

West Greenland Commission

WGC(01)11

*Initial Comments On The NASCO Decision Structure For Fisheries
Management*

(Tabled by the European Union)

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Introduction:

At its first meeting in March 2000, the Standing Committee on the Precautionary Approach (SCPA) developed a 'Decision Structure to Aid the Council and Commissions of NASCO and the Relevant Authorities in Implementing the Precautionary Approach to the Management of North Atlantic Salmon Fisheries'. The Council agreed that the decision structure should be considered by the Commissions at their meetings and that each Contracting Party should apply the decision structure on a selection of rivers with different stock status and management policies. Contracting Parties were asked to report annually to the Commissions, and the Commissions and Contracting Parties agreed to report back to the SCPA in the spring of 2002 so that there could be a thorough evaluation of the proposal. At the meeting of the North-East Atlantic Commission, the representative of the European Union stressed the need to carry the process forward and expressed a commitment to provide an initial evaluation to the Commission in June 2001. Further information will be supplied to the SCPA in 2002.

The decision structure has therefore been applied to a number of salmon stocks/fisheries in UK and examples for fisheries listed below are attached (Examples 1-5):

- River Tyne - rod fishery
- Rivers Taw and Torridge joint estuary - net fishery
- North East coast mixed stock - drift net fishery
- North Esk – net & coble and rod fisheries
- Strathy Point – fixed engine fishery

In addition an example for the River Bush (Northern Ireland) was presented in the report of the SCPA (CNL(00)57-Annex 12). The examples have provided an opportunity for managers and scientists to evaluate the overall purpose of the decision structure, how it may best be used, and whether the questions and layout could be improved.

Purpose of the Decision Structure:

The SCPA recommended that the decision structure should be used in developing pre-agreed and other management actions for distant water fisheries and as guidance for the preparation of management actions for homewater fisheries. The trials on fisheries in UK indicated that such a decision structure could provide a sound basis for developing more consistent approaches to determining appropriate management actions which are compatible with the application of a precautionary approach to the conservation and sustainable exploitation of salmon stocks.

The decision structure is a useful first step towards developing management protocols although it requires further refinement to accommodate fully the management of individual

populations that may contribute to fisheries in diverse ways. Within England and Wales, the decision structure will integrate well with the technical reports currently prepared by the Environment Agency to support submissions to Ministers for approval of Byelaws or Orders.

How the Decisions Structure should be used:

The SCPA has indicated that the decision structure is intended to be used iteratively such that the effects of actions will be monitored and evaluated, and decisions reconsidered to ensure that they are consistent with the Precautionary Approach. This suggests that the document should be filled in like a questionnaire in order to provide a record of the decision making process, which can be assessed and evaluated at a future date. This will also facilitate the dissemination of information on the management of salmon fisheries between Contracting Parties. This is the approach adopted in the Annexes to the SCPA Report and in our examples.

This approach is not entirely consistent with the format of the draft decision structure, which currently includes both questions (e.g. *Is the stock threatened by external factors?*) and instructions (e.g. *Assess status of stock*). We propose that the form would be easier to use and would provide a clearer description of the decision making process if all sections posed questions or requested information. The format would be further clarified if the answers were typed in boxes in a similar way to the NASCO's return forms for Articles 14 and 15.

The decision structure depends very heavily upon conservation limits as indicators of the need for management action. It is important that account is also taken of uncertainties in assessments and management and that additional margins of protection are provided for stocks. In addition, if stocks are in decline, there may be a need for management action to be taken before estimates of abundance fall below the conservation limit. Similarly, simply because stocks fall below conservation limits in occasional years there may be no need for immediate action. Stock status must therefore be viewed in the wider context of changes in abundance and diversity over more than a single year, and this should be taken into account in the decision structure.

Comments on questions and layout:

We have identified the following concerns with the questions or layout in the decision structure:

1. The preliminary question asks whether it is a single or mixed stock fishery; a mixed stock fishery is defined as one that exploits significant numbers of salmon from more than one river. As a result single stock fisheries will include those that exploit fish from a number of populations which may be quite diverse. While this diversity is addressed in later questions, we are concerned that the need to protect these populations, rather than the overall diversity of the river stock, is not fully addressed in the decision structure.
2. Question A/1 appears to imply that stocks will only be 'threatened by external factors' if they are below their conservation limits (i.e. if the answer is 'yes', no further questions are answered). However, there may be evidence of threats before stocks fall to critical levels and management action should be taken at this stage. Thus both 'yes' and 'no' answers to this question should lead on the subsequent questions.

