Table I A

Recruitment data series. In this table, recruitment data series are listed, in the units in which they were reported. Part 1: Scandinavia and British Isles

	N Imsa	S Viskan	S Upsala	S Motala	S Göta Älv	Dk Vidaa	D Ems	N.Irl Bann	Irl Erne	Irl Shannon	UK Severn
1950				305	2947		875				
1951			210	2713	1744		719				
1952			324	1544	3662		1516				
1953			242	2698	5071		3275				
1954			509	1030	1031		5369				
1955			550	1871	2732		4795		0.2		
1956			215	429	1622		4194				
1957			162	826	1915		1829				
1958			337	172	1675		2263				
1959			613	1837	1745		4654		0.2		
1960			289	799	1605		6215	7409	1.2		
1961			303	706	269		2995	4939	0.6		
1962			289	870	873		4430	6740	2.5		
1963			445	581	1469		5746	9077	0.4		
1964			158	182	622		5054	3137	0.2		
1965			276	500	746		1363	3801	0.9		
1966			158	1423	1232		1840	6183	1.4		
1967			332	283	493		1071	1899	0.3		
1968			266	184	849		2760	2525	1.5		
1969			34	135	1595		1687	422	0.6		
1970			150	2	1046		683	3992	0.1		
1971		12	242	1	842	787	1684	4157	0.5		
1972		88	88	51	810	780	3894	2905			
1973		177	160	46	1179	641	289	2524			
1974		13	50	59	631	464	4129	5859	0.8		
1975		99	149	224	1230	888	1031	4637	0.4		
1976		500	44	24	798	828	4205	2920	0.4		
1977		850	176	353	256	91	2172	6443	0.1	1.0	
1978		533	34	266	873	335	2024	5034	0.3	1.4	
1979		505	34	112	190	220	2774	2089	0.5	6.7	40
1980		72	71	7	906	220	3195	2486	1.4	4.5	33
1981		513	7	31	40	226	962	3023	2.3	2.1	32
1982		380	1	22	882	490	674	3854	4.4	3.2	30
1983	7	308	56	12	113	662	92	242	0.7	6.3	6
1984	3	21	34	48	325	123	352	1534	1.1	5.1	29
1985		200	70	15	77	13	260	557	0.4	1.1	19
1986		151	28	26	143	123	89	1848	0.7	0.9	16
1987	2	146	74	201	168	341	8	1683	2.3	1.6	18
1988	7	92	69	170	475	141	67	2647	3.0	0.1	23
1989	4	32		35	598	9	13	1568	1.7	0.1	14
1990	13	42		21	149	5	99	2293	2.2	0.5	16
1991	3	1		2	264		52	677	0.5	0.1	8
1992	2	70	8	108	404		6	978	1.4	0.1	18
1993	3.4	43	6	89	64		20	1525	1.8	0.1	21
1994	0.2	76	72	650	377		52	1249	3.5	0.3	22
1995	0.8	6	8	32			40	1403	2.4	0.4	36
1996	0.4	1	18	14	277		20	2667	1.0	0.5	24
1997		8		8	180		5	2533	1.0	2.0	17
1998		5		6			4	1283	0.8	0.1	20
1999		2		85			3	1345	1.1	0.1	18
2000		14		270			4	563	0.9		8
2001		2					0	250	0.7		

