Council

CNL(05)45

Development of the NASCO Database of Irish Salmon Rivers - Report on Progress

(Tabled by European Union – Ireland)

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Background

In order to measure and improve progress in meeting the objective of the NASCO Plan of Action for Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat, CNL(01)51, it is recommended that Contracting Parties and their relevant jurisdictions establish inventories of rivers to:

- *establish the baseline level of salmon production against which changes can be assessed;*
- *provide a list of impacts responsible for reducing the productive capacity of rivers, so as to identify appropriate restoration plans.*

At the 2004 NASCO meeting the next steps in the development of the salmon rivers database were identified and agreed, CNL(04)38. The next steps are summarised below ((i) – (iii)) and the progress made by Ireland is identified.

(i) Parties should agree to update the original NASCO rivers database annually (via the expanded web-based database) to correct errors and inconsistencies and conform to the new format.

Progress On Updating the Original NASCO Rivers Database For Irish Rivers

Previously, the Rivers Table on the NASCO rivers database for Ireland listed 192 Irish rivers. This list was drawn up several years ago and, on the basis of new information, it has been revised.

Significant revisions follow McGinnity *et al.* (2003). This project involved identification (consultation with Fisheries Board Inspectors in the 17 Irish Fishery Districts and interrogation of extensive recent and archival juvenile population database) of all salmon (and sea trout) rivers in Ireland and an estimation of their size in terms usable river habitat area. McGinnity *et al.* (2003) lists 173 Irish salmon rivers, classified as "salmon and sea trout rivers". Each river was deemed to have a significant run of salmon and many also contained sea trout. These are the salmon rivers which are currently being used to set salmon conservation limits (CLs) on a Fishery District basis. A further 88 rivers were classified as "sea trout only rivers", regarded as not holding significant salmon runs (although small runs of salmon may enter the rivers annually). A summary of amendments to the NASCO rivers database is outlined below (see Table 1 for details):

A. The original NASCO database had 192 rivers for Ireland. Five rivers, which enter Lough Foyle, in the Foyle Fisheries Commission Area, a cross-border fisheries body, which were already in the NASCO database, are omitted from the

new list. Sixty-seven rivers (Table 2) are deleted, either because they are regarded as primarily sea trout rivers or are not regarded as being significant producers of salmon.

B. Fifty-three rivers (Table 3), which were not listed in the original NASCO Rivers database, are now added to the new list.

C. The 2003 database (McGinnity *et al*., 2003) has been re-evaluated in 2005 with Fisheries Board personnel. Consequently, 26 rivers have been re-classified as "sea trout only rivers or not significant producers of salmon" on the basis of having insignificant salmon runs (see definition below) and one river was upgraded from "sea trout only" to salmon river status, (Table 4). The net result is that, in 2005, 148 rivers are now classified as salmon rivers.

Table 1. Details of revision of NASCO Irish Salmon Rivers Database

Description of database/table/data	**No. of rivers**
NASCO Irish Salmon Rivers database	**192**
Subtract 5 salmon rivers in ROI in Foyle	- 5
Subtract 67 non-salmon-producing rivers identified in McGinnity *et al.,* (2003)	- 67
Add 53 'new' salmon-producing rivers identified in McGinnity *et al.,* (2003)	53
TOTAL (i.e. total number identified in McGinnity *et al.*, (2003))	**173**
Total no. of salmon-producing rivers identified in McGinnity *et al.*, (2003)	**173**
Subtract 26 rivers reclassified as non-salmon rivers in May 2005	- 26
Add 1 'new' salmon-producing river	1
TOTAL (i.e. total number of salmon rivers in Ireland in 2005)	**148**

Definitions

River

In McGinnity *et al.*, (2003) and in the revised list of Irish rivers in the NASCO Rivers Table, a river is recognised as a distinct river if it discharges directly into the sea or at a point below the High Water Mark (i.e. tidal discharge) of another river's discharge point into the sea. For example, the River Suir catchment can be broken up into four separate salmon rivers, namely the Suir, Lingaun, Clodiagh and Blackwater as all discharge directly into the Suir estuary.

River names

All rivers are named as per the Ordnance Survey of Ireland "Rivers and their Catchment Basins" (1958) map. Where a channel is unnamed on this OS map, the newly produced OS Discovery Map Series (in a GIS layer) was used to name the river. A local name was applied where neither of the above provided any name.

Salmon run

A significant run of salmon is considered to have at least one hundred spawning fish.

Revised Rivers Table & Status of Salmon Stocks based on NASCO Categories

The revised Irish Rivers Table is set out in Table 5. Data is presented on OS River Name, NASCO Category and Habitat Impacts. Explanations for the categories and the habitat impacts are presented in Appendix 1. The great majority of Irish salmon rivers fall into NASCO categories 4 & 5. It was difficult to categorise some rivers as being 'threatened with loss' as the exact definition may not be fully applicable, while the salmon stocks in these rivers could be described as being under severe pressure. Such rivers were put into the "threatened with loss" category with the symbol # added in Table 5. These rivers are classified in a sub-category, Category 4a, "*Rivers with salmon stocks under severe pressure"* in Fig 1.

The 148 Irish rivers are summarised by NASCO category in Figure 1. The salmon population(s) in the majority (79.7%) of rivers (118) listed are not threatened with loss. Twenty-eight rivers (18.9%) are categorised as 'threatened with loss'. Of these, seven rivers are categorised as having salmon stocks under severe pressure, Category 4a. One river is categorised as being 'lost' and one river is 'maintained'.

