MASMANAP country report: Norway

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SUMMARY – This report presents Norwegian seafood consumption data based on the methodology of the MASMANAP project. The methodology uses data on seafood production, exports and imports to calculate domestic seafood consumption. There are some difficulties in calculating Norwegian seafood consumption using this methodology. As the Norwegian fishery sector is large and the population is relatively small the calculated consumption figures are sensitive to incompatibilities and flaws in the statistics.

Key words: Norway, fishery, aquaculture, seafood, supply, consumption.

RESUME – *"Rapport national dans le cadre de MASMANAP : Norvège". Ce rapport présente les chiffres de la consommation d'aliments de la mer en Norvège, en se basant sur la méthodologie du projet MASMANAP. Cette méthodologie utilise les données de la production d'aliments de la mer, ainsi que les exportations et les importations, pour en calculer la consommation intérieure. Nous avons rencontré quelques difficultés quant au calcul de la consommation d'aliments de la mer en Norvège en employant cette méthodologie. Etant donné que le secteur norvégien de la pêche est vaste, et que la population est relativement réduite, les chiffres calculés pour la consommation peuvent parfois présenter des incompatibilités et des défaillances par rapport aux statistiques.*

Mots-clés : *Norvège, pêche, aquaculture, produits de la mer, offre, consommation.*

Statistical methodology evaluation of the Norwegian consumption data

Statistical sources

Statistics Norway and the Directorate of Fisheries are the sources of the data on fishery landings and processing. Official Statistics of Norway (NOS) Salmon and Sea Trout Fishing are responsible for the salmonids data. The export and import data were provided by the Norwegian Seafood Export Council, although Statistics Norway is the primary source of most of the data. All of these sources can be considered as quite reliable.

Data: Production, exports and imports

All quantity data are reported by species in landed live weight as million t. However, not all the quantity data we use are originally in this form. The export and import data are originally reported in net weight. We have transformed them to landed live weight by applying conversion rates. This exercise is not unproblematic, as it is very difficult to deduct the "true" conversion rate. We will address this problem in further detail later on.

The values are all reported in million NOK. The production values are constructed in a form that are comparable to the export and import figures, since it is not possible to compare the original first-hand value with the wholesale dealer value of the exports and imports. We have done this by creating values for the production data based on constructed "wholesale dealer" prices.

Seafood categories

The following sub-categories are shared for production, exports and imports data.

(i) Sea-fish 1, pelagics. The species included in this category are the ones that go directly to human consumption, and only the most important of these are included: namely herring, mackerel and sprat.

Hence species like capelin, blue whiting, sandeel and Norway pout are not included since they are mainly used in fishmeal and fish oil production.

(ii) Sea-fish 2, non-pelagics. The species included here are cod, saithe, haddock, Norway haddock, ling, tusk and Greenland halibut.

(iii) Salmonids. This category is mainly constituted by Atlantic salmon and rainbow trout (salmon trout).

(iv) Shellfish. Shrimp is the only species included here.

(v) Crustaceans. This includes crabs, lobsters, scallops and mussels.

(vi) Fresh-water fish and cephalopods. These fisheries are marginal compared with the rest of the Norwegian fisheries therefore data are not included here.

Evaluation

There are several problems related to the Norwegian apparent consumption figures. While there is a considerable amount of statistics concerning Norwegian fishery and aquaculture this does not seem to conform to the purpose of calculating consumption. Much of this is caused by an incompatibility problem between trade and production statistics because the former is reported in net weight while the latter is reported in landed weight. This problem is enlarged due to the size of Norwegian exports so that the bias increases. However, this is not the only problem. We review the problems together with the relevant statistics later on.

Production and total supply of aquatic food

Norwegian fishery exports

In Table 1 the product types of Norwegian fishery exports are reported. The exports of fresh fish account for the largest value with 27% of the total in 1998. Exports of fresh salmon account for over 80% of these 27%. Frozen fish, which is the second largest export article in value, accounts for 17% of the total value. On the other hand, it is the largest in quantity accounting for 20% of the total.

Table 2 gives an overview over the most important product types of exported farmed salmon and trout. It is evident that the export of salmon is dominated by fresh, whole salmon, both in quantity and value.

Comments on 1988-1998 – Quantity figures

Trend figures from 1988 to 1998 regarding quantity are presented in Tables 3-6.

Production – Quantity

The total catches in the Norwegian fisheries fell in the last years of the 1980s. However, from 1990 to 1995 the catches increased markedly, and then flattened out after 1995. Both demersal and pelagic fisheries increased in the first half of the 1990s. The shrimp catches decreased in the same period, but rose markedly in 1998. The production of farmed salmon has increased through the entire 1990s ending at approximately 400,000 t in 1998. All in all the total production of aquatic products has increased with approximately 70% in the decade from 1988 to 1998.

Comments on the statistics

It should be noted that fisheries catches are biased downward because fishermen report too low catches. It has been estimated that this downward bias probably is between 5 to 10%. Further, the pelagic production figures are probably too high in years with very high catches, as it is likely that this volume exceeds the demand for consumption. Thus, some of this is probably used in animal and aqua feed instead of human consumption.