Table I B

Recruitment data series; continued. Part 2: Mainland Europe

	NL Den Oever	B Yser	F Loire	F Vilaine	F Gironde (CPUE)	F Gironde (Yield)	F Adour	E Nalon	P/E Minho	It Tiber
1950	7		86							
1951	13		166							
1952	84		121							
1953	12		91							
1954	18		86							
1955	25		181					14		
1956	7		187					17		
1957	15		168					15		
1958	48		230					14		
1959	27		174					13		
1960	21		411					19		
1961	36		334					13		
1962	80		185					18		
1963	115		116					11		
1964	36	4	142					16		
1965	75	115	134					20		
1966	18	385	253					12		
1967	28	575	258					13		
1968	19	554	712					22		
1969	16	445	225					16		
1970	36	795	453					198		
1971	17	399	330					18		
1972	29	557	311	39				11		
1973	22	356	292	78				11		
1974	25	946	563	107				25	2	
1975	32	264	495	44				32	11	11.0
1976	26	618	770	106				55	20	6.7
1977	57	450	654	52				37	37	5.9
1978	37	388	523	105				650	24	3.6
1979	50	675	608	209	20	286		77	28	8.4
1980	26	358	502	95	26	405		42	21	8.2
1981	22	74	284	57	20	332		35	54	4.0
1982	14	138	266	98	15	123		27	16	4.0
1983	9	10	276	69	14	80		22	30	4.0
1984	12	6	168	36	19	82		23	31	1.8
1985	14	13	159	32	10	65		12	21	2.5
1986	14	26	137	48	11	45	8	14	13	0.2
1987	6	33	93	32	14	82	10	24	8	7.4
1988	4	48	138	39	11	33	12	15	8	10.5
1989	3	30	61	30	7	80	9	14	9	5.5
1990	3	218	76	31	6	48	3	9	6	4.4
1991	1	13	30	15	8	64	2	7	9	0.8
1992	3	19	32	30	4	42	8	11	10	0.6
1993	3	12	80	32	8		4	10	8	0.5
1994	4	18	95	24	9		3	10	5	0.5
1995	7	2	68	30	8		8			0.3
1996	7	5	32	22	5		4			0.1
1997	12	10	90	23	7		5			0.1
1998	2	8		18	4		2			0.1
1999	3	76		15			4			0.1
2000	2			14			9			
2001	0.5			8						

Table II

Statistics of eel landings, reported in the FAO database of fishing yields.

These data include landings of 'river eels' in Atlantic waters, the Mediterranean and Inland waters.

Data for Denmark, Netherlands and Italy have been corrected for incorrectly included aquaculture yield

	Norway	Sweden	Denmark	Germany	Ireland	UK	Nether-lands	France	Spain	Portu-gal	Italy	Rest Europe	N. Africa
1950	300	2200	4500	400			4200	500	100		1000		
1951	300	1900	4400	400			3700	500	100		1000		
1952	200	1600	3900	400			4000	700	100		1000		
1953	400	2400	4300	500		400	3100	600	100		1000	900	
1954	300	2100	3800	300		500	2100	500	900		1000	800	
1955	500	2600	4800	500		700	1700	500	600		1000	1000	
1956	300	1500	3700	400		600	1800	500	800		2000	900	
1957	400	2200	3600	400		600	2500	500	500		2000	800	
1958	400	1800	3300	400	100	600	2700	500	500		2100	1200	
1959	400	2800	4000	500	100	500	3400	900	500		3000	700	
1960	400	1500	4723	400	0	800	3000	1300	500		2700	1000	
1961	500	2100	3875	500	100	800	2660	1300	400		2600	900	300
1962	400	1900	3907	400	100	700	1543	1300	800		3100	1000	300
1963	500	1900	3928	2100	100	700	1818	1400	1100		3500	1000	300
1964	400	2368	3282	1900	100	600	2368	1400	1700		3500	1100	400
1965	500	1868	3197	1500	200	800	2509	1700	1300		3200	900	500
1966	500	2070	3690	1700	100	1000	2739	1300	1300		3100	1000	400
1967	500	1667	3436	1900	100	600	2884	2000	1400		3100	1100	400
1968	600	1872	4218	1800	100	600	2622	2700	1300		3200	1100	400
1969	500	1773	3624	1600	100	600	2741	1900	1400		3400	1100	400
1970	400	1270	3309	1600	200	800	1512	4200	1100		3300	1400	100
1971	400	1469	3195	1300	100	800	1153	4900	1100		3400	1500	100
1972	400	1274	3229	1300	100	700	1057	2600	1000		2900	1138	100
1973	400	1277	3455	1300	100	800	1023	3900	700		2900	1150	800
1974	383	1106	2814	1285	67	817	994	2493	1300	42	2697	1528	352
1975	411	1492	3225	1398	79	833	1173	1590	570	44	2973	1400	85
1976	386	1023	2876	1322	150	694	1306	2959	675	38	2677	1254	47
1977	352	1084	2323	1317	108	742	929	1538	666	52	2462	1384	159
1978	347	1162	2335	1162	76	877	862	2455	655	44	2237	1357	112
1979	374	1043	1826	1164	110	879	687	3144	394	25	2422	1518	134
1980	387	1205	2141	1051	75	1053	828	4503	300	32	2264	1242	448
1981	369	976	2087	1033	94	858	876	1425	250	33	2340	1192	497
1982	385	1250	2378	1027	144	1032	1097	1469	200	14	2087	1419	455
1983	324	1304	2003	1029	117	1113	1230	1856	150	11	2076	1782	575
1984	309	1176	1745	911	88	957	681	2336	150	80	2361	2445	477
1985	352	1261	1519	866	87	781	666	2288	200	76	1907	2123	258
1986	271	981	1552	887	87	997	729	2924	200	633	1928	1867	356
1987	282	896	1189	731	221	939	512	2378	259	566	2076	2479	306
1988	513	1198	1759	746	215	715	590	2879	205	501	2165	2790	256
1989	312	1141	1582	678	400	1075	645	2482	83	6	1301	2365	368
1990	336	1120	1568	976	256	1039	657	2484	75	295	1199	2209	560
1991	323	1244	1366	1010	245	822	707	2260	65	314	1106	2337	358
1992	373	1375	1342	1026	234	782	621	1964	60	674	1662	2749	358
1993	340	1336	1023	1027	260	752	320	1674	55	505	1307	2509	613
1994	472	1480	1140	585	300	873	369	1417	50	979	986	2797	732
1995	454	1257	840	585	400	808	279	500	106	10	886	2572	1176
1996	352	1226	717.5	696	550	895	336	563	97	21	883	2676	984
1997	497	1288	757.6	746	550	807	315	1942	113	16	1010	2034	1327
1998	353	877	557	717	670	741	346	491	160	13	682	2159	1069
1999	475	987	686	747	675	697	372	189	166	3		1532	1257
2000							368						

