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TABLE 19. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH3	Percentage Change	Base UPLH	Scenario UPLH3	Percentage Change
1/1983	0.392	0.392	-0.01	1.45	1.45	0.01
2/1983	0.308	0.302	-1.93	1.19	1.28	-0.31
3/1983	0.285	0.268	-5.91	1.03	1.00	-2.28
4/1983	0.527	0.506	-3.99	1.35	1.33	-1.26
1/1984	0.358	0.349	-2.56	1.37	1.36	-0.82
2/1984	0.280	0.272	-3.06	1.16	1.15	-0.80
3/1984	0.303	0.286	-5.68	1.08	1.06	-2.04
4/1984	0.574	0.551	-4.00	1.44	1.42	-1.14
1/1985	0.360	0.350	-2.76	1.31	1.30	-0.88
2/1985	0.313	0.304	-2.78	1.19	1.18	-0.70
3/1985	0.250	0.235	-6.02	0.94	0.92	-2.36
4/1985	0.439	0.417	-4.98	1.31	1.28	-1.78
1/1986	0.326	0.314	-3.48	1.26	1.25	-1.22
2/1986	0.340	0.329	-3.19	1.14	1.13	-0.91
3/1986	0.291	0.274	-5.88	1.00	0.98	-2.24
4/1986	0.515	0.492	-4.45	1.39	1.37	-1.38
1/1987	0.418	0.406	-2.95	1.48	1.46	-0.96
2/1987	0.380	0.367	-3.42	1.35	1.34	-0.99
3/1987	0.471	0.446	-5.46	1.31	1.29	-1.83
4/1987	0.989	0.949	-4.07	2.01	1.99	-1.04
1/1988	0.827	0.805	-2.73	2.04	2.03	-0.78
2/1988	0.626	0.602	-3.84	2.04	2.02	-0.97
3/1988	0.615	0.584	-4.99	1.80	1.77	-1.36
4/1988	0.907	0.871	-4.00	2.07	2.05	-0.96

TABLE 20. Scenario 4, North American Low-Valued Salmon Landings Decrease by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	19,811,887	0.00
NQA EH	14,578,054	14,578,012	0.00
QAUH	3,746,145	3,746,187	0.00
NPA EH	21.059	21.063	0.02
EPA EH	2.890	2.890	0.02
NPAUH	23.094	23.097	0.01
UPAUH	3.166	3.167	0.01
JPAJH	467.660	467.742	0.02
QHJH	42,002,766	41,939,223	-0.15
QHEH	6,958,529	7,012,927	0.78
UPHJH	2.356	2.357	0.06
JPHJH	426.640	426.852	0.05
UPHEH	2.419	2.423	0.15
EPHEH	2.576	2.580	0.17
UPHH	2.365	2.367	0.07
QLJH	10,939,052	10,511,306	-3.91
QLEH	8,242,731	8,141,653	-1.23
UPLJH	1.173	1.199	2.22
JPLJH	203.240	207.621	2.16
UPLEH	1.569	1.587	1.17
EPLH	1.618	1.637	1.15
UPLH	1.343	1.369	1.89
PHEXH	1.271	1.272	0.05
PLEXH	0.379	0.403	6.22

TABLE 21. Scenario 4, North American Low-Valued Salmon Landings Decrease by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH4	Percentage Change	Base UPHH	Scenario UPHH4	Percentage Change	Base PHEXH	Scenario PHEXH4	Percentage Change
1/1983	2.901	2.901	0.00	1.582	1.582	0.00	1.731	1.731	0.00
2/1983	2.849	2.849	0.00	1.754	1.754	0.00	0.815	0.815	0.00
3/1983	3.231	3.232	0.03	1.722	1.724	0.12	0.843	0.844	0.10
4/1983	3.189	3.191	0.05	2.036	2.040	0.22	0.957	0.959	0.20
1/1984	2.678	2.678	0.01	1.750	1.750	0.03	2.231	2.232	0.05
2/1984	2.721	2.721	0.00	1.753	1.753	0.00	0.921	0.921	0.00
3/1984	2.875	2.876	0.03	1.851	1.854	0.12	0.975	0.976	0.10
4/1984	2.678	2.679	0.05	2.186	2.190	0.20	1.105	1.107	0.18
1/1985	3.084	3.085	0.01	1.833	1.833	0.02	2.689	2.690	0.03
2/1985	3.103	3.103	0.00	1.786	1.786	0.00	1.022	1.022	0.00
3/1985	2.808	2.809	0.03	1.928	1.930	0.08	1.008	1.008	0.07
4/1985	3.204	3.205	0.04	2.250	2.254	0.17	1.188	1.190	0.15
1/1986	3.200	3.200	0.00	1.996	1.997	0.02	2.946	2.947	0.03
2/1986	3.040	3.040	0.00	2.133	2.133	0.00	1.419	1.419	0.00
3/1986	2.552	2.552	0.02	2.405	2.406	0.05	1.232	1.223	0.04
4/1986	2.611	2.611	0.02	2.588	2.589	0.05	1.236	1.237	0.05
1/1987	3.064	3.064	0.00	2.377	2.377	0.00	3.097	3.097	0.00
2/1987	3.649	3.649	0.00	2.737	2.737	0.00	1.705	1.705	0.00
3/1987	4.187	4.188	0.02	2.699	2.700	0.05	1.590	1.590	0.04
4/1987	3.753	3.754	0.02	3.122	3.125	0.08	1.663	1.664	0.03
1/1988	3.613	3.613	0.00	3.419	3.419	0.00	5.652	5.652	0.01
2/1988	3.747	3.747	0.00	3.621	3.621	0.00	2.268	2.268	0.00
3/1988	3.351	3.352	0.02	3.640	3.642	0.03	2.107	2.108	0.03
4/1988	3.406	3.407	0.01	3.701	3.702	0.02	2.000	2.000	0.02

TABLE 21. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH4	Percentage Change	Base UPLH	Scenario UPLH4	Percentage Change
1/1983	0.392	0.392	0.01	1.449	1.448	-0.01
2/1983	0.308	0.314	1.96	1.286	1.289	0.23
3/1983	0.285	0.305	6.90	1.028	1.054	2.53
4/1983	0.527	0.551	4.57	1.350	1.369	1.41
1/1984	0.358	0.368	2.92	1.375	1.387	0.91
2/1984	0.280	0.290	3.40	1.161	1.171	0.85
3/1984	0.303	0.323	6.63	1.082	1.107	2.27
4/1984	0.574	0.601	4.59	1.435	1.453	1.27
1/1985	0.360	0.372	3.15	1.314	1.327	0.98
2/1985	0.313	0.323	3.13	1.193	1.202	0.76
3/1985	0.250	0.268	7.05	0.942	0.967	2.63
4/1985	0.439	0.464	5.72	1.306	1.332	1.95
1/1986	0.326	0.339	3.95	1.262	1.279	1.34
2/1986	0.340	0.352	3.59	1.136	1.147	0.99
3/1986	0.291	0.311	6.89	1.002	1.027	2.50
4/1986	0.515	0.542	5.13	1.393	1.415	1.53
1/1987	0.418	0.432	3.36	1.477	1.493	1.07
2/1987	0.380	0.394	3.85	1.350	1.364	1.06
3/1987	0.471	0.501	6.37	1.315	1.341	2.04
4/1987	0.989	1.036	4.69	2.010	2.033	1.17
1/1988	0.827	0.853	3.13	2.044	2.062	0.88
2/1988	0.626	0.653	4.36	2.042	2.064	1.06
3/1988	0.615	0.651	5.81	1.796	1.823	1.51
4/1988	0.907	0.949	4.59	2.073	2.094	1.06

fourth quarters were 0.2 million pounds, 13.3 million pounds, and 28.6 million pounds, respectively.

From the average total analysis, it is evident that a 10 percent increase in low-valued salmon landings would largely impact the low-valued salmon markets with little impact on high-valued and farmed Atlantic salmon markets. Japan, with a high own-price demand elasticity for low-valued salmon, would receive much more of the increased supplies than would the EEC. The increased low-valued salmon landings would decrease the weighted average export price of low-valued salmon by 1.71 percent and the low-valued salmon exvessel price by 5.34 percent. The existence of a substitution effect between high- and low-valued salmon in the EEC, but not in Japan, contributes to the greater increase in low-valued landings being exported to Japan than to the EEC.

The largest percentage change in a variable other than variables pertaining to the low-valued salmon market occurred in the high-valued salmon exports to the EEC which decreased by 0.7 percent. Because of the substitution in the EEC between high- and low-valued salmon, there would be a small reallocation of high-valued salmon from the EEC to Japan. The overall decrease in the exvessel price of high-valued salmon was insignificant. The Atlantic salmon market was left largely unaffected.

As in the scenario for changes in high-valued landings, the results of a decrease in low-valued Pacific salmon landings induced effects that were largely opposites of those for the low-valued Pacific salmon landing increases. On average, a 10 percent decrease in low-valued salmon landings would increase the exvessel price of low-valued salmon by 6.22 percent. Quantities of high-valued salmon exports would increase slightly to the EEC

because of the positive cross-price elasticity between high- and low-valued salmon in the EEC.

Group 3: Norwegian and Scottish Farmed Atlantic Salmon Total Exports $\pm$ 10% Relative to Historical Levels

These scenarios were designed to measure the effects on the world salmon markets of increases or decreases in production and concomitantly increases or decreases in exportation from the main producers of farmed salmon. The results are presented in Tables 22-25.

The increases in Atlantic salmon exports would be disproportionately allocated to the EEC relative to the North American market. The EEC's importation of Norwegian Atlantic salmon would increase by 11.46 percent, and the importation of Scottish and Norwegian Atlantic salmon combined would increase by 11.08 percent. This larger increase in the EEC market is in part due to a larger short- and long-run demand price elasticity in the EEC as compared to the North American market for Atlantic salmon.

Prices of Atlantic salmon would decrease approximately 2.5 percent in all markets, except Japan, indicating that Atlantic salmon was allocated such that the price ratio between the EEC and North American markets remained relatively constant. The exports of Norwegian salmon to Japan were assumed exogenous during the historical time period as Norway sought to penetrate the Japanese market by introducing farmed Atlantic salmon to Japan. It should be noted that if total Norwegian salmon exports had increased by 10 percent, the Norwegian exporters might have been willing to send more Atlantic salmon to Japan in pursuit of their market development strategy. If Norway had also increased Atlantic salmon exports to Japan by 10 percent, the price of

TABLE 22. Scenario 5, Norwegian and Scottish Farmed Salmon Exports Increase by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	22,006,324	11.08
NQAEH	14,578,054	16,249,061	11.46
QAUH	3,746,145	3,960,594	5.72
NPAEH	21.059	20.534	-2.49
EPAEH	2.890	2.817	-2.50
NPAUH	23.094	22.493	-2.60
UPAUH	3.166	3.083	-2.63
JPAJH	467.660	467.260	-0.09
QHJH	42,002,766	42,152,463	0.36
QHEH	6,958,529	6,767,433	-2.75
UPHJH	2.356	2.353	-0.13
JPHJH	426.640	426.129	-0.12
UPHEH	2.419	2.411	-0.35
EPHEH	2.576	2.565	-0.41
UPHH	2.365	2.361	-0.17
QLJH	10,939,052	10,942,828	0.03
QLEH	8,242,731	8,231,440	-0.14
UPLJH	1.173	1.173	-0.02
JPLJH	203.240	203.203	-0.02
UPLEH	1.569	1.569	-0.03
EPLH	1.618	1.618	-0.04
UPLH	1.343	1.343	-0.04
PHEXH	1.271	1.265	-0.50
PLEXH	0.379	0.379	-0.04

TABLE 23. Scenario 5, Norwegian and Scottish Farmed Salmon Production Increase by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH5	Percentage Change	Base UPHH	Scenario UPHH5	Percentage Change	Base PHEXH	Scenario PHEXH5	Percentage Change
1/1983	2.901	2.717	-6.35	1.582	1.564	-1.16	1.731	1.695	-2.04
2/1983	2.849	2.736	-3.94	1.754	1.749	-0.26	0.815	0.808	-0.93
3/1983	3.231	3.105	-3.91	1.722	1.718	-0.26	0.843	0.836	-0.89
4/1983	3.189	3.066	-3.86	2.036	2.026	-0.48	0.957	0.947	-1.00
1/1984	2.678	2.602	-2.85	1.750	1.739	-0.61	2.231	2.210	-0.94
2/1984	2.721	2.648	-2.68	1.753	1.749	-0.23	0.921	0.915	-0.65
3/1984	2.875	2.816	-2.05	1.851	1.847	-0.25	0.975	0.969	-0.56
4/1984	2.678	2.610	-2.54	2.186	2.175	-0.47	1.105	1.097	-0.77
1/1985	3.084	2.979	-3.43	1.833	1.823	-0.54	2.689	2.662	-1.00
2/1985	3.103	3.014	-2.88	1.786	1.782	-0.22	1.022	1.015	-0.68
3/1985	2.808	2.748	-2.15	1.928	1.925	-0.16	1.008	1.003	-0.50
4/1985	3.204	3.133	-2.21	2.250	2.240	-0.44	1.188	1.180	-0.68
1/1986	3.200	3.104	-2.98	1.996	1.986	-0.50	2.946	2.920	-0.89
2/1986	3.040	2.961	-2.60	2.133	2.128	-0.20	1.419	1.410	-0.60
3/1986	2.552	2.500	-2.04	2.405	2.403	-0.08	1.222	1.217	-0.42
4/1986	2.611	2.553	-2.24	2.588	2.586	-0.08	1.236	1.231	-0.40
1/1987	3.064	2.965	-3.21	2.377	2.374	-0.12	3.097	3.079	-0.59
2/1987	3.649	3.572	-2.10	2.737	2.735	-0.08	1.705	1.698	-0.42
3/1987	4.187	4.124	-1.51	2.699	2.696	-0.12	1.590	1.584	-0.36
4/1987	3.753	3.694	-1.56	3.122	3.115	-0.23	1.663	1.655	-0.44
1/1988	3.613	3.525	-2.45	3.419	3.416	-0.09	5.652	5.624	-0.49
2/1988	3.747	3.643	-2.75	3.621	3.618	-0.06	2.268	2.256	-0.52
3/1988	3.351	3.287	-1.90	3.640	3.638	-0.07	2.107	2.099	-0.39
4/1988	3.406	3.340	-1.96	3.701	3.700	-0.05	2.000	1.993	-0.37

TABLE 23. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH5	Percentage Change	Base UPLH	Scenario UPLH5	Percentage Change
1/1983	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	-0.08	1.028	1.027	-0.08
4/1983	0.527	0.527	-0.13	1.350	1.349	-0.09
1/1984	0.358	0.358	-0.05	1.375	1.375	-0.02
2/1984	0.280	0.280	0.01	1.161	1.161	0.00
3/1984	0.303	0.303	-0.06	1.082	1.081	-0.06
4/1984	0.574	0.574	-0.10	1.435	1.434	-0.08
1/1985	0.360	0.360	-0.04	1.314	1.314	-0.01
2/1985	0.313	0.313	0.02	1.193	1.193	0.01
3/1985	0.250	0.250	-0.06	0.942	0.942	-0.05
4/1985	0.439	0.439	-0.10	1.306	1.305	-0.09
1/1986	0.326	0.326	-0.04	1.262	1.261	-0.02
2/1986	0.340	0.340	0.02	1.136	1.136	0.01
3/1986	0.291	0.291	-0.03	1.002	1.001	-0.02
4/1986	0.515	0.515	-0.03	1.393	1.393	-0.03
1/1987	0.418	0.418	0.00	1.477	1.477	0.00
2/1987	0.380	0.380	0.01	1.350	1.350	0.01
3/1987	0.471	0.471	-0.03	1.315	1.314	-0.03
4/1987	0.989	0.989	-0.04	2.010	2.009	-0.04
1/1988	0.827	0.827	-0.01	2.044	2.044	0.00
2/1988	0.626	0.626	0.00	2.042	2.042	0.00
3/1988	0.615	0.615	-0.02	1.796	1.796	-0.02
4/1988	0.907	0.907	-0.03	2.073	2.072	-0.03

TABLE 24. Scenario 6, Norwegian and Scottish Farmed Salmon Exports Decrease by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	17,632,640	-11.00
NQAEH	14,578,054	12,922,149	-11.36
QAUH	3,746,145	3,516,593	-6.13
NPAEH	21.059	21.659	2.85
EPAEH	2.890	2.972	2.86
NPAUH	23.094	23.796	3.04
UPAUH	3.166	3.264	3.07
JPAJH	467.660	468.119	0.10
QHJH	42,002,766	41,832,638	-0.41
QHEH	6,958,529	7,183,713	3.24
UPHJH	2.356	2.360	0.15
JPHJH	426.640	427.224	0.14
UPHEH	2.419	2.429	0.40
EPHEH	2.576	2.588	0.47
UPHH	2.365	2.370	0.20
QLJH	10,939,052	10,934,745	-0.04
QLEH	8,242,731	8,255,665	0.16
UPLJH	1.173	1.173	0.02
JPLJH	203.240	203.281	0.02
UPLEH	1.569	1.570	0.04
EPLH	1.618	1.619	0.04
UPLH	1.343	1.344	0.04
PHEXH	1.271	1.279	0.58
PLEXH	0.379	0.379	0.05

