore the stocks in the other NAC regions are considered to be outside precautionary limits.
- As the biological objective is to have all rivers reaching their conservation requirements, river-by-river management is necessary. On individual rivers where spawning requirements are being achieved, there are no biological reasons to restrict the harvest.
- Advice regarding management of this stock complex in the fishery at West Greenland is provided in Section 5.

Catch advice, N. America:

- **2005 fisheries on 2SW maturing salmon**
  - **Updated PFA forecast for 2004: 118,600**
  - **82,158 2SW equivalents predicted to return to homewaters in 2005 (after subtraction of 2004 fisheries and natural mortality)**
  - **CL is 152,548**
  - **therefore, zero harvest recommended on this stock complex**
- **2006 fisheries on 2SW maturing salmon**
  - **PFA forecast for 2005: 120,400**
  - **accounting for mortality, 60:40 W. Greenland sharing agreement and the NAC CL, there are no harvest options that will achieve CL with high probability (will be updated, when 2005 catches are known)**

TOR: provide an analysis of any new biological and/or tag return data to identify the origin and biological characteristics of Atlantic salmon caught at St. Pierre & Miquelon.



St. P & M

TOR: provide an analysis of any new biological and/or tag return data to identify the origin and biological characteristics of Atlantic salmon caught at St. Pierre & Miquelon.

- Sampling programmes in 2003 and 2004 reported to ICES in 2005.
- Approx 30% of catch sampled each year.
- In 2004, 166 sampled for scales, 25 for genetics (genetics results not available yet).
- Sea age distributions: 1SW (81.1%); 2SW (18.2%); repeat spawner (0.7%).
- River age distributions: 1 (0.7%); 2 (29.8%); 3 (49.7%); 4 (17.7%); 5 (2.1%).
  - Characteristic of eastern Canadian wild stocks, however, the river age 1 fish probably originated from a hatchery in Canada or hatchery or river in USA.
- No tag returns from this fishery in 2004.

ICES Advice to NASCO 2005

WEST GREENLAND COMMISSION AREA

Walter Crozier
WGNAS Chair

Questions to ICES:

- describe the 2004 fisheries and status of stocks
- provide any new information on the extent to which objectives of significant management measures introduced in recent years have been achieved
- origin of salmon caught at West Greenland at finer resolution than continent of origin (river stocks, country or stock complexes)
- provide catch options or alternative management advice and advise on the implications of these for stock rebuilding:

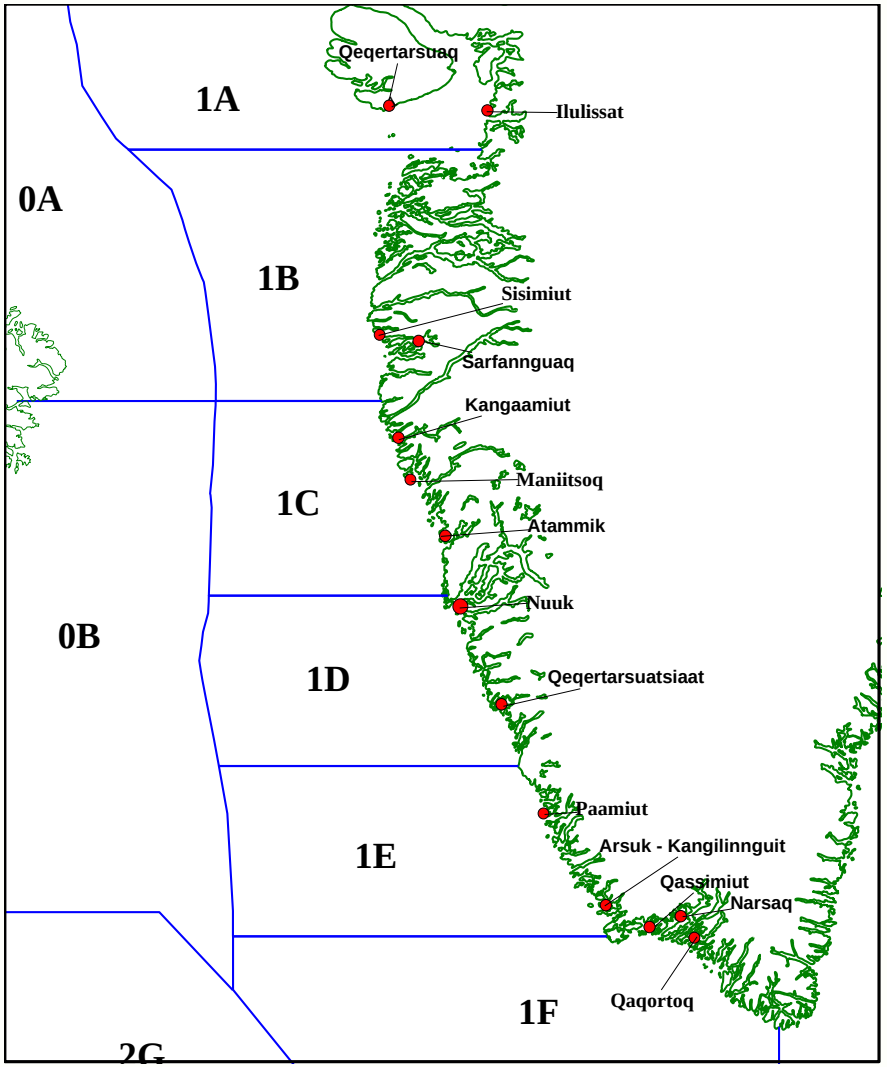
The fishery in 2004

- In 2004, NASCO agreed to restrict the fishery *"to that amount used for internal subsistence consumption in Greenland, which in the past has been estimated at 20t"*
- Greenlandic authorities set commercial quota to nil:
  - landings to fish plants, sale to shops and for export forbidden.
  - all catches to be reported to fishery office daily.
- Season allowed 09 Aug- end of year.
- 14.7t landed salmon reported (9t 2003);
  - 27% in NAFO 1A/1B, <15% 1F (recently 50% 1F)
  - distributed evenly across weeks (usually tails off)

Table 5.9.1.2. Distribution of nominal catches (metric tons) by Greenland vessels (1977-2004).

	NAFO Division							West	East	Total
Year	1A	1B	1C	1D	1E	1F	UNK	Greenland	Greenland	Greenland
1977	201	393	336	207	237	46	-	1,420	6	1,426
1978	81	349	245	186	113	10	-	984	8	992
1979	120	343	524	213	164	31	-	1,395	+	1,395
1980	52	275	404	231	158	74	-	1,194	+	1,194
1981	105	403	348	203	153	32	20	1,264	+	1,264
1982	111	330	239	136	167	76	18	1,077	+	1,077
1983	14	77	93	41	55	30	-	310	+	310
1984	33	116	64	4	43	32	5	297	+	297
1985	85	124	198	207	147	103	-	864	7	871
1986	46	73	128	203	233	277	-	960	19	979
1987	48	114	229	205	261	109	-	966	+	966
1988	24	100	213	191	198	167	-	893	4	897
1989	9	28	81	73	75	71	-	337	-	337
1990	4	20	132	54	16	48	-	274	-	274
1991	12	36	120	38	108	158	-	472	4	476
1992	-	4	23	5	75	130	-	237	5	242
1993[1]	-	-	-	-	-	-	-	-	-	-
1994[1]	-	-	-	-	-	-	-	-	-	-
1995	+	10	28	17	22	5	-	83	2	85
1996	+	+	50	8	23	10	-	92	+	92
1997	1	5	15	4	16	17	-	58	1	59
1998	1	2	2	4	1	2	-	11	-	11
1999	+	2	3	9	2	2	-	19	+	19
2000	+	+	1	7	+	13	-	21	-	21
2001	+	1	4	5	3	28	-	43	-	43
2002	+	+	2	4	1	2	-	9	-	9
2003	1	+	2	1	1	5	-	9	-	9
2004	3	1	4	2	3	2	-	15	-	15

[1]) The fishery was suspended
+) Small catches <0.5 t
-) No catch



The fishery in 2004

- 151 licenses issued (152, 2003)
- 66 fishers reported catch; increase from 40 in past two years, however, only 24 of these licensed.
- URC estimated at 10t (unverified)
- no cpue data collected
- Given low proportion of license holders reporting catch and sampling observations of more catch than reported at Nuuk, this suggests that the nominal catch is an underestimate.
- ICES recommends further investigation of the true extent of fishing activity.