3. Section B should also include a question asking whether any of the stocks exploited by a mixed stock fishery are threatened by external factors.
4. Question B/2 seeks information on the stock components that are exploited by a mixed stock fishery. A similar request should be included for the single stock fisheries in Section A because this can have a significant effect on management actions.
5. No information is sought on the effectiveness of the current regulatory measures either when these appear to be working or when they have failed to protect the abundance or diversity of the stock. In many fisheries, this will provide the basis for deciding upon future actions.
6. Questions A/3a, A/4a and B/5a give instructions to implement pre-agreed management actions but do not request a description (or reference) for these. Such a description would aid the iterative application of the decision structure.
7. Questions A/3b, A/4b and B/6 give instructions to undertake monitoring programmes. These programmes should be outlined in the answers along with information gaps that are being addressed.
8. Question B/5b should request information on the reasons for deciding not to close the fishery and details of the management actions that are being taken.

Example 1: River Tyne (rod fishery), England

Does the fishery exploit salmon from more than one river?

No evidence that it is.

If no, see A.

If yes, see B.

A. *Single Stock*

1. Is the stock threatened by external factors (e.g. acidification, disease) ?

If yes, take special management action as appropriate (e.g. establish gene bank).

If no, go to A2.

No – overall. However, part of the upper catchment has been lost because of reservoir construction. A stocking programme supported by a local hatchery operates to mitigate these losses.

2. Assess status of the stock (abundance and diversity)

(a) Have age-specific conservation limits been set?

No.

(i) If yes, is the conservation limit being exceeded according to agreed compliance criteria (e.g. 3 out of 4 years)?

N/A (the only conservation limit set is not age specific)

(ii) If no, assess other measures of abundance.

The river's salmon stock is estimated to comply with its conservation limit since 1987, having recovered from virtual extinction in the 1950s. The conservation limit excludes parts of the catchment inaccessible to salmon. The conservation limit has been significantly exceeded in the last three years:

<i>Year</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>
<i>Proportion of conservation limit achieved*</i>	<i>157%</i>	<i>174%</i>	<i>213%</i>

** estimates derived from rod catch*

(b) Is the stock meeting other diversity criteria?

Uncertain. There was concern that in 1998 about the abundance of early-run multi-sea-winter salmon when the proportion in the annual rod catch fell to 5 per cent, its lowest level since the stock began to recover in the 1960s. Since the introduction of national byelaws in 1999 (these include closure of the North East Coast drift net fishery before June), the abundance of early-run salmon has apparently increased.

3. If either abundance or diversity is unsatisfactory, then seek to identify the reasons.

Diversity: In contrast to many other rivers, conditions for Tyne salmon may once have selected for early run fish due to poor estuarine water quality in the summer and heavy exploitation of later run salmon by driftnets. Conditions may have been becoming more conducive to survival of summer run salmon, including grilse, with reduced drift netting

and improved estuary quality. Exploitation of early-run multi-sea-winter salmon by rods is also likely to have increased with increasing angling effort.

- (a) Immediately implement pre-agreed procedures to introduce appropriate measures to address reasons for failure (including stock rebuilding programmes).

Exploitation: To improve the number of early-run, multi-sea-winter spawners there have been cuts in legal exploitation in fisheries both in distant and home waters.

Distant water: The quota agreed at NASCO for the Greenland fishery (taking fish destined to return as MSW salmon) has been reduced to subsistence level, equivalent to about 100 salmon destined for all the rivers in England and Wales. The Faroes long-line fishery has operated at a very low level since the early 1990s.

Home waters (legal coastal fisheries): There has been a substantial reduction in netting effort since 1992 due to the introduction of a reducing Net Limitation Order, phasing out the drift net fishery, and other factors. The National Salmon Byelaws introduced in 1999 extended the close season for the drift net fishery to 1 June. Fixed nets are allowed to fish earlier for sea trout but are required to release any salmon caught.

Home waters (rods): National byelaws designed to give protection to early run MSW salmon were also introduced for the rod fishery in 1999. Anglers are required to release any salmon caught before 16 June. In addition, voluntary catch and release of stale spring salmon caught after 16 June has been promoted. The proportion of all rod-caught salmon released by anglers rose to 51 per cent in 1999.

Other factors: work is in progress to address localised habitat and water quality problems within the catchment. Early-run salmon are being tagged to identify where they spawn.

- (b) Monitor the effect of the measures and take the results into account in future management and assessment; include identification of information gaps, process and timeframe for resolution.