Table 1. Norwegian export of fish in 1997/98 reported by product type (source: Norwegian Seafood Export Council)

	1998			1997		
	Quantity (1000 t)	Value (million NOK)	Price per kg	Quantity (1000 t)	Value (million NOK)	Price per kg
Fresh fish	358	7486	20.89	295	6326	21.45
Frozen fish	388	4805	12.38	388	4465	11.52
Fresh fillet	22	823	38.05	20	722	35.47
Frozen fillet	105	3751	35.84	122	3252	26.63
Clip fish	78	2925	37.36	70	2166	30.77
Dried fish	10	555	56.03	8	450	56.10
Salted fish	59	1690	28.74	68	1468	21.62
Non-prep. shrimps and crustaceans/cephalopods	11	289	26.14	11	311	28.56
Prep. shrimps and crustaceans/cephalopods	20	985	49.88	17	744	44.45
Fresh/frozen herring	380	1139	3.00	546	1735	3.18
Other herring prod.	126	746	5.92	113	646	5.72
Prepared fish	16	669	41.75	20	717	36.08
Liver/hard roe	7	152	23.20	6	156	26.73
Meal/oil	197	1177	5.97	122	664	5.46
Other fish products	160	668	4.18	212	814	3.84
Total	1935	27861	14.39	2018	24635	12.21

Table 2. Norwegian export of farmed salmon and trout in 1997/98 reported by product type (source: Norwegian Seafood Export Council)

	1998			1997		
	Quantity (1000 t)	Value (million NOK)	Price per kg	Quantity (1000 t)	Value (million NOK)	Price per kg
Fresh farmed salmon (with head)	222	6210	28.01	205	5388	26.25
Frozen farmed trout	26	1010	39.24	–	–	–
Frozen salmon fillets	24	724	30.21	28	803	28.86
Fresh salmon fillets	12	580	47.79	12	537	44.67
Smoked salmon	3	217	81.52	2	201	82.13
Frozen farmed salmon (other, incl. without head)	5	162	30.32	–	–	–
Fresh farmed trout	4	91	24.28	1	22	23.40
Fresh farmed salmon (other, incl. without head)	2	47	30.55	–	–	–

Imports/exports – Quantity

Due to the size of the fisheries and aquaculture sectors in Norway very little imports are required to satisfy the home market with aquatic products. However, there is a substantial import meant for re-exportation. This is largely constituted of cod and mackerel imports from Russia. The cod imports, which are the largest, ranged from 138,000 to 142,000 t from 1992 to 1998. The exports have followed the same trend as the production and increased over the decade, for all pelagic, demersal and salmonid groups. Only the shellfish exports have remained relatively constant. This export is also significantly smaller than the other groups.

Table 3. Fisheries and aquaculture production in quantity for human consumption in Norway, 1988-1998. Amounts in 1000 t of landed weight

Year	Fisheries						Aquaculture						Total production					
	Total catches	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Shell-fish	Crusta-ceans	Ceph-alopods	Total	Salmon-ids	Other sea-fish	Other fresh-water fish	Shell-fish	Others	Total	Fish salmon-ids	Other fish	Shell-fish	Crusta-ceans	Others
1988	1214	501	544	42	1	–	88	88	–	–	–	–	1302	88	1045	42	1	126
1989	1096	423	469	56	1	–	115	115	–	–	–	–	1211	115	892	56	1	147
1990	981	358	377	63	1	–	151	151	–	–	–	–	1132	151	735	63	1	182
1991	1046	333	467	49	1	–	151	151	–	–	–	–	1197	151	800	49	1	196
1992	1196	433	523	49	2	–	131	131	–	–	–	–	1327	131	956	49	2	189
1993	1453	574	601	49	2	–	164	164	–	–	–	–	1617	164	1175	49	2	227
1994	1742	799	718	38	2	–	217	217	–	–	–	–	1959	217	1517	38	2	185
1995	1853	991	739	39	9	–	277	277	–	–	–	–	2130	277	1730	39	9	75
1996	1821	922	766	41	2	–	321	321	–	–	–	–	2142	321	1688	41	2	90
1997	1953	1106	759	42	3	–	364	364	–	–	–	–	2317	364	1865	42	3	43
1998	1819	1003	682	56	3	–	407	407	–	–	–	–	2226	407	1685	56	3	75

Table 4. Net quantity of imports and exports of aquatic products for human consumption in Norway, 1988-1998. Amounts in t of net weight[†]

Year	Imports for human consumption 1									Exports for human consumption 1								
	Total aquatic prod-ucts[††]	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Salmon-ids	Other fresh-water fish	Shell-fish	Crusta-ceans	Ceph-alopods	Others	Total aquatic prod-ucts[††]	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Salmon-ids	Other fresh-water fish	Shell-fish	Crusta-ceans	Ceph-alopods	Others
1988	–	–	–	–	–	–	–	–	–	582	223	224	66	–	16	–	–	53
1989	–	–	–	–	–	–	–	–	–	623	260	193	96	–	22	–	–	52
1990	13	–	–	–	–	13	–	–	–	715	299	186	131	–	24	–	–	75
1991	19	–	–	1	–	19	–	–	–	943	419	220	127	–	22	–	–	155
1992	142	55	69	2	–	18	–	–	–	969	404	240	122	–	21	–	–	182
1993	200	61	113	4	–	26	–	–	–	1149	516	291	131	–	22	–	–	189
1994	166	66	87	1	–	13	–	–	–	1313	507	332	154	–	22	–	–	298
1995	193	78	98	2	–	17	–	–	–	1486	675	348	189	–	16	–	–	258
1996	116	–	98	1	–	18	–	–	–	1681	772	394	214	–	18	–	–	283
1997	119	–	106	–	–	13	–	–	–	1986	890	407	283	–	22	–	–	384
1998	105	–	91	–	–	14	–	–	–	1739	761	362	316	–	27	–	–	273

[†]All categories of products are disjoined: sea-fish and fresh-water fish categories do not include salmonids
[††]Including all type of preservation: fresh, smoked, dried, marinated, salted, frozen, canned, etc.