(ii) Parties should consider using the database to report basic salmon habitat and habitat impacts information so as to establish the basic level of salmon production potential against which changes can be assessed and to monitor changes over time, and to identify appropriate restoration activities and assist policy makers in prioritising restoration programmes.

Habitat impacts affecting salmon production in a selection of Irish catchments has previously been described, (O'Grady & Gargan, 1993). Recent habitat impact information for the 148 Irish salmon rivers is set out into 18 principal categories and presented in Table 5 for each river. Several habitat impacts may prevail in any single salmon river. Data are summarised in Fig. 2. The information suggests that agriculture and forestry are the major impacts affecting Irish salmon rivers.

(iii) As data and resources permit, the Parties should enter generalized juvenile and adult salmon production data.

Data is being compiled and will be entered at a later date.

Concluding Remarks:

After consultation with relevant Regional Fisheries Board personnel nationally, this report presents best available information on the number of salmon-producing rivers in Ireland. It also presents a preliminary qualitative assessment of their status and the factors which have been identified as impacting on the habitat and salmon production. The report provides an overview of the types and frequency of occurrence of these problems in Irish salmon catchments. The information will be refined annually to provide more quantitative measurable data on impact levels, which will enable measurement of change over time in salmon production.

References:

McGinnity, P., Gargan, P., Roche, W., Mills, P. & McGarrigle, M. (2003). Quantification of the Freshwater Salmon Habitat Asset in Ireland using data interpreted in a GIS platform. Irish Freshwater Fisheries, Ecology and Management Series: Number 3, Central Fisheries Board, Dublin, Ireland. ISSN: 1649-265X

O'Grady, M.F. & Gargan, P.G. (1993) Factors affecting salmon (*Salmo salar* L.) production in Irish waters. Paper presented to the Anadromous and Catadromous Fish Committee, I.C.E.S., Dublin, September 1993.

Table 2. List of deletions from the original NASCO Rivers database for Irish rivers - May 2005

No.	RiverName	Revision	Reason
1	Abberachrin River	Delete	ST River named as Duvoge River (224) in WAR
2	Aughaveemagh River	Delete	ST River (136) in WAR
3	Ballymasganlan River	Delete	ST River (1) in WAR
4	Ballynahinch River	Delete	Will be included as Owenmore (OS name) in revised database
5	Bawnaknockane River	Delete	ST River (75) in WAR
6	Belderg River	Delete	ST River (190) in WAR
7	Bellawady River	Delete	ST River (197) in WAR
8	Big Burn River	Delete	ST River (241) in WAR
9	Bradoge River	Delete	BT river
10	Brickey River	Delete	ST River (54) in WAR
11	Broad Meadow Water	Delete	ST River (13) in WAR
12	Bunlin River	Delete	ST River (242) in WAR
13	Caher River	Delete	OMIT - not a producer
14	Carrowbeg River	Delete	ST River (174) in WAR
15	Carrownamaddy River	Delete	OMIT - not a producer
16	Clonough River	Delete	ST River (27) called Inch River in WAR
17	Cloonalaghan River	Delete	OMIT - not a producer
18	Creegh River	Delete	Called Skivileen R (134) SAL in WAR and will be included in revised database
19	Crumlin River	Delete	ST River (151) in WAR
20	Daligan River	Delete	ST River (52) in WAR
21	Delvin	Delete	ST River (10) in WAR
22	Duntally River	Delete	ST River (239) in WAR
23	Finned River	Delete	ST River aka Owenykeevan River (199)
24	Glashaboy River	Delete	ST River (65) in WAR
25	Glenaddragh River	Delete	ST River (218) in WAR
26	Glenalla	Delete	ST River (247) in WAR
27	Glencullen River	Delete	ST River (192) in WAR = Bellanaminnaun River
28	Glenvar River	Delete	ST River (245) in WAR
29	Groin River	Delete	OMIT - not a producer
30	Keenagh River	Delete	AKA Culoort River (261) SAL in WAR and will be included in revised database
31	Kinvara Catchment	Delete	OMIT - not a producer
32	Leamawaddra River	Delete	ST River (74) in WAR
33	Loughinn	Delete	called Glenagannon River (SAL) in WAR (259) and will be included in revised database
34	Loughkeel River	Delete	ST River (243) in WAR
35	Mayne	Delete	OMIT - not a producer
36	Moyour River	Delete	ST River (175) in WAR
37	Nanny River	Delete	ST River (9) in WAR
38	Owenalongdrig River	Delete	ST River (110) in WAR
39	Owenawillin River	Delete	ST River (232) in WAR
40	Owenboy River	Delete	ST River (67) in WAR
41	Owencashla River	Delete	ST River (116) in WAR
42	Owenee/Belclare River	Delete	NB - spelling OWENWEE not OWENEE. Will be included in revised database
43	Owengowla River	Delete	ST River (160) in WAR
44	Owennacurra River	Delete	ST River (64) in WAR
45	Owennadornaun River	Delete	ST River (170) in WAR
46	Owennafeanna River	Delete	ST River (113) in WAR
47	Owenriff River	Delete	ST River (150) in WAR
48	Piedmont River	Delete	ST River AKA Castletown River (1) in WAR
49	Potters River	Delete	ST River (24) in WAR
50	Redcross River	Delete	ST River (25) in WAR
51	Rossow River	Delete	ST River (177) in WAR