TABLE 25. Scenario 6, Norwegian and Scottish Farmed Salmon Production Decrease by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM6	Percentage Change	Base UPHN	Scenario UPHN6	Percentage Change	Base PHEXH	Scenario PHEXH6	Percentage Change
1/1983	2.901	3.120	7.53	1.582	1.605	1.40	1.731	1.772	2.40
2/1983	2.849	2.979	4.57	1.754	1.759	0.30	0.815	0.824	1.06
3/1983	3.231	3.378	4.54	1.722	1.727	0.30	0.843	0.852	1.01
4/1983	3.189	3.332	4.46	2.036	2.047	0.55	0.957	0.968	1.13
1/1984	2.678	2.767	3.31	1.750	1.762	0.70	2.231	2.255	1.08
2/1984	2.721	2.807	3.14	1.753	1.758	0.27	0.921	0.928	0.74
3/1984	2.875	2.944	2.38	1.851	1.857	0.30	0.975	0.981	0.64
4/1984	2.678	2.758	2.98	2.186	2.198	0.55	1.105	1.115	0.89
1/1985	3.084	3.208	3.99	1.833	1.845	0.63	2.689	2.720	1.14
2/1985	3.103	3.208	3.36	1.786	1.791	0.26	1.022	1.030	0.78
3/1985	2.808	2.879	2.52	1.928	1.932	0.18	1.008	1.013	0.58
4/1985	3.204	3.287	2.59	2.250	2.261	0.51	1.188	1.197	0.79
1/1986	3.200	3.311	3.49	1.996	2.008	0.58	2.946	2.976	1.02
2/1986	3.040	3.133	3.05	2.133	2.138	0.23	1.419	1.428	0.70
3/1986	2.552	2.613	2.39	2.405	2.407	0.09	1.222	1.228	0.48
4/1986	2.611	2.679	2.62	2.588	2.590	0.09	1.236	1.242	0.47
1/1987	3.064	3.180	3.79	2.377	2.380	0.14	3.097	3.118	0.68
2/1987	3.649	3.739	2.48	2.737	2.740	0.09	1.705	1.713	0.49
3/1987	4.187	4.262	1.78	2.699	2.703	0.14	1.590	1.596	0.42
4/1987	3.753	3.822	1.86	3.122	3.130	0.27	1.663	1.671	0.52
1/1988	3.613	3.719	2.92	3.419	3.423	0.11	5.652	5.684	0.58
2/1988	3.747	3.869	3.27	3.621	3.623	0.07	2.268	2.282	0.61
3/1988	3.351	3.426	2.24	3.640	3.643	0.08	2.107	2.116	0.45
4/1988	3.406	3.486	2.33	3.701	3.703	0.05	2.000	2.008	0.43

TABLE 25. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH6	Percentage Change	Base UPLH	Scenario UPLH6	Percentage Change
1/1983	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	0.09	1.028	1.029	0.09
4/1983	0.527	0.528	0.14	1.350	1.351	0.10
1/1984	0.358	0.358	0.06	1.375	1.375	0.02
2/1984	0.280	0.280	-0.01	1.161	1.161	-0.01
3/1984	0.303	0.303	0.07	1.082	1.083	0.07
4/1984	0.574	0.575	0.12	1.435	1.436	0.09
1/1985	0.360	0.360	0.04	1.314	1.314	0.01
2/1985	0.313	0.313	-0.02	1.193	1.193	-0.01
3/1985	0.250	0.250	0.07	0.942	0.943	0.06
4/1985	0.439	0.440	0.12	1.306	1.307	0.10
1/1986	0.326	0.326	0.05	1.262	1.262	0.02
2/1986	0.340	0.339	-0.02	1.136	1.136	-0.01
3/1986	0.291	0.291	0.03	1.002	1.002	0.03
4/1986	0.515	0.515	0.04	1.393	1.394	0.03
1/1987	0.418	0.418	0.00	1.477	1.477	0.00
2/1987	0.380	0.380	-0.02	1.350	1.350	-0.01
3/1987	0.471	0.472	0.03	1.315	1.315	0.03
4/1987	0.989	0.990	0.03	2.010	2.011	0.04
1/1988	0.827	0.827	0.02	2.044	2.044	0.00
2/1988	0.626	0.626	-0.01	2.042	2.042	0.00
3/1988	0.615	0.615	0.02	1.796	1.796	0.02
4/1988	0.907	0.907	0.03	2.073	2.073	0.03

Atlantic salmon in Japan would have decreased by 3.08 percent. In this case, other endogenous variables would also have been slightly affected. (This latter result was generated from a different scenario from the one reported here. In the interest of brevity, the details of this scenario are not reported here.)

Some high-valued Pacific salmon would be reallocated away from the EEC, with much of the reallocation going to Japan. Export prices of high-valued Pacific salmon to both markets would decline slightly, and the exvessel price of high-valued salmon declined by 0.5 percent. The directions of movements would be the same for low-valued salmon as those for the high-valued salmon although the magnitudes of changes in the low-valued salmon market would be less. The exvessel price of low-valued salmon would have decreased by only 0.04 percent. Most of the changes in low-valued salmon would have been in quarters 3 and 4 when some high-valued salmon would be substituted for low-valued salmon in the EEC.

A decrease in Norwegian and Scottish salmon exports of Atlantic salmon by 10 percent would increase prices of all salmon products. The price of Atlantic salmon in the United States would rise by 3.07 percent, and the exvessel price of high-valued Pacific salmon would rise by 0.58 percent. Allocation of Pacific salmon would shift away from Japan and toward the EEC, with the average North American export prices of both low- and high-valued Pacific salmon rising by approximately the same percentage in each market. The price of Pacific salmon exported to Japan would rise because of the reduction in supply due to the reallocation of Pacific salmon to the EEC. The price to the EEC would increase because of the upward shift in the EEC demand for Pacific salmon due to the decreased availability of farmed salmon and the

resulting higher prices of Atlantic salmon in the EEC. There is relatively little effect on the high-valued exvessel price because of the low cross-price substitution between farmed Atlantic salmon and high-valued Pacific salmon in all markets.

Group 4: Norwegian Farmed Atlantic Salmon Exports $\pm$ 10% Relative to Historical Levels

This group of scenarios refers to a situation where increased or decreased farmed salmon exports are isolated to Norwegian farmed salmon. Since Scottish farmed salmon is essentially only exported to the EEC, it is of interest to compare this group of scenarios to the previous group of scenarios.

Tables 26-29 present the results. The basic difference between these scenarios and the previous scenarios (in which both Norwegian and Scottish salmon were increased or decreased by 10 percent) is the magnitude of the effect on Norwegian farmed Atlantic salmon allocated to the EEC, which is slightly accentuated under the current set of assumptions. The increased allocation of Norwegian Atlantic salmon to the EEC under Scenario 7 in comparison to Scenario 5 is explained by the fact there would be increased Scottish salmon allocated to the EEC under Scenario 5. Under Scenario 7, the price decrease for Atlantic salmon in North America and the decrease in high-valued exvessel price would not be as great as under Scenario 5 because the allocation of Atlantic salmon to North American would not have increased as much. Ultimately, increased Scottish salmon exports would affect prices in North America through the extra allocation of Norwegian Atlantic salmon that would be exported to North America. In comparing the two scenarios, it is evident that, because Scottish production during the historical time period

TABLE 26. Scenario 7, Norwegian Farmed Salmon Exports
Increase by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	21,507,678	8.56
NQA EH	14,578,054	16,273,799	11.63
QA UH	3,746,145	3,935,855	5.06
NPA EH	21.059	20.641	-1.99
EPA EH	2.890	2.832	-2.00
NPA UH	23.094	22.562	-2.30
UPA UH	3.166	3.092	-2.34
JPA JH	467.660	467.356	-0.07
QH JH	42,002,766	42,136,943	0.32
QHEH	6,958,529	6,796,452	-2.33
UPH JH	2.356	2.353	-0.12
JPH JH	426.640	426.182	-0.11
UPHEH	2.419	2.412	-0.30
EPHEH	2.576	2.567	-0.36
UPHH	2.365	2.361	-0.16
QL JH	10,939,052	10,942,485	0.03
QLEH	8,242,731	8,232,605	-0.12
UPL JH	1.173	1.173	-0.02
JPL JH	203.240	203.207	-0.02
UPLEH	1.569	1.569	-0.03
EPL EH	1.618	1.618	-0.04
UPLH	1.343	1.343	-0.03
PHEXH	1.271	1.266	-0.47
PLEXH	0.379	0.379	-0.04

TABLE 27. Scenario 7, Norwegian Farmed Salmon Exports
Increase by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH7	Percentage Change	Base UPHH	Scenario UPHH7	Percentage Change	Base PHEXH	Scenario PHEXH7	Percentage Change
1/1983	2.901	2.733	-5.80	1.582	1.568	-0.93	1.731	1.700	-1.76
2/1983	2.849	2.742	-3.76	1.754	1.750	-0.21	0.815	0.808	-0.86
3/1983	3.231	3.105	-3.89	1.722	1.718	-0.25	0.843	0.836	-0.88
4/1983	3.189	3.068	-3.80	2.036	2.026	-0.47	0.937	0.947	-1.00
1/1984	2.678	2.610	-2.54	1.750	1.741	-0.48	2.231	2.213	-0.80
2/1984	2.721	2.660	-2.25	1.753	1.751	-0.15	0.921	0.917	-0.50
3/1984	2.875	2.815	-2.10	1.851	1.847	-0.26	0.975	0.969	-0.57
4/1984	2.678	2.615	-2.37	2.186	2.176	-0.43	1.105	1.097	-0.73
1/1985	3.084	2.988	-3.14	1.833	1.826	-0.40	2.689	2.666	-0.85
2/1985	3.103	3.025	-2.51	1.786	1.783	-0.15	1.022	1.016	-0.55
3/1985	2.808	2.753	-1.96	1.928	1.926	-0.13	1.008	1.003	-0.44
4/1985	3.204	3.144	-1.88	2.250	2.242	-0.34	1.185	1.181	-0.56
1/1986	3.200	3.111	-2.77	1.996	1.988	-0.41	2.946	2.923	-0.80
2/1986	3.040	2.975	-2.14	2.133	2.130	-0.13	1.419	1.412	-0.47
3/1986	2.552	2.502	-1.95	2.405	2.403	-0.07	1.222	1.217	-0.40
4/1986	2.611	2.559	-1.99	2.588	2.586	-0.07	1.236	1.232	-0.37
1/1987	3.064	2.978	-2.79	2.377	2.375	-0.07	3.097	3.082	-0.50
2/1987	3.649	3.586	-1.71	2.737	2.736	-0.06	1.705	1.699	-0.34
3/1987	4.187	4.130	-1.37	2.699	2.696	-0.11	1.590	1.584	-0.32
4/1987	3.753	3.703	-1.31	3.122	3.116	-0.20	1.663	1.656	-0.38
1/1988	3.613	3.550	-1.77	3.519	3.417	-0.05	5.652	5.632	-0.35
2/1988	3.747	3.659	-2.33	3.621	3.619	-0.04	2.268	2.258	-0.44
3/1988	3.351	3.292	-1.77	3.640	3.638	-0.06	2.107	2.099	-0.36
4/1988	3.406	3.347	-1.73	3.701	3.700	-0.04	2.000	1.993	-0.33

TABLE 27. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH7	Percentage Change	Base UPLH	Scenario UPLH7	Percentage Change
1/1983	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	-0.08	1.028	1.027	-0.07
4/1983	0.527	0.527	-0.12	1.350	1.349	-0.08
1/1984	0.358	0.358	-0.05	1.375	1.375	-0.02
2/1984	0.280	0.280	0.01	1.161	1.161	0.00
3/1984	0.303	0.303	-0.06	1.082	1.081	-0.06
4/1984	0.574	0.574	-0.10	1.435	1.434	-0.07
1/1985	0.360	0.360	-0.03	1.314	1.314	-0.01
2/1985	0.313	0.313	0.02	1.193	1.193	0.01
3/1985	0.250	0.250	-0.05	0.942	0.942	-0.05
4/1985	0.439	0.439	-0.08	1.306	1.305	-0.07
1/1986	0.326	0.326	-0.03	1.262	1.261	-0.01
2/1986	0.340	0.340	0.02	1.136	1.136	0.01
3/1986	0.291	0.291	-0.02	1.002	1.001	-0.02
4/1986	0.515	0.515	-0.03	1.393	1.393	-0.03
1/1987	0.418	0.418	0.00	1.477	1.477	0.00
2/1987	0.380	0.380	0.01	1.350	1.350	0.00
3/1987	0.471	0.471	-0.03	1.315	1.314	-0.03
4/1987	0.989	0.989	-0.04	2.010	2.009	-0.03
1/1988	0.827	0.827	-0.01	2.044	2.044	0.00
2/1988	0.626	0.626	0.00	2.042	2.042	0.00
3/1988	0.615	0.615	-0.02	1.796	1.796	-0.02
4/1988	0.907	0.907	-0.03	2.073	2.072	-0.02

TABLE 28. Scenario 8, Norwegian Farmed Salmon Exports
Decrease by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	18,130,567	-8.49
NQA EH	14,578,054	12,896,690	-11.53
QA UH	3,746,145	3,542,052	-5.45
NPA EH	21.059	21.523	2.20
EPA EH	2.890	2.954	2.22
NPA UH	23.094	23.712	2.67
UPA UH	3.166	3.252	2.71
JPA JH	467.660	467.997	0.07
QH JH	42,002,766	41,852,606	-0.36
QHEH	6,958,529	7,144,090	2.67
UPH JH	2.356	2.359	0.14
JPH JH	426.640	427.154	0.12
UPHEH	2.419	2.428	0.34
EPHEH	2.576	2.587	0.41
UPHH	2.365	2.369	0.18
QL JH	10,939,052	10,935,191	-0.04
QLEH	8,242,731	8,254,148	0.14
UPL JH	1.173	1.173	0.02
JPL JH	203.240	203.277	0.02
UPLEH	1.569	1.569	0.03
EPLH	1.618	1.619	0.04
UPLH	1.343	1.344	0.04
PHEXH	1.271	1.278	0.53
PLEXH	0.379	0.379	0.04

TABLE 29. Scenario 8, Norwegian Farmed Salmon Exports
Decrease by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM8	Percentage Change	Base UPHH	Scenario UPHH8	Percentage Change	Base PHEXH	Scenario PHEXH8	Percentage Change
1/1983	2.901	3.098	6.79	1.582	1.599	1.08	1.731	1.765	2.01
2/1983	2.849	2.972	4.33	1.754	1.758	0.24	0.815	0.823	0.96
3/1983	3.231	3.377	4.50	1.722	1.727	0.29	0.843	0.852	0.99
4/1983	3.189	3.329	4.38	2.036	2.046	0.53	0.957	0.968	1.13
1/1984	2.678	2.757	2.93	1.750	1.759	0.53	2.231	2.251	0.90
2/1984	2.721	2.793	2.62	1.753	1.756	0.16	0.921	0.926	0.57
3/1984	2.875	2.946	2.45	1.851	1.857	0.30	0.975	0.981	0.65
4/1984	2.678	2.752	2.76	2.186	2.196	0.49	1.105	1.114	0.84
1/1985	3.084	3.197	3.64	1.833	1.841	0.43	2.689	2.714	0.95
2/1985	3.103	3.194	2.92	1.786	1.789	0.16	1.022	1.028	0.62
3/1985	2.808	2.872	2.29	1.928	1.931	0.15	1.008	1.013	0.51
4/1985	3.204	3.275	2.19	2.250	2.258	0.38	1.188	1.195	0.64
1/1986	3.200	3.303	3.24	1.996	2.006	0.46	2.946	2.973	0.91
2/1986	3.040	3.116	2.51	2.133	2.136	0.14	1.419	1.426	0.54
3/1986	2.552	2.610	2.27	2.405	2.407	0.08	1.222	1.228	0.45
4/1986	2.611	2.672	2.32	2.588	2.590	0.08	1.236	1.242	0.43
1/1987	3.064	3.164	3.27	2.377	2.379	0.07	3.097	3.115	0.57
2/1987	3.649	3.722	2.02	2.737	2.739	0.05	1.705	1.712	0.39
3/1987	4.187	4.255	1.61	2.699	2.702	0.12	1.590	1.595	0.38
4/1987	3.753	3.811	1.55	3.122	3.129	0.23	1.663	1.670	0.45
1/1988	3.613	3.689	2.10	3.419	3.421	0.06	5.652	5.675	0.41
2/1988	3.747	3.850	2.77	3.621	3.622	0.04	2.268	2.280	0.50
3/1988	3.351	3.421	2.08	3.640	3.643	0.07	2.107	2.116	0.41
4/1988	3.406	3.476	2.05	3.701	3.703	0.05	2.000	2.008	0.38

TABLE 29. Continued

QUARTER	Base PLEXH	Scenario PLEXH8	Percentage Change	Base UPLH	Scenario UPLH8	Percentage Change
	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	0.09	1.028	1.029	0.08
4/1983	0.527	0.528	0.14	1.350	1.351	0.09
1/1984	0.358	0.358	0.06	1.375	1.375	0.02
2/1984	0.280	0.280	-0.01	1.161	1.161	-0.01
3/1984	0.303	0.303	0.07	1.082	1.083	0.07
4/1984	0.574	0.575	0.11	1.435	1.436	0.08
1/1985	0.360	0.360	0.04	1.314	1.314	0.01
2/1985	0.313	0.313	-0.02	1.193	1.193	-0.01
3/1985	0.250	0.250	0.05	0.942	0.943	0.05
4/1985	0.439	0.440	0.09	1.306	1.307	0.07
1/1986	0.326	0.326	0.03	1.262	1.262	0.01
2/1986	0.340	0.339	-0.02	1.136	1.136	-0.01
3/1986	0.291	0.291	0.03	1.002	1.002	0.02
4/1986	0.515	0.515	0.03	1.393	1.394	0.03
1/1987	0.418	0.418	0.01	1.477	1.477	0.00
2/1987	0.380	0.380	-0.01	1.350	1.350	-0.01
3/1987	0.471	0.471	0.03	1.315	1.315	0.03
4/1987	0.989	0.990	0.04	2.010	2.010	0.04
1/1988	0.827	0.827	0.01	2.044	2.044	0.00
2/1988	0.626	0.626	-0.01	2.042	2.042	0.00
3/1988	0.615	0.615	0.02	1.796	1.796	0.02
4/1988	0.907	0.907	0.03	2.073	2.073	0.03

was small, a 10 percent increase in Scottish production would not have had a significant effect on the market since the changes in Scenarios 5 and 7 are not large in magnitude. But as Scottish production is projected to increase rapidly in the future, the effect of increased Scottish production may become very noticeable in the future.