Table 5. Quantity of imports and exports of aquatic products for human consumption in Norway, 1988-1998. Amounts in t of landed weight (for the calculation, please refer to the instruction in the summary)[†]

Year	Imports for human consumption 2									Exports for human consumption								
	Total aquatic products[††]	Sea-fish 1 pelagic	Sea-fish 2 non-pelagic	Salmonids	Other fresh-water fish	Shellfish	Crustaceans	Cephalopods	Others	Total aquatic products[††]	Sea-fish 1 pelagic	Sea-fish 2 non-pelagic	Salmonids	Other fresh-water fish	Shellfish	Crustaceans	Cephalopods	Others
1988	–	–	–	–	–	–	–	–	–	868	245	470	79	–	21	–	–	53
1989	–	–	–	–	–	–	–	–	–	887	286	405	115	–	29	–	–	52
1990	17	–	–	–	–	17	–	–	–	983	329	391	157	–	31	–	–	75
1991	25	–	–	1	–	25	–	–	–	1259	461	462	152	–	29	–	–	155
1992	185	72	138	2	–	23	–	–	–	1303	444	504	146	–	27	–	–	182
1993	260	79	226	5	–	34	–	–	–	1554	568	611	157	–	29	–	–	189
1994	216	86	174	1	–	17	–	–	–	1767	558	697	185	–	29	–	–	298
1995	251	101	196	2	–	22	–	–	–	1980	743	731	227	–	21	–	–	258
1996	151	–	196	1	–	23	–	–	–	2239	849	827	257	–	23	–	–	283
1997	155	–	212	–	–	17	–	–	–	2587	979	855	340	–	29	–	–	384
1998	137	–	182	–	–	18	–	–	–	2284	837	760	379	–	35	–	–	273

[†]All categories of products are disjoined: sea-fish and fresh-water fish categories do not include salmonids
[††]Including all type of preservation: fresh, smoked, dried, marinated, salted, frozen, canned, etc.

Table 6. Apparent consumption (production + imports – exports) in quantity of aquatic products in Norway, 1988-1998. Amounts in t of landed weight

Year	Total aquatic products	Sea-fish 1 pelagic	Sea-fish 2 non-pelagic	Salmonids	Fresh-water fish	Shellfish	Crustaceans	Cephalopods	Others
1988	346	256	74	9	–	21	1	–	73
1989	209	137	64	0	–	27	1	–	95
1990	15	29	–14	–6	–	49	1	–	107
1991	–188	–128	5	0	–	45	1	–	41
1992	78	61	157	–13	–	45	2	–	7
1993	159	85	216	12	–	54	2	–	38
1994	191	327	195	33	–	26	2	–	–113
1995	124	349	204	52	–	40	9	–	–183
1996	–267	73	135	65	–	41	2	–	–193
1997	–479	127	116	24	–	30	3	–	–341
1998	185	166	39	91	–	39	3	–	–198

Comments on the statistics

We have tried to construct conversion rates for the live weight equivalent for these categories. However, this represents several problems. If these procedures are to be used consistently from year to year then it is important to not make them overly complicated. This may make the conversion rates unrealistic. The problem is that the export size and the product composition for the different species vary from year to year. Thus, it is not easy to construct a conversion rate that represents the "true" conversion rate for an aggregated fish group. This is in particular not realistic if the same conversion rate is used from year to year. We have however tried to use the same conversion rates from year to year, in order to find a workable approach.

We used the figures from the "detailed apparent consumption" from 1997 as a point of departure to construct tentative conversion rates for the aggregated trend figures. It should be noted that the apparent consumption figures for the detailed data are constructed so that the conversion rates are chosen so as to make the apparent consumption believable. This is not an ideal approach, but it may provide operational conversion rates for the aggregated trend data that are not wholly unbelievable. The benchmark for the tentatively realistic apparent consumption figures for 1997 is figures from panel data studies of fish consumption conducted with several households in 1995[1]. The conversion rates used for 1997 do not seem wholly unrealistic given the composition of the product range for the different fish species.

Apparent consumption – Quantity

Both the white fish and pelagic fish consumption have varied substantially through the decade, and there does not seem to be any clear trend. With salmonid fish there is however an upward trend in the consumption. The shrimp consumption has stayed quite constant although it was highest in the beginning of the 1990s. However, the figures are marred by negative figures, too large figures and too large variations in the apparent consumption.

Comments on the statistics

The figures do not seem very realistic regarding the trends they represent. In particular for the sea fish 1 and sea fish 2 categories. The "total aquatic products" figures should probably be disregarded since they add up all the deficiencies of the data. The estimated apparent Norwegian consumption of fish suffers from the relative size of the Norwegian production and export relative to own consumption. This makes the estimated consumption very sensitive to differences in trade and production statistics, resulting sometimes in unbelievably high consumption figures and other times negative apparent consumption. Firstly, and most severely, is the fact that production and trade are reported in different product forms, i.e., landed weight and net product weight. Second, the composition of the product types for the different species vary from year to year, e.g. the amount of a fish species used for fish meal and fish oil can vary from zero to hundred of thousands tonnes from one year to another. Thus, using fixed category definitions from one year to the next cannot represent human consumption satisfactorily. Third, a year's production is not necessarily all consumed the same year. We do not have figures for the fish stocks, and are thus enable to incorporate this aspect into the estimations. Fourth, there is some degree of cheating among fishermen regarding the actual landed quantity of fish. The fishermen report too low catches. This has been confirmed by Norway Statistics, as there are large unaccounted discrepancies in their data. More specifically, the export quantity of fish products exceeds the production figures.