Table III

Re-stocking of glass eel. Numbers of glass eels (in millions) re-stocked in (eastern) Germany (D east), the Netherlands (NL), Sweden (S), Poland (PO) and Northern Ireland (N.Irl.)

	D (east)	N	S	PO	North. Irl.	SUM
1945					17.0	17.0
1946		7.3			21.0	28.3
1947		7.6				7.6
1948		1.9				1.9
1949		10.5				10.5
1950	0.0	5.1				5.1
1951	0.0	10.2	0.0			10.2
1952	0.0	16.9	0.1	17.6		34.5
1953	2.2	21.9	0.0	25.5		49.6
1954	0.0	10.5		26.6		37.1
1955	10.2	16.5		30.8	0.5	58.0
1956	4.8	23.1		21.0		48.9
1957	1.1	19.0		24.7		44.8
1958	5.7	16.9		35.0		57.6
1959	10.7	20.1		52.5	0.7	83.9
1960	13.7	21.1		64.4	25.9	125.1
1961	7.6	21.0		65.1	16.7	110.4
1962	14.1	19.8		61.6	27.6	123.1
1963	20.4	23.2		41.7	28.5	113.8
1964	11.7	20.0	0.0	39.2	10.0	80.9
1965	27.8	22.5		39.8	14.2	104.4
1966	21.9	8.9		69.0	22.7	122.6
1967	22.8	6.9		74.2	6.7	110.7
1968	25.2	17.0			12.1	54.3
1969	19.2	2.7			3.1	25.0
1970	27.5	19.0			12.2	58.6
1971	24.3	17.0			14.1	55.4
1972	31.5	16.1			8.7	56.3
1973	19.1	13.6			7.6	40.2