The fishery in 2004

- Sampling
  - NASCO international programme continued in 2004
- Biological details from sampling:
  - 73% N. American; 27% European (DNA analysis).
  - N. American 97% non-m 1SW; European 97% non-m 1SW.
  - Smolt age:
    - N. American 2% age 1, 20% age 2, 52% age 3, 23% age 4 (age 2 below avg.)
    - European 18% age 1, 58% age 2, 20% age 3, 3% age 4 (close to avg.)
- 2004 lengths and weights among highest in last decade.

TOR: provide information on the origin of Atlantic salmon caught at Greenland at a finer resolution than continent of origin (river stocks, country or stock complexes)

- Composition of mixed stock fisheries essential pre-requisite for management (NASCO Decision Structure)
- In 2003 a model was developed that classified fish at W, Greenland to country and sub-country of origin for N. American fish (probabilistic genetic assignment, PGA)
  - Refined PGA examined in 2005; sensitivity analyses and estimation of input data from unsampled NAFO divisions.
  - Applied to 2000-2002 Greenland data and NAC baseline data at 11 loci.

Table 5.9.4.1. Probabilistic-based Genetic Assignments for the 2000-2002 West Greenland Atlantic salmon fisheries. Reported and unreported catch in numbers were partitioned by continent (E-European origin and NA-North American origin) and country (CAN-Canadian origin and USA- United States origin) of origin for NA origin fish only.

Year	Continent of Origin Country of Origin	Estimate	Percent	90% Confidence Interval Lower	 Upper
2000	NA total	7,731	66.0%	7,657	7,808
	E total	3,983	34.0%	3,906	4,057
	CAN total	7,685	99.4%	7,527	7,793
	USA total	46	0.6%	0	192
2001	NA total	10,673	64.6%	10,673	10,859
	E total	5,893	35.4%	5,798	5,985
	CAN total	10,402	96.6%	10,046	10,691
	USA total	364	3.4%	89	710
2002	NA total	4,782	70.0%	4,728	4,837
	E total	2,054	30.0%	1,999	2,107
	CAN total	4,737	99.1%	4,737	4,817
	USA total	45	0.9%	0	141

Not available for 2003 or 2004 yet

TOR: provide information on the origin of Atlantic salmon caught at Greenland at a finer resolution than continent of origin (river stocks, country or stock complexes)

- **Results give first genetic assessment of NAC sub-continent of origin at W. Greenland.**
- **Canadian fish dominated the N. American component of the harvest, ranging from 96% to 99% for the period 2000-2002.**
- **ICES recommends further development of the method and enhancement of European baseline datasets to extend analysis to European stock complexes.**

Effects of WG management measures on NAC and NEAC stocks

- Updated data on biological characteristics (1999-2004) were used to re-calculate the potentially returning fish per tonne not harvested at West Greenland:
  - N. America 159-187 fish (5^{th} 95^{th} percentiles)
  - Europe 64-80 fish
- Because these fish are distributed among many rivers in both continents, it is not possible to show direct benefits to individual stocks.
- However, tentative exploitation rates for NAC fish (Greenland harvest/PFA) at W. Greenland have fallen from 26% prior to 1993 to around 5% in last 5 years, suggesting recent management measures have reduced exploitation on this stock complex.

Age-specific stock conservation limits for stocks in the WGC area

- N. American stocks:
  - W. Greenland catches of NAC fish dominated (>90%) by non-maturing 1SW salmon originating from most areas of N. America
  - CLs therefore based on this stock component (2SW)
  - 152,548 (123,349 Canada; 29,199 USA), no change 2004

Age-specific stock conservation limits for stocks in the WGC area

- European stocks:
  - Tagging data/biological sampling suggests mostly non-maturing 1SW fish from southern European stocks
  - CL for this stock complex for this age group is 278,000 2SW fish
  - This CL is uncertain, based on national pseudo-stock/recruitment model in most cases, but is best available estimate