It can be interesting to note that The Directorate of Fisheries has estimated the Norwegian consumption of fish with a similar approach as Masmanap's. In 1994 they ended the estimation of fish consumption with this approach. In "Utvikling i norsk kosthold" (Developments in the Norwegian diet) report 3/98 from The National Council on Nutrition and Physical Activity, it is explained why they ended this estimation:

"The total consumption of fish was estimated by the Directorate of Fisheries until the year 1984. As one concluded that the estimation method was too insecure, one supported oneself on the Norway Statistics' Consumer surveys in 1985 and 1986, also with the consumption estimate at the wholesale

[1]Confer Table A2 in Appendix for conversion rates.

level. Even if the Directorate of Fisheries' estimation method was burdened with very large insecurity, the Directorates' numbers for the years 1987-94 were used. The insecurity owed amongst other to the fact that the estimation builds on information of planned utilisation of fish when purchased, and that there are no adjustments for eventual changes in final use. Furthermore it is difficult to acquire data for stocks and export of imported fish, which is processed in Norway. This insecurity increased when Norway Statistics in 1990 stopped to collect figures for stocks. Furthermore the insecurities around use of own catch, gifts, eventual unrecorded sales of fish are also significant to the estimation of the wholesale consumption. There do not exist any figures for this, so it has to be estimated. Changes in the calculated wholesale consumption of fish from one year to another can therefore just as well reflect problems in the data foundations instead of factual changes in inland consumption to food. The Directorate of Fisheries therefore stresses that the estimation should not be used as a basis to evaluate the changes in the wholesale consumption of fish over time. The Directorate of Fisheries therefore decided not to continue these estimations for 1995 and the following years".'

In the report "Consumption of fish and fish products" which is included in Task 3 as report #10 represents the latest approach in an attempt to adequately collecting statistics of fish consumption in Norway. Confer this report for more reliable statistics concerning the consumption of fish.

Comments on 1988-1998 – Value figures

Trend figures from 1988 to 1998 regarding value are presented in Tables 7-9.

Production values

The value is reported in million NOK. Not surprisingly the trends in the production value follow the trends in the production quantity. The value of almost all the fisheries has increased during the decade. Only shrimp fisheries have remained quite constant in value. The salmonid production has also increased in value over the period.

Comments on the statistics

The production values are not based on the first-hand prices for the fish. Since we compare the value of the production with export and imports we have to construct prices for the production. We do this by constructing "export wholesale dealer" prices. These prices are calculated by dividing the export value by the export volume for the relevant year and category. Thereafter they are multiplied with the production volume for the corresponding year and category, thus, representing the value of the production.

The calculated "export wholesale dealer" prices do probably not reflect the real value of the pelagics, since some of this is used as fish meal and fish oil. With this use the value is lower than for most pelagics for consumption.

Export and import – Values

The import figures start running from 1992. From that point on the "sea-fish 2" values increased radically. This mainly consists of cod from Russia, which is bought fresh and processed in Norway. The export value has also increased together with increasing export volume, both for capture fisheries and aquaculture. Salmonid and white fish are clearly the most important measured in value.

Apparent consumption – Value

The most striking with the apparent consumption figures is the value of the high values for the pelagic consumption. As it was noted above this is due to the too high production values. Further, the value of the white fish also shows an increasing trend.

Table 7. Fisheries and aquaculture production in value for human consumption in Norway, 1988-1998. Amounts in million NOK

Year	Fisheries						Aquaculture						Total production					
	Total catches	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Shell-fish	Crusta-ceans	Ceph-alopods	Total	Salmon-ids	Other sea-fish	Other fresh-water fish	Shell-fish	Others	Total	Fish salmon-ids	Other fish	Shell-fish	Crusta-ceans	Others
1988	13856	2148	9335	2373	–	–	4457	4457	–	–	–	–	18313	4457	11483	2373	–	–
1989	13133	1733	8651	2749	–	–	4491	4491	–	–	–	–	17624	4491	10384	2749	–	–
1990	11967	1589	7483	2895	–	–	5898	5898	–	–	–	–	17865	5898	9027	2895	–	–
1991	14668	1528	10877	2263	–	–	6084	6084	–	–	–	–	20752	6084	12405	2263	–	–
1992	16485	1618	12487	2380	–	–	5651	5651	–	–	–	–	22136	5651	14105	2380	–	–
1993	17154	2043	12935	2176	–	–	6912	6912	–	–	–	–	24066	6912	14978	2176	–	–
1994	19888	3103	15225	1560	–	–	8277	8277	–	–	–	–	28165	8277	18328	1560	–	–
1995	21992	3974	15895	2123	–	–	10312	10312	–	–	–	–	32304	10312	19869	2123	–	–
1996	21956	4818	15079	2059	–	–	11148	11148	–	–	–	–	33104	11148	19897	2059	–	–
1997	22856	5668	15477	1711	–	–	10619	10619	–	–	–	–	33475	10619	21145	1711	–	–
1998	26543	5209	18949	2385	–	–	12549	12549	–	–	–	–	39092	12549	24158	2385	–	–

Table 8. Value of imports and exports of aquatic products for human consumption in Norway, 1988-1998. Amounts in million NOK