	D (east)	N	S	PO	North.. Irl.	SUM
1974	23.7	24.4			20.0	68.1
1975	18.6	14.4			15.1	48.1
1976	31.5	18.0			9.9	59.5
1977	38.4	25.8			19.7	83.9
1978	39.0	27.7			16.1	82.8
1979	39.0	30.6	0.1		7.7	77.5
1980	39.7	24.8	0.1		11.5	76.1
1981	26.1	22.3			16.1	64.5
1982	30.6	17.2			24.7	72.5
1983	25.2	14.1			2.9	42.2
1984	31.5	16.6			12.0	60.1
1985	6.0	11.8	0.8		13.8	32.3
1986	23.8	10.5	0.1		25.4	59.8
1987	26.3	7.9	0.0		25.8	59.9
1988	26.6	8.4	0.2		23.4	58.6
1989	14.3	6.8	0.0		9.9	31.0
1990	10.5	6.1	0.7		13.3	30.6
1991	1.9	1.9	0.3		3.5	7.6
1992	6.2	3.5	0.3		9.4	19.4
1993	7.6	3.8	0.6		9.9	21.9
1994	7.4	6.2	1.7		16.4	31.8
1995	6.2	4.8	1.5		13.5	26.0
1996	0.5	1.8	2.3		11.1	15.7
1997	0.4	2.3	2.4		10.9	16.1
1998	0.0	2.5	2.1		6.2	10.9
1999	0.0	2.9	2.2		12.0	17.1
2000		2.8	1.2		5.4	9.4
2001		0.9			2.8	3.7

Table IV

Re-stocking of bootlace eel. Numbers of bootlace eels (in millions) re-stocked in (eastern) Germany (D east), the Netherlands (NL), Sweden (S) and Denmark (DK)

	D (east)	NL	S	DK	SUM
1945					0.0
1946					0.0
1947		1.6			1.6
1948		2.0			2.0
1949		1.4	0.0		1.4
1950	0.9	1.6	0.0		2.5
1951	0.9	1.3	0.0		2.2
1952	0.6	1.2	0.0		1.8
1953	1.5	0.8	0.0		2.3
1954	1.1	0.7	0.0		1.8
1955	1.2	0.9	0.0		2.2
1956	1.3	0.7	0.0		2.0
1957	1.3	0.8	0.0		2.1
1958	1.9	0.8	0.0		2.8
1959	1.9	0.7	0.0		2.6
1960	0.8	0.4	0.0		1.2
1961	1.8	0.6	0.0		2.4
1962	0.8	0.4	0.0		1.2
1963	0.7	0.1	0.0		0.9
1964	0.8	0.3	0.1		1.3
1965	1.0	0.5	0.1		1.6
1966	1.3	1.1	0.1		2.5
1967	0.9	1.2	0.1		2.2
1968	1.4	1.0	0.1		2.5
1969	1.4	0.0	0.0		1.4
1970	0.7	0.2	0.0		1.0
1971	0.6	0.3	0.0		1.0
1972	1.9	0.4	0.1		2.4
1973	2.7	0.5	0.1		3.3

	D (east)	NL	S	DK	SUM
1974	2.4	0.5	0.1		3.0
1975	2.9	0.5	0.1		3.6
1976	2.4	0.5	0.1		2.9
1977	2.7	0.6	0.0		3.3
1978	3.3	0.8	0.1		4.2
1979	1.5	0.8	0.1		2.4
1980	1.0	1.0	0.1		2.1
1981	2.7	0.7	0.1		3.6
1982	2.3	0.7	0.4		3.4
1983	2.3	0.7	1.0		4.0
1984	1.7	0.7	0.8		3.2
1985	1.1	0.8	0.9		2.8
1986	0.0	0.7	0.5		1.2
1987	0.0	0.4	1.0	1.6	3.0
1988	0.0	0.3	1.3	0.8	2.4
1989	0.0	0.1	1.0	0.4	1.5
1990	0.1	0.1	1.6	3.5	5.3
1991	0.2	0.1	1.8	3.1	5.1
1992	0.2	0.0	2.2	3.9	6.3
1993	0.3	0.0	2.0	4.0	6.3
1994	0.4	0.1	2.0	7.4	9.9
1995	0.4	0.1	1.8	8.4	10.7
1996	0.9	0.0	2.5	4.6	8.1
1997	2.3	0.1	2.5	2.5	7.4
1998	1.8	0.1	2.4	3.0	7.3
1999	1.1	0.1	2.4	4.1	7.7
2000		0.0	1.5	3.8	5.3
2001				1.7	1.7

Table V

Inter- and intra-catchment re-stocking. Percentage intra-catchment re-stockings in the Netherlands (NL) and Northern Ireland (N.Irl.)