52	Roury River	Delete	ST River (71) in WAR
53	Santry River	Delete	OMIT - not a producer
54	Sea (Rush)	Delete	OMIT - not a producer
55	Sow River	Delete	ST River (30) in WAR
56	Stick River	Delete	ST River (68) in WAR
57	Stream	Delete	OMIT - not a producer (South of Nanny River)
58	Stream	Delete	OMIT - not a producer (Ballyteigue)
59	Stream	Delete	OMIT - not a producer (Dundalk)
60	Stream	Delete	OMIT - not a producer (Sligo Town)
61	Stream	Delete	OMIT - not a producer
62	Stream River	Delete	OMIT - not a producer (Lough Derg)
63	Stream River	Delete	AKA Milltown River (111) will be included in revised database
64	Three Mile River	Delete	ST River (23) in WAR
65	Tolka River	Delete	ST River (14) in WAR
66	Tyshe River	Delete	OMIT - not a producer
67	Waterville System	Delete	renamed as Currane (for consistency with WAR) and will be included in revised database

WAR = Wetted Area Report (Mc Ginnity et al., 2003)

Table 3. List of inclusions to NASCO Rivers database for Irish Rivers

No.	RiverName (Name to be used in database)	Revision	Reason (WAR = Wetted Area Report)	FB_CODE
1	Abbey (River)	Include	SAL River flowing directly into Erne estuary	211
2	Aughnavaud (River)	Include	SAL River in Barrow catchment flowing into sea as a separate river	36
3	Aughyvackeen (River)	Include	SAL river in WAR (named as Dealagh on OS rivers map)	143
4	Ballinaboy (River)	Include	SAL River flowing into sea in Ballinakill	162
5	Ballyline (River)	Include	SAL River in WAR in Shannon estuary (not named on OS Rivers Map)	121
6	Black Water	Include	SAL River in Suir catchment flowing directly to estuary	39
7	Bracky (River)	Include	SAL River flowing into sea north of Killybegs	221
8	Brick (River)	Include	SAL River flowing into estuary of Feale	118
9	Bride (River)	Include	SAL River flowing into estuary of Cork BW	60
10	Brusna (River)	Include	SAL River flowing into Moy estuary	196
11	Caol	Include	V small SAL River on Valentia Island	100
12	Carney (River)	Include	Small SAL River discharging to sea in Sligo	206
13	Cartron (River)	Include	Small SAL River discharging to sea in Bangor District	183
14	Cleggan (River)	Include	Small SAL River in Ballinakill (not marked on OS Rivers Map)	164
15	Clodiagh (River)	Include	SAL River in Suir catchment flowing directly to estuary	44
16	Cloon (River)	Include	SAL river flowing into the Shannon estuary	132
17	Cottoners (River)	Include	SAL River in Laune catchment flowing directly to estuary	105
18	Culoort (River)	Include	Called Keenagh in original NASCO table	261
19	Currane (River)	Include	called Waterville River in OS Map	97
20	Deel (River)	Include	SAL River - trib to Shannon esturay	125
21	Derryart (River)	Include	Small SAL River in Letterkenny Dist	237
22	Emlagh (River)	Include	SAL River not named on OS Rivers Map	108
23	Emlaghmore (River)	Include	SAL River not named on OS Rivers Map	99
24	Finisk (River)	Include	SAL River in Cork BW catchment - enters estuary	57
25	Flurry (River)	Include	SAL River named as per Discovery Map series	2
26	Galey (River)	Include	SAL River trib of Feale (entering estuary)	120
27	Glen (River)	Include	SAL River, trib of Suir, entering estuary separately	42
28	Glen (River)	Include	Small SAL River in Letterkenny Dist	231
29	Glencorbly (River)	Include	Small SAL River in Shannon est	122
30	Glennagannon (River)	Include	SAL River in Letterkenny District (called Loughinn River in OS MAP)	259
31	Glenshelane (River)	Include	SAL River: trib of Suir, entering estuary separately	58
32	Grange (River)	Include	SAL River in Sligo District	207
33	Isle (Burn)	Include	Small SAL River in Lough Swilly	250
34	Keal (Stream)	Include	Small SAL River in Cork near Ilen River	73
35	Laghy (Stream)	Include	Small SAL River in Donegal Bay	213
36	Licky (River)	Include	SAL River: trib of Cork BW entering estuary separately	55
37	Lingaun (River)	Include	SAL River: trib of Suir, entering estuary separately	41
38	Lough Fadda (Stream)	Include	SAL River in Kerry	83
39	Maigue (River)	Include	Major SAL River flowing into Shannon est	126
40	Milltown (River)	Include	Small SAL River in Kerry, Called stream in OS map	111
41	Owenagarney [Ratty] (River)	Include	Small SAL River flowing into Shannon est	130
42	Owengarve (River)	Include	Small SAL River flowing into Clew Bay	181
43	Owenmore (River)	Include	Small SAL River in Kerry	114
44	Owenmore (River)	Include	Deleted as Ballynahinch, OS name is Owenmore	161
45	Owenwee (River)	Include	Deleted as Owenee, correct spelling is Owenwee (AKA Belclare River)	173
46	Owenwee (River)	Include	SAL River, flows into Glen estuary, Ballyshannon District	220
47	Owreagh (River)	Include	SAL River, flows in Kenmare Bay	93
48	Pollmounty (River)	Include	SAL River, Barrow catchment trib flowing into estuary	35
49	Screeb	Include	Small SAL River in Connemara District	155

50	Skivileen (River)	Include	SAL River, delete as Creegh River, named in WAR as Skivileen	134
51	stream (L. Nafurnace)	Include	Small SAL River in Connemara	154
52	Tahilla (River)	Include	Small SAL River in Kerry	91
53	Tourig (River)	Include	Small SAL River, Trib of Cork BW, entering estuary	61
54	White (River)	Include	Small SAL river flowing into Shannon est	123

