1955

A statistical analysis of selected freight commodities terminated by New England Class I railroads, 1931-1950

BOSTON UNIVERSITY

College of Business Administration

THESIS

A Statistical Analysis of Selected Freight Commodities Terminated by New England Class I Railroads 1931 - 1950

by

Frederick Roberts Payne
(B.S. in B.A. Boston University 1953)

Submitted in partial fulfillment of
the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

1955

TABLE OF CONTENTS

Page

SECTION III

LIST OF TABLES

LIST OF CHARTS

INTRODUCTION

Objective

This study has as its purpose the discovery of past and present trends and relationships in the composition of the carload# freight tonnage terminated by the New England Class I## railroads for the period 1931 through 1950. The analysis will include the annual tonnage figures of the five major commodity groups - listed under scope - and selected individual commodities within each group as well as each group or commodity tonnage figure both as part of the New England total tonnage and as a part of the United States tonnage of each group or commodity. This is designed to show the trends and changes of the main components of the freight tonnage terminated in the New England region and the importance of the New England region in the national rail transportation of these commodity groups and individual commodities during the 20 year period under study.

Scope

The study is based on the annual tonnage figures of carload freight terminated by the New England railroads, since this region is primarily a terminal area and derives the majority of its tonnage and revenue from terminated freight. The term "terminated freight" is used to include freight delivered to water or motor carriers where no further rail transportation is indicated, freight terminated on

A shipment of not less than 10,000 pounds of one commodity
Carriers with operating revenues above $1,000,000 annually

the railroad's own line, and export shipments delivered to water carriers. All tonnage figures are for tons of 2,000 pounds.

The five commodity groups and selected individual commodities included in this study are as found in the Interstate Commerce Commission's "Freight Commodity Statistics" and are as follows:

1. Products of Agriculture

   a. Flour, wheat
   b. Mill products, NOS#
   c. Oranges and grapefruit

2. Animals and Products

   a. Fresh meats, NOS
   b. Wool, mohair
   c. Hides

3. Products of Mines

   a. Anthracite coal
   b. Bituminous coal
   c. Coke

4. Products of Forests

   a. Pulpwood
   b. Lumber, shingle and lath

5. Manufactures and Miscellaneous

   a. Petroleum products
      Petroleum oils, refined and all other gasolines
      Fuel, road, and petroleum residual oils, NOS
      Lubricating oils and greases
      Petroleum products NOS

   b. Manufactured iron and steel
   c. Cement, natural and Portland

The individual commodities in each group were selected as being the three commodities with the largest tonnage in each group in the New England region, with the exception of Products of Forests in

Not otherwise specified

which two commodities account for over 80% of the tonnage for the group.

This study has been conducted on a regional basis; and, due to the interstate and interregional characteristics of railroads, the following Class I rail carriers are included in the New England Region:

The Bangor and Aroostook R.R.
The Boston and Albany R.R.
The Boston and Maine R.R.
The Canadian National System
    Canadian National Lines in New England
    Central Vermont Ry. Inc.
The Canadian Pacific System
    Canadian Pacific Lines in Maine
    Canadian Pacific Lines in Vermont
The Maine Central R.R.
The New York, New Haven, and Hartford R.R.
The Rutland R.R.
The New York Connecting R.R.

The above listed carriers are those listed by the Interstate Commerce Commission as being in the New England region and it is the figures for these carriers which have been used.

The years 1931 through 1950 were selected to show rail transportation in New England as to tonnage of terminated freight from just prior to the depression low in 1932 to the beginning of the Korean conflict.

In order to make a full analysis of the carload freight terminated by New England Class I railroads this analysis is divided into three main sections. The first section is an analysis of the total carload freight terminated in New England showing the actual tonnage figures and the relationship of the New England region total tonnage to the total tonnage of carload freight in the entire United States. This section also shows how the New England tonnage figures have compared with the movements in selected national business indicators

during the period of this study.

The second section is an analysis on a commodity group basis and covers all freight terminated in New England. The New England tonnage of each group is further analyzed as a part of New England total freight and as a part of the United States total tonnage of each group.