Year	Imports for human consumption									Exports for human consumption								
	Total aquatic prod-ucts	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Salmon-ids	Other fresh-water fish	Shell-fish	Crusta-ceans	Ceph-alopods	Others	Total aquatic prod-ucts	Sea-fish 1 pela-gic	Sea-fish 2 non-pelagic	Salmon-ids	Other fresh-water fish	Shell-fish	Crusta-ceans	Ceph-alopods	Others
1988	–	–	–	–	–	–	–	–	–	10469	956	3844	3343	–	904	–	–	1422
1989	–	–	–	–	–	–	–	–	–	10801	1065	3560	3749	–	1080	–	–	1347
1990	–	–	–	–	–	–	–	–	–	12870	1327	3692	5117	–	1103	–	–	1631
1991	–	–	–	–	–	–	–	–	–	14944	1923	5124	5117	–	1016	–	–	1764
1992	916	99	532	–	–	285	–	–	–	15399	1510	5730	5263	–	1020	–	–	1876
1993	1180	98	743	–	–	339	–	–	–	16623	1837	6263	5521	–	977	–	–	2025
1994	1204	127	813	–	–	264	–	–	–	19566	1969	7040	5874	–	903	–	–	3780
1995	1529	211	950	–	–	368	–	–	–	20091	2707	7485	7036	–	871	–	–	1992
1996	1204	–	851	–	–	353	–	–	–	22458	4034	7756	7432	–	904	–	–	2332
1997	1332	–	1004	–	–	328	–	–	–	24635	4561	8299	8256	–	896	–	–	2623
1998	1720	–	1344	–	–	376	–	–	–	27861	3952	10058	9743	–	1150	–	–	2958

Table 9. Apparent consumption (production + imports – exports) in value of aquatic products in Norway, 1988-1998. Amounts in million NOK

Year	Total aquatic products	Sea-fish 1 pelagic	Sea-fish 2 non-pelagic	Salmon-ids	Fresh-water fish	Shell-fish	Crusta-ceans	Ceph-alopods	Others
1988	7844	1192	5491	1114	–	1469	–	–	–
1989	6823	668	5091	742	–	1669	–	–	–
1990	4995	262	3791	781	–	1792	–	–	–
1991	5808	–395	5753	967	–	1247	–	–	–
1992	7653	207	7289	388	–	1645	–	–	–
1993	8623	304	7415	1391	–	1538	–	–	–
1994	9803	1261	8998	2403	–	921	–	–	–
1995	13742	1478	9360	3276	–	1620	–	–	–
1996	11850	784	8174	3716	–	1508	–	–	–
1997	10172	1107	8182	2363	–	1143	–	–	–
1998	12951	1257	10235	2806	–	1611	–	–	–

Comments on detailed Information 1997

Tables 10-13 present detailed information corresponding to 1997.

Table 10. Total production of aquatic products in 1997

Category	Main species	Quantity (t)	Value (million NOK)	Average price (€/kg)	Market share (% of the category)	% Aquaculture (in quantity)
Marine fishes 1 pelagic	Total	2022	3594	–	100	–
	Herring	747	2301	3.08	0	0
	Mackerel	137	1293	9.44	24	0
Marine fishes 2 non-pelagic	Total	784	7422	10.95	100	–
	Cod	402	4402	7.16	59	0
	Saithe	184	1317	7.96	18	0
	Haddock	106	844	9.10	11	0
	Norway haddock	22	200	20.08	3	0
	Ling	15	301	11.85	4	0
	Tusk	14	166	16.00	2	0
	Greenland halibut	12	192		3	0
Salmonids	Total	–	10595	–	100	–
	Salmon	331	9698	29.30	92	100
	Rainbow trout	33	897	27.17	8	100
Fresh-water fishes	Total	–	–	–	100	–
Shellfish	Total	42	1696	–	100	–
	Shrimps	42	1696	41.00	100	0
Crustaceans	Total	–	–	–	100	–
Cephalopods	Total	–	30	–	100	–
		2	15	7.50	50	–
Others	Total	–	–	–	100	–

General trends in volume: stagnant, fluctuating, rising or falling trends
Outlook: idem or unknown

Table 11. Total imports in 1997

Category	Main species	Quantity (t)		Value (1000 €)	Average price (€/kg)	Market share (% of the category)	Main forms of imports†
		Net weight	Landed weight				
Marine fishes 1 pelagic	Total	125	132	448	–	100	–
	Herring	58	58	81	–	18	–
	Mackerel	67	74	367	–	82	–
Marine fishes 2 non-pelagic	Total	114	137	1043	–	100	–
	Cod	106	127	1004	–	96	Fresh, frozen
	Haddock	8	10	39	–	4	–
Salmonids	Total	–	–	–	–	100	–
	Salmon	–	–	–	–		–
	Rainbow trout	–	–	–	–		–
Fresh-water fishes	Total	–	–	–	–	100	–
Shellfish	Total	14	–	328	–	100	–
	Shrimps	14	–	328	–	100	–
Crustaceans	Total	–	–	–	–	100	–
Cephalopods	Total	–	–	–	–	100	–
Others	Total	–	–	–	–	100	–

†Live fish, fresh whole or fresh fillets, frozen whole or frozen fillets, canned, smoked, salted, etc.
General trends in volume: stagnant, fluctuating, rising or falling trends
Outlook: idem or unknown

Total production

The herring production is the largest of the pelagic fish for consumption with 64% share of the total production of approximately 2 million t. Further we see that cod is the largest of the white fish 59% of the total production of 784,000 t. Finally, almost the entire salmonid productions is constituted of Atlantic salmons.