Table 4. Revisions to Wetted Area report - May 2005

OS_RIV_NAM	Original FB_TYPE	FB_CODE (Wetted area code no.)	FB_TYPE2005
Aughnavaud (River)	SAL	36	Change to non-producer
Glen (River)	SAL	42	Change to non-producer
Keal (Stream)	SAL	73	Change to non-producer
Owenacurra	ST	64	Change from ST to SAL
Four Mile (Water)	SAL	76	Change from SAL to ST
Tahilla (River)	SAL	91	Change from SAL to ST
Scorid (River)	SAL	115	Change from SAL to ST
Ballyline (River)	SAL	121	Change from SAL to ST
Glencorbly (River)	SAL	122	Change from SAL to ST
White (River)	SAL	123	Change from SAL to ST
Cloon (River)	SAL	132	Change from SAL to ST
Annagh (River)	SAL	137	Change from SAL to ST
Ballinaboy (River)	SAL	162	Change from SAL to ST
Cleggan (River)	SAL	164	Change from SAL to ST
Traheen (River)	SAL	165	Change from SAL to ST
Cartron (River)	SAL	183	Change from SAL to ST
Dunneill (River)	SAL	201	Change from SAL to ST
Carney (River)	SAL	206	Change from SAL to ST
Owencronahulla	SAL	230	Change from SAL to ST
Glen	SAL	231	Change from SAL to ST
Derryart (River)	SAL	237	Change from SAL to ST
Faymore (River)	SAL	238	Change from SAL to ST
Drumhallagh (River)	SAL	246	Change from SAL to ST
Burnfoot	SAL	251	Change from SAL to ST
Mill (River)	SAL	252	Change from SAL to ST
Owenerk (River)	SAL	255	Change from SAL to ST

Table 5. Revised NASCO Irish Salmon Rivers Table and identified habitat impacts – May 2005

FB_CODE (Wetted area code no.)	OS_RIV_NAM	NASCO category	Agricultural enrichment	Afforestation	Artificial barriers / fish passage problems	Bank erosion / braiding	Drainage / channel modification	Fish farming - freshwater	Fish farming - marine	Flash flooding / excessive substrate displacement	Gravel removal	Hydropower	Inadequate sewage treatment	Industrial discharges	Inadequate nos. of spawning fish (unknown cause)	Overgrazing/bank trampling/riparian damage	Peat harvesting/other siltation	Quarrying/Suspended solids run-off	Urbanisation/road development	Water abstraction
2	Flurry (River)	Not threatened with loss	*										*							
3	Castletown (River)	Not threatened with loss	*															*	*	
4	Fane (River)	Not threatened with loss	*																	*
5	Glyde (River)	Not threatened with loss	*				*												*	
6	Dee (River)	Not threatened with loss	*				*												*	
8	Boyne (River)	Not threatened with loss	*				*						*	*				*	*	
15	Liffey (River)	# Threatened with loss	*		*							*	*						*	*
18	Dargle (River)	Threatened with loss		*										*					*	
21	Vartry (River)	Threatened with loss			*								*							*
26	Avoca (River)	Threatened with loss						*						*						
28	Owenavorragh (River)	Threatened with loss	*				*						*	*					*	
31	Slaney (River)	# Threatened with loss	*	*				*				*		*	*			*		*
33	Corock (River)	Not threatened with loss	*	*												*			*	
34	Owenduff (River)	Not threatened with loss	*																*	
35	Pollmounty (River)	Not threatened with loss	*		*														*	
37	Barrow (River)	Not threatened with loss	*	*			*			*	*		*	*		*			*	*
38	Nore (River)	Not threatened with loss	*	*			*						*			*				
39	Black Water	Not threatened with loss	*		*								*							
41	Lingaun (River)	Not threatened with loss				*										*				
43	Suir (River)	Not threatened with loss	*			*										*				
44	Clodiagh (River)	Not threatened with loss																		
50	Mahon (River)	Not threatened with loss		*																
51	Tay (River)	Not threatened with loss																		
53	Colligan (River)	Not threatened with loss																		
55	Licky (River)	Not threatened with loss		*				*												
57	Finisk (River)	Not threatened with loss	*																	
58	Glenshelane (River)	Not threatened with loss		*									*							
59	Blackwater (River)	Not threatened with loss	*	*	*					*						*		*		
60	Bride (River)	# Threatened with loss	*										*							
61	Tourig (River)	Not threatened with loss	*																	
62	Womanagh (River)	Not threatened with loss	*																	*