The third section is an analysis of indiviual commodities in each group which will cover the most important commodities in each group for the New England railroads. This analysis covers the actual tonnage figures of each commodity in New England, each commodity as part of the New England commodity group tonnage, and also as a part of the United States tonnage of each individual commodity. This is done to show the trends and changes in the actual tonnage, the importance of each as a component of the New England totals, and New England's relative importance in the national rail transportation of each group or commodity.

Limitations

Beginning with January 1947 the number of commodity classes for reporting to the Interstate Commerce Commission was increased from 157 to 262 classes, and the number of commodity groups was increased from five to six by the addition of a separate class for Freight Forwarder Traffic which was previously included in the group Manufactures and Miscellaneous. Freight Forwarder Traffic is freight traffic consigned by or to a forwarder, i.e., a company, firm or individual recognized as engaged in the business of collecting and accumulating less than

carload shipments into consolidated carloads without an ownership interest in the goods so handled. For the years 1947 through 1950 this group has been included in Manufactures and Miscellaneous as was done previously. The increase in the number of commodity classes necessitated the grouping of the classes Wool, mohair (in grease) and Wool, mohair, NOS for the years 1947-1950 to compare with the class Wool for the period 1931-1946. All products of petroleum have been combined as one group for the purposes of this study in order to make the figures for both periods comparable. The classification Iron and Steel, rated fifth class in official classification NOS (also tin and terne plate) was changed to Manufactured Iron and Steel; and the classification Hides, green was changed to Hides, skins, and pelts, NOS. Neither change affects the comparability of the figures, and all other commodities used in this study have remained the same for the entire period.

In 1949 the Boston and Albany R.R. discontinued reporting as an independent carrier in the New England region and its tonnage figures are now included in those of the New York Central System. The Boston and Albany R.R. was kind enough to furnish their tonnage figures for the years 1949 and 1950 which were added to the New England region figures as found in the Interstate Commerce Commission "Freight Commodity Statistics" for those years.

In the figures for 1942 and 1943 some data have been omitted to avoid revealing information concerning certain strategic and critical materials pursuent to an order of the Commission dated April 27, 1942. These items include copper, lead, and zinc ores under

Products of Mines; crude rubber under Products of Forests; and copper, lead, zinc, and aluminum ingots, alcohol, sulfuric acid, and explosives, NOS, under Manufactures and Miscellaneous. The data for these commodities are included in the figures for the Grand Total Carload Traffic.* These discrepencies affect only the commodity group figures in this study and are of a minor nature, amounting to 1,005,000 tons in 1942 and 1,036,000 tons in 1943 from a total New England tonnage of 58,632,000 and 61,173,000 tons respectively.

The year 1931 was selected as the base year for the indices used in this study to facilitate the comparison of movements in each series from a common point at the start of the period under study. It must be kept in mind that the size of the base will influence the magnitude of a change in the index when comparing one index to another index with a substantially different base. In order to have all indices on the same base, any index that had a different base has been revised to a 1931 base. The main point of this process has been to show the similarity in the movements of the various series with the magnitude of the changes as a secondary characteristic, always keeping in mind the base of the series being considered. The year 1931 is not considered to be a normal year.

* 8, 1942, p. 71

SECTION I

ANALYSIS OF TOTAL NEW ENGLAND CARLOAD FREIGHT

Before beginning the analysis of total carload freight terminated by the New England railroads it would be well to set down a few general comments about the entire study. All tonnage figures used in this study are of carload tonnage of revenue freight terminated by the New England Class I railroads from 1931-1950. Revenue freight, as distinguished from non-revenue freight, is that freight which is carried for compensation by the railroads while non-revenue freight is freight of which the railroad itself is the owner. Since this study is of the tonnage and not the revenue of the groups and commodities, it should be noted that the importance of a group of commodity as measured by its tonnage may not be the same as it would be for revenue. This is the case with Products of Mines where in New England in 1940, the middle year of the period under study, it accounted for 37% of the tonnage while furnishing only 19% of the revenues of the New England Carriers.