Comments on the statistics

The values are calculated with the same procedure, as they are for the trend data, i.e. based on values from the export data.

Total imports/exports

Norway is a net exporter, which we can clearly see from the detailed figures from 1997. Clipfish, fresh, frozen and salted are the most important product forms for the exports. The value of the white fish export is double that of pelagic fish. And of the white fish exports cod is clearly the most important followed by saithe and haddock. The salmon exports are equal in value to the white fish exports.

Comments on the statistics

The trade statistics are originally reported in net weight. We have used conversion rates based on what seem reasonable conversion rates and also what can seem like realistic apparent consumption figures. This is based on a comparison with a household panel study of fish consumption from 1994-95[2]. We then used these conversion rates as a basis for the export and import figures for the 10 years trend figures above[3]. This is not a very scientific approach of obtaining the "true" conversion rate. Still, we have checked our conversion rates against officially used conversion rates and they do not differ much.

[2]Confer results from panel study in Table A3 in Appendix.
[3]Confer Table A1 in Appendix for conversion rates.

Table 12. Total exports in 1997

Category	Main species	Quantity (t)		Value (1000 €)	Average price (€/kg)	Market share (% of the category)	Main forms of exports†
		Net weight	Landed weight				
Marine fishes 1 pelagic	Total	890	1003	4561	–	100	–
	Herring	659	772	2381	3.08	52	Frozen
	Mackerel	231	231	2180	9.44	48	Frozen
Marine fishes 2 non-pelagic	Total	407	831	8299	10.95	100	–
	Cod	228	502	5495	7.16	66	Clipfish, salted, fresh
	Saithe	82	164	1175	7.96	14	Clipfish, fresh
	Haddock	60	108	860	9.10	10	Frozen, fresh
	Norway haddock	17	20	182	20.08	2	Fresh, frozen
	Ling	6	12	241	11.85	3	Dried fillets, salted fillets
	Tusk	6	13	154	16.00	2	Clipfish
	Greenland halibut	8	12	192		2	Frozen
Salmonids	Total	283	339	8256	–	100	–
	Salmon	261	313	7657	29.30	93	Fresh, frozen
	Rainbow trout	22	26	599	27.17	7	Frozen
Fresh-water fishes	Total	–	–	–	–	100	–
Shellfish	Total	22	–	896	–	100	–
	Shrimps	22	–	896	41.00	100	–
Crustaceans	Total	–	–	–	–	100	–
Cephalopods	Total	–	–	–	–	100	–
Others	Total	–	–	–	–	100	–

†Live fish, fresh whole or fresh fillets, frozen whole or frozen fillets, canned, smoked, salted, etc.
General trends in volume: stagnant, fluctuating, rising or falling trends
Outlook: idem or unknown

Total apparent consumption

Besides from mackerel, which has negative consumption, the figures do seem believable. Shrimp has the largest consumption with 42,000 t. Next herring, cod, saithe and salmon follows in that order as the most important aquatic species in the menu.

Comments on the statistics

These figures should not be weighted too much because of how the trade figures have been calculated. Much of the problems that the trend figures suffered from are also apparent here. Still, they can provide an indication of the relative consumption of the different aquatic species.

National seafood market information

1994-1995 Norwegian Seafood Consumption Study

Study of the Norwegian seafood consumption based on a panel of 1500 representative households. Confer Table A3 in Appendix for results from study.

Table 13. Total apparent consumption in 1997. Foreign trade data expressed in landed weight

Category	Main species	Quantity (t) landed weight	Market share (% of the category)
Marine fishes 1 pelagic	Total	13	–
	Herring	33	254
	Mackerel	–20	–154
Marine fishes 2 non-pelagic	Total	61	–
	Cod	27	44
	Saithe	20	33
	Haddock	8	13
	Norway haddock	2	3
	Ling	3	5
	Tusk	1	2
	Greenland halibut	0	0
Salmonids	Total	25	–
	Salmon	18	72
	Rainbow trout	7	28
Fresh-water fishes	Total	–	–
Shellfish	Total	42	–
	Shrimps	42	100
Crustaceans	Total	–	–
Cephalopods	Total	2	–
		2	100
Others	Total	–	–

Key findings

(i) Background. For some time it has been indicated that the statistics on domestic fish consumption is very unreliable. In 1993 a task group evaluated several methods with the purpose of getting more reliable and more detailed statistics of fish consumption. The task group found that GfKNorges' (market research institute) approach should be tried. The group suggested that there should be a test registration of fish and fish products in GfKNorges' household panel in order to verify if this approach could cover the different needs for statistics of fish and fish products. Such a test registration was carried through in the period between July 1994 and December 1995.

(ii) Results. The results give figures for fish themselves and all types of fish products which the households have recorded that they have obtained (i.e. both bought, fished and received as gifts). In the course of 1995, 97% of the households had obtained fish at least once, and 28% had self fished or received fish as gifts. Of the obtained amount 79% were bought, 15% were fished by themselves and 6% were received as gifts. Fishing for own consumption and gifts were highest in the period June to September, this included both the numbers of households which had fished and the average quantity per household. The registration showed that each household in the panel had obtained an average of 25.7 kg fish and fish products in 1995. This corresponds to an average of 10.4 kg per person in the panel (reported as product weight, i.e. the sum of the different products in the form they were obtained). GfKNorges' registration showed that in 1995 whole not cleaned fish constituted 16% of obtained amount (reported in product weight), other whole fish 31%, processed fish 45% and shellfish and crustaceans 8%. There was seasonal variation in this distribution, mainly because of variation in fish to own use and gifts, which for a large part was whole not cleaned fish. 49% of the obtained amount (product weight) were fresh fish, 25% frozen, 14% canned, 12% other (amongst other smoked, conserved in glass). Cod and saithe were the fish species which accounted for the largest part of the total amount. 67% of the total obtained amount of fish and fish products (product weight) were purchased in grocery shops, in all 12% in fish shops, fish-truck/-boat and more, and 21% were self fished or received as gifts. Average price for fish and fish products was 43.60 NOK per kg (incl. VAT). The purchases in the grocery shops are characterised both by low share of fresh fish, low share of whole fish, partly cleaned fish and fillet together with high share of processed products. The