FB_CODE (Wetted area code no.)	OS_RIV_NAM	NASCO category	Agricultural enrichment	Afforestation	Artificial barriers / fish passage problems	Bank erosion / braiding	Drainage / channel modification	Fish farming - freshwater	Fish farming - marine	Flash flooding / excessive substrate displacement	Gravel removal	Hydropower	Inadequate sewage treatment	Industrial discharges	Inadequate nos. of spawning fish (unknown cause)	Overgrazing/bank trampling/riparian damage	Peat harvesting/other siltation	Quarrying/Suspended solids run-off	Urbanisation/road development	Water abstraction
64	Owenacurra	Not threatened with loss	*	*	*											*	*			
66	Lee (River)	Not threatened with loss			*							*								*
69	Bandon (River)	Not threatened with loss	*			*	*			*	*		*			*				
70	Ardigeen (River)	Not threatened with loss	*				*													
72	Ilen (River)	# Threatened with loss		*			*				*				*					
77	Mealagh (River)	Not threatened with loss																		
78	Owvane (River)	# Threatened with loss				*	*			*						*				
79	Coomhola (River)	Not threatened with loss						*												
80	Glengarriff (River)	Not threatened with loss		*					*	*										
81	Ardrigole (River)	Not threatened with loss					*					*								
82	Kealincha (River)	Not threatened with loss							*											
83	Lough Fadda (Stream)	Not threatened with loss							*											
84	Croanshagh (River)	Not threatened with loss							*											
85	Owenshagh (River)	Not threatened with loss							*											
86	Cloonee (River)	Not threatened with loss					*		*											
87	Sheen (River)	Not threatened with loss				*			*											
88	Roughty (River)	Not threatened with loss	*	*		*														
89	Finnihy (River)	Not threatened with loss																		
90	Blackwater (River)	Not threatened with loss				*														
92	Sneem (River)	Not threatened with loss							*											
93	Owreagh (River)	Not threatened with loss																		
97	Currane (River)	Not threatened with loss														*				
98	Inny (River)	Not threatened with loss		*		*					*									
99	Emlaghmore (River)	Not threatened with loss																		
101	Carhan (River)	Not threatened with loss																		
102	Ferta (River)	Not threatened with loss																		
103	Behy (River)	Not threatened with loss																		
104	Caragh (River)	Not threatened with loss																		
105	Cottoners (River)	Not threatened with loss				*														
106	Laune (River)	Not threatened with loss	*			*							*						*	
107	Maine (River)	Not threatened with loss	*			*	*												*	
108	Emlagh (River)	Not threatened with loss																		
109	Owenascaul (River)	Not threatened with loss				*														

FB_CODE (Wetted area code no.)	OS_RIV_NAM	NASCO category	Agricultural enrichment	Afforestation	Artificial barriers / fish passage problems	Bank erosion / braiding	Drainage / channel modification	Fish farming - freshwater	Fish farming - marine	Flash flooding / excessive substrate displacement	Gravel removal	Hydropower	Inadequate sewage treatment	Industrial discharges	Inadequate nos. of spawning fish (unknown cause)	Overgrazing/bank trampling/riparian damage	Peat harvesting/other siltation	Quarrying/Suspended solids run-off	Urbanisation/road development	Water abstraction
111	Milltown (River)	Not threatened with loss																		
112	Feohanagh (River)	Not threatened with loss																		
114	Owenmore (River)	Not threatened with loss																		
117	Lee (River)	Not threatened with loss	*				*												*	
118	Brick (River)	Not Threatened with loss	*																	
119	Feale (River)	Not Threatened with loss	*	*							*		*	*						
120	Galey (River)	Threatened with loss	*	*																
125	Deel (River)	Threatened with loss	*									*								*
126	Maigue (River)	Threatened with loss	*	*									*							
128	Shannon River	Threatened with loss	*		*							*	*	*			*			*
130	Owenagarney (River)	Not Threatened with loss											*							
131	Fergus (River)	Not Threatened with loss																		
133	Doonbeg (River)	Threatened with loss													*					
134	Skivileen (River)	Threatened with loss													*					
135	Annageeragh (River)	Threatened with loss			*										*					
142	Inagh (River)	Not Threatened with loss		*								*	*							
143	Aughyvackeen (River)	Not Threatened with loss																		
144	Aille (River)	Threatened with loss											*		*					
145	Kilcolgan (River)	Not Threatened with loss	*	*			*						*						*	
146	Clarinbridge (River)	Not Threatened with loss	*				*						*						*	
147	Corrib (River)	Not Threatened with loss	*	*			*						*			*			*	
148	Knock (River)	Threatened with loss													*					
149	Owenboliska	Threatened with loss		*											*					*
152	Cashla (River)	Not Threatened with loss		*					*											
154	stream (L. Nafurnace)	Threatened with loss							*						*				*	
155	Screeb	Threatened with loss	*	*					*						*		*			
161	Owenmore (River)	Not Threatened with loss		*					*							*				
163	Owenglin (River)	Not Threatened with loss		*					*											
166	Dawros (River)	Not Threatened with loss							*							*				
167	Culfin (River)	Not Threatened with loss		*					*							*		*		
168	Erriff (River)	Not Threatened with loss		*					*							*		*		
169	Bundorragha (River)	Not Threatened with loss		*					*							*				
171	Carrownisky (River)	Not Threatened with loss				*										*				

FB_CODE (Wetted area code no.)	OS_RIV_NAM	NASCO category	Agricultural enrichment	Afforestation	Artificial barriers / fish passage problems	Bank erosion / braiding	Drainage / channel modification	Fish farming - freshwater	Fish farming - marine	Flash flooding / excessive substrate displacement	Gravel removal	Hydropower	Inadequate sewage treatment	Industrial discharges	Inadequate nos. of spawning fish (unknown cause)	Overgrazing/bank trampling/riparian damage	Peat harvesting/other siltation	Quarrying/Suspended solids run-off	Urbanisation/road development	Water abstraction
172	Bunowen (River)	Not Threatened with loss		*									*			*				
173	Owenwee (River)	Not Threatened with loss		*													*			
178	Newport (River)	Threatened with loss	*	*					*											
179	Srahmore (River)	Not Threatened with loss		*					*							*				
181	Owengarve (River)	# Threatened with loss		*					*						*	*				
185	Owenduff	Not Threatened with loss																		
186	Owenmore (River)	Not Threatened with loss	*	*												*	*			
187	Glenamoy (River)	Not Threatened with loss	*	*							*									
188	Muingnabo (River)	Not Threatened with loss		*																
193	Ballinglen (River)	Not Threatened with loss	*	*													*			
194	Cloonaghmore (River)	Not Threatened with loss	*														*			
195	Moy (River)	Not Threatened with loss	*				*						*	*						
196	Brusna (River)	Not threatened with loss																		
198	Leaffony (River)	Not threatened with loss	*																	
200	Easky (River)	Not threatened with loss																		
202	Ballysadare (River)	Not Threatened with loss										*								
203	Garvogue (River)	Not Threatened with loss	*															*	*	
205	Drumcliff (River)	Not Threatened with loss		*												*				
207	Grange (River)	Not Threatened with loss											*	*		*				
208	Duff (River)	Not Threatened with loss					*				*									
209	Drowes (River)	Not Threatened with loss		*									*						*	
210	Erne	Maintained										*	*							
211	Abbey (River)	Not Threatened with loss	*															*		
212	Ballintra (River)	Not Threatened with loss		*									*							
213	Laghy (Stream)	Not Threatened with loss																		
214	Eske (River)	Not Threatened with loss	*	*					*											
215	Eany (Water)	Not Threatened with loss		*					*										*	
216	Oily (River)	Not Threatened with loss							*		*								*	
217	Bungosteen (River)	Not Threatened with loss												*	*					
219	Glen (River)	Not Threatened with loss					*							*						
220	Owenwee (River)	Not Threatened with loss		*												*	*			
221	Bracky (River)	Not Threatened with loss									*			*						
222	Owentocker (River)	Not Threatened with loss	*	*							*									