Status of stocks in the WGC area

- N. American stocks:
- Abundance (PFA) of non-maturing 1SW salmon remains at near record low levels
  - 1SW non-maturing in 2003 was estimated at 112,410, very similar to 2002 value (112,282) and far below 917,300 in 1975.
  - PFA remains below overall CL for this stock complex.
- In 2004, the combined CL for 2SW salmon was not met for N. America, hence, the overall stock complex is outside precautionary limits (only Newfoundland met CL)
- Return rates have not improved following fishery closures (Newfoundland, 1992, Labrador, 1998, Quebec, 2000) and in some areas have declined further

Status of stocks in the WGC area

- **Southern European stocks:**
  - **PFA of non-maturing 1SW has declined steadily since 1970's, and prediction for 2005 (486,000) is close to recent low levels (i.e. no increase forecast)**
  - **Spawning escapement has not been significantly above CL for past 9 years; the stock complex is outside precautionary limits**
  - **Sea survival indices remain low, relative to historical values**

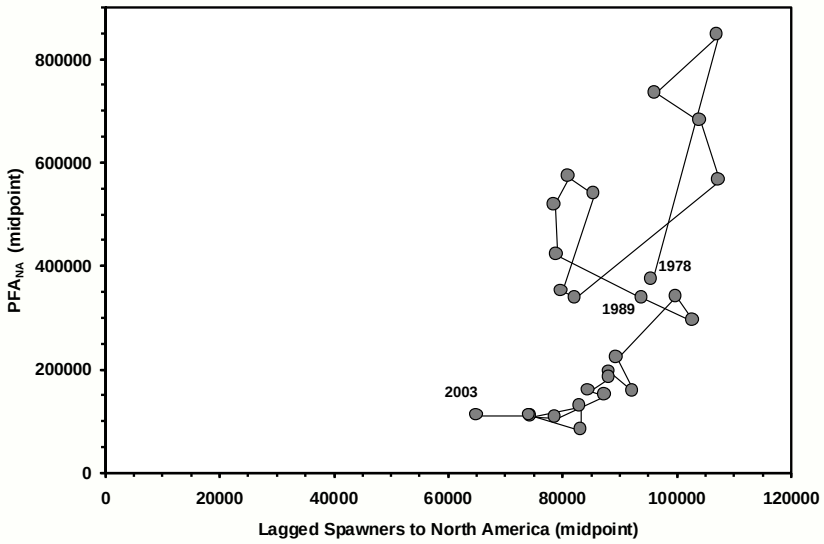
Status of stocks in the WGC area

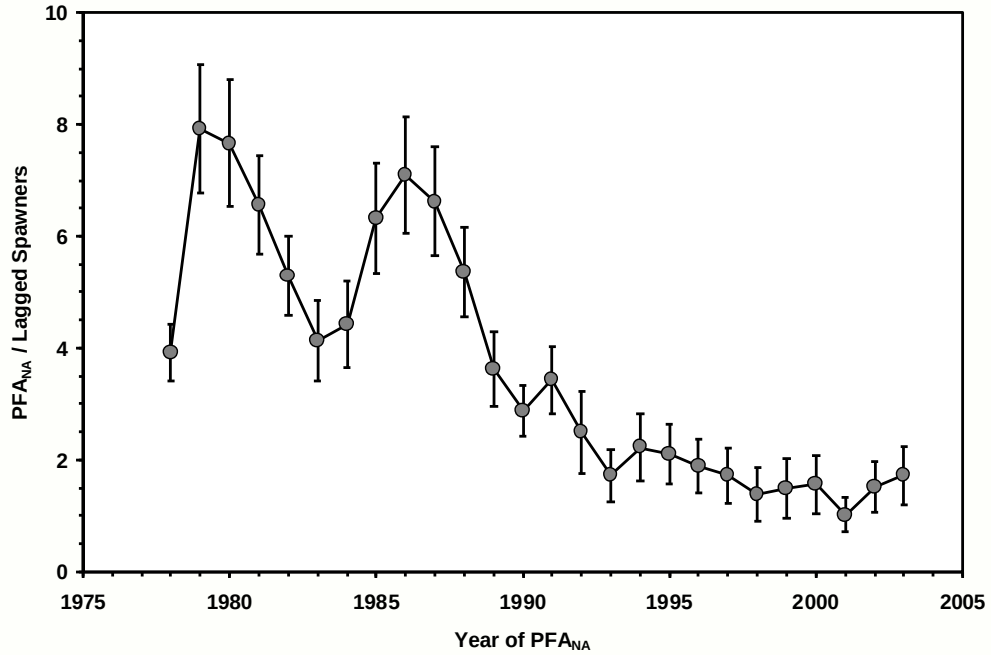
- ICES considers the stock complex at West Greenland to be outside precautionary limits.