households in Oslo and the areas close by had obtained less fish than the rest of the country. Furthermore the households with a young housewife obtained less fish than households with an older housewife. Estimated per person the households with one or two persons had obtained twice as much fish as the households with four or five persons. In Table A3 in Appendix the household panel's consumption by species is reported.

(iii) Conclusions. When it comes to showing the development of the obtained amount over time GfKNorges' method is considered suitable because the registration period is long for the single household. This also goes for relative changes and differences between various subgroups of the population.

The statistics for the level of obtained amount of fish are considered as more unreliable. The experiences from the test registration is that the method does not seem to completely capture the amount of products which other sources report has gone to the grocery market. Hence total figures for the grocery market have to be estimated on the basis of GfKNorges' registration and factors which builds on other statistics. Thereby the reliability of the reported amount can improve. For the time being such statistics are missing for some groups of fish and fish products. With a permanent registration the conversion factors have to be considered and possibly modified within even intervals.

Consumption places

The consumption places for aquatic meals reflect the fact that most meals in Norway are consumed at home (Fig. 1). Eating out is rather expensive due to high labour costs in Norway. Still, there is a trend towards more consumption based on catering.

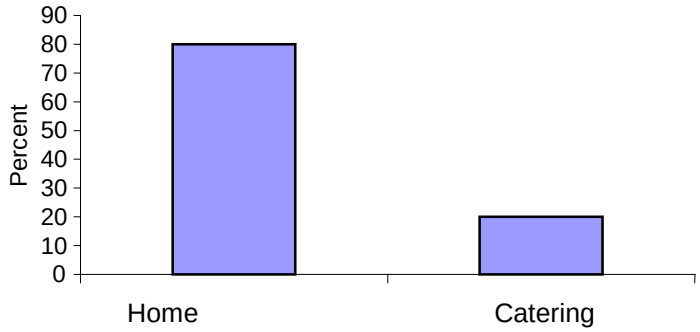

Fig. 1. Consumption places for aquatic meals (source: rough estimate based on several studies).

Breakdown of seafood consumption

The seafood consumption is distributed on a range of products (Fig. 2). The largest group is "cakes and puddings". These fish products are usually made into traditional everyday dishes, which are relatively easy to prepare. Next follows "clean fish meat, fillets and slices" that are made into various dishes. Then "other processed" and "whole, unprocessed" as the third and fourth largest group with 20% and 17% respectively.

Distribution channels

Supermarkets handle the largest part retail of aquatic species (Fig. 3). This is probably due to lower prices and the convenience (time-saving) of purchasing all the groceries in the same place.

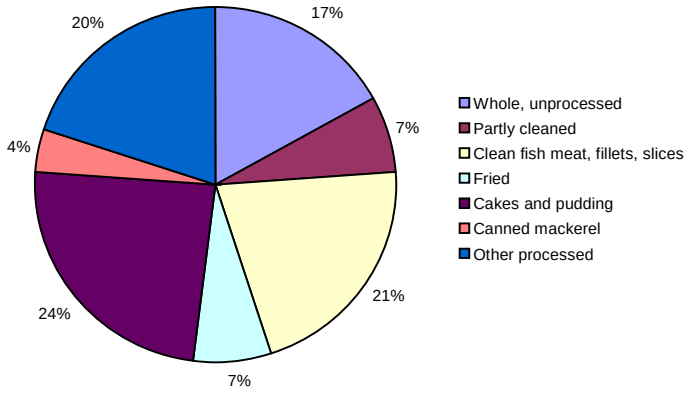

Fig. 2. Consumption in 1997 by preservation type (source: GfK's panel data survey).

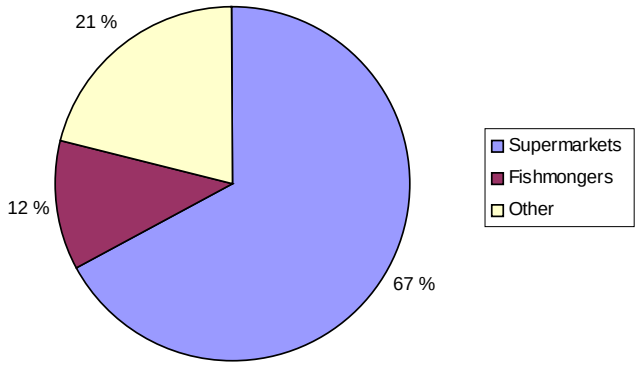

Fig. 3. Distribution channels for aquatic products (source: GfK's panel data survey).

General characteristics of the population

Data on the characteristics of the population are presented in Tables 14-16.

Table 14. Levels of income and breakdown of household expenditure dedicated to food

	%
Levels of income 1995†	
No income	8.87
100-49900	13.16
50000-99000	24.53
100000-149000	20.39
150000-199000	15.91
200000-249000	7.89
250000-299000	3.60
300000-	5.61
Income share devoted to food††	13.8
Income share devoted to meat††	3.2
Others††	9.7
Seafood††	0.9

†Source: Statistics Norway.
††Source: Statistics Norway, consumer survey 1993-95.