FB_CODE (Wetted area code no.)	OS_RIV_NAM	NASCO category	Agricultural enrichment	Afforestation	Artificial barriers / fish passage problems	Bank erosion / braiding	Drainage / channel modification	Fish farming - freshwater	Fish farming - marine	Flash flooding / excessive substrate displacement	Gravel removal	Hydropower	Inadequate sewage treatment	Industrial discharges	Inadequate nos. of spawning fish (unknown cause)	Overgrazing/bank trampling/riparian damage	Peat harvesting/other siltation	Quarrying/Suspended solids run-off	Urbanisation/road development	Water abstraction
223	Owenea (River)	Not Threatened with loss		*							*		*							
225	Gweebarra (River)	Not Threatened with loss																		
226	Owennamarve (River)	Threatened with loss													*					
228	Gweedore (River)	Not Threatened with loss																		
229	Clady (River)	Not Threatened with loss										*								
234	Glenna (River)	Not Threatened with loss																	*	
235	Tullaghobegly (River)	Not Threatened with loss						*												
236	Ray (River)	Threatened with loss									*			*						
240	Lackagh (River)	Not Threatened with loss																		
248	Leannan (River)	Not Threatened with loss	*	*					*					*						
249	Swilly (River)	# Threatened with loss	*	*									*							
250	Isle (Burn)	Threatened with loss	*				*													
253	Crana (River)	Not Threatened with loss		*	*														*	
256	Clonmany (River)	Threatened with loss	*	*			*								*					
257	Straid (River)	Lost	*																	
258	Donagh (River)	Not Threatened with loss											*	*						
259	Glennagannon (River)	Not Threatened with loss	*				*													
261	Culoort (River)	Not Threatened with loss	*																	

Fig. 1. NASCO Classification of status of Irish Salmon Rivers in May 2005 (* see Page 4, paragraph 1)