The main difference between the scenario for a 10 percent decrease in Norwegian exports and the scenario for a 10 percent decrease in both Norwegian and Scottish exports was, again, the amount of Norwegian farmed Atlantic salmon allocated to the EEC and North America. With the decreased Norwegian farmed Atlantic salmon exports, the EEC markets would experience a larger decline in Norwegian exports than if Scottish exports also declined. Prices of all salmon would rise, with the Atlantic salmon price in the United States rising by 2.71 percent and the high-valued exvessel price rising by 0.53 percent. These price increases are less than if Scottish farmed salmon also decreased. Allocation of high- and low-valued Pacific salmon would shift in the EEC, replacing some of the decreases in Atlantic salmon.

Chilean Exports $\pm$ 25% Re

Historical Levels

These scenarios examined the effect of an increase or decrease in Chilean farmed salmon exports to North American (United States) would have on salmon markets. The Chilean scenario is particularly important to the United States since most of the Chilean exports of farmed salmon were shipped to the U.S. West Coast through 1988. Recently, Japan has also been importing a measurable amount of Chilean salmon, but over the historical period this amount has been insignificant.

Tables 30-33 present the effects of a 25 percent increase and decrease in Chilean exports to North America. The time period examined in the average

TABLE 30. Scenario 9, Chilean Farmed Salmon Exports
Increase by 25 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	19,854,867	0.22
NQA EH	14,578,054	14,620,992	0.29
QA UH	3,746,145	3,703,207	-1.15
NPA EH	21.06	21.05	-0.03
EPA EH	2.89	2.89	-0.04
NPA UH	23.09	22.97	-0.53
UPA UH	3.17	3.15	-0.65
JPA JH	467.660	467.65	-0.00
QH JH	42,002,766	42,002,388	-0.00
QHEH	6,958,529	6,956,266	-0.03
UPH JH	2.36	2.36	-0.00
JPH JH	426.64	426.64	0.00
UPHEH	2.42	2.42	-0.00
EPHEH	2.58	2.58	-0.01
UPHH	2.36	2.36	-0.00
QL JH	10,939,052	10,939,023	-0.00
QLEH	8,242,731	8,242,795	0.00
UPL JH	1.17	1.17	-0.00
JPL JH	203.240	203.24	0.00
UPLEH	1.57	1.57	0.00
EPLH	1.62	1.62	0.00
UPLH	1.34	1.34	0.00
PHEXH	1.27	1.27	-0.04
PLEXH	0.38	0.38	0.00

TABLE 31. Scenario 9, Chilean Farmed Salmon Exports
Increase by 25 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH9	Percentage Change	Base UPHH	Scenario UPHH9	Percentage Change	Base PHEXH	Scenario PHEXH9	Percentage Change
1/1983	2.901	2.901	0.00	1.582	1.582	0.00	1.731	1.731	0.00
2/1983	2.849	2.849	0.00	1.754	1.754	0.00	0.815	0.815	0.00
3/1983	3.231	3.231	0.00	1.722	1.722	0.00	0.843	0.843	0.00
4/1983	3.189	3.189	0.00	2.036	2.036	0.00	0.957	0.957	0.00
1/1984	2.678	2.675	-0.12	1.750	1.750	-0.01	2.231	2.231	-0.03
2/1984	2.721	2.721	-0.01	1.773	1.753	0.00	0.921	0.921	0.00
3/1984	2.875	2.875	0.00	1.771	1.851	0.00	0.975	0.975	0.00
4/1984	2.678	2.678	0.07	2.186	2.186	0.00	1.105	1.104	-0.09
1/1985	3.084	3.075	-0.30	1.833	1.833	-0.01	2.689	2.687	-0.06
2/1985	3.103	3.102	-0.03	1.786	1.786	0.00	1.022	1.022	0.00
3/1985	2.808	2.808	0.00	1.928	1.928	0.00	1.008	1.008	0.00
4/1985	3.204	3.204	0.00	2.250	2.250	0.00	1.188	1.186	-0.18
1/1986	3.200	3.121	-2.46	1.996	1.994	-0.10	2.946	2.931	-0.51
2/1986	3.040	3.032	-0.27	2.133	2.133	0.01	1.419	1.418	-0.04
3/1986	2.552	2.550	-0.05	2.405	2.405	0.00	1.222	1.222	-0.01
4/1986	2.611	2.610	-0.02	2.588	2.588	0.00	1.236	1.216	-1.68
1/1987	3.064	2.980	-2.73	2.377	2.376	-0.04	3.097	3.081	-0.50
2/1987	3.649	3.643	-0.16	2.737	2.738	0.01	1.705	1.705	-0.02
3/1987	4.187	4.186	-0.04	2.699	2.699	0.00	1.590	1.589	-0.01
4/1987	3.753	3.752	-0.02	3.122	3.122	0.00	1.663	1.614	-2.95
1/1988	3.613	3.515	-2.73	3.419	3.418	-0.02	5.652	5.624	-0.49
2/1988	3.747	3.722	-0.65	3.621	3.621	0.00	2.268	2.266	-0.11
3/1988	3.351	3.348	-0.10	3.640	3.641	0.00	2.107	2.107	-0.02
4/1988	3.406	3.405	-0.03	3.701	3.701	0.00	2.000	1.973	-1.35

TABLE 31. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH9	Percentage Change	Base UPLH	Scenario UPLH9	Percentage Change
1/1983	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	0.00	1.028	1.028	0.00
4/1983	0.527	0.527	0.00	1.350	1.350	0.00
1/1984	0.358	0.358	0.00	1.375	1.375	0.00
2/1984	0.280	0.280	0.00	1.161	1.161	0.00
3/1984	0.303	0.303	0.00	1.082	1.082	0.00
4/1984	0.574	0.574	0.00	1.435	1.435	0.00
1/1985	0.360	0.360	0.00	1.314	1.314	0.00
2/1985	0.313	0.313	0.00	1.193	1.193	0.00
3/1985	0.250	0.250	0.00	0.942	0.942	0.00
4/1985	0.439	0.439	0.00	1.306	1.306	0.00
1/1986	0.326	0.326	0.00	1.262	1.262	0.00
2/1986	0.340	0.340	0.00	1.136	1.136	0.00
3/1986	0.291	0.291	0.00	1.002	1.002	0.00
4/1986	0.515	0.515	0.00	1.393	1.393	0.00
1/1987	0.418	0.418	0.00	1.477	1.477	0.00
2/1987	0.380	0.380	0.00	1.350	1.350	0.00
3/1987	0.471	0.471	0.00	1.315	1.315	0.00
4/1987	0.989	0.989	0.00	2.010	2.010	0.00
1/1988	0.827	0.827	0.00	2.044	2.044	0.00
2/1988	0.626	0.626	0.00	2.042	2.042	0.00
3/1988	0.615	0.615	0.00	1.796	1.796	0.00
4/1988	0.907	0.907	0.00	2.073	2.073	0.00

TABLE 32. Scenario 10, Chilean Farmed Salmon Exports
Decrease by 25 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	19,768,397	-0.22
NQAEH	14,578,054	14,534,521	-0.30
QAUH	3,746,145	3,789,678	1.16
NPAEH	21.06	21.07	0.03
EPAEH	2.89	2.89	0.04
NPAUH	23.09	23.23	0.59
UPAUH	3.17	3.19	0.71
JPAJH	467.660	467.67	0.00
QHJH	42,002,766	42,003,130	0.00
QHEH	6,958,529	6,960,891	0.03
UPHJH	2.36	2.36	0.00
JPHJH	426.64	426.64	-0.00
UPHEH	2.42	2.42	0.00
EPHEH	2.58	2.58	0.01
UPHH	2.36	2.36	0.00
QLJH	10,939,052	10,939,080	0.00
QLEH	8,242,731	8,242,667	-0.00
UPLJH	1.17	1.17	0.00
JPLJH	203.240	203.24	-0.00
UPLEH	1.57	1.57	-0.00
EPLEH	1.62	1.62	-0.00
UPLH	1.34	1.34	-0.00
PHEXH	1.27	1.27	0.04
PLEXH	0.38	0.38	0.00

TABLE 33. Scenario 10, Chilean Farmed Salmon Exports
Decrease by 25 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH10	Percentage Change	Base UPHH	Scenario UPHH10	Percentage Change	Base PHEXH	Scenario PHEXH10	Percentage Change
1/1983	2.900	2.900	0.00	1.580	1.580	0.00	1.730	1.730	0.00
2/1983	2.850	2.850	0.00	1.750	1.750	0.00	0.820	0.820	0.00
3/1983	3.230	3.230	0.00	1.720	1.720	0.00	0.840	0.840	0.00
4/1983	3.190	3.190	0.00	2.040	2.040	0.00	0.960	0.960	0.00
1/1984	2.680	2.680	0.12	1.750	1.750	0.01	2.230	2.230	0.03
2/1984	2.720	2.720	0.01	1.750	1.750	0.00	0.920	0.920	0.00
3/1984	2.880	2.880	0.00	1.850	1.850	0.00	0.970	0.970	0.00
4/1984	2.680	2.680	0.00	2.190	2.190	0.00	1.110	1.110	0.09
1/1985	3.080	3.090	0.30	1.830	1.830	0.01	2.690	2.690	0.06
2/1985	3.100	3.100	0.02	1.790	1.790	0.00	1.020	1.020	0.00
3/1985	2.810	2.810	0.00	1.930	1.930	0.00	1.010	1.010	0.00
4/1985	3.200	3.200	0.00	2.250	2.250	0.00	1.190	1.190	0.18
1/1986	3.200	3.280	2.57	2.000	2.000	0.11	2.950	2.960	0.52
2/1986	3.040	3.050	0.26	2.130	2.130	-0.01	1.420	1.420	0.04
3/1986	2.550	2.550	0.05	2.410	2.410	0.00	1.220	1.220	0.01
4/1986	2.610	2.610	0.02	2.590	2.590	0.00	1.240	1.260	1.71
1/1987	3.060	3.150	2.89	2.380	2.380	0.04	3.100	3.110	0.52
2/1987	3.650	3.650	0.15	2.740	2.740	-0.01	1.700	1.710	0.02
3/1987	4.190	4.190	0.04	2.700	2.700	0.00	1.590	1.590	0.01
4/1987	3.750	3.750	0.02	3.120	3.120	0.00	1.660	1.710	3.05
1/1988	3.610	3.720	3.01	3.420	3.420	0.02	5.650	5.680	0.53
2/1988	3.750	3.770	0.63	3.620	3.620	0.00	2.270	2.270	0.11
3/1988	3.350	3.350	0.10	3.640	3.640	0.00	2.110	2.110	0.02
4/1988	3.410	3.410	0.03	3.700	3.700	0.00	2.000	2.030	1.37

TABLE 33. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH10	Percentage Change	Base UPLH	Scenario UPLH10	Percentage Change
1/1983	0.390	0.390	0.00	1.450	1.450	0.00
2/1983	0.310	0.310	0.00	1.290	1.290	0.00
3/1983	0.280	0.280	0.00	1.030	1.030	0.00
4/1983	0.530	0.530	0.00	1.350	1.350	0.00
1/1984	0.360	0.360	0.00	1.370	1.370	0.00
2/1984	0.280	0.280	0.00	1.160	1.160	0.00
3/1984	0.300	0.300	0.00	1.080	1.080	0.00
4/1984	0.570	0.570	0.00	1.440	1.440	0.00
1/1985	0.360	0.360	0.00	1.310	1.310	0.00
2/1985	0.310	0.310	0.00	1.190	1.190	0.00
3/1985	0.250	0.250	0.00	0.940	0.940	0.00
4/1985	0.440	0.440	0.00	1.310	1.310	0.00
1/1986	0.330	0.330	0.00	1.260	1.260	0.00
2/1986	0.340	0.340	0.00	1.140	1.140	0.00
3/1986	0.290	0.290	0.00	1.000	1.000	0.00
4/1986	0.520	0.520	0.00	1.390	1.390	0.00
1/1987	0.420	0.420	0.00	1.480	1.480	0.00
2/1987	0.380	0.380	0.00	1.350	1.350	0.00
3/1987	0.470	0.470	0.00	1.310	1.310	0.00
4/1987	0.990	0.990	0.00	2.010	2.010	0.00
1/1988	0.830	0.830	0.00	2.040	2.040	0.00
2/1988	0.630	0.630	0.00	2.040	2.040	0.00
3/1988	0.620	0.620	0.00	1.800	1.800	0.00
4/1988	0.910	0.910	0.00	2.070	2.070	0.00

total analysis was 1983-88. Before 1986, the Chilean exports to the United States were very small; 1986 was the first year that Chilean exports to the United States were over 1 million pounds.

The largest effect of the increased Chilean salmon exports to the United States was on the Norwegian Atlantic salmon shipments and prices to North America. Norwegian allocations to North American would decrease by 1.15 percent, and the price of Atlantic salmon in North American would decrease by 0.65 percent. There was a small effect (0.04 percent) on the exvessel price of high-valued Pacific salmon in North America. This is because over the historical time period, Chilean shipments were still very small in comparison to the consumption of high-valued Pacific salmon in the United States. No effect on the exvessel price of low-valued Pacific salmon was found.

Quarterly analysis showed that the largest effects of increased Chilean salmon on exvessel prices of high-valued Pacific salmon would be in the first and fourth quarters. First quarter prices of Atlantic salmon in the United States would decrease an average of 1.97 percent. This in turn was the main factor in a 0.32 percent decrease in the high-valued Pacific salmon exvessel price in the first quarter. Prices of Atlantic salmon also would decrease slightly in the EEC because of the increased allocation of Norwegian farmed Atlantic salmon to the EEC. Fourth quarter high-valued Pacific salmon exvessel price would decrease the most, declining an average of 1.5 percent. The effects of increased Chilean exports became more noticeable in the last two years when Chilean salmon exports became much larger in magnitude. For the first quarters of both 1987 and 1988, a 25 percent increase in Chilean shipments to the United States would decrease the Atlantic salmon prices in the United States by an average of 2.73 percent.

In comparison to increased Chilean exports, the effects of a 25 percent decrease in Chilean exports are opposite and very similar in magnitudes. If Chilean salmon exports decreased by 25 percent, more Norwegian farmed Atlantic salmon would be allocated to North America at a high price because of the increased demand for Atlantic salmon to replace farmed Chilean salmon. The price of Atlantic salmon would rise by 0.71 percent in North America, and the average exvessel price of high-valued Pacific salmon would rise by only 0.04 percent.

The quarterly patterns were also similar to Scenario 9 in magnitude, with the effect on the Atlantic salmon price in the United States being largest in quarter 1. The largest effect on high-valued exvessel price was in quarter 4. Again, noticeable effects of changing levels of Chilean salmon exports were mainly found in the later years.

Group 6: Tariff Changes

Free Trade

Scenario 11 examined the situation where the salmon market is operating under free trade. There has been much discussion recently among world leaders concerning tariff-free trade. Even though this possibility does not seem to be an immediate possibility for salmon, it is, nevertheless, interesting to examine what would happen if all markets were tariff-free.

Tables 34-35 present the results of the salmon market operating without tariffs. In this scenario, the Japanese tariff on fresh/frozen salmon would decrease from 5 to 0 percent and the EEC tariff which varied between 2.8 to 2 percent, over the historical time period, would drop to 0 percent.