Fish counters can now monitor the pre-June runs of migratory salmonids, mainly salmon. The national byelaws will be reviewed after 5 years, i.e. after the 2003 season.

4. If both abundance and diversity are satisfactory:

Not applicable.

- (a) Implement pre-agreed management actions to permit harvest of the surplus taking into account uncertainty (where appropriate use management targets to establish the exploitable surplus).
- (b) Monitor the effect of the measures and take the results into account in future ~ management and assessment; include identification of information gaps, process and timeframe for resolution.

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Example 2: Taw/Torridge Estuary net fishery, England

Does the fishery exploit salmon from more than one river?

Yes.

If no, see A. N/A

If yes, see B.

B. Mixed Stock

1. Identify river stocks that are available to the fishery

Netting licences allow netsmen to fish in the Torridge estuary, the Taw estuary, and their joint estuary.

The fishery exploits salmon and sea trout from the rivers Taw and Torridge. Tagging studies indicated that in 1992-4 about 75% of the salmon catch was destined for the Taw and 25% for the Torridge.

2. Identify stock components that are exploited by the fishery

Since the introduction of byelaws in 1998, the fishing season runs from 1 June to 31 August (inclusive) and the fishery therefore exploits summer run salmon. Prior to that the season opened on 1 March and spring salmon were also exploited.

3. Assess abundance and diversity of individual stocks contributing to the fishery (see A above)

Neither the Taw nor Torridge stocks comply with their respective conservation limits (combined ages). Stocks in both rivers have shown a decline in the abundance of early salmon.

4. Is abundance and diversity satisfactory (consider the % of stocks that are unsatisfactory and the extent of failure for each stock) ?

No. The Taw and Torridge stocks have failed to comply with their conservation limits since 1981 and 1968 respectively. The proportion of their conservation limits attained in the past three years have been:-

	1997	1998	1999
Taw	57%	99%	80%
Torridge	19%	33%	15%

The abundance of both stocks and of their early-running components (multi-sea-winter salmon) in particular is unsatisfactory.

(a) If yes, go to 5.
N/A

(b) If no, consider closing the fishery (taking into account socio-economic factors). If the decision is made not to close the fishery, then continue to 5.

The spring fishery has already been closed.

There are 14 net licensees and 62 endorsees. The sales value of the catch (salmon & sea trout) is currently only worth about £20k, of which perhaps half comprises profit to the netsmen. Most of this accrues to two or three licensees and their endorsees. Even at the current depressed level of stocks it may therefore be a significant proportion of a few netsmen's income. If the stocks were to recover sufficiently to allow net catches to increase, this public fishery might perhaps double in value.

The report of the Government's Salmon & Freshwater Fisheries Review Group supports the view that although a mixed stock fishery, permanent closure of the Taw/Torridge net fishery is not warranted on management grounds since it is an estuarial fishery exploiting predominantly two stocks.

Given that the Taw stock is now only marginally failing its conservation limit, under the local restrictions imposed in 1998, and national byelaws in 1999, complete temporary closure of the fishery does not seem warranted on conservation grounds, provided that one could selectively reduce further exploitation on the Torridge stock.

5. Is the combined conservation limit(s) for all stocks subject to the fishery being exceeded?

No.

(a) If yes, implement pre-agreed procedures for the management of the fishery based on effort or quota control:

- Quota control
 - define management target based on an assessment of risk of failing conservation limits
 - predict pre-fishery abundance
 - determine exploitable surplus
 - apply pre-agreed rules on setting quotas
- Effort control (and quota control in the absence of management targets and/or prediction of pre-fishery abundance)
 - evaluate effectiveness of previous effort control measures and apply appropriate changes.

N/A

(b) If no, consider closing the fishery taking into account socio-economic factors. If the decision is made not to close the fishery, apply pre-agreed reserve measures to minimize exploitation.

No. The most recent existing local byelaws restricting exploitation by both the net fishery and by the rod fisheries upstream will expire in 2001. In the light of the most recent ICES advice accepted by NASCO (June 2000), these measures should be reinstated and certain aspects strengthened, i.e.

1. *Torridge rod fishery: reimpose rod restrictions;*
2. *Taw rod fishery: reimpose existing rod restrictions;*
3. *Taw/Torridge estuary: exploitation of Torridge salmon should be significantly reduced. Options for byelaws to achieve this will need to be promoted and assessed, after public consultation, in light of their socio-economic impact.*

Byelaws should be time limited until 2008, when the national byelaws for the protection of spring salmon expire.