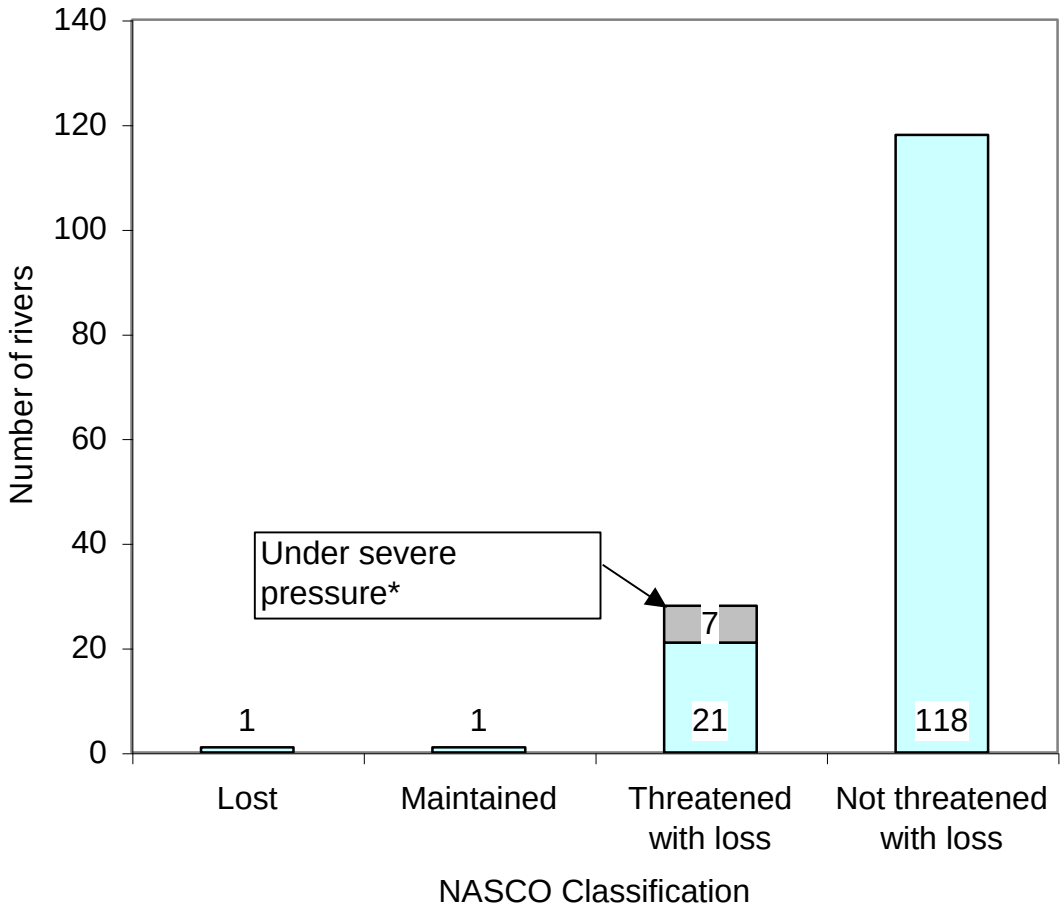
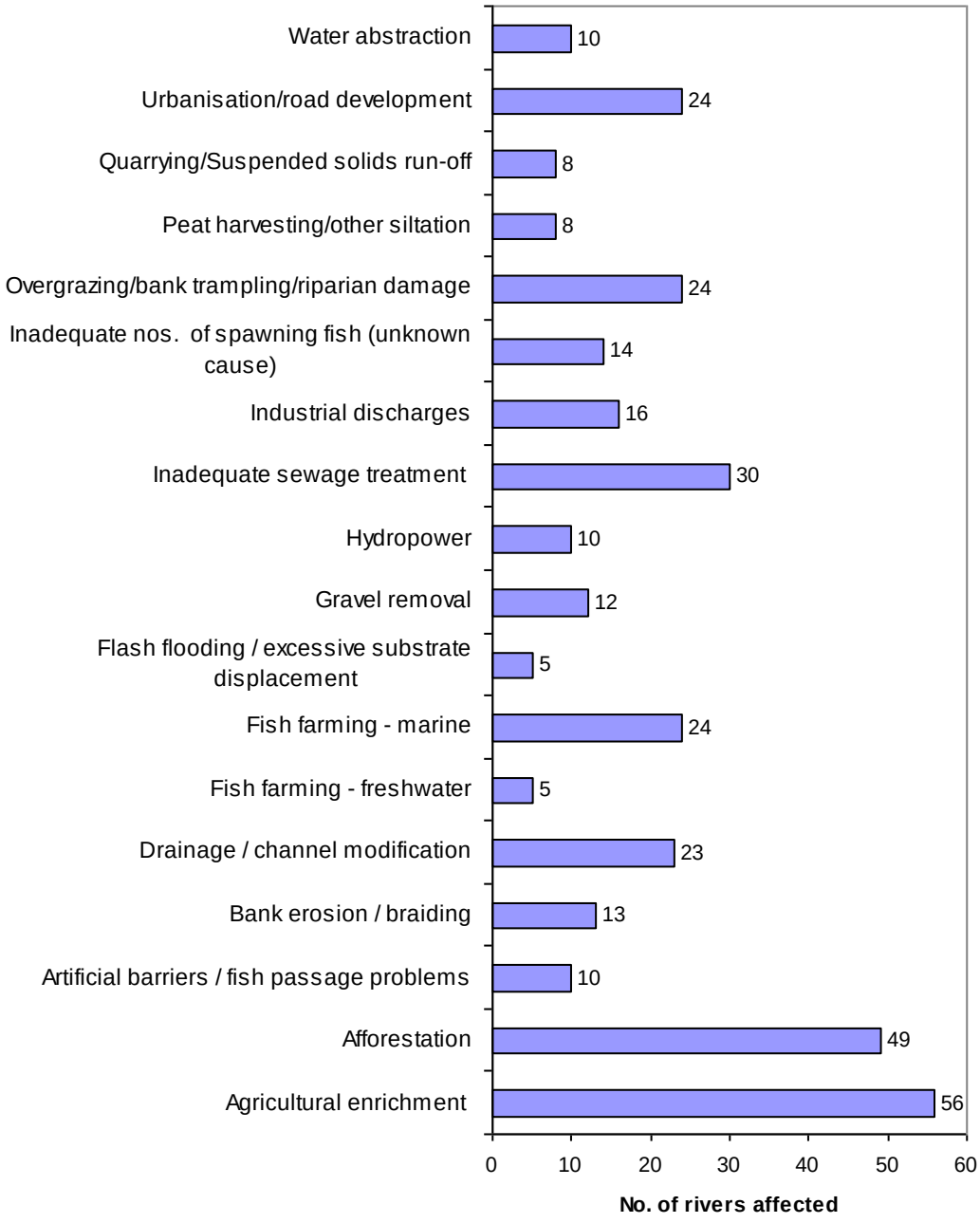


Fig. 2. Habitat impact factors in Irish Salmon Rivers



Appendix 1

NASCO SALMON RIVERS DATABASE
FORMAT FOR SUBMISSION OF INFORMATION

CLASSIFICATION OF RIVERS

A river is named as the main stem of the system of rivers and tributaries at the point, within the NASCO Convention area, where it reaches the sea. A tributary is defined as any river or stream which does not flow directly into the sea but flows into a river as defined above.

CATEGORY 1: LOST
Rivers in which there is no natural or maintained stock of salmon but which are known to have contained salmon in the past.

CATEGORY 2: MAINTAINED
Rivers in which there is no natural stock of salmon, which are known to have contained salmon in the past, but in which a salmon stock is now only maintained through human intervention.

CATEGORY 3: RESTORED
Rivers in which the natural stock of salmon is known to have been lost in the past but in which there is now a self-sustaining stock of salmon as a result of restoration efforts or natural recolonization.

CATEGORY 4: THREATENED WITH LOSS
Rivers in which there is a threat to the natural stock of salmon which would lead to loss of the stock unless the factor(s) causing the threat is(are) removed.