Free trade would have effects on all species of salmon. Norwegian farmed Atlantic salmon exports would increase to the EEC by 0.45 percent and

TABLE 34. Scenario 11, Free Trade: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	19,877,722	0.33
NQAEH	14,578,054	14,643,845	0.45
QAUH	3,746,145	3,680,354	-1.76
NPAEH	21.06	21.51	2.15
EPAEH	2.89	2.95	2.17
NPAUH	23.09	23.39	1.28
UPAUH	3.17	3.21	1.28
JPAJH	467.66	488.52	4.46
QHJH	42,002,766	45,486,477	8.29
QHEH	6,958,529	6,868,941	-1.29
UPHJH	2.36	2.41	2.43
JPHJH	426.64	436.31	2.27
UPHEH	2.42	2.47	2.29
EPHEH	2.58	2.64	2.32
UPHH	2.36	2.42	2.38
QLJH	10,939,052	11,719,836	7.14
QLEH	8,242,731	8,401,551	1.93
UPLJH	1.17	1.19	1.36
JPLJH	203.24	205.91	1.31
UPLEH	1.57	1.58	0.59
EPLEH	1.62	1.63	0.64
UPLH	1.34	1.35	0.62
PHEXH	1.27	1.30	2.00
PLEXH	0.38	0.38	0.82

TABLE 35. Scenario 11, Free Trade: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUI	Scenario UPAUI11	Percentage Change	Base UPHI	Scenario UPHI11	Percentage Change	Base PHEX	Scenario PHEX11	Percentage Change
1/1983	2.90	2.94	1.36	1.58	1.62	2.19	1.73	1.77	1.99
2/1983	2.85	2.90	1.74	1.75	1.79	2.29	0.82	0.83	2.20
3/1983	3.23	3.27	1.94	1.72	1.76	2.33	0.84	0.86	2.21
4/1983	3.19	3.24	1.71	2.04	2.07	1.74	0.96	0.97	1.59
1/1984	2.68	2.70	0.76	1.75	1.78	1.67	2.23	2.26	1.15
2/1984	2.72	2.76	1.47	1.75	1.79	2.17	0.92	0.94	1.93
3/1984	2.88	2.92	1.70	1.85	1.90	2.37	0.97	1.00	2.18
4/1984	2.68	2.72	1.43	2.19	2.22	1.57	1.11	1.12	1.33
1/1985	3.08	3.10	0.62	1.83	1.86	1.59	2.69	2.71	0.94
2/1985	3.10	3.14	1.29	1.79	1.82	2.12	1.02	1.04	1.86
3/1985	2.81	2.85	1.67	1.93	1.98	2.66	1.01	1.03	2.41
4/1985	3.20	3.25	1.43	2.25	2.28	1.55	1.19	1.20	1.36
1/1986	3.20	3.23	0.82	2.00	2.03	1.51	2.95	2.97	0.90
2/1986	3.04	3.08	1.27	2.13	2.17	1.83	1.42	1.44	1.55
3/1986	2.55	2.59	1.55	2.41	2.46	2.21	1.22	1.25	2.03
4/1986	2.61	2.65	1.46	2.59	2.65	2.31	1.24	1.26	1.96
1/1987	3.06	3.09	0.79	2.38	2.43	2.08	3.10	3.14	1.53
2/1987	3.65	3.70	1.42	2.74	2.79	1.86	1.70	1.73	1.67
3/1987	4.19	4.26	1.66	2.70	2.76	2.26	1.59	1.62	2.09
4/1987	3.75	3.81	1.53	3.12	3.18	1.93	1.66	1.69	1.66
1/1988	3.61	3.65	1.13	3.42	3.48	1.82	5.65	5.73	1.31
2/1988	3.75	3.79	1.18	3.62	3.68	1.51	2.27	2.30	1.36
3/1988	3.35	3.40	1.48	3.64	3.71	1.88	2.11	2.14	1.76
4/1988	3.41	3.46	1.46	3.70	3.77	1.88	2.00	2.03	1.61

TABLE 35. Continued

Quarter/ Year	Base PLEX	Scenario PLEXH11	Percentage Change	Base UPLH	Scenario UPLH11	Percentage Change
1/1983	0.39	0.40	0.88	1.45	1.46	0.82
2/1983	0.31	0.31	1.29	1.29	1.30	0.97
3/1983	0.28	0.29	0.75	1.03	1.04	0.69
4/1983	0.53	0.53	0.88	1.35	1.36	0.80
1/1984	0.36	0.36	0.97	1.37	1.39	0.87
2/1984	0.28	0.28	0.92	1.16	1.17	0.84
3/1984	0.30	0.31	1.02	1.08	1.09	0.95
4/1984	0.57	0.58	0.77	1.44	1.45	0.72
1/1985	0.36	0.36	0.65	1.31	1.32	0.77
2/1985	0.31	0.32	0.91	1.19	1.20	0.96
3/1985	0.25	0.25	1.01	0.94	0.95	0.94
4/1985	0.44	0.44	0.18	1.31	1.31	0.23
1/1986	0.33	0.33	-0.05	1.26	1.27	0.41
2/1986	0.34	0.34	0.54	1.14	1.14	0.74
3/1986	0.29	0.29	1.10	1.00	1.01	1.03
4/1986	0.52	0.52	0.64	1.39	1.40	0.58
1/1987	0.42	0.42	0.30	1.48	1.48	0.53
2/1987	0.38	0.38	0.36	1.35	1.36	0.49
3/1987	0.47	0.48	0.85	1.31	1.33	0.79
4/1987	0.99	0.99	0.40	2.01	2.02	0.39
1/1988	0.83	0.83	0.25	2.04	2.05	0.48
2/1988	0.63	0.63	0.23	2.04	2.05	0.29
3/1988	0.62	0.62	0.71	1.80	1.81	0.67
4/1988	0.91	0.91	0.31	2.07	2.08	0.28

decrease to North America by 1.76 percent. The price that Norway receives for farmed Atlantic salmon would rise in the EEC by 2.15 percent. The price paid by the EEC importer would decrease. In North America, prices would increase by 1.28 percent because of the decreased allocation of Atlantic salmon. High-valued Pacific salmon allocation would shift in favor of Japan and away from the EEC. There are two reasons for this: first, the tariff reduction was larger in Japan than the EEC; and second, increased exports of Norwegian salmon to the EEC would pressure the EEC high-valued Pacific salmon market. Prices received in North America for exports to both the Japanese and EEC markets would increase by approximately 2.3 to 2.4 percent, and the exvessel price of high-valued Pacific salmon would rise by 2 percent.

For low-valued Pacific salmon, the quantity exported would increase to both the EEC and Japan. More of the increased allocation would be exported to Japan due in part to the larger tariff reduction in Japan and due in part to the substitution of Atlantic salmon with high-valued Pacific salmon in the EEC market. The increase in the exvessel price of low-valued Pacific salmon was 0.82 percent.

Japanese Tariff Doubles to 10%

Scenario 12 represented a more restrictive trade policy in Japan. In this scenario, the tariffs placed on fresh/frozen salmon double to 10 percent. Tables 36-37 present the results of Scenario 12.

In this scenario, the allocation of high-valued salmon shifts dramatically away from Japan and increases slightly to the EEC. Much salmon would not be allocated to either export market. The average high-valued Pacific salmon price declines in export both markets by approximately 2 percent, and the high-valued Pacific salmon exvessel price declines by 1.6

TABLE 36. Scenario 12, Japanese Tariff on All Fresh/ Frozen Salmon Doubles to 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	19,817,522	0.03
NQAEH	14,578,054	14,583,646	0.04
QAUH	3,746,145	3,740,553	-0.15
NPAEH	21.059	20.983	-0.36
EPAEH	2.890	2.879	-0.36
NPAUH	23.094	23.014	-0.35
UPAUH	3.166	3.155	-0.35
JPAJH	467.660	449.234	-3.94
QHJH	42,002,766	38,808,190	-7.61
QHEH	6,958,529	7,160,220	2.90
UPHJH	2.356	2.305	-2.16
JPHJH	426.640	418.038	-2.02
UPHEH	2.419	2.372	-1.94
EPHEH	2.576	2.527	-1.90
UPHH	2.365	2.315	-2.09
QLJH	10,939,052	10,224,853	-6.53
QLEH	8,242,731	8,198,961	-0.53
UPLJH	1.173	1.159	-1.18
JPLJH	203.240	200.907	-1.15
UPLEH	1.569	1.563	-0.38
EPLEH	1.618	1.612	-0.38
UPLH	1.343	1.339	-0.32
PHEXH	1.271	1.251	-1.60
PLEXH	0.379	0.377	-0.56

TABLE 37. Scenario 12, Japanese Tariff on All Fresh/ Frozen Salmon Doubles to 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM12	Percentage Change	Base UPHH	Scenario UPHH12	Percentage Change	Base PHEXH	Scenario PHEXH12	Percentage Change
1/1983	2.901	2.896	-0.18	1.582	1.559	-1.51	1.731	1.709	-1.24
2/1983	2.849	2.836	-0.45	1.754	1.720	-1.92	0.815	0.802	-1.67
3/1983	3.231	3.217	-0.44	1.722	1.688	-2.00	0.843	0.829	-1.68
4/1983	3.189	3.178	-0.36	2.036	2.008	-1.36	0.957	0.946	-1.10
1/1984	2.678	2.674	-0.16	1.750	1.732	-1.01	2.231	2.218	-0.57
2/1984	2.721	2.709	-0.46	1.753	1.721	-1.83	0.921	0.907	-1.49
3/1984	2.875	2.862	-0.47	1.851	1.814	-2.01	0.975	0.958	-1.69
4/1984	2.678	2.669	-0.34	2.186	2.160	-1.18	1.105	1.095	-0.89
1/1985	3.084	3.081	-0.13	1.833	1.816	-0.92	2.689	2.678	-0.40
2/1985	3.103	3.089	-0.47	1.786	1.754	-1.81	1.022	1.007	-1.48
3/1985	2.808	2.793	-0.53	1.928	1.884	-2.31	1.008	0.988	-1.94
4/1985	3.204	3.193	-0.36	2.250	2.222	-1.25	1.188	1.176	-0.99
1/1986	3.200	3.195	-0.15	1.996	1.976	-1.02	2.946	2.932	-0.48
2/1986	3.040	3.029	-0.38	2.133	2.100	-1.53	1.419	1.402	-1.18
3/1986	2.552	2.539	-0.51	2.405	2.357	-2.00	1.222	1.202	-1.69
4/1986	2.611	2.598	-0.50	2.588	2.532	-2.15	1.236	1.215	-1.73
1/1987	3.064	3.057	-0.21	2.377	2.333	-1.85	3.097	3.056	-1.34
2/1987	3.649	3.634	-0.41	2.737	2.690	-1.72	1.705	1.681	-1.40
3/1987	4.187	4.167	-0.47	2.699	2.644	-2.02	1.590	1.563	-1.70
4/1987	3.753	3.739	-0.35	3.122	3.069	-1.69	1.663	1.641	-1.28
1/1988	3.613	3.606	-0.22	3.419	3.363	-1.64	5.652	5.593	-1.04
2/1988	3.747	3.733	-0.35	3.621	3.570	-1.40	2.268	2.242	-1.14
3/1988	3.351	3.337	-0.42	3.640	3.580	-1.67	2.107	2.077	-1.40
4/1988	3.406	3.394	-0.36	3.701	3.636	-1.75	2.000	1.973	-1.33

TABLE 37. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH12	Percentage Change	Base UPLH	Scenario UPLH12	Percentage Change
1/1983	0.392	0.391	-0.28	1.449	1.445	-0.26
2/1983	0.308	0.307	-0.40	1.286	1.282	-0.30
3/1983	0.285	0.284	-0.25	1.028	1.026	-0.23
4/1983	0.527	0.524	-0.53	1.350	1.343	-0.48
1/1984	0.358	0.356	-0.58	1.375	1.369	-0.42
2/1984	0.280	0.279	-0.41	1.161	1.157	-0.35
3/1984	0.303	0.301	-0.65	1.082	1.075	-0.60
4/1984	0.574	0.571	-0.57	1.435	1.428	-0.46
1/1985	0.360	0.359	-0.35	1.314	1.309	-0.34
2/1985	0.313	0.311	-0.60	1.193	1.186	-0.63
3/1985	0.250	0.248	-0.68	0.942	0.936	-0.63
4/1985	0.439	0.439	0.07	1.306	1.307	0.07
1/1986	0.326	0.327	0.30	1.262	1.260	-0.09
2/1986	0.340	0.338	-0.34	1.136	1.131	-0.49
3/1986	0.291	0.288	-0.90	1.002	0.993	-0.84
4/1986	0.515	0.512	-0.58	1.393	1.387	-0.46
1/1987	0.418	0.417	-0.21	1.477	1.472	-0.32
2/1987	0.380	0.379	-0.14	1.350	1.347	-0.24
3/1987	0.471	0.468	-0.67	1.315	1.306	-0.63
4/1987	0.989	0.987	-0.29	2.010	2.005	-0.24
1/1988	0.827	0.827	-0.04	2.044	2.040	-0.21
2/1988	0.626	0.627	0.12	2.042	2.043	0.04
3/1988	0.615	0.612	-0.52	1.796	1.787	-0.49
4/1988	0.907	0.905	-0.19	2.073	2.070	-0.12

percent. The effect on prices to the wholesalers in the EEC and the Japanese market was the opposite of that in Scenario 11. The tariff wedge would decrease the pre-tariff price exporters receive and increase the post-tariff price importers pay. In all markets and for all species the pre-tariff prices that the exporters received would decline, and the import prices that importers paid with the tariffs added would rise.

There was little effect on the Atlantic salmon market, with only a minor amount being reallocated from North America to the EEC as the average export price of high-valued Pacific salmon decreased in North America. The price of Norwegian Atlantic salmon exported to North America would decrease by only 0.35 percent. Low-valued Pacific salmon average export prices would decrease in both export markets, with prices decreasing more in the Japanese market. The exvessel price of low-valued Pacific salmon would decrease by 0.56 percent.

EEC Tariff Increases to 12%

Scenario 13 examined the case of the EEC tariff rate increasing to 12 percent. This increase in EEC tariffs on fresh/frozen salmon has been discussed by the EEC to protect its own salmon production, especially in light of its claim that Norway has been dumping salmon on the EEC market. (Salmon Market Newsletter, 1990).

Tables 38-39 present the results of Scenario 13. In this scenario, allocations of all species of salmon to the EEC would be reduced. Norwegian Atlantic salmon imports would decline in the EEC by 2.07 percent and increase in North America by 8.07 percent. The price received by Norway would decline in both markets, with the larger decline occurring in the EEC. The price of Atlantic salmon in North America would decline by 3.57 percent due to the

TABLE 38. Scenario 13, EEC Tariff on Fresh/Frozen Salmon
Increases by 12 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	19,509,724	-1.53
NQA EK	14,578,054	14,275,834	-2.07
QAUH	3,746,145	4,048,365	8.07
NPA EH	21.059	19.568	-7.08
EPA EH	2.890	2.685	-7.07
NPAUH	23.094	22.254	-3.64
UPAUH	3.166	3.053	-3.57
JPAJH	467.660	466.272	-0.3
QHJH	42,002,766	42,362,979	0.86
QHEH	6,958,529	6,491,418	-6.71
UPHJH	2.356	2.349	-0.31
JPHJH	426.640	425.426	-0.28
UPHEH	2.419	2.399	-0.85
EPHEH	2.576	2.551	-0.99
UPHH	2.365	2.355	-0.41
QLJH	10,939,052	11,027,782	0.81
QLEH	8,242,731	7,808,218	-5.27
UPLJH	1.173	1.168	-0.43
JPLJH	203.240	202.412	-0.41
UPLEH	1.569	1.555	-0.86
EPLH	1.618	1.604	-0.9
UPLH	1.343	1.329	-1.08
PHEXH	1.271	1.258	-1.03
PLEXH	0.379	0.376	-0.83

TABLE 39. Scenario 13, EEC Tariff on Fresh/Frozen Salmon Increases by 12 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM13	Percentage Change	Base UPHM	Scenario UPHM13	Percentage Change	Base PHEXH	Scenario PHEXH13	Percentage Change
1/1983	2.901	2.800	-3.48	1.582	1.554	-1.82	1.731	1.695	-2.07
2/1983	2.849	2.742	-3.74	1.754	1.740	-0.81	0.815	0.804	-1.36
3/1983	3.231	3.090	-4.36	1.722	1.714	-0.49	0.843	0.834	-1.15
4/1983	3.189	3.064	-3.92	2.036	2.017	-0.89	0.957	0.945	-1.27
1/1984	2.678	2.625	-1.97	1.750	1.714	-2.03	2.231	2.190	-1.86
2/1984	2.721	2.633	-3.24	1.753	1.739	-0.83	0.921	0.910	-1.23
3/1984	2.875	2.764	-3.86	1.851	1.842	-0.53	0.975	0.964	-1.09
4/1984	2.678	2.586	-3.43	2.186	2.163	-1.02	1.105	1.091	-1.23
1/1985	3.084	3.029	-1.79	1.833	1.793	-2.17	2.689	2.638	-1.88
2/1985	3.103	3.013	-2.89	1.786	1.771	-0.83	1.022	1.010	-1.16
3/1985	2.808	2.699	-3.88	1.928	1.920	-0.43	1.008	0.997	-1.02
4/1985	3.204	3.085	-3.71	2.250	2.232	-0.79	1.188	1.175	-1.07
1/1986	3.200	3.115	-2.64	1.996	1.963	-1.67	2.946	2.899	-1.58
2/1986	3.040	2.935	-3.45	2.133	2.115	-0.84	1.419	1.401	-1.25
3/1986	2.552	2.450	-3.97	2.405	2.400	-0.21	1.222	1.212	-0.86
4/1986	2.611	2.515	-3.66	2.588	2.584	-0.15	1.236	1.229	-0.58
1/1987	3.064	2.984	-2.62	2.377	2.363	-0.57	3.097	3.076	-0.67
2/1987	3.649	3.487	-4.43	2.737	2.728	-0.33	1.705	1.688	-1.01
3/1987	4.187	3.975	-5.07	2.699	2.693	-0.23	1.590	1.572	-1.08
4/1987	3.753	3.562	-5.07	3.122	3.108	-0.45	1.663	1.643	-1.18
1/1988	3.613	3.470	-3.98	3.419	3.406	-0.38	5.652	5.599	-0.93
2/1988	3.747	3.610	-3.66	3.621	3.611	-0.26	2.268	2.249	-0.84
3/1988	3.351	3.196	-4.61	3.640	3.633	-0.20	2.107	2.086	-0.97
4/1988	3.406	3.243	-4.80	3.701	3.697	-0.13	2.000	1.982	-0.90

TABLE 39. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH13	Percentage Change	Base UPLH	Scenario UPLH13	Percentage Change
1/1983	0.392	0.385	-1.83	1.449	1.424	-1.70
2/1983	0.308	0.300	-2.67	1.286	1.260	-2.02
3/1983	0.285	0.281	-1.47	1.028	1.014	-1.35
4/1983	0.527	0.522	-0.99	1.350	1.338	-0.92
1/1984	0.358	0.353	-1.27	1.375	1.355	-1.45
2/1984	0.280	0.275	-1.73	1.161	1.142	-1.63
3/1984	0.303	0.300	-1.09	1.082	1.071	-1.01
4/1984	0.574	0.571	-0.58	1.435	1.423	-0.82
1/1985	0.360	0.356	-1.21	1.314	1.293	-1.57
2/1985	0.313	0.309	-1.16	1.193	1.180	-1.14
3/1985	0.250	0.247	-1.00	0.942	0.933	-0.94
4/1985	0.439	0.434	-1.07	1.306	1.290	-1.20
1/1986	0.326	0.322	-1.29	1.262	1.244	-1.39
2/1986	0.340	0.337	-0.90	1.136	1.126	-0.93
3/1986	0.291	0.289	-0.55	1.002	0.996	-0.52
4/1986	0.515	0.514	-0.15	1.393	1.387	-0.43
1/1987	0.418	0.416	-0.56	1.477	1.463	-0.97
2/1987	0.380	0.375	-1.10	1.350	1.335	-1.11
3/1987	0.471	0.469	-0.56	1.315	1.308	-0.52
4/1987	0.989	0.985	-0.46	2.010	1.997	-0.65
1/1988	0.827	0.819	-1.01	2.044	2.020	-1.20
2/1988	0.626	0.616	-1.66	2.042	2.011	-1.54
3/1988	0.615	0.611	-0.67	1.796	1.785	-0.62
4/1988	0.907	0.902	-0.55	2.073	2.057	-0.74

combined effect of increased Atlantic salmon supplies allocated to North America and the decreased price of high-valued Pacific salmon.