After the introduction of new byelaws, the Net Limitation Order should also be revised to expire in the same year. The number of licences should therefore be set to provide those netsmen who continue fishing with the best possible opportunity, given the new restrictions, to make a significant income.

There is known to be some interception of fish returning to the Torridge in the Irish coastal fisheries, although initial assessments suggest that the level of exploitation has been reduced since the introduction of the new measures in 1997.

Recognition of the depleted state of the Taw and Torridge stocks should continue to be taken into account in the assessment and management of other distant water fisheries, principally Greenland.

6. Monitor the effect of the measures and take the results into account in future management and assessment; include identification of information gaps, process and timeframe for resolution

A fish counter is needed for the Torridge as soon as possible (see assessment of rod fishery).

Assuming new regulations are imposed confining netting to the Taw estuary, tagging studies are required to assess the contribution of Taw and Torridge stocks to the net catch.

The exploitation of English & Welsh stocks by the Irish drift net fishery is currently being assessed by a joint UK/Irish Working Group.

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Example 3: North East Coast Drift Net Fishery, England

Does the fishery exploit salmon from more than one river?

Yes.

If no, see A. N/A

If yes, see B.

B. Mixed Stock

1. Identify river stocks that are available to the fishery

Studies in the 1970s suggest that the fishery exploits mainly salmon returning to the rivers of North East England and of the East and North East Districts of Scotland. These include:

North East England: Aln, Coquet, Tyne, Tees, Wear, Yorkshire Esk

East District, Scotland: Tweed, Forth, Tay

NorthEast District, Scotland: South Esk, North Esk & Bervie, Dee, Don, Ythan, Ugie

In addition to salmon, the fishery also takes a large number of sea trout.

2. Identify stock components that are exploited by the fishery

Since the introduction of national byelaws in 1999, the salmon fishing season runs from 1 June to 31 August. The fishery therefore now exploits summer run salmon, both grilse and multi-sea-winter fish. Before 1999, the fishing seasons opened earlier and spring salmon were also exploited.

3. Assess abundance and diversity of individual stocks contributing to the fishery (see A above)

An assessment has been made for the Tyne rod fishery. Assessments according to this decision structure have not been made for the other rivers as yet, although Salmon Action Plans have been prepared for most of the English rivers.

4. Is abundance and diversity satisfactory (consider the % of stocks that are unsatisfactory and the extent of failure for each stock) ?

No.

English rivers : the Tyne and Coquet stocks have both recovered and are currently complying with their conservation limits. The Wear and Tees are still recovering from the consequences of their industrial heritage, and although their stocks are below their conservation limits, they are still improving. The Yorkshire Esk, although small, is not showing any clear improvement in salmon stocks and is not complying with its conservation limit.

There is some uncertainty about the validity of the conservation limits on these rivers. There may be an element of competition with the substantial populations of large sea trout which are also present. The proportion of the conservation limit achieved in the last three year in each river is estimated to be:

River	1997	1998	1999	Conservation Limit (Million eggs)
Coquet	159%	131%	117%	4.5
Tyne	157%	174%	213%	15.7
Wear	38%	62%	52%	7.8
Tees	4%	20%	19%	20.5
Esk-Yorks	52%	28%	16%	1.7

Prior to the introduction of national byelaws in 1999 to protect spring salmon there was concern about a possible decline in this important component of the stocks.

Scottish rivers: Conservation limits have not been set for the stocks likely to be exploited by the fishery. There are no immediate concerns about the overall level of spawning escapement on these rivers. However, there are concerns about the abundance of early-run salmon, which have been in long-term decline on most if not all rivers, and perhaps also of multi-sea-winter salmon in general.

(a) If yes, go to 5.
N/A

(b) If no, consider closing the fishery (taking into account socio-economic factors). If the decision is made not to close the fishery, then continue to 5.

The fishery prior to the 1 June has been closed, at least until 2008, to protect spring salmon. In addition, the fishery as a whole is being phased out. As licensees have left the fishery, they have not been replaced. The number of drift net licence issued has fallen by 50 per cent since 1992. These measures have resulted in a significant, though less than proportional decline in fishing effort.