Forecasting pre-fishery abundance of the NAC stock complex

- **PFA forecast model used to estimate PFA of NAC non-maturing 1SW fish was unchanged from 2004:**
  - **Overall approach models natural log transformed PFA and lagged spawners, using regressions, and uses a Monte Carlo method to derive a probability density function for the PFA forecast.**
  - **The LS variable is an index of the 2SW parental stock of the PFA and therefore historical relationships between the two variables may be used to forecast future PFA.**
  - **Phase change incorporated in PFA/LS ratio.**
  - **Models include two without phase shifts, plus five models with phase shifts with eight possible break years (1986 to 1993) for each model. In each simulation the most parsimonious model was selected using Akaike's Information Criterion.**
  - **Approach accounts for uncertainty in the input data and in the model selection.**

Figure 5.10.1.1. PFA (mid-point) and lagged spawner (mid-point) association for the NAC area showing the sequence from 1978 to 2003 (upper panel) and the relative change of the PFA to lagged spawners over the time series (lower panel).

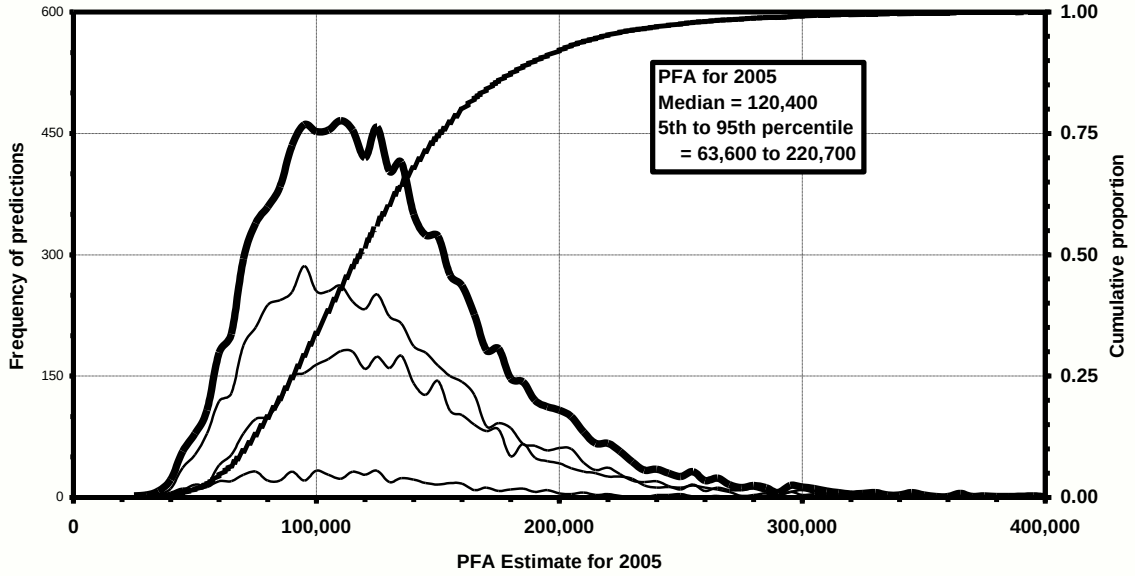




PFA forecast model input changes/updates 2005:

- Updated PFA estimate for 2003 included in historical time series.
- Lagged spawner index is the sum of the lagged spawner estimates for the six N. American regions.
  - In 2005, ICES developed a method for deriving Labrador spawners for recent years, hence, Labrador is again included in the index.
- Forecast for non-maturing 1SW fish in 2005 remains among the lowest in the time series, with a mid point of 120,360 fish.

Figure 5.4.1. PFA_{NA} forecast estimate distribution for the year 2005 non-maturing 1SW salmon.