Most of the high-valued Pacific salmon allocation decrease to the EEC would be diverted to Japan. Prices received by North American exporters of high-valued Pacific salmon would decline in both markets, and the exvessel price of high-valued Pacific salmon would decline by 1.03 percent. Low-valued Pacific salmon would follow a similar pattern, with the exvessel price decreasing by 0.83 percent. Most of the decrease in the low-valued Pacific salmon allocation to the EEC would remain in North America.

North American Imposes 5% Tariff

Scenario 14 represents the case where North America imposes a 5 percent tariff on salmon. On the surface, this scenario seems unrealistic given the general trend in North America to favor free trade. But there has been periodic talk about protecting U.S. salmon markets from Norwegian salmon because of Norwegian whaling practices. Also there is the possibility of retaliation against Norway if Norway is found guilty of dumping farmed Atlantic salmon in the United States. Since protectionism against Norwegian salmon has been discussed, it is interesting to examine the possible effects of a tariff.

Tables 40-41 present the effects on the salmon market of a 5 percent tariff imposed by North America on fresh/frozen salmon imports, excluding trade between Canada and the United States. In this scenario, the Norwegian Atlantic salmon allocations would increase to the EEC by 1.44 percent and decrease to North America by 5.60 percent. Prices received by Norway for Atlantic salmon shipped to North America would decrease by 2.20 percent, and the price of Atlantic salmon that North American importers would pay would

TABLE 40. Scenario 14, United States Places 5 Percent
Tariff on Norwegian Farmed Salmon: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	20,021,755	1.06
NQ JH	14,578,054	14,787,879	1.44
QAUH	3,746,145	3,536,320	-5.60
NPAEH	21.059	21.008	-0.24
EPAEH	2.890	2.883	-0.24
NPAUH	23.094	22.586	-2.20
UPAUH	3.166	3.095	-2.24
JPAJH	467.660	467.621	-0.01
QHJH	42,002,766	42,014,409	0.03
QHEH	6,958,529	6,937,909	-0.30
UPHJH	2.356	2.356	-0.01
JPHJH	426.640	426.599	-0.01
UPHEH	2.419	2.419	-0.03
EPHEH	2.576	2.575	-0.05
UPHH	2.365	2.365	-0.01
QLJH	10,939,052	10,939,340	0.00
QLEH	8,242,731	8,241,683	-0.01
UPLJH	1.173	1.173	0.00
JPLJH	203.240	203.237	0.00
UPLEH	1.569	1.569	0.00
EPLEH	1.618	1.618	0.00
UPLH	1.343	1.343	0.00
PHEXH	1.271	1.278	0.54
PLEXH	0.379	0.379	0.00

TABLE 41. Scenario 14, United States Places 5 Percent Tariff on Norwegian Farmed Salmon: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAH	Scenario UPAH14	Percentage Change	Base UPHH	Scenario UPHH14	Percentage Change	Base PHEX	Scenario PHEX14	Percentage Change
1/1983	2.901	2.838	-2.18	1.582	1.581	-0.11	1.731	1.737	0.38
2/1983	2.849	2.791	-2.04	1.754	1.753	-0.03	0.815	0.819	0.46
3/1983	3.231	3.184	-1.45	1.722	1.722	-0.01	0.843	0.848	0.58
4/1983	3.189	3.131	-1.84	2.036	2.034	-0.06	0.957	0.962	0.48
1/1984	2.678	2.588	-3.38	1.750	1.747	-0.15	2.231	2.234	0.14
2/1984	2.721	2.654	-2.48	1.753	1.753	-0.02	0.921	0.925	0.39
3/1984	2.875	2.820	-1.91	1.851	1.851	-0.02	0.975	0.980	0.49
4/1984	2.678	2.616	-2.31	2.186	2.184	-0.07	1.105	1.109	0.40
1/1985	3.084	2.975	-3.54	1.833	1.831	-0.12	2.689	2.692	0.13
2/1985	3.103	3.016	-2.80	1.786	1.786	-0.02	1.022	1.026	0.34
3/1985	2.808	2.753	-1.95	1.928	1.928	-0.01	1.008	1.013	0.50
4/1985	3.204	3.137	-2.09	2.250	2.249	-0.05	1.188	1.193	0.45
1/1986	3.200	3.106	-2.92	1.996	1.994	-0.09	2.946	2.954	0.26
2/1986	3.040	2.967	-2.40	2.133	2.132	-0.02	1.419	1.424	0.41
3/1986	2.552	2.503	-1.91	2.405	2.405	-0.01	1.222	1.228	0.51
4/1986	2.611	2.556	-2.10	2.588	2.587	-0.01	1.236	1.242	0.48
1/1987	3.064	2.974	-2.94	2.377	2.377	-0.02	3.097	3.107	0.32
2/1987	3.649	3.588	-1.67	2.737	2.737	0.00	1.705	1.714	0.55
3/1987	4.187	4.139	-1.15	2.699	2.699	-0.01	1.590	1.600	0.64
4/1987	3.753	3.709	-1.17	3.122	3.121	-0.02	1.663	1.673	0.63
1/1988	3.613	3.542	-1.97	3.419	3.419	-0.01	5.652	5.680	0.49
2/1988	3.747	3.663	-2.22	3.621	3.620	-0.01	2.268	2.278	0.45
3/1988	3.351	3.301	-1.50	3.640	3.640	0.00	2.107	2.119	0.58
4/1988	3.406	3.360	-1.36	3.701	3.701	0.00	2.000	2.012	0.61

TABLE 41. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH14	Percentage Change	Base UPLH	Scenario UPLH14	Percentage Change
1/1983	0.392	0.392	0.00	1.449	1.449	0.00
2/1983	0.308	0.308	0.00	1.286	1.286	0.00
3/1983	0.285	0.285	0.00	1.028	1.028	0.00
4/1983	0.527	0.527	-0.01	1.350	1.350	-0.01
1/1984	0.358	0.358	-0.01	1.375	1.375	0.00
2/1984	0.280	0.280	0.00	1.161	1.161	0.00
3/1984	0.303	0.303	-0.01	1.082	1.082	-0.01
4/1984	0.574	0.574	-0.01	1.435	1.435	-0.01
1/1985	0.360	0.360	-0.01	1.314	1.314	0.00
2/1985	0.313	0.313	0.00	1.193	1.193	0.00
3/1985	0.250	0.250	0.00	0.942	0.942	0.00
4/1985	0.439	0.439	-0.01	1.306	1.306	-0.01
1/1986	0.326	0.326	0.00	1.262	1.262	0.00
2/1986	0.340	0.340	0.00	1.136	1.136	0.00
3/1986	0.291	0.291	0.00	1.002	1.002	0.00
4/1986	0.515	0.515	0.00	1.393	1.393	0.00
1/1987	0.418	0.418	0.00	1.477	1.477	0.00
2/1987	0.380	0.380	0.00	1.350	1.350	0.00
3/1987	0.471	0.471	0.00	1.315	1.315	0.00
4/1987	0.989	0.989	0.00	2.010	2.010	0.00
1/1988	0.827	0.827	0.00	2.044	2.044	0.00
2/1988	0.626	0.626	0.00	2.042	2.042	0.00
3/1988	0.615	0.615	0.00	1.796	1.796	0.00
4/1988	0.907	0.907	0.00	2.073	2.072	0.00

increase by 2.65 percent after the 5 percent tariff was imposed

There were minor effects on the high-valued Pacific salmon market. North American exports of high-valued Pacific salmon would decrease by 0.30 percent with the exvessel price increasing by 0.54 percent. More of the decrease in Norwegian Atlantic salmon exports to North America was in the third and fourth quarters during and preceding the heavy fishing season for high-valued Pacific salmon in North America.

Group 7: Exchange Rate Changes

Scenario 15 examines changing exchange rates, with the U.S. dollar strengthening against foreign currencies, with the exception of the Canadian dollar. Since the exchange rate market has operated under a free-floating system, there will be a consistent relationship among all exchange rates maintained by arbitraging. The three exchange rates used in the simulation are U.S. dollar/yen, U.S. dollar/ECU, and U.S. dollar/Norwegian kroner. Table 42 shows the changes in all other combinations of exchange rates in the system if the U.S. dollar strengthens by 10 percent against all other currencies.

Tables 43-44 examine the results of a strengthening of the U.S. dollar against the yen, Norwegian kroner, and the ECU. (Implicit in this assumption is that the U.S. dollar/Canadian dollar exchange rate remained constant.)

If the U.S. dollar strengthened against other foreign currencies, there would be significant effects on the salmon market. Norwegian Atlantic salmon allocation to North America would be increased by 9.05 percent. Norwegian allocation of Atlantic salmon would decrease to the EEC by 2.33 percent. The price paid by North American importers of Norwegian salmon (in U.S. dollars) would decrease 4.8 percent.

TABLE 42. Changes in Exchange Rates When the U.S. Dollar Strengthens by 10 Percent Against the Yen, ECU, and Norwegian Kroner

Country	Norway	United States	Japan	EEC
Norway	1.0000	0.9091	1.0000	1.0000
United States	1.1000	1.0000	1.1000	1.1000
Japan	1.0000	0.9091	1.0000	1.0000
EEC	1.0000	0.9091	1.0000	1.0000

NOTE: This table is read as the column country's currency divided by the row country's currency. So, for example, the 1.1000 in the column under Norway means that the U.S. dollar can purchase ten percent more Norwegian kroners after the dollar strengthens. Thus, in the simulations, the Norwegian kroner/U.S. dollar exchange rate would be increased by a factor of 1.1000.

TABLE 43. Scenario 15, U.S. Dollar Strengthens by 10 Percent Against All Currencies: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQA EH	19,811,930	19,472,976	-1.71
NQA EH	14,578,054	14,239,101	-2.33
QA UH	3,746,145	4,085,098	9.05
NPA EH	21.059	21.347	1.37
EPA EH	2.890	2.929	1.35
NPA UH	23.094	24.168	4.65
UPA UH	3.166	3.014	-4.80
JPA JH	467.660	494.073	5.65
QH JH	42,002,766	36,040,643	-14.19
QHEH	6,958,529	6,827,689	-1.88
UPH JH	2.356	2.245	-4.71
JPH JH	426.640	448.760	5.18
UPHEH	2.419	2.302	-4.83
EPHEH	2.576	2.721	5.63
UPHH	2.365	2.254	-4.68
QL JH	10,939,052	9,621,157	-12.05
QLEH	8,242,731	7,646,588	-7.23
UPL JH	1.173	1.139	-2.93
JPL JH	203.240	217.239	6.89
UPLEH	1.569	1.541	-1.77
EPLEH	1.618	1.765	9.04
UPLH	1.343	1.317	-1.96
PHEXH	1.271	1.216	-4.39
PLEXH	0.379	0.371	-2.16

TABLE 44. Scenario 15, U.S. Dollar Strengthens by 10 Percent Against All Currencies: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAHH	Scenario UPAHH15	Percentage Change	Base UPHH	Scenario UPHH15	Percentage Change	Base PHEXH	Scenario PHEXH15	Percentage Change
1/1983	2.901	2.767	-4.61	1.582	1.499	-5.29	1.731	1.643	-5.03
2/1983	2.849	2.692	-5.49	1.754	1.668	-4.91	0.815	0.774	-5.05
3/1983	3.231	3.031	-6.19	1.722	1.643	-4.60	0.843	0.803	-4.76
4/1983	3.189	3.014	-5.51	2.036	1.958	-3.83	0.957	0.921	-3.75
1/1984	2.678	2.607	-2.64	1.750	1.671	-4.49	2.231	2.156	-3.38
2/1984	2.721	2.591	-4.81	1.753	1.670	-4.72	0.921	0.880	-4.50
3/1984	2.875	2.716	-5.55	1.851	1.765	-4.67	0.975	0.929	-4.69
4/1984	2.678	2.550	-4.79	2.186	2.107	-3.59	1.105	1.069	-3.25
1/1985	3.084	3.013	-2.32	1.833	1.751	-4.46	2.689	2.607	-3.05
2/1985	3.000	2.969	-4.34	1.786	1.703	-4.65	1.022	0.977	-4.37
3/1985	2.808	2.651	-5.61	1.928	1.829	-5.12	1.008	0.957	-5.06
4/1985	3.204	3.042	-5.06	2.250	2.173	-3.42	1.188	1.150	-3.21
1/1986	3.200	3.094	-3.31	1.996	1.917	-3.99	2.946	2.864	-2.78
2/1986	3.040	2.897	-4.73	2.133	2.045	-4.10	1.419	1.364	-3.85
3/1986	2.552	2.410	-5.57	2.405	2.303	-4.26	1.222	1.169	-4.37
4/1986	2.611	2.475	-5.22	2.588	2.470	-4.55	1.236	1.185	-4.16
1/1987	3.064	2.962	-3.33	2.377	2.272	-4.43	3.097	2.989	-3.47
2/1987	3.649	3.437	-5.80	2.737	2.632	-3.87	1.705	1.637	-3.97
3/1987	4.187	3.910	-6.63	2.699	2.583	-4.30	1.590	1.517	-4.59
4/1987	3.753	3.512	-6.41	3.122	3.000	-3.91	1.663	1.598	-3.89
1/1988	3.613	3.437	-4.88	3.419	3.290	-3.77	5.652	5.473	-3.16
2/1988	3.747	3.566	-4.81	3.621	3.507	-3.13	2.268	2.195	-3.24
3/1988	3.351	3.150	-5.99	3.640	3.511	-3.55	2.107	2.025	-3.88
4/1988	3.406	3.198	-6.11	3.701	3.564	-3.72	2.000	1.926	-3.70

TABLE 44. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH15	Percentage Change	Base UPLH	Scenario UPLH15	Percentage Change
1/1983	0.392	0.381	-2.84	1.449	1.410	-2.65
2/1983	0.308	0.296	-4.17	1.286	1.246	-3.16
3/1983	0.285	0.278	-2.40	1.028	1.005	-2.21
4/1983	0.527	0.515	-2.34	1.350	1.321	-2.14
1/1984	0.358	0.348	-2.72	1.375	1.339	-2.63
2/1984	0.280	0.272	-2.93	1.161	1.130	-2.70
3/1984	0.303	0.295	-2.70	1.082	1.055	-2.51
4/1984	0.574	0.564	-1.88	1.435	1.407	-1.94
1/1985	0.360	0.353	-2.12	1.314	1.280	-2.57
2/1985	0.313	0.305	-2.60	1.193	1.162	-2.66
3/1985	0.250	0.243	-2.63	0.942	0.919	-2.46
4/1985	0.439	0.434	-1.12	1.306	1.289	-1.29
1/1986	0.326	0.323	-0.84	1.262	1.239	-1.79
2/1986	0.340	0.334	-1.68	1.136	1.113	-2.08
3/1986	0.291	0.284	-2.50	1.002	0.978	-2.34
4/1986	0.515	0.508	-1.35	1.393	1.373	-1.43
1/1987	0.418	0.414	-1.04	1.477	1.451	-1.75
2/1987	0.380	0.374	-1.51	1.350	1.326	-1.76
3/1987	0.471	0.462	-2.02	1.315	1.290	-1.89
4/1987	0.989	0.978	-1.12	2.010	1.985	-1.23
1/1988	0.827	0.817	-1.24	2.044	2.007	-1.82
2/1988	0.626	0.616	-1.67	2.042	2.008	-1.70
3/1988	0.615	0.604	-1.85	1.796	1.765	-1.73
4/1988	0.907	0.898	-1.01	2.073	2.050	-1.10

Allocation of high-valued Pacific salmon to Japan would diminish significantly by 14.19 percent. The decreased allocation of 1.88 percent to the EEC market was much less because the price of Atlantic salmon would rise in the EEC due to a decreased allocation. The average export price of high valued Pacific salmon in the EEC would decrease by 4.83 percent, and the exvessel price of high-valued salmon would decrease by 4.39 percent. The Atlantic salmon price in Japan would increase by 5.65 percent because of the increased demand for Atlantic salmon as the price of high-valued Pacific salmon increases.

Low-valued Pacific salmon prices would be affected to a lesser extent but the effects are still quite significant. Low-valued Pacific salmon allocation would decrease to Japan by 12.05 percent and to the EEC by 7.23 percent. The weighted average export price of low-valued Pacific salmon would decrease by 1.96 percent, and the low-valued Pacific salmon exvessel price would decrease by 2.16 percent.

Scenario 16 was the opposite of Scenario 15, representing the U.S. dollar weakening by 10 percent against all other currencies. Tables 45-46 present the results of this scenario. A weakening of the U.S. dollar makes it cheaper for foreign countries to purchase U.S. salmon and makes it less lucrative to export salmon to the U.S. market. In this case, the allocation of Norwegian Atlantic salmon would increase to the EEC and decrease to North America. The average price of Norwegian Atlantic salmon exported to the U.S., measured in U.S. dollars, would increase by 5.99 percent.