Table 15. Total wholesale consumption of meat (1997) (source: NILF, the Norwegian Agriculture Economics Research Institute)

	Mill. kg/year	%
Ruminants	114.6	45.2
Pigs	105.9	41.8
Poultry	32.8	12.9

Table 16. Type of housing, demographic data and women employment rate (1997) (source: Statistics Norway)

	%
Type of housing	50 (places with 800 or more inhabitants)
Demographic data	
Age group	
0-15	20
15-35	21
35-55	21
55-	38
Family size	
1 (single)	53
2	11
3 (1 child)	3
4	4
5	2
Women employment rate	66

Conclusions

The analysis of Norwegian consumption of aquatic products is not adequate based on the Masmanap procedure. This is not primarily due to procedure itself, but rather the special situation of Norway as a major fishery nation. Due to the size of the fisheries and aquaculture relatively small mistakes and biases can have large impacts on the statistics. In particular as total apparent consumption is to be divided among a relatively small number of citizens. In the end there are too many figures that do not seem believable. It does seem like panel studies are more appropriate in the case of Norway than a calculation of the consumption based on production, import and export statistics.

Appendix

Table A1. Conversion rates for 1997 detailed apparent consumption

	Conversion rates	Product types
Herring	1.2	Frozen
Mackerel	1.2	Frozen
Cod	2.2	Clipfish, salted, fresh and frozen
Saithe	2.0	Clipfish, fresh
Haddock	1.8	Frozen, fresh
Norway haddock	1.2	Fresh, frozen
Ling	2.0	Dried fillets, salted fillets
Tusk	2.2	Clipfish
Greenland halibut	1.5	Frozen
Salmon	1.2	Fresh, frozen
Rainbow trout	1.2	Frozen

In Table A2 follows the conversion rates that are constructed on the basis of the 1997 conversion rates. The non-pelagic marine fishes have the largest conversion rate due the relative higher processing of these products.

Table A2. Conversion rates for aggregated apparent consumption

	Conversion rates
Marine fishes 1 pelagic	1.2
Marine fishes 2 non-pelagic	2.1
Salmonids	1.2

Table A3. The total amount of fish obtained by the household panel by fish species, January 1995 – December 1995 (source: GfKNorge)

	Amount in kg		Buyers		Amount per buyer		Amount per person	
Basis	1500	100.0	1500	100.0	1500	100.0	3595	100.0
	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Total	37455.75	100.0	97.4	100.0	25.66	100.0	10.42	100.0
Greenland halibut	59.94	0.2	3.8	3.9	1.05	4.1	0.02	0.2
Tusk	61.80	0.2	2.0	2.1	2.13	8.3	0.02	0.2
Plaice	361.11	1.0	18.0	18.5	1.33	5.2	0.10	1.0
Haddock	1130.00	3.0	19.8	20.3	3.81	14.8	0.31	3.0
Halibut	280.63	0.7	9.8	10.1	1.91	7.4	0.08	0.7
Salmon, farmed	1122.76	3.0	35.7	36.7	2.10	8.2	0.31	3.0
Salmon, other	1053.37	2.8	35.9	36.9	1.96	7.6	0.29	2.8
Ling	190.34	0.5	5.8	6.0	2.19	8.5	0.05	0.5
Pollack	463.30	1.2	7.4	7.6	4.21	16.4	0.13	1.2
Mackerel	2907.28	7.8	71.8	73.7	2.70	10.5	0.81	7.8
Saithe	4794.00	12.8	64.1	65.8	4.98	19.4	1.33	12.8
Herring	2508.54	6.7	67.1	68.9	2.49	9.7	0.70	6.7
Catfish	162.51	0.4	7.7	7.9	1.40	5.5	0.05	0.4
Cod	7570.05	20.2	77.8	79.9	6.48	25.3	2.11	20.2
Tuna	290.29	0.8	16.0	16.4	1.21	4.7	0.08	0.8
Norway haddock	420.78	1.1	10.5	10.8	2.68	10.4	0.12	1.1
Trout, farmed	792.87	2.1	19.4	19.9	2.73	10.6	0.22	2.1
Trout, other	742.91	2.0	22.5	23.1	2.20	8.6	0.21	2.0
Blue mussel	43.95	0.1	4.0	4.1	0.73	2.9	0.01	0.1
Crabs	229.35	0.6	11.0	11.3	1.39	5.4	0.06	0.6
Norway lobster	30.63	0.1	2.5	2.6	0.81	3.1	0.01	0.1
Shrimps	2641.20	7.1	51.0	52.4	3.45	13.5	0.74	7.1
Total fish	37455.75	100.0	97.4	100.0	25.66	100.0	10.42	100.0

Identify applications of the panel study:

(i) AUTHOR: Berge, Sigrid
DATE OF PUBLICATION: April 1996
TITLE: Anskaffelse av fisk og fiskevarer (Consumption of fish and fish products)
PUBLISHER: Norwegian Agriculture Economics Research Institute
PLACE OF PUBLICATION: Oslo
ISSN: 0805-9691
(ii) GEOGRAPHICAL AREA COVERED: Norway
(iii) PRIMARY DATA: Panel of 1500 representative households
(iv) PRODUCTS: All fish and fish products
(v) METHODOLOGY: Each household has a diary where the purchases of selected groceries are reported continuously.