Percentile	Estimate
5	63,645
10	73,321
15	80,509
20	87,109
25	92,725
30	98,151
35	103,830
40	109,312
45	114,715
50	120,360
55	125,768
60	132,023
65	138,048
70	145,407
75	153,173

PFA N American stock complex 2005

Management objectives

- To meet spawning requirements simultaneously in Labrador/Newfoundland/Quebec/Gulf (98,644 2SW)
- To achieve >10% or >25% increase on average of 5 year baseline period (1992-1996) returns to Scotia-Fundy and US (to support stock rebuilding)
  - Note, baseline was newly defined in 2004 (as period of 1 generation at the time most Canadian commercial fisheries were closing); replaces previously used average of most recent 5 years and provides a consistent criterion to assess performance of management decisions affecting these stocks

Catch advice for 2005 for W. Greenland fishery: N. American stocks

- The level of risk aversion adopted by NASCO is 75%
- Even in the absence of fisheries on non-m 1SW at W. Greenland in 2005 and on returning 2SW salmon in N. America in 2006, there is only a 9% chance that CLs for the 4 northern regions will be met
- The probability of realising >25% or even >10% increases in returns to the Scotia-Fundy and USA regions (relative to the 1992-1996 baseline) is effectively zero.

West Greenland Harvest (t)	Simultaneous Conservation (Lab, NF, Quebec, Gulf)	Improvement (SF, USA) of returns in 2006	
		> 10%	> 25%
0	0.091	0.000	0.000
5	0.084	0.000	0.000
10	0.079	0.000	0.000
15	0.073	0.000	0.000
20	0.069	0.000	0.000
25	0.065	0.000	0.000
30	0.061	0.000	0.000
35	0.057	0.000	0.000
40	0.054	0.000	0.000
45	0.050	0.000	0.000
50	0.046	0.000	0.000
100	0.023	0.000	0.000

Catch advice for 2005 for W. Greenland fishery: N. American stocks

- There are no fishery allocations that would meet the objective of achieving CLs for 2SW salmon in the four northern regions, or an alternative objective of increasing returns to the under-escaped regions of N. America.
- None of the stated management objectives would allow a fishery to take place.

Catch advice for 2005 for W. Greenland fishery: Combining catch advice for NAC and NEAC stocks

- ICES also considered catch advice based on applying NAC and the NEAC PFA forecasts for 2005 into a single catch advice table.
- Parameters for NEAC risk analysis:
  - sNEAC PFA forecast of 486,000 (313,000-755,000)
  - Adjust PFA for 8 months of natural mortality (0.03/month) to time of fishery
  - NAC sharing arrangement for West Greenland assumed to apply to European fish (cannot be set separately for NAC and NEAC in the mixed stock anyway). Historically Greenland share of harvest of NEAC close to 40%.
  - CL of sNEAC MSW salmon is 278,000 fish

Catch advice for 2005 for W. Greenland fishery: Combining catch advice for NAC and NEAC stocks

- In the absence of any fishery at W. Greenland, there is a less than 75% probability (68%) that the MSW CL for southern Europe will be met.
- The stated management objective would not allow a fishery to take place.

West Greenland Harvest (t)	Simultaneous Conservation (Lab, NF, Quebec, Gulf)	Improvement (SF, USA) of returns in 2006		Conservation MSW Salmon Southern NEAC
		> 10%	> 25%	
0	0.091	0.000	0.000	0.684
5	0.084	0.000	0.000	0.680
10	0.079	0.000	0.000	0.673
15	0.073	0.000	0.000	0.669
20	0.069	0.000	0.000	0.664
25	0.065	0.000	0.000	0.656
30	0.061	0.000	0.000	0.650
35	0.057	0.000	0.000	0.645
40	0.054	0.000	0.000	0.640
45	0.050	0.000	0.000	0.634
50	0.046	0.000	0.000	0.628
100	0.023	0.000	0.000	0.576

Catch advice for 2005 for W. Greenland fishery: Combining catch advice for NAC and NEAC stocks

- NAC/NEAC combined
  - ICES advises that there should be no catch on these stock complexes in 2005 at West Greenland.
  - Analyses carried out by ICES indicates that attainment of the CL for the NAC stock complex is highly sensitive to the magnitude of the catch as West Greenland. Therefore, where catches are allowed, it is imperative that fishing is closely monitored and full details are provided to ICES.