North American high-valued Pacific salmon exports would increase dramatically to Japan by 18.12 percent, with a resulting export price (in dollars) increase in Japan of 5.51 percent. High-valued Pacific salmon

TABLE 45. Scenario 16, U.S. Dollar Weakens by 10 Percent
Against All Currencies: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	20,184,710	1.88
NQAEH	14,578,054	14,950,844	2.56
QAUH	3,746,145	3,373,334	-9.95
NPAEH	21.06	20.79	-1.29
EPAEH	2.89	2.86	-1.12
NPAUH	23.09	22.05	-4.53
UPAUH	3.17	3.36	5.99
JPAJH	467.66	440.19	-5.87
QHJH	42,002,766	49,614,568	18.12
QHEH	6,958,529	6,987,317	0.41
UPHJH	2.36	2.49	5.51
JPHJH	426.64	403.74	-5.37
UPHEH	2.42	2.55	5.51
EPHEH	2.58	2.47	-4.03
UPHH	2.36	2.49	5.46
QLJH	10,939,052	12,653,421	15.67
QLEH	8,242,731	8,802,035	6.79
UPLJH	1.17	1.21	3.13
JPLJH	203.24	188.45	-7.28
UPLEH	1.57	1.60	1.70
EPLEH	1.62	1.50	-7.46
UPLH	1.34	1.37	1.85
PHEXH	1.27	1.34	5.21
PLEXH	0.38	0.39	2.16

TABLE 46. Scenario 16, U.S. Dollar Weakens by 10 Percent Against All Currencies: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM16	Percentage Change	Base UPHM	Scenario UPHM16	Percentage Change	Base PHEXH	Scenario PHEXH16	Percentage Change
1/1983	2.90	3.07	5.73	1.58	1.67	5.48	1.73	1.82	5.37
2/1983	2.85	3.04	6.76	1.75	1.85	5.28	0.82	0.86	5.56
3/1983	3.23	3.48	7.77	1.72	1.81	5.35	0.84	0.89	5.62
4/1983	3.19	3.41	6.89	2.04	2.12	4.12	0.96	1.00	4.24
1/1984	2.68	2.77	3.36	1.75	1.83	4.51	2.23	2.31	3.45
2/1984	2.72	2.88	5.86	1.75	1.84	5.07	0.92	0.97	4.93
3/1984	2.88	3.07	6.95	1.85	1.95	5.47	0.97	1.03	5.56
4/1984	2.68	2.84	5.97	2.19	2.27	3.86	1.11	1.15	3.68
1/1985	3.08	3.17	2.94	1.83	1.92	4.49	2.69	2.77	3.08
2/1985	3.10	3.27	5.26	1.79	1.88	5.01	1.02	1.07	4.78
3/1985	2.81	3.01	7.04	1.93	2.05	6.13	1.01	1.07	6.11
4/1985	3.20	3.41	6.35	2.25	2.33	3.77	1.19	1.23	3.75
1/1986	3.20	3.33	4.23	2.00	2.08	4.15	2.95	3.03	2.97
2/1986	3.04	3.22	5.84	2.13	2.23	4.41	1.42	1.48	4.23
3/1986	2.55	2.73	7.01	2.41	2.53	4.99	1.22	1.29	5.19
4/1986	2.61	2.78	6.53	2.59	2.72	5.10	1.24	1.30	4.82
1/1987	3.06	3.19	4.24	2.38	2.49	4.84	3.10	3.22	3.87
2/1987	3.65	3.91	7.25	2.74	2.85	4.21	1.70	1.78	4.45
3/1987	4.19	4.54	8.43	2.70	2.84	5.17	1.59	1.68	5.57
4/1987	3.75	4.06	8.14	3.12	3.26	4.49	1.66	1.74	4.64
1/1988	3.61	3.84	6.28	3.42	3.56	4.19	5.65	5.86	3.64
2/1988	3.75	3.97	6.02	3.62	3.74	3.41	2.27	2.35	3.65
3/1988	3.35	3.61	7.62	3.64	3.80	4.32	2.11	2.21	4.75
4/1988	3.41	3.67	7.72	3.70	3.86	4.17	2.00	2.09	4.32

TABLE 46. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH16	Percentage Change	Base UPLH	Scenario UPLH16	Percentage Change
1/1983	0.39	0.40	2.63	1.45	1.48	2.44
2/1983	0.31	0.32	3.85	1.29	1.32	2.89
3/1983	0.28	0.29	2.16	1.03	1.05	1.98
4/1983	0.53	0.54	2.24	1.35	1.38	2.06
1/1984	0.36	0.37	2.65	1.37	1.41	2.50
2/1984	0.28	0.29	2.78	1.16	1.19	2.53
3/1984	0.30	0.31	2.66	1.08	1.11	2.47
4/1984	0.57	0.58	1.88	1.44	1.46	1.88
1/1985	0.36	0.37	2.00	1.31	1.35	2.40
2/1985	0.31	0.32	2.59	1.19	1.22	2.65
3/1985	0.25	0.26	2.63	0.94	0.97	2.45
4/1985	0.44	0.44	0.83	1.31	1.32	0.99
1/1986	0.33	0.33	0.51	1.26	1.28	1.57
2/1986	0.34	0.35	1.67	1.14	1.16	2.09
3/1986	0.29	0.30	2.66	1.00	1.03	2.48
4/1986	0.52	0.52	1.44	1.39	1.41	1.44
1/1987	0.42	0.42	0.98	1.48	1.50	1.67
2/1987	0.38	0.38	1.39	1.35	1.37	1.67
3/1987	0.47	0.48	2.13	1.31	1.34	1.99
4/1987	0.99	1.00	1.10	2.01	2.03	1.17
1/1988	0.83	0.84	1.09	2.04	2.08	1.69
2/1988	0.63	0.63	1.37	2.04	2.07	1.44
3/1988	0.62	0.63	1.89	1.80	1.83	1.76
4/1988	0.91	0.92	0.92	2.07	2.09	0.97

allocation to the EEC would increase by only 0.41 percent, due in part to the lower price of Atlantic salmon in the EEC. The high-valued Pacific salmon exvessel price would increase by 5.21 percent. The Japanese price of Atlantic salmon (in yen) would decrease by 5.87 percent as the Atlantic salmon decreases due to lower high-valued Pacific salmon prices.

The low-valued Pacific salmon exports would also dramatically increase to both export markets which would leave less low-valued Pacific salmon for the domestic and canned markets. The resulting price increase in the average export price would be 1.85 percent, and the exvessel price of low-valued Pacific salmon would increase by 2.16 percent.

Group 8: Canned Low-Valued Pacific Salmon Prices $\pm$ 10% Relative to Historical Levels

This group of scenarios examined the effects of changes in the levels of low-valued canned Pacific salmon prices on salmon markets. Low-valued canned Pacific salmon prices were set exogenously in simulations. In reality, they are influenced by some of the same factors that affect the fresh/frozen markets so the results must be interpreted as being conditional on canned prices and care must be taken in interpreting the results as not allowing for feedback between the fresh/frozen and canned markets.

Tables 47-50 present the results of these scenarios. An increase in the canned salmon price would increase the price of low-valued salmon and would reduce the North American low-valued Pacific salmon allocation to both export markets. The allocation would be reduced by 9.48 percent to Japan and by 4.11 percent to the EEC. The low-valued salmon that is not exported would remain in North America to be canned or sold in fresh/frozen form. Prices received in both export markets would increase, and the exvessel price of low-valued

TABLE 47. Scenario 17, Prices of Canned Low-Valued Salmon Increase by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	19,811,825	0.00
NQAEH	14,578,054	14,577,950	0.00
QAUH	3,746,145	3,746,249	0.00
NPAEH	21.059	21.070	0.05
EPAEH	2.890	2.891	0.05
NPAUH	23.094	23.103	0.04
UPAUH	3.166	3.167	0.04
JPAJH	467.660	467.962	0.06
QHJH	42,002,766	41,848,821	-0.37
QHEH	6,958,529	7,114,471	2.24
UPHJH	2.356	2.359	0.12
JPHJH	426.640	427.140	0.12
UPHEH	2.419	2.432	0.51
EPHEH	2.576	2.589	0.51
UPHH	2.365	2.369	0.19
QLJH	10,939,052	9,901,672	-9.48
QLEH	8,242,731	7,903,948	-4.11
UPLJH	1.173	1.234	5.23
JPLJH	203.240	213.942	5.27
UPLEH	1.569	1.629	3.85
EPLH	1.618	1.680	3.80
UPLH	1.343	1.410	4.95
PHEXH	1.271	1.273	0.12
PLEXH	0.379	0.401	5.85

TABLE 48. Scenario 17, Prices of Canned Low-Valued Salmon Increase by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUH	Scenario UPAUH17	Percentage Change	Base UPHH	Scenario UPHH17	Percentage Change	Base PHEXH	Scenario PHEXH17	Percentage Change
1/1983	2.901	2.901	0.00	1.582	1.582	0.00	1.731	1.731	0.00
2/1983	2.849	2.849	0.00	1.754	1.754	0.00	0.815	0.815	0.00
3/1983	3.231	3.234	0.08	1.722	1.727	0.28	0.843	0.845	0.24
4/1983	3.189	3.195	0.17	2.036	2.051	0.77	0.957	0.964	0.68
1/1984	2.678	2.679	0.03	1.750	1.751	0.10	2.231	2.235	0.18
2/1984	2.721	2.721	0.00	1.753	1.753	0.00	0.921	0.921	-0.01
3/1984	2.875	2.877	0.08	1.851	1.857	0.28	0.975	0.977	0.24
4/1984	2.678	2.682	0.15	2.186	2.200	0.66	1.105	1.111	0.58
1/1985	3.084	3.085	0.02	1.833	1.834	0.06	2.689	2.692	0.12
2/1985	3.103	3.103	0.00	1.786	1.786	0.00	1.022	1.022	-0.01
3/1985	2.808	2.810	0.05	1.928	1.931	0.16	1.008	1.009	0.14
4/1985	3.204	3.207	0.09	2.250	2.259	0.40	1.188	1.192	0.35
1/1986	3.200	3.200	0.01	1.996	1.997	0.04	2.946	2.948	0.07
2/1986	3.040	3.040	0.00	2.133	2.133	-0.01	1.419	1.418	-0.01
3/1986	2.552	2.553	0.04	2.405	2.407	0.08	1.222	1.223	0.07
4/1986	2.611	2.612	0.05	2.588	2.591	0.14	1.236	1.238	0.12
1/1987	3.064	3.064	0.00	2.377	2.377	0.01	3.097	3.097	0.01
2/1987	3.649	3.649	0.00	2.737	2.737	0.00	1.705	1.705	0.00
3/1987	4.187	4.189	0.05	2.699	2.702	0.11	1.590	1.591	0.10
4/1987	3.753	3.756	0.09	3.122	3.133	0.35	1.663	1.668	0.30
1/1988	3.613	3.614	0.01	3.419	3.420	0.03	5.652	5.655	0.06
2/1988	3.747	3.747	0.00	3.621	3.620	0.00	2.268	2.268	0.00
3/1988	3.351	3.353	0.07	3.640	3.646	0.14	2.107	2.110	0.13
4/1988	3.406	3.409	0.06	3.701	3.705	0.11	2.000	2.002	0.11

TABLE 48. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH17	Percentage Change	Base UPLH	Scenario UPLH17	Percentage Change
1/1983	0.392	0.408	4.23	1.449	1.505	3.92
2/1983	0.308	0.330	7.12	1.286	1.357	5.49
3/1983	0.285	0.303	6.25	1.028	1.087	5.75
4/1983	0.527	0.561	6.31	1.350	1.416	4.91
1/1984	0.358	0.375	4.72	1.375	1.432	4.13
2/1984	0.280	0.292	4.33	1.161	1.210	4.25
3/1984	0.303	0.321	6.05	1.082	1.143	5.62
4/1984	0.574	0.601	4.58	1.435	1.494	4.11
1/1985	0.360	0.371	2.95	1.314	1.361	3.56
2/1985	0.313	0.323	3.30	1.193	1.241	3.96
3/1985	0.250	0.265	5.90	0.942	0.994	5.49
4/1985	0.439	0.458	4.29	1.306	1.359	4.01
1/1986	0.326	0.334	2.45	1.262	1.303	3.27
2/1986	0.340	0.348	2.53	1.136	1.174	3.36
3/1986	0.291	0.305	4.74	1.002	1.046	4.43
4/1986	0.515	0.535	3.79	1.393	1.446	3.77
1/1987	0.418	0.431	3.02	1.477	1.531	3.66
2/1987	0.380	0.394	3.68	1.350	1.404	4.01
3/1987	0.471	0.496	5.22	1.315	1.379	4.86
4/1987	0.989	1.036	4.70	2.010	2.100	4.50
1/1988	0.827	0.858	3.72	2.044	2.127	4.05
2/1988	0.626	0.665	6.19	2.042	2.168	6.13
3/1988	0.615	0.659	7.16	1.796	1.915	6.63
4/1988	0.907	0.957	5.46	2.073	2.177	5.06

TABLE 49. Scenario 18, Prices of Canned Low-Valued Salmon
Decrease by 10 Percent: Average Total Analysis

Variable	Base Quarter	Scenario Quarter	Percentage Change
EQAEH	19,811,930	19,812,007	0.00
NQAEH	14,578,054	14,578,131	0.00
QAUH	3,746,145	3,746,067	0.00
NPAEH	21.06	21.05	-0.05
EPAEH	2.89	2.89	-0.05
NPAUH	23.09	23.09	-0.04
UPAUH	3.17	3.17	-0.03
JPAJH	467.66	467.36	-0.06
QHJH	42,002,766	42,156,440	0.37
QHEH	6,958,529	6,807,437	-2.17
UPHJH	2.36	2.35	-0.12
JPHJH	426.64	426.14	-0.12
UPHEH	2.42	2.41	-0.50
EPHEH	2.58	2.56	-0.50
UPHH	2.36	2.36	-0.18
QLJH	10,939,052	12,138,248	10.96
QLEH	8,242,731	8,595,825	4.28
UPLJH	1.17	1.11	-5.18
JPLJH	203.24	192.63	-5.22
UPLEH	1.57	1.51	-3.86
EPLH	1.62	1.56	-3.81
UPLH	1.34	1.28	-4.96
PHEXH	1.27	1.27	-0.11
PLEXH	0.38	0.36	-5.79

TABLE 50. Scenario 18, Prices of Canned Low-Valued Salmon
Decrease by 10 Percent: Quarter-by-Quarter Analysis

Quarter/ Year	Base UPAUM	Scenario UPAUM18	Percentage Change	Base UPHH	Scenario UPHH18	Percentage Change	Base PHEXH	Scenario PHEXH18	Percentage Change
1/1983	2.90	2.90	0.00	1.58	1.58	0.00	1.73	1.73	0.00
2/1983	2.85	2.85	0.00	1.75	1.75	0.00	0.82	0.82	0.00
3/1983	3.23	3.23	-0.08	1.72	1.72	-0.28	0.84	0.84	-0.23
4/1983	3.19	3.18	-0.17	2.04	2.02	-0.75	0.96	0.95	-0.67
1/1984	2.68	2.68	-0.03	1.75	1.75	-0.10	2.23	2.23	-0.18
2/1984	2.72	2.72	0.00	1.75	1.75	0.00	0.92	0.92	0.01
3/1984	2.88	2.87	-0.08	1.85	1.85	-0.28	0.97	0.97	-0.24
4/1984	2.68	2.67	-0.15	2.19	2.17	-0.64	1.11	1.10	-0.57
1/1985	3.08	3.08	-0.02	1.83	1.83	-0.06	2.69	2.69	-0.12
2/1985	3.10	3.10	0.00	1.79	1.79	0.00	1.02	1.02	0.01
3/1985	2.81	2.81	-0.05	1.93	1.93	-0.16	1.01	1.01	-0.13
4/1985	3.20	3.20	-0.09	2.25	2.24	-0.40	1.19	1.18	-0.34
1/1986	3.20	3.20	-0.01	2.00	2.00	-0.04	2.95	2.94	-0.07
2/1986	3.04	3.04	0.00	2.13	2.13	0.01	1.42	1.42	0.01
3/1986	2.55	2.55	-0.04	2.41	2.40	-0.08	1.22	1.22	-0.07
4/1986	2.61	2.61	-0.05	2.59	2.58	-0.13	1.24	1.23	-0.12
1/1987	3.06	3.06	0.00	2.38	2.38	-0.01	3.10	3.10	-0.01
2/1987	3.65	3.65	0.00	2.74	2.74	0.00	1.70	1.70	0.00
3/1987	4.19	4.19	-0.05	2.70	2.70	-0.11	1.59	1.59	-0.10
4/1987	3.75	3.75	-0.09	3.12	3.11	-0.33	1.66	1.66	-0.29
1/1988	3.61	3.61	-0.01	3.42	3.42	-0.02	5.65	5.65	-0.06
2/1988	3.75	3.75	0.00	3.62	3.62	0.00	2.27	2.27	0.00
3/1988	3.35	3.35	-0.07	3.64	3.64	-0.14	2.11	2.10	-0.13
4/1988	3.41	3.40	-0.06	3.70	3.70	-0.10	2.00	2.00	-0.11

TABLE 50. Continued

Quarter/ Year	Base PLEXH	Scenario PLEXH18	Percentage Change	Base UPLH	Scenario UPLH18	Percentage Change
1/1983	0.39	0.38	-3.82	1.45	1.39	-3.91
2/1983	0.31	0.29	-6.39	1.29	1.22	-5.50
3/1983	0.28	0.27	-5.63	1.03	0.97	-5.72
4/1983	0.53	0.50	-5.69	1.35	1.28	-4.93
1/1984	0.36	0.34	-4.27	1.37	1.32	-4.12
2/1984	0.28	0.27	-3.89	1.16	1.11	-4.22
3/1984	0.30	0.29	-5.43	1.08	1.02	-5.57
4/1984	0.57	0.55	-4.15	1.44	1.38	-4.10
1/1985	0.36	0.35	-2.64	1.31	1.27	-3.52
2/1985	0.31	0.30	-2.94	1.19	1.15	-3.90
3/1985	0.25	0.24	-5.29	0.94	0.89	-5.43
4/1985	0.44	0.42	-3.95	1.31	1.25	-4.06
1/1986	0.33	0.32	-2.26	1.26	1.22	-3.25
2/1986	0.34	0.33	-2.27	1.14	1.10	-3.32
3/1986	0.29	0.28	-4.25	1.00	0.96	-4.38
4/1986	0.52	0.50	-3.44	1.39	1.34	-3.77
1/1987	0.42	0.41	-2.75	1.48	1.42	-3.63
2/1987	0.38	0.37	-3.35	1.35	1.30	-4.00
3/1987	0.47	0.45	-4.69	1.31	1.25	-4.82
4/1987	0.99	0.95	-4.27	2.01	1.92	-4.50
1/1988	0.83	0.80	-3.39	2.04	1.96	-4.02
2/1988	0.63	0.59	-5.64	2.04	1.92	-6.14
3/1988	0.62	0.58	-6.42	1.80	1.68	-6.57
4/1988	0.91	0.86	-4.98	2.07	1.97	-5.09

salmon would rise by 5.85 percent. Prices would rise in the export markets because of the decreased allocation to both markets.