Total Freight in the New England Region

The tonnage figures for total freight in the New England region as reported to the Interstate Commerce Commission and the index of this tonnage with 1931 as the base year can be found in Table I on page 16 while Chart I on page 17 shows this index in graphic form. From Chart I it can be seen that the 1931 tonnage level was not exceeded until 1941, the beginning of World War II. The movements of this index

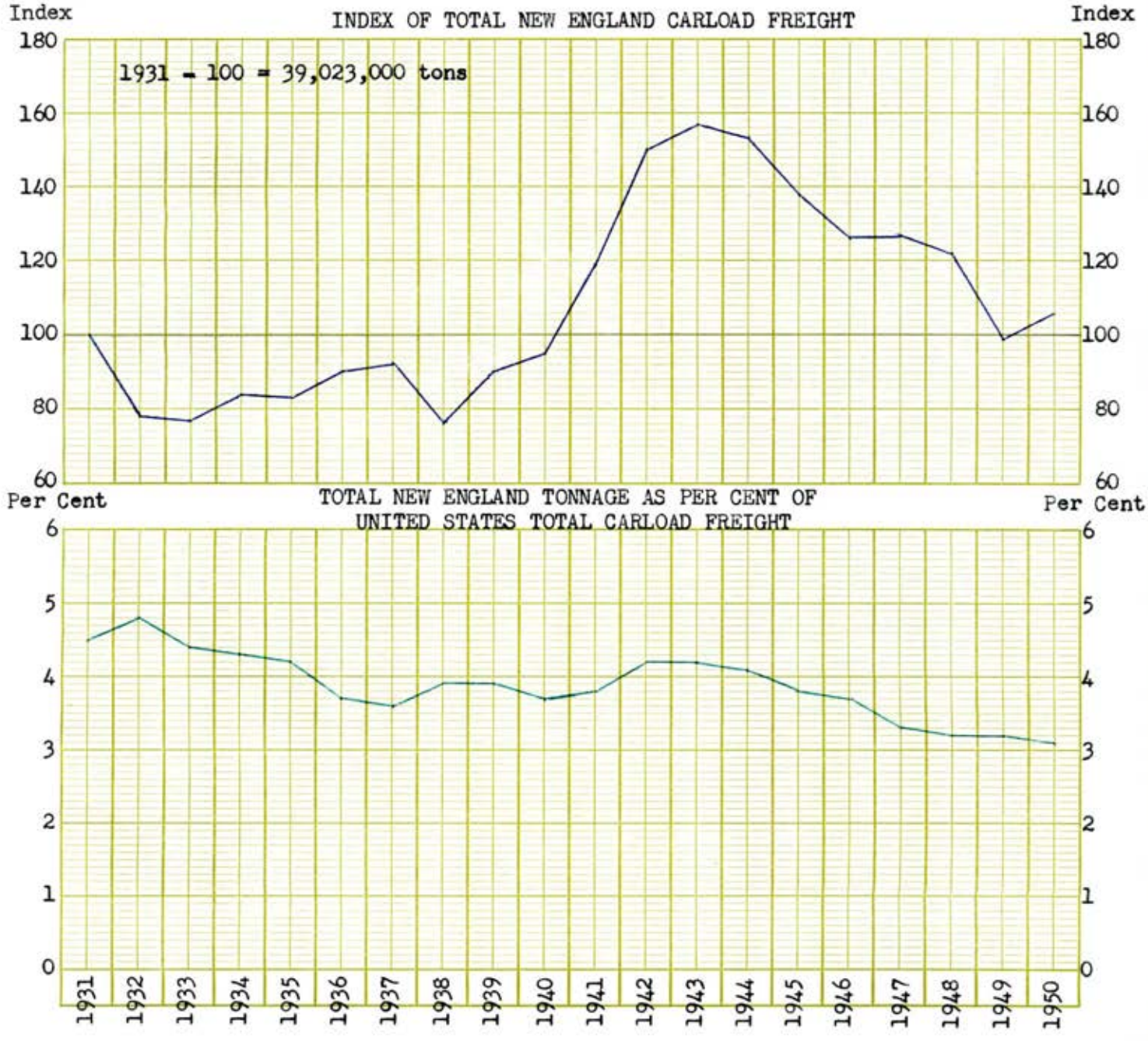
TABLE I: TOTAL TONNAGE OF CARLOAD FREIGHT TERMINATED BY NEW ENGLAND CLASS I RAILROADS AND NEW ENGLAND TOTAL AS PER CENT OF UNITED STATES TOTAL CARLOAD FREIGHT 1931 - 1950