	NL	North. Irl.
1958	0.0	
1959	0.0	
1960	15.0	100
1961	14.3	100
1962	15.6	100
1963	12.7	100
1964	15.0	100
1965	11.9	100
1966	21.0	100
1967	15.2	100
1968	18.1	100
1969	52.3	100
1970	17.4	100
1971	na	100
1972	47.8	100

	NL	North. Irl.
1973	43.6	100
1974	44.2	100
1975	56.6	100
1976	23.7	100
1977	37.2	100
1978	33.0	100
1979	30.8	100
1980	38.4	100
1981	37.0	100
1982	10.9	100
1983	22.2	100
1984	7.6	53.5
1985	2.1	13.3
1986	7.4	23.7
1987	4.4	26.9

	NL	North. Irl.
1988	13.5	55.7
1989	7.9	100
1990	29.3	100
1991	50.9	100
1992	26.3	55.4
1993	15.9	100
1994	40.9	61.8
1995	10.7	67.2
1996	62.8	98.8
1997	66.7	97.3
1998	68.6	98.7
1999	46.6	53.5
2000	42.7	78.9
2001	27.3	100

Table VI

Production of European eel in aquaculture in Europe and Japan. Compilation of production estimates (tonnes) derived from reports of previous meetings, FAO, FEAP and others

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Norway									
Sweden	15	47	59	193	233	190	160	195	179
Denmark	16	30	120	160	300	620	900	900	706
Germany									
Ireland									
UK				20	30	0	0		
Netherlands		20	100	200	200	350	550	520	500
Belgium/Lux.					30	30	125	125	30
Spain	15	20	25	37	32	57	98	105	130
Portugal	60	60	590	566	501	6	270	622	267
Marocco							35	41	60
Algeria					72	53	22	1	46
Tunisia							150	151	144
Italy	2600	2800	4200	4600	4250	4500	3700	4185	3265
Greece			6	4	10	54	94	132	81
Turkey									
Macedonia									
Yugoslavia	44	52	48	49	19	10	5	1	8
Croatia								7	
Hungary					90	39	73	33	98
Czech Republic									
sum EU	1950	2229	3448	4729	5517	5159	6667	6098	6349
Japan		3000							

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Norway		120	200	200	200	200			
Sweden	192	182	158	184	215	250	250	250	260
Denmark	900	1000	1200	1200	1700	2468	2700	2675	2500
Germany		100	100	100	150	150	150	150	300
Ireland									100
UK		25		25					
Netherlands	1250	1487	1535	2800	2443	3250	3800	4000	3800
Belgium/Lux.	125	125	150	140	150	150	40	20	50
Spain	175	134	214	249	266	270	300	425	200
Portugal	505	979	200	110	200	200	200	200	
Marocco	68	85	55	55	56				
Algeria	0	22	20	17	17				
Tunisia	250	260	108	158	147	108			
Italy	3000	2800	3000	3000	3100	3100	3100	2800	2700
Greece	337	341	659	550	312	500	500	300	600
Turkey									
Macedonia	1	0	70	83	60				
Yugoslavia	8	2	9	5	5				
Croatia	5	5	7	6	7				
Hungary		50		50			19	19	
Czech Republic	2	4	4	3	3				
sum EU	6818	7721	7689	8935	9031	10646	11059	10839	10510
Japan									10000

Table VII

Natural and fishing mortality values for eel (M and F represent the instantaneous rate of natural and fishing mortality respectively; percentage mortality represents the mortality in percentage terms between time t and t+n, where n is variable and dependent on the study), adapted from Knights *et al*. (2001)