Some high-valued Pacific salmon would be reallocated to the EEC to replace some of the loss of low-valued Pacific salmon exports to the EEC, due to the increased use of low-valued Pacific salmon for canning. Both export markets experience increases in high-valued Pacific salmon prices because of the reduced supply of high-valued salmon to Japan and the increased demand in the EEC for high-valued salmon. Atlantic salmon markets would be largely unaffected.

When canned salmon prices are decreased, the allocation of low-valued Pacific fresh/frozen salmon would increase to all export markets and the exvessel price would decline by 5.79 percent. This decrease is caused by the low-valued Pacific salmon average export price declining by 4.96 percent due to the increased allocation of low-valued salmon to the export markets.

High-valued Pacific salmon would be reallocated from the EEC to Japan. The EEC market would be less lucrative for high-valued Pacific salmon because of the decreasing low-valued Pacific salmon price. The exvessel price of high-valued Pacific salmon would diminish slightly by 0.11 percent. The Atlantic salmon market, again, would be largely unaffected.

Summary of Simulations

In this section, some observations are made regarding comparisons of the effects of the scenarios on the key price variables in the model. Tables 51 and 52 compare the changes in the five key prices. Table 51 summarizes average total change in a quarter's price variables for scenarios that generally resulted in a decrease in the key prices. Table 52 summarizes average total change in a quarter's price variables for scenarios that

TABLE 51. Percentage Changes in Key Price Variables For Scenarios in Which at Least One Relevant Price Decreases: Average Total Analysis

Scenario	UPAUH	UPHH	UPLH	PHEXH	PLEXH
1	-0.42	-1.94	-0.29	-3.82	-0.30
3	-0.01	-0.07	-1.71	-0.04	-5.34
5	-2.63	-0.17	-0.04	-0.50	-0.04
7	-2.34	-0.16	-0.03	-0.47	-0.04
9	-0.87	0.00	0.00	-0.07	0.00
12	-0.35	-2.09	-0.32	-1.60	-0.56
13	-3.57	-0.41	-1.08	-1.03	-0.83
15	-4.80	-4.68	-1.96	-4.39	-2.16
18	-0.03	-0.18	-4.96	-0.11	-5.79

TABLE 52. Percentage Changes in Key Price Variables For Scenarios in Which at Least One Relevant Price Increases: Average Total Analysis

Scenario	UPAUH	UPHH	UPLH	PHEXH	PLEX
2	0.47	2.18	0.32	4.40	0.34
4	0.01	0.07	1.89	0.05	6.22
6	3.07	0.20	0.04	0.58	0.05
8	2.71	0.18	0.04	0.53	0.04
10	0.96	0.00	0.00	0.07	0.00
11	1.28	2.38	0.62	2.00	0.82
14	2.65	0.00	0.00	0.54	0.00
16	5.99	5.46	1.85	5.21	2.16
17	0.04	0.19	4.95	0.12	5.85

generally increased the level of the key prices.

Price decreases reported in Table 51 are for Scenarios 1, 3, 5, 7, 9, 12, 13, 15, and 18, in which: landings of North American high-valued salmon increased by 10 percent; landings of low-valued salmon increased by 10 percent; Norwegian and Scottish exports of farmed Atlantic salmon increased by 10 percent; Chilean farmed salmon exports to North America increased by 25 percent; Japanese tariffs on all fresh/frozen salmon doubled; the EEC tariff on all fresh/frozen salmon increased to 12 percent; the U.S. dollar strengthened by 10 percent against all foreign currencies except the Canadian dollar; and low-valued canned salmon prices decreased by 10 percent.

For the price of Norwegian Atlantic salmon exported to the United States, there were large effects when exports of Atlantic salmon increased, tariffs rose, or the U.S. dollar strengthened. The scenarios that generated the largest decrease in the high-valued Pacific salmon average export price and the exvessel price occurred when high-valued Pacific salmon landings increased, the EEC and Japanese tariffs increased, and the U.S. dollar strengthened. The effects of an increase in Norwegian and Scottish farmed Atlantic salmon exports on high-valued Pacific salmon prices were smaller due in part to the low cross-price demand elasticities found between the two species.

The scenarios that generated the largest decreases in the average export price and exvessel price of low-valued Pacific salmon occurred in scenarios in which low-valued landings increased, the U.S. dollar strengthened, or the low-valued canned Pacific salmon price decreased. The effects of tariffs were smaller than expected because the decreased shipments of high-valued Pacific salmon to the export markets strengthened the EEC demand for low-valued

Pacific salmon in quarters 3 and 4 and, therefore, dampened the decrease.

Increases in prices are reported in Table 52 and are associated with scenarios 2, 4, 6, 8, 10, 14, 16, and 17 in which: landings of North American high-valued salmon decreased by 10 percent; landings of low-valued salmon decreased by 10 percent; Norwegian and Scottish exports of farmed Atlantic salmon decreased by 10 percent; Chilean farmed salmon exports to North American decreased by 25 percent; salmon trade was tariff-free; a 5 percent North American tariff was placed on all fresh/frozen salmon imports; the North American currencies weakened against all other currencies by 10 percent; and the low-valued canned Pacific salmon price rose by 10 percent.

In comparison to the associated scenarios in Table 51, the effects were close in magnitude but opposite in signs. Atlantic salmon prices rose the most when the Norwegian and Scottish exports decreased, salmon trade was tariff-free, and the North American currencies weakened against all other currencies. When both Norwegian and Scottish exports were decreased, the Atlantic salmon price rose more in North America and there was movement to reallocate some Norwegian salmon to the EEC to make up for the decreased Scottish salmon supplies.

The prices of high-valued Pacific salmon (in U.S. dollars) rose the most when high-valued Pacific salmon landings decreased, trade was tariff-free, or North American currencies weakened. The low-valued salmon prices rose the most when low-valued landings decreased, the North American exchange rate weakened, or low-valued salmon canned prices rose.

4. Forecasting Salmon Prices for 1990-1993

In this section forecasts of five key salmon price variables are presented for the period 1990-1993. The price variables include:

- 1) the price of Norwegian farmed Atlantic salmon exported to North America (FOB Norway)
- 2) the average North American export price for high-valued Pacific salmon (FOB North America)
- 3) the average North American export price for low-valued Pacific salmon (FOB North America)
- 4) the North American exvessel price for high-valued Pacific salmon
- 5) the North American exvessel price for low-valued Pacific salmon.

An overview of the forecasting methodology was presented on pages 51-54 of section IV. Further details on the approach used for forecasting the price variables can be found in Herrmann (1990, p. 622-651).

In the tabled results, the letter "H" following a variable name stands for "hat" or prediction, as before. Also, the letter "R" following the "H" indicates that the price is expressed in real terms, i.e., the price is adjusted for the effects of general price inflation over time. The forecasts for the price variables are reported below in Tables 53-56. Real prices were derived by deflating nominal prices by the appropriate price index values using the first quarter of 1989 as the base quarter for the index (i.e., price index = 1.00 in the first quarter of 1989; see the definition of UPPI on page 65).

Both quarterly and yearly weighted average prices are reported. The quarterly forecasted prices generally exhibit a more pronounced seasonality than do the historical prices which may be a function of the seasonality projected for some of the exogenous variables in the model or the intercept adjustments. The yearly prices are quantity-weighted averages of the quarterly prices and provide an indication of the trend in future annual prices.

TABLE 53. Forecasts of Nominal Salmon Prices by Quarter from 1990 to 1993 (in U.S. dollars per pound)

Year:Qtr	Price Variables				
	UPAUH	UPHH	UPLH	PHEXH	PLEXH
1990:1	2.45	2.69	1.65	3.47	0.48
1990:2	2.79	3.16	1.64	1.89	0.41
1990:3	3.01	3.27	1.41	1.96	0.55
1990:4	2.48	3.13	1.66	1.40	0.88
1991:1	2.57	2.66	1.67	3.67	0.52
1991:2	2.99	3.21	1.68	2.02	0.44
1991:3	3.08	3.32	1.44	2.08	0.58
1991:4	2.67	3.20	1.70	1.46	0.93
1992:1	2.63	2.71	1.70	3.90	0.54
1992:2	3.11	3.24	1.71	2.13	0.47
1992:3	3.15	3.37	1.48	2.19	0.61
1992:4	2.81	3.25	1.74	1.50	0.98
1993:1	2.64	2.75	1.73	4.07	0.56
1993:2	3.20	3.28	1.74	2.23	0.48
1993:3	3.21	3.42	1.51	2.30	0.64
1993:4	2.90	3.31	1.77	1.53	1.02

TABLE 54. Forecasts of Quantity-Weighted Average Nominal Salmon Prices by Year from 1990 to 1993 (in U.S. dollars per pound)

Year	Price Variables				
	UPAUH	UPHH	UPLH	PHEXH	PLEXH
1990	2.62	3.20	1.48	1.94	0.57
1991	2.78	3.26	1.51	2.05	0.60
1992	2.89	3.31	1.55	2.17	0.63
1993	2.96	3.36	1.58	2.27	0.66

TABLE 55. Forecasts of Real Salmon Prices by Quarter from 1990 to 1993, Deflated to First Quarter 1989 Dollars (in U.S. dollars per pound)

Year:Qtr	Price Variables				
	UPAUHR	UPHHR	UPLHR	PHEXHR	PLEXHR
1990:1	2.45	2.68	1.64	3.46	0.48
1990:2	2.78	3.13	1.54	1.87	0.41
1990:3	2.97	3.23	1.51	1.94	0.54
1990:4	2.43	3.07	1.92	1.38	0.87
1991:1	2.51	2.60	1.64	3.58	0.50
1991:2	2.90	3.12	1.55	1.96	0.43
1991:3	2.98	3.21	1.51	2.01	0.56
1991:4	2.56	3.07	1.92	1.41	0.90
1992:1	2.52	2.59	1.63	3.72	0.52
1992:2	2.96	3.09	1.55	2.03	0.44
1992:3	2.98	3.19	1.51	2.07	0.57
1992:4	2.65	3.06	1.91	1.42	0.92
1993:1	2.47	2.58	1.62	3.82	0.53
1993:2	2.98	3.06	1.54	2.08	0.45
1993:3	2.98	3.17	1.51	2.13	0.59
1993:4	2.68	3.05	1.90	1.42	0.94

TABLE 56. Forecasts of Quantity-Weighted Real Salmon Prices by Year from 1990 to 1993, Deflated to First Quarter 1989 Dollars (in U.S. dollars per pound)

Year	Price Variables				
	UPAUHR	UPHHR	UPLHR	PHEXHR	PLEXHR
1990	2.59	3.16	1.58	1.92	0.56
1991	2.69	3.15	1.58	1.99	0.58
1992	2.75	3.14	1.57	2.05	0.59
1993	2.75	3.12	1.57	2.11	0.61

For the price of Norwegian Atlantic salmon exported to North America, the trend is for the nominal prices to increase about 13 percent from 1990 to 1993, but for the real prices to increase by only 6 percent. The forecasted real price of Norwegian farmed Atlantic salmon in 1993 is approximately one dollar lower than the 1988 prices, being more comparable to the real prices at the 1985 levels. It was forecasted that the real annual price will rise from \$2.59 per pound in 1990 to \$2.75 per pound in 1993. This price increase was largely a result of the decreased growth rate in production from Norway coupled with a moderately increasing demand for salmon over the time period. Sensitivity analyses on Norwegian production will be performed later in this section.

The quarterly prices show a peak in quarters 2 and 3 in comparison to quarters 1 and 4 due, to some extent, to Norway decreasing its allocation to North America in these quarters as the North American landings of Pacific salmon peak and also due to the downward shift in demand in the first quarter as Chilean salmon imports increase in the North American market. Since these swings have not been as pronounced or seasonally inclined in the past, these swings should be viewed with some caution.

For high-valued Pacific salmon, the nominal prices increased by 5 percent for the average export price and by 17 percent for the exvessel price from 1990 to 1993. The real prices indicate that the weighted average export price will remain relatively constant while the exvessel price increases by 9.8 percent between 1990 and 1993. The increase in the exvessel price of high-valued Pacific salmon is induced by landings being held constant into the future, while production of farmed salmon increases at a decreasing rate and the real growth rate of income is increasing. If landings increase due to

salmon enhancement, or if farmed salmon supplies grow faster than expected, then predicted prices may be overstated. The quarterly figures exhibit a diminishing price in the fourth quarter due to a rapid increase in Chilean production. This seasonality is probably overstated, because Chile may penetrate other markets in response to price changes.

The low-valued Pacific salmon price forecasts show a 6.7 percent increase in the FOB export price and a 15.7 percent increase for exvessel price for the nominal prices between 1990 and 1993. For real prices, UPLH remains essentially constant and the exvessel price of low-valued Pacific salmon rises by 5.1 percent. The increase in the exvessel price of low-valued Pacific salmon is due to factors that are similar to those that caused the increase in prices in the exvessel price of high-valued Pacific salmon, mainly due to rising real incomes and slowly expanding salmon demand.

Sensitivity analyses were performed on the total exports of farmed Atlantic salmon from Norway and Scotland, the exchange rates, and the landings of North American Pacific salmon. These variables were chosen for sensitivity analyses because of their volatility and because of their significant effects on salmon prices as found in the sensitivity analyses over the historical time period.

Production of farmed Atlantic salmon from Norway and Scotland was varied by 20 percent above and below the baseline forecast levels. The resulting changes in the real price of Norwegian farmed Atlantic salmon exported to North America and the real price of high-valued Pacific salmon at the exvessel level resulted in price differentials ranging from \$.29 to \$.63 per pound, and \$.03 to \$.08 per pound, respectively.

The Pacific salmon landings were varied one standard deviation above and below their yearly mean. This resulted in high-valued Pacific salmon landings being varied by 8.7 percent above and below its mean level and low-valued Pacific landings were varied by 17 percent. Differences in the price of Norwegian Atlantic salmon ranged between \$.05 to \$.07 per pound. The differences in the North American weighted average export price of high-valued salmon ranged between \$.05 - .08 per pound, and the differences in the North American high-valued exvessel price ranges between \$.01 - .23 per pound. Differences in the North American average export price of low-valued Pacific salmon and the exvessel prices of low-valued salmon ranged from \$.0 - .08 and \$.0 - \$.12 per pound, respectively.

The exchange rates were varied above and below their quarterly means calculated from values observed between 1982 to 1988. The standard deviations were equivalent to variations of 11 percent above and below the mean values for NORUSA, 9.1 percent for NORECU, 16 percent for USAECU, and 24.8 percent for JAPUSA. Since all the exchange rates were varied systematically, the percentage changes were incorporated for NORUSA, NORECU, and USAECU, with NORECU being changed by 14.2 percent to account for arbitraging clearing the exchange rates.

The price changes resulting from variations in exchange rates are quite large. The differences between the high and low values of the real price of Norwegian Atlantic salmon ranged from \$.48 to \$.66, and the real North American average export price differences for high-valued salmon ranged from \$.51 to \$.68 per pound. The range of differences in real high-valued Pacific salmon exvessel prices were between \$.28 and \$.36 per pound. The difference between the high and low real weighted average North American low-valued

Pacific salmon export price and the low-valued Pacific salmon exvessel price ranged from \$.06 to \$.18 and \$.04 to \$.06 per pound, respectively.

Tables 57-59 present the lowest and highest future salmon prices that were predicted in any of the sensitivity analyses reported above. It is obvious that the ranges between high and low real prices are quite large, indicating that accurate forecasts are difficult to make if changes in the predetermined variables do not follow the assumed or predicted values. For the price of Norwegian Atlantic salmon in the United States, it was found that the low and high prices resulted from sensitivity analyses that changed farmed Atlantic salmon exports and changed exchange rates. For the Pacific salmon, the low and high prices were generated solely from the changing exchange rate sensitivity analyses. For low-valued salmon, the high and low prices were generated from the sensitivity analyses for which the low-valued Pacific salmon landings and exchange rates were varied.