CATEGORY 4a: RIVERS WITH SALMON STOCKS UNDER SEVERE PRESSURE
It was difficult to categorise some rivers as being threatened with loss as the exact definition may not be fully applicable while the salmon stocks in these rivers could be described as being under severe pressure. Such rivers were put into the "threatened with loss" category with the symbol # added in Table 5. These rivers are included in a sub-category, Category 4a, "*Rivers with salmon stocks under severe pressure"* in Fig 1.

CATEGORY 5: NOT THREATENED WITH LOSS
Rivers in which the natural salmon stocks are not considered to be threatened with loss (as defined in Category 4).

Descriptions of the different habitat impact factors

Agricultural Enrichment
Organic enrichment of surface water bodies from agricultural sources, including intensive livestock rearing, run-off from fertiliser application, and farmyard point source enrichment.

Afforestation/Reafforestation
Afforestation is the planting of commercial, non-native, coniferous trees in previously unafforested land. Reafforestation is the second and subsequent rotation of the forest crop on that land. Shading, tunnelling, acidification in acid sensitive catchments, hydrological regime change, erosion, sedimentation and enrichment are impacts that are often associated with commercial forest programmes.

Artificial Barriers/Fish Passage Problems
Small hydro-schemes, weirs for water abstraction, old mill weirs or other obstacles that prevent or impede upstream passage of adult salmon or downstream passage of smolts, resulting in stress, onset of disease and mortality of these fish. Such artificial barriers also present opportunities for predator aggregations and illegal fishing.

Bank Erosion/Braiding
A combination of habitat impacts including land drainage, afforestation/reafforestation, gravel removal, over-grazing and other factors can result in bank erosion and braiding (excessive channel widening and loss of channel depth) resulting in loss of channel form and a natural riffle/glide/pool sequence and introduction of fines into streambed substrates. This reduces the quantity and quality of habitat for juvenile salmon production.

Arterial Drainage/Channel Modification
Arterial drainage is the re-engineering of natural river channels to increase the rate and volume of water transfer from land to sea resulting in loss of natural stream and bankside structure. Maintenance programmes are conducted on an ongoing basis to maintain channel design. In recent years, habitat rehabilitation programmes have been undertaken to restore natural stream features.

Freshwater Fish Farming
Freshwater fish farming is the production of trout and salmon in fresh water. Rearing fish in fresh water can result in enrichment, siltation and dewatering. Escapes can result in predation on wild juvenile salmonids, genetic introgression and transfer of disease.

Marine Fish Farming
Marine fish farming here is defined as the production of farmed salmon in the sea. Marine salmon farming is associated with transfer of disease to natural populations, e.g. mortality associated with sea lice infestations (*Lepeophtheirus salmonis*) Where escape farmed salmon interbreed with wild populations, genetic change and loss of production can occur.

Flash Flooding/Excessive Substrate Displacement
Land drainage results in a change in the hydraulic characteristics of the surface water drainage network. This leads to increased and rapid run-off of water and thus to shorter but more intense flood events. Consequently, bank erosion and substrate loading will increase. The geomorphological response of the river will be to widen, become shallower and increase substrate fines.

Gravel removal
This is where gravel is removed directly from watercourses. Natural stream bed structure is changed. This can lead to potential loss of spawning opportunities and reduced juvenile production.

Hydropower
A number of large-scale hydro-power schemes (Shannon, Lee, Erne, Liffey) cause smolt passage problems and impede the upstream passage of adult salmon resulting in reduced salmon production. These rivers have been described as being non-self sustaining as a result (McGinnity *et al*., 2003). Many smaller hydropower schemes are also operational in Ireland and can impact on salmon populations in different ways including fish passage (upstream and downstream) and impacts on the natural channel.

Inadequate Sewage Treatment
Many towns and villages have only primary or secondary treatment facilities resulting in large inputs of organic nutrients to watercourses. This contributes to eutrophication of rivers and has impacts on juvenile salmon production. There has been considerable investment in upgrading of facilities in recent years.

Industrial discharges
Inadequate waste treatment from factory units, creameries and other industrial production has impacted on salmon rivers either by increasing nutrient input/enrichment or input of toxic substances.

Inadequate numbers of spawning fish (unknown cause)
An inadequate escapement of spawning salmon was reported for several catchments.

Overgrazing/bank trampling/riparian damage
Overgrazing of vegetation, primarily by sheep, in upland areas along the western seaboard has resulted in increased run-off leading to severe land erosion and accompanying siltation problems. Bank destabilisation and channel braiding are further consequences. The poaching of riverbanks by livestock will contribute to siltation, channel braiding and bank destabilisation. Recent changes in EU farm support policy are likely to reduce the level of impact into the future.

Peat harvesting/other siltation
Problems associated with commercial peat harvesting include drainage of peatland resulting in increased run-off and increased siltation leading to increased sedimentation instream. Gravel compaction will reduce the salmon spawning capacity of the channel and losses in instream floral and faunal production will also impact on the capacity of the channel to produce juvenile salmon.

Quarrying/suspended solids run-off
Quarrying is carried within several salmon river systems and can lead to the input of fine suspended material to the watercourse. This material can have a deleterious effect on the juvenile stages (eggs and fry) and render spawning areas unsuitable.

Urbanisation/road development
Infrastructural development, including road construction, has increased over the past decade. Channel diversions, culverting of rivers and problems associated with road construction have resulted in habitat impacts. Increased levels of run-off and the requirement for additional assimilative capacity in rivers are problems associated with urbanisation.

Water abstraction
There is strong competition for water for utilities, agriculture and industry. Changes in natural water flow regimes (water quantity) will impact on ecological functioning with respect to spawning requirements and availability and quality of nursery habitats.