<i>Year</i>	<i>No. of licences</i>	<i>No. of days fished</i>
1992	142	4599
1993	124	5187
1994	114	5505
1995	99	5303
1996	89	3581
1997	81	3200
1998	75	2881
1999	72	2848
2000	71	3282

5. Is the combined conservation limit(s) for all stocks subject to the fishery being exceeded?

(a) If yes, implement pre-agreed procedures for the management of the fishery based on effort or quota control:

- Quota control
 - define management target based on an assessment of risk of failing conservation limits
 - predict pre-fishery abundance
 - determine exploitable surplus
 - apply pre-agreed rules on setting quotas

- Effort control (and quota control in the absence of management targets and/or prediction of pre-fishery abundance)
 - evaluate effectiveness of previous effort control measures and apply appropriate changes.

N/A

- (b) If no, consider closing the fishery taking into account socio-economic factors. If the decision is made not to close the fishery, apply pre-agreed reserve measures to minimize exploitation.

Uncertain – although the English rivers are together achieving their combined conservation limit, no conservation limits have been set for Scottish rivers which are believed to contribute 70 per cent or more of the drift net catch. However, these Scottish rivers make up a large proportion of the multi-sea-winter component of the Southern European stocks, which ICES advises are below their overall combined conservation limit.

The ICES advice to NSACO in June 2000, regarding the management of multi-sea-winter stocks from Southern Europe was: ‘that reductions in exploitation rates are required for as many stocks as possible and that mixed stock fisheries present a particular threats to conservation. Management of single stock fisheries should be based upon local assessments of the status of river and sub-river stocks. Conservation would be best achieved by fisheries in estuarine and in-river harvests targeting stocks, which have been shown to be above biologically-based escapement requirements.’

Provisonal catch data for 2000 indicate a significant upturn in the catch and catch per unit effort for the drift net fishery, implying a general increase in salmon abundance this year.

	Total salmon catch	Catch/day
2000	40,059	12.2
Average 1995-99	24,894	6.8

Additional restrictions, on top of the phase out and the spring salmon byelaws, are therefore not immediately necessary though the status of stocks will need to be kept under review.

The phase out results from a Government Review of East Coast Salmon Fisheries in England and Scotland in 1991, which concluded that mixed stock fisheries pose particular problems for stock management. In the absence of an immediate conservation need, the decision was made to phase out the fishery for as netsmen retire. This conclusion has recently been endorsed by a further Government review of Salmon and Freshwater Fisheries, which recommended that the phase out be speeded up through a buyout of licensees, and that Government should provide pump-priming funds for this purpose. The Government has now offered £750,000 for this purpose subject to matching funding from private sources.

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Example 4. North Esk in river fisheries (n/c and r/l), Scotland

Does the fishery exploit salmon from more than one river?

No, single stock fishery.

If no, see A.

If yes, see B.

A. Single Stock

1. Is the stock threatened by external factors (eg. acidification, disease)?

Not in any obvious, or as yet demonstrated, way.

If yes, take special management action as appropriate (eg establish gene bank).

If no, go to A2.

2. Assess status of the stock (abundance and diversity)

(a) Have age-specific conservation limits been set?

No (not deemed appropriate).

(i) If yes, is the conservation limit being exceeded according to agreed compliance criteria (e.g. 3 out of 4 years)?

(ii) If no, access other measures of abundance.

Spawning escapement, as measured by a resistivity fish counter, has remained stable over the period 1981-2000.

Juvenile abundance at selected sites remains high.

Smolt output over the period 1964-2000 has been variable but shows no long-term trend leading to the conclusion that it is stable.

Redd counts and observations, where information is available, indicate adequate spawning.

(b) Is the stock meeting other diversity criteria?

Yes. Monthly breakdowns of counts indicate that the numerical strength of temporal components of the overall stock have been maintained.

3. If either abundance or diversity are unsatisfactory, then seek to identify the reasons.

Both abundance and diversity of the stock have been adjudged to be satisfactory at the level of the spawning stock. However, the long-term decline in marine survival of the stock is a major concern. The most likely explanation for the maintenance of the spawning stock, despite decreased marine survival, is the large reduction in net catches. As this buffer has almost been exhausted (ie.

catches have declined), further declines in marine survival would in the near future be expected to have detrimental effects on the spawning stock.

- (a) Immediately implement pre-agreed procedures to introduce appropriate measures to address reasons for failure (including stock rebuilding programmes).

*Although abundance and diversity of the spawning stock are currently thought to be satisfactory, measures to reduce exploitation are being encouraged. Firstly, as part of a near **national** voluntary measure to preserve the spring component of the stock, no netting took place until April (although spawning levels for the North Esk are thought to be adequate). Secondly, anglers have been encouraged to practice catch and release throughout the season.*

- (b) Monitor the effect of the measures and take the results into account in future management and assessment; include identification of information gaps, process and timeframe for resolution.