Year	New England Total Tonnage (thousands)	Index (1931 = 100)	New England as Per Cent of United States Carload Freight
1931	39,023	100.0	4.5
1932	30,512	78.2	4.8
1933	30,206	77.4	4.4
1934	32,805	84.1	4.3
1935	32,512	83.3	4.2
1936	34,994	89.7	3.7
1937	35,781	91.7	3.6
1938	29,702	76.1	3.9
1939	34,971	89.6	3.9
1940	37,156	95.2	3.7
1941	46,490	119.1	3.8
1942	58,632	150.2	4.2
1943	61,173	156.3	4.2
1944	59,708	153.0	4.1
1945	53,999	138.4	3.8
1946	49,177	126.0	3.7
1947	49,374	126.5	3.2
1948	47,628	122.0	3.2
1949	38,430	98.5	3.2
1950	41,723	105.9	3.1

Source: Interstate Commerce Commission, Freight Commodity Statistics", 1931 - 1950

CHART I: INDEX OF TOTAL TONNAGE OF CARLOAD FREIGHT TERMINATED BY NEW ENGLAND CLASS I RAILROADS AND TOTAL NEW ENGLAND TONNAGE AS PER CENT OF UNITED STATES TOTAL CARLOAD FREIGHT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



are fairly constant except for the dips in 1938 and 1949 which can be attributed to general business conditions in those years. The recovery from an index of 77 in 1933 was fairly constant, except for 1938, with a rapid rise during the war years to a peak in 1943 of 156, followed by a fairly constant decline to 106 in 1950, the year prior to the Korean conflict. The rise in tonnage during the war can be attributed to the increased exports from New England and the decrease in coastal water transportation as well as to the increased production for the war effort. The fact that this index was well above 100 from 1941 through 1948 would indicate that for the entire period 1931-1950 there was an increasing trend in New England total freight. This condition is not well founded due to the fact that while there was a slow but steady recovery from the depression low in 1932 until 1941 the tremendous increase in the war years and its subsequent constant decline to an index of 106 at the end of the period would indicate that had not the Korean conflict or some other equally important happening occurred this index would continue this downward trend thus indicating a decline in New England total carload freight tonnage.

New England as Part of United States Total Freight

It can be seen from Chart I that there is an almost constant decline in New England's contribution to the national total from 1931 to 1940 and again from 1942 to 1950 with a decline from contributing 4.5% of the national total in 1931 to 3.1% in 1950, a decline of 1.4% over the period of this study. The fluctuations and the apparent

upward trend in New England tonnage is more than offset by the increase in United States tonnage thus showing that while New England may have had an increase in tonnage it did not have as great an increase as the rest of the country which reveals the downward trend in the importance of the New England region as a part of the United States total carload freight. Part of this decline can be attributed to the increase in motor carrier activity in New England but it would be very difficult to ascertain the exact influence of this factor because the data for freight carried by motor carriers is neither as accurate nor complete as that reported to the I.C.C. by the rail carriers. Much of the lack of data is due to the inherent nature of this mode of transportation.

New England Total Freight and Business Indicators

The index of New England total carload freight fairly well follows those of Total Industrial Production (physical volume),* United States freight carloadings (number of cars),** and Total Gross National Product (in constant 1939 dollars).*** Chart II on page 21 shows these series with all indices on a 1931 base. The original figures, as well as the 1931 indices, will be found in Table II on page 20. Although the indices of Industrial Production and Gross National Product show a more pronounced upward trend than do those of U.S. Freight Carloadings and New England total freight, the similarity of the movements of all four series, as shown in Chart II, tends to indicate a definite relationship between New England total freight and the three business indicators. Coefficients of correlation have been computed for New

* 5, p. 1319.
** 4, p. 490.
*** 4, p.370.