5. Profitability of Farming Salmon in the Puget Sound

As discussed in section IV., p. 54-60, the forecast of the future prices of Norwegian Atlantic salmon exported to North American were adjusted by marketing margins and by an apparent price premium relative to North American farmed Atlantic salmon to proxy the price received by Puget Sound salmon farmers for farm-raised Atlantic salmon. Farmers selling directly to retail buyers were assumed to obtain a 15% price premium over farmers selling to a first receiver (wholesaler). These prices were then compared to per pound costs of production to establish profit margins for Puget Sound farming operators. Costs of production (in real terms) were assumed to be \$3.00/pound for efficient established farms and \$3.50/pound for less efficient/startup

TABLE 57. Forecasts of Real High and Low Salmon Prices for UPAUH and UPHH by Quarter from 1990 to 1993, Deflated to First Quarter 1989 Dollars (in U.S. dollars per pound)

Year:Qtr	UPAUHR		UPHHR	
	Low	High	Low	High
1990:1	2.24	2.78	2.39	3.04
1990:2	2.47	3.11	2.87	3.45
1990:3	2.72	3.32	2.99	3.58
1990:4	2.17	2.79	2.75	3.48
1991:1	2.28	2.82	2.32	2.94
1991:2	2.62	3.27	2.88	3.41
1991:3	2.70	3.35	2.97	3.57
1991:4	2.27	2.94	2.77	3.46
1992:1	2.28	2.83	2.33	2.91
1992:2	2.67	3.31	2.86	3.37
1992:3	2.71	3.36	2.96	3.56
1992:4	2.35	3.04	2.76	3.44
1993:1	2.24	2.79	2.33	2.89
1993:2	2.69	3.35	2.84	3.33
1993:3	2.71	3.35	2.94	3.55
1993:4	2.38	3.08	2.76	3.42

TABLE 58. Forecasts of Real High and Low Salmon Prices for PHEXH and UPLH by Quarter from 1990 to 1993, Deflated to First Quarter 1989 Dollars (in U.S. dollars per pound)

Year:Qtr	PHEXHR		UPLHR	
	Low	High	Low	High
1990:1	3.11	3.90	1.59	1.71
1990:2	1.71	2.07	1.47	1.63
1990:3	1.79	2.15	1.47	1.56
1990:4	1.24	1.55	1.88	1.96
1991:1	3.23	4.01	1.59	1.70
1991:2	1.81	2.14	1.50	1.62
1991:3	1.86	2.23	1.47	1.56
1991:4	1.28	1.57	1.88	1.95
1992:1	3.40	4.13	1.59	1.68
1992:2	1.88	2.20	1.49	1.61
1992:3	1.91	2.31	1.47	1.56
1992:4	1.29	1.58	1.88	1.94
1993:1	3.58	4.21	1.58	1.67
1993:2	1.93	2.25	1.49	1.61
1993:3	1.97	2.38	1.47	1.56
1993:4	1.29	1.58	1.87	1.93

TABLE 59. Forecasts of Real High and Low Salmon Prices for PLEXHR by Quarter from 1990 to 1993, Deflated to First Quarter 1989 Dollars (in U.S. dollars per pound)

Year:Qtr	PLEXHR Low	PLEXHR High
1990:1	0.46	0.50
1990:2	0.39	0.44
1990:3	0.49	0.59
1990:4	0.81	0.92
1991:1	0.49	0.52
1991:2	0.41	0.45
1991:3	0.51	0.61
1991:4	0.84	0.96
1992:1	0.50	0.54
1992:2	0.42	0.47
1992:3	0.53	0.63
1992:4	0.87	0.98
1993:1	0.51	0.56
1993:2	0.43	0.47
1993:3	0.54	0.64
1993:4	0.89	1.01

farms. Production costs are interpreted to be dressed, packaged, and delivered priced FOB Seattle, but are not inclusive of a fair return to investment capital.

The profits margin per quarter for Puget Sound Atlantic salmon farmer selling to a first receiver, using the baseline price forecasts and a cost of production of \$3.00 per pound, ranged from $-\$0.04$ to $\$0.33$ per pound (see Figure 9). For a Puget Sound Atlantic salmon farmer who can bypass the first

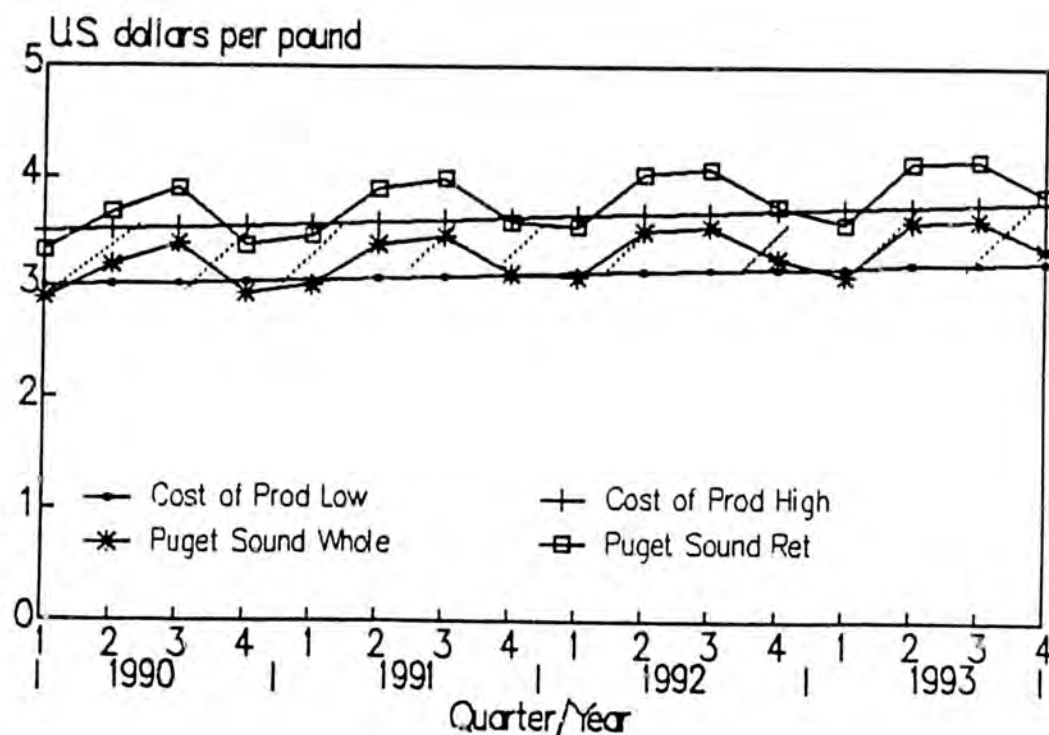


FIGURE 9. Estimated Future Nominal Costs of Production of Puget Sound Atlantic Farmed Salmon (for Low and High Costs of Production) vs. Estimated Nominal Future Wholesale and Retail Prices, 1990-93 (in U.S. dollars per pound)

receiver level, the profit margin ranged from \$0.39 to \$0.90 per pound. (The profit margins for farmers selling to a retailer reported here, and in the following sections do not account for any additional marketing costs associated with bypassing wholesalers. Actual profit margins from selling to a retailer will generally be lower since farmers will be performing additional services that wholesalers would otherwise perform).

As another perspective on profit margins, examine the quantity-weighted average annual prices reported in Table 60. For a farm that had a real cost of production of \$3.00 per pound, it is predicted that the real profit margins for 1990-93 would be between \$0.14 and \$0.25 per pound for farmers selling to first receivers and between \$0.61 and \$0.73 per pound for farms selling to retailers. Figure 10 compares real prices received for Puget Sound Atlantic salmon sold to first receivers and to receivers at the retail level with high and low costs of production.

Table 61 presents ranges for the forecasted average annual real prices for Puget Sound farmed Atlantic salmon sold at first receiver (wholesale) and retail levels. The ranges were developed from the sensitivity analysis performed on forecasted prices discussed previously. Real profit margins calculated on the basis of these ranges are presented in Table 62 for farmers selling at the first receiver (wholesale) level and in Table 63 for farmers selling to retailers directly. It is obvious that fluctuating market conditions which are outside the control of salmon farmers in Puget Sound can greatly affect forecasted profit margins. For salmon farmers that sell to wholesalers, all farmers experience losses in the scenarios where salmon prices are low. This low scenario is most likely to happen when exchange rates strengthen and/or foreign producers of farmed Atlantic salmon produce

TABLE 60. Quantity-Weighted Average Annual Forecasted Nominal and Real Prices of Puget Sound Farmed Atlantic Salmon (FOB Seattle) at the Wholesale and Retail Level (in U.S. dollars per pound)

Year	Nominal Wholesale Price	Nominal Retail Price	Real Wholesale Price	Real Retail Price
1990	3.17	3.64	3.14	3.61
1991	3.30	3.80	3.21	3.69
1992	3.40	3.91	3.24	3.72
1993	3.48	4.00	3.25	3.73

TABLE 61. Estimated Real Annual Future Puget Sound Farmed Atlantic Salmon Wholesale and Retail Prices, 1990-93 (U.S. Dollars per pound)

Year	Real Wholesale Price		Real Retail Price	
	Low Scenario	High Scenario	Low Scenario	High Scenario
1990	2.89	3.32	3.41	3.92
1991	2.89	3.33	3.43	3.95
1992	2.88	3.31	3.41	3.92
1993	2.84	3.27	3.36	3.87

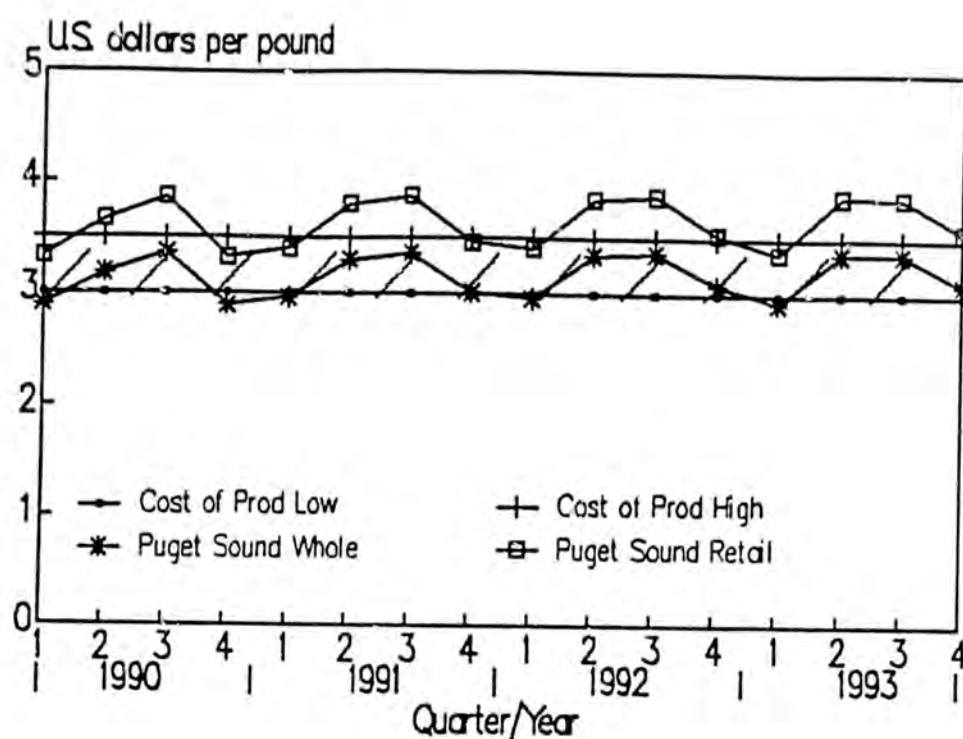


FIGURE 10. Estimated Real Future Costs of Production of Puget Sound Atlantic Salmon (for Low and High Costs of Production) vs. Estimated Real Future Wholesale and Retail Prices, 1990-93 (in U.S. dollars per pound)

more than was anticipated in the future baseline predictions. When conditions are favorable, i.e., the dollar weakens against foreign currencies or foreign producers of farmed Atlantic salmon produce less than anticipated in the future baseline predictions, the efficient farmers will have a positive profit margin, but the less efficient or start-up farms will experience losses. If sales are direct to retail, only the start-up or less efficient farmers have negative profit margins under the low price scenario, and all farmers will have positive profit margins under the high price scenario. It is obvious that the future profitability of salmon farms in Puget Sound depends on efficient farming and conditions favorable to higher salmon prices, and,

TABLE 62. Estimated Real Annual Future Puget Sound Farmed Atlantic Salmon Wholesale Profit Margins with Real Production at \$3.00 and \$3.50 per Pound, 1990-93 (in U.S. dollars per pound)

Year	Low Scenario		High Scenario	
	Cost \$3.00	Cost \$3.50	Cost \$3.00	Cost \$3.50
1990	-0.11	-0.61	0.32	-0.18
1991	-0.11	-0.61	0.33	-0.17
1992	-0.12	-0.62	0.31	-0.19
1993	-0.16	-0.64	0.27	-0.23

TABLE 63. Estimated Real Annual Future Puget Sound Farmed Atlantic Salmon Retail Profit with Real Costs of Production at \$3.00 and \$3.50 per Pound, 1990-93 (U.S. dollars per pound)

Year	Low Scenario		High Scenario	
	Cost \$3.00	Cost \$3.50	Cost \$3.00	Cost \$3.50
1990	0.41	-0.09	0.92	0.42
1991	0.43	-0.07	0.95	0.45
1992	0.41	-0.09	0.92	0.42
1993	0.36	-0.14	0.87	0.37

unfortunately, these conditions cannot be anticipated with a high degree of certainty. For farmers that can bypass the marketing margin of the first receiver, the possibilities of generating a positive profit margin are much higher, and under favorable conditions actual profits could be quite large. It should be noted that the high and low scenarios are for the scenarios simulated in this model, and actual swings in the economy could produce price swings that have even greater ranges.

Salmon farming, like all types of agricultural and aquacultural farming, is very risky, with the most efficient farms having a higher probability of generating profits. Favorable exchange rates and a reduction in the growth rate of farmed salmon from Norway will increase these probabilities. Also, if a concerted effort is made to market Puget Sound salmon as a high quality product, and this marketing effort is successful, then the price difference might narrow between the wholesale price of Norwegian and Puget Sound farmed Atlantic salmon. This price difference, if narrowed to the point of nonexistence, could mean an increase profit to Puget Sound Atlantic salmon farmers of up to \$.27 per pound, less advertising and other costs of quality enhancement.

6. Effect of Increase Puget Sound Farmed Salmon Production on Future Prices

An alternative future scenario was examined to assess the effects of an increase in North American farmed salmon production on the future price of Norwegian farmed Atlantic salmon exported to North America and on the exvessel price of high-valued Pacific salmon.

It was assumed that farmed Atlantic salmon from the United States and British Columbia are substitutable, and that there will remain a constant spread between the Norwegian export price of farmed Atlantic salmon from

Norway and farmed Atlantic salmon from North America. If farmed Atlantic salmon from the United States were increased by 100 percent above the baseline projected levels in the period 1990-93, this would mean an increase of 9,964,822 pounds of North American farmed Atlantic salmon by 1993. If eastern U.S. production was not effected by this increase, then this would represent more than a four-fold increase in the supply from Puget Sound. The effects of this magnitude of increase on Atlantic salmon prices and high-valued salmon exvessel prices in real terms in North America appeared to be minimal, as shown in Table 64.

The resulting decrease in Norwegian Atlantic salmon price would average \$0.05 per pound, and the decrease in the exvessel price of high-valued Pacific salmon would average \$0.01 per pound. The price decreases for Atlantic salmon are small because the quantity of this rise in farmed Atlantic salmon production is still quite small in comparison to the total amount of Atlantic salmon consumed and because Puget Sound farmed Atlantic salmon will, to some extent, replace imported Norwegian Atlantic salmon. For the high-valued Pacific salmon exvessel price, decreases are small because of the relatively small substitution coefficient between the two salmon species and the fact that the quantity of the increase in farmed Atlantic salmon from Puget Sound is very small in comparison to Pacific salmon landings.

TABLE 64. Real Norwegian Export Price (FOB Norway) and Real North American High-Valued Pacific Salmon Exvessel Price Predicted Using Baseline Assumptions with an Increase in North American Atlantic Salmon Scenarios, 1990-93 (in U.S. dollars per pound)

Year	UPAUHR	UPAURH1 ^a	PHEXHR	PHEXHR1 ^a
1990	2.59	2.54	1.92	1.91
1991	2.69	2.64	1.99	1.98
1992	2.75	2.70	2.05	2.04
1993	2.75	2.70	2.11	2.10

^aThe number 1 signifies, for the relevant price, the scenario in which North American farmed Atlantic salmon production increases.

IV. EVALUATION

A. Goals and Objectives

1. Original Goals and Objectives

There were five objectives listed in the project description, as shown below:

1. To assess the present and future U.S. and world demand, supply, and price structure for canned and noncanned salmon products in the context of an econometric model that analyzes the effects of:
 - a) product form,
 - b) currency/trade barriers,
 - c) taste/preferences/health benefits,
 - d) substitution among food products,
 - e) interregional product distribution.
2. To analyze the effects of worldwide salmon farming and other salmon production on the demand for U.S. fresh, frozen, and canned salmon products, and the balance of trade.
3. To analyze the cost of production to grow farmed salmon using the Puget Sound as the example location, to compare the farming cost to reported costs of competing wild production, and to assess the profitability of producing and marketing salmon given the price structures generated in (1).
4. To examine production/marketing strategies and fish regulation/management policies that may enhance the economic returns to U.S. farmed and wild salmon production in light of the price structures suggested by (1). The examination will include an assessment of the influence that production capability, stability, and seasonality of the capture fishery have on policy and strategy formulation.
5. To assess the direction of and need for future research and development concerning the expansion of salmon farming operations in the Puget Sound.

2. Were goals measurable or quantifiable?

A structural simultaneous equations model of salmon trade was econometrically estimated and simulated to address the majority of goals and objectives of the original project. Other information generated by the

project included presented papers, published articles, and a data book that also related to the goals and objectives of the project. The degree to which a goal or objective was attained can be measured by the provision of information relating to the given goal or objective. The soundness and usefulness of the structural model constructed to address goals and objectives can be partially measured by an array of goodness of fit statistics that were provided following the simulation of the system of equations, as well as equation-by-equation statistics that were also provided.

3. Modifications of the Goals or Objectives

The objectives as stated in the funded project proposal were not modified. Some of the objectives were accomplished only partially while other objectives were more than met, as discussed in section A.4.

4. Were goals and objectives attained?

The data collected for this project is, in our judgement, the most comprehensive and up-to-date database that has ever been constructed by any government agency, university, or private organization for modeling the international salmon markets. The database was collected through persistent effort and dedication, requiring numerous domestic and international trips, and consuming six months of time overall for data collection and compilation. Individuals and organizations which assisted us in data collection are: Joe Terry and the National Marine Fisheries Service, the Central Bureau of Statistics of Norway, Statistics of Canada, Peter Leitz and the Canadian Department of Fisheries and Oceans, Larry Neilson and the Ministry of Agriculture and Fisheries in Victoria Canada, Commercial Fisheries Entry Commission of Alaska, the Pacific Fisheries Management Council, the Alaska