The spawning stock level is assessed on an annual basis by the Freshwater Laboratory.

4. If both abundance and diversity are satisfactory:

- (a) Implement pre-agreed management actions to permit harvest of the surplus taking into account uncertainty (where appropriate use management targets to establish the exploitable surplus).

Management targets have not been agreed for this stock. Netting effort varies in relation to perceived abundance and is driven by economic factors.

- (b) Monitor the effect of the measures and take the results into account in future management and assessment; include identification of information gaps, process and timeframe for resolution.

The spawning stock level is assessed on an annual basis by the Freshwater Laboratory.

Example 5. Strathy Point fishery (f/e), Scotland

Does the fishery exploit salmon from more than one river?

Yes, the fishery exploits stocks from the river Strathy, the neighbouring rivers Naver and Halladale and many other Scottish rivers (coastal tagging experiments at Strathy and other north coast fishing stations have shown that salmon tagged on the north coast can be subsequently recaptured over an area of coast bounded by the river Ayr in the west and the river Tay in the east).

If no, see A.

If yes, see B.

A. Mixed Stock

1. Identify river stocks that are available to the fishery

River stocks belonging from a wide geographical range within Scotland have been shown to contribute to this fishery. The major contributors (ca. 50%) are stocks from the adjacent rivers Naver and Halladale. (The river Strathy is a small river relative to its neighbours and hence native Strathy salmon are only a small component of the Strathy Point fixed engine fishery catch).

2. Identify stock components that are exploited by the fishery

The fishery exploits mainly (ca. 80%) ISW salmon. The remainder (ca. 20%) of the catch is almost entirely comprised of later running MSW salmon.

3. Assess abundance and diversity of individual stocks contributing to the fishery (see A above)

Scotland has 382 recognised salmon rivers (by NASCO agreed definitions). Only one (North Esk) is a monitored river where long-term information on the status of the stock is available. A further established monitored site exists on the Girnock Burn, a tributary of the river Dee. With the exception of these two rivers, the most widely available information that can be used to assess the individual stocks contributing to this fishery is catch statistics.

As the fishery exploits individual stocks from a wide geographic range of Scottish rivers, any assessment should take into account trends in Scottish catches as a whole as well as examining trends in the catches of the rivers Naver and Halladale. For this particular example, trends in the rod and line catches in Scotland as a whole show the same pattern as rod and line catches in the rivers Naver and Halladale.

In general, later running MSW catches have remained stable and ISW catches have increased. If we assume exploitation levels in rod fisheries have remained stable then spawning stock levels of both ISW and later running MSW salmon remain at satisfactory levels.

4. Is abundance and diversity satisfactory (consider the % of stocks that are unsatisfactory and the extent of failure for each stock)?

Yes. From the above assessment, the stock components that are considered here (ISW and late running MSW salmon) are argued to meet satisfactory spawning levels. Early running MSW salmon need not be considered in this example as the fishery under consideration does not exploit this stock component.

- (a) If yes, go to 5.
- (b) If no, consider closing the fishery (taking into account socio-economic factors). If the decision is made not to close the fishery, then continue to 5.

5. Is the combined conservation limit(s) for all stocks subject to the fishery being exceeded?

Yes (probably, finer scale analysis of rod catches required to conclude with more likelihood). No formal conservation limits have been set but spawning levels of ISW and late running MSW salmon are deemed to be satisfactory based on the argument presented above (sec. 3).

- (a) If yes, implement pre-agreed procedures for the management of the fishery based on effort or quota control:

- Quota control
 - define management target based on an assessment of risk of failing conservation limits
 - predict pre-fishery abundance
 - determine exploitable surplus
 - apply pre-agreed rules on setting quotas

Not applicable

- Effort control (and quota control in the absence of management targets and/or prediction of pre-fishery abundance)
 - evaluate effectiveness of previous effort control measures and apply appropriate changes.

Netting effort varies in relation to perceived abundance and is driven by economic factors. Previous changes in effort have maintained, or increased the spawning levels of the stock components considered here.

- (b) If no, consider closing the fishery taking into account socio-economic factors. If the decision is made not to close the fishery, apply pre-agreed reserve measures to minimize exploitation.

6. Monitor the effect of the measures and take the results into account in future management and assessment; include identification of information gaps, process and timeframe for resolution.

Inferences on the level of the spawning stock are made annually from the catch returns.