Habitat Location	Natural mortality %	M	Fishing mortality %	F	Comments	Reference
River and Stillwaters – for combined yellow and silver eel						
Lough Neagh (Irl)	82% pre-fishery		75%		Stocked system heavily exploited	Knights and White, 1997 Moriarty and McCarthy, 1982
Shannon lakes (Irl)			20%		Low exploitation rates	McCarthy *et al*., 1994a; Moriarty, 1987; 1990
L.Derg andRee (Irl.)	68-74%	0.3-0.38			Low exploitation rates	McCarthy *et al*., 1994b
Swedish lake	<90%				Stocked in 1980, study not completed in 1994	Wickström, Westin and Clevestam, 1996
Finnish lakes	28-73%				Stocked, variable exploitation	Pursianen and Toivonen, 1984
Byelorussian lakes	Total mortality 95%				Stocked	Leopold, 1976
Ijsselmeer (NL)				1.0	Yellow and silver eels heavily exploited	Dekker, 2000b
Small lake (Dk)	24-45%	Z = 0.07-0.04			Stocking study after seven years-wild eel	Pedersen, 2000
Ponds (NL)	30-77%	0.17-0.65			Fingerling stocking experiments	Klein Breteler, 1994
Ponds (Dk)	89%				Stocking study after one year	Dahl, 1967
Coastal lagoons (It)		0.25-0.72			Commachio stocked lagoons	Ciccotti, 1997
Rivers in England. (UK)	75%				From age-cohort analyses	Barak and Mason, 1992
River Imsa (N)	50-84% (av. 73%)	0.088-0.225 (av. 0.167)			Recruitment and escapement measured over 13 years	Vøllestad and Jonsson, 1988
River Gudena (Dk)	77-82%				Post-stocking studies	Berg and Jørgensen, 1994
Stocked streams (Dk)	97%	0.23-1.79			Post-stocking studies	Pedersen, 1997
Unstocked streams (Dk)	60%				Post-stocking studies (still in progress)	Pedersen, 1997
Stream (Dk)		0.36-0.65			From age-cohort analyses	Rasmussen and Therkildsen, 1979
River Tiber (It)		0.8			From age-cohort analyses	Ciccotti, 1997
West Coast (S)		0.23	96.5%	0.16-0.42	Coastal fyke net fishery data	Svedäng, 1999
S.E. Coast(N)		0.04-0.46		0.02-0.08	Coastal fyke net fishery data	Vøllestad, 1986
German Bight				0.2	Age-structured cohort analysis	Sparre, 1979
Thames Estuary (UK)	>95%	Z = 0.5-0.7		Z = 0.5-0.7	Compartmental Z model, comparing exploited v. unexploited zones	Naismith and Knights, 1993

(continued)

Habitat Location	Natural mortality %	M	Fishing mortality %	F	Comments	Reference
Glass eel fisheries						
Severn, England	>99%		<1.0%		Mark-recapture	Knights *et al*., 2001
Creek, NW UK			>70-90%		Trapping study	Mower, 1998; 1999
Bay of Biscay (F)				3.15	Fishing mortality over the glass eel stage	Dekker, 2000b
Vilaine (F)			96-99%		Mark-recapture and trapping below barrage	Briand *et al*., in press, b
Adour (F)			20-25%			De Casamajor *et al*., 2001
Silver eel fisheries						
Coast (S)	80%	0.18	27%		Mark-recapture	Wickström *et al.*, 1996
Limfjord (Dk)			43-88%		Mark-recapture	Pedersen, 1997
Coast (Dk)			19-38%		Mark-recapture	Pedersen and Dieperink, 2000

Table VIII

Status of eel stocks with respect to impact of yellow eel fisheries. Table VII lists case studies, this table provides indications for country averages

	Principal Fisheries			Level of Exploitation			Qualitative impact of fishery on spawner escapement
	Glass eel	**Yellow eel**	**Silver eel**	**Low**	**Optimal**	**Over-exploited**	
Sweden West Coast		**x**			**x**		Predominantly yellow eel fishery. Low degree of spawner escapement?
Sweden East Coast		**x**	**x**		**x**		Mixed yellow and silver eel fishery. Low spawner escapement?
Denmark		**x**	**x**		**x**		Mixed yellow and silver eel fishery (50/50). Overall low spawner escapement from the Baltic Sea.
Germany		**x**	**x**		**x**		Mixed yellow and silver eel fishery. Moderate degree of spawner escapement.
Northern Ireland (Lough Neagh)		**x**	**x**		**x**		Predominantly yellow eel fishery, with significant silver eel catch. Significant proportion of spawner escapement.
UK	**x**			**x**			Significant local glass eel fishery. Scattered, low-intensity yellow and silver eel fisheries. Minimal impacts on stocks and spawner escapement (cf. Unexploited populations)
The Netherlands (IJsselmeer)		**x**				**x**	Low yield of silver eels. Fully fished yellow eel fishery. Very low spawner escapement
France	**x**	**x**		**x**			Large glass eel fishery, but some other mixed yellow and silver eel fisheries. Overall high degree of spawner escapement.
Spain	**x**			**x**			Mostly glass eel fishery. High degree of spawner escapement
Portugal	x					**x?**	Limited data available. Significant illegal fishery suspected.

Level of exploitation:	Low	$F \leq M$	fishing mortality equal or less than natural mortality
	Optimal	Fmax	maximum yield per recruit
	Over-exploited	$F \geq 1$	growth-overfishing evident

Table IX

Commonly used reference points and their associated data requirements (source: ICES, 1997)

Reference Point	Definition	Data requirements
Fishing rates		
F0.1	Fishing mortality rate (F) at which slope of the yield per recruit (Y/R) curve is 10 percent of its value near the origin	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector)
Fmax	F giving the maximum yield on a Y/R curve	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector)
FMSY	F corresponding to Maximum Sustainable Yield from a production model or from an age-based analysis using a stock recruitment model	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector), stock recruitment relationship or general production models
F30%SPR	F corresponding to a Spawning Stock Biomass per Recruit (SSB/R) which is 30 percent of the SSB/R obtained when F = 0	Weight and maturity at age, natural mortality, exploitation pattern (F, partial recruitment vector)
F >= M	Empirical (for top predators)	M and sustainable F's for similar resources
Fcrash	F represented by the tangent through the origin of a stock recruitment relationship	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector), stock recruitment relationship
Fpa	F precautionary approach, used to constrain mortality to ensure high probability of exceeding Flim (mortality limit reference point)	Same as data required for other F reference point calculations
Biomass / Spawning Stock Levels		
BMSY	Biomass corresponding to Maximum Sustainable Yield from a production model or from an age-based analysis using a stock recruitment model	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector), stock recruitment relationship or general production models
MBAL	A value of SSB below which the probability of reduced recruitment increases	Data series of spawning stock size and recruitment
B50%R	The level of spawning stock at which average recruitment is one half of the maximum of the underlying stock recruitment relationship	Stock recruitment relationship
B20%B-virg	Level of spawning stock corresponding to a fraction (for ex. 20 percent) of the unexploited biomass	Weight at age, natural mortality, exploitation pattern (F, partial recruitment vector), stock recruitment relationship
Bpa	B precautionary approach, used as constraint on mortality to ensure a high probability of exceeding Blim (biomass limit reference point)	Same as data required for other B reference point calculations

Appendix

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The European Inland Fisheries Advisory Commission/International Council for the Exploration of the Sea (EIFAC/ICES) Working Group on Eels met at ICES headquarters from 28 to 31 August 2001 to finish the work initiated at its 1999 meeting on defining biological reference points for European eel management use. The review of available information revealed that the European eel stock is in decline and that fisheries are outside safe biological limits. Anthropogenic factors (exploitation, habitat loss, increased predation, contamination and transfer of parasites and diseases) as well as natural processes (climate change) have contributed to the decline. Latest recruitment data (spring 2001) indicated a further deterioration of the status of the stock.

As management at local level has failed to address the global decline of the stock, the implementation of an international stock recovery plan is of utmost urgency.

The Working Group recommended that an international commission for the management of the European eel stock be formed to organize monitoring and research on eel stocks and fisheries and to serve as a clearing house for regular exchange of information regarding landings and resource status.