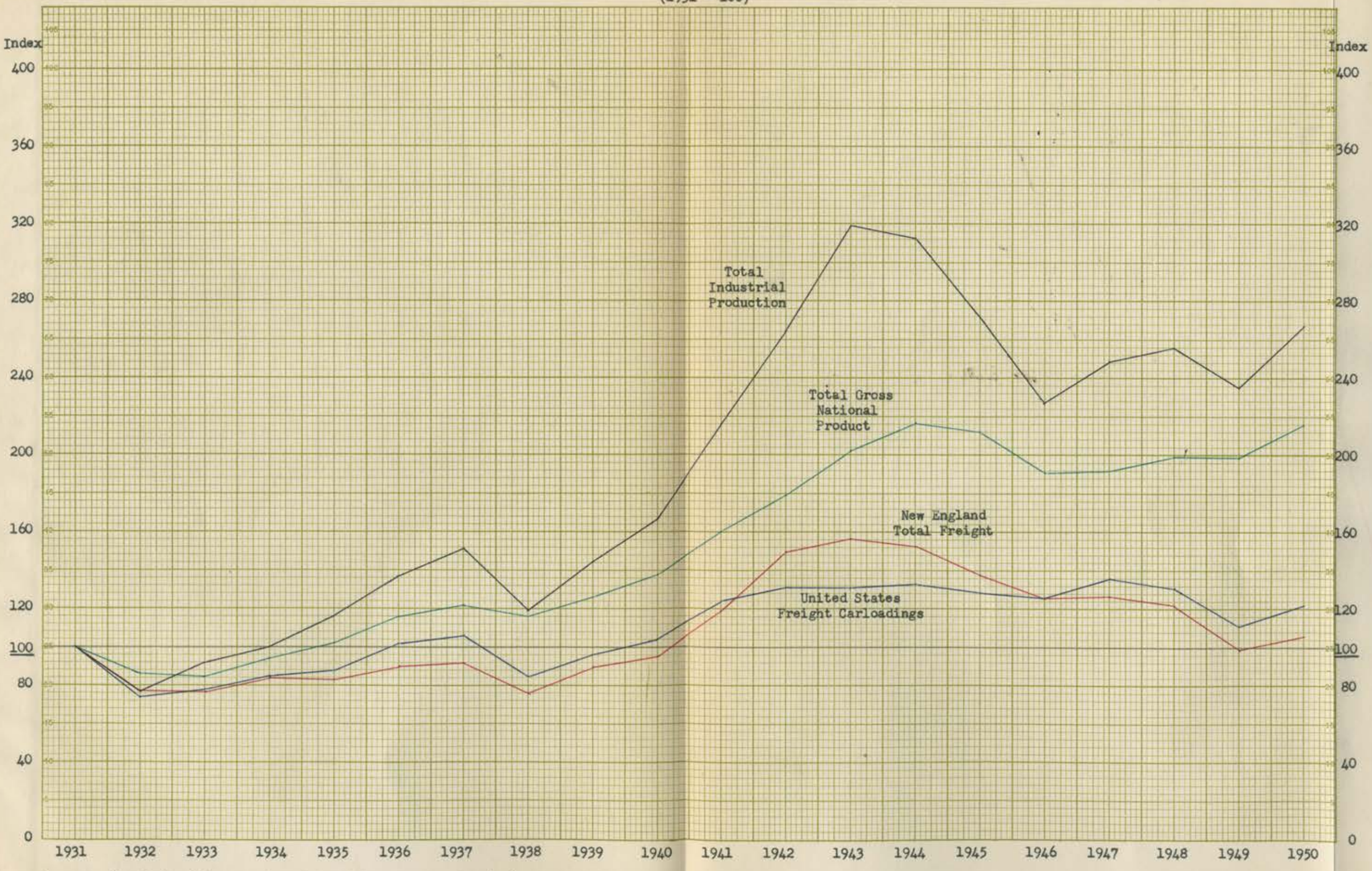
TABLE II: INDICES OF TOTAL GROSS NATIONAL PRODUCT, TOTAL INDUSTRIAL PRODUCTION, AND UNITED STATES FREIGHT CARLOADINGS 1931 - 1950

	TOTAL GROSS NATIONAL PRODUCT		TOTAL INDUSTRIAL PRODUCTION		UNITED STATES FREIGHT CARLOADINGS	
Year	Billion 1939 Dollars	Index 1931= 100	Index 1935-39 = 100	Index 1931= 100	Index 1935-39 = 100	Index 1931= 100
1931	72.3	100	75	100	105	100
1932	61.9	86	58	77	78	74
1933	61.5	85	69	92	82	78
1934	67.9	94	75	100	89	85
1935	73.9	102	87	116	92	88
1936	83.9	116	103	137	107	102
1937	87.9	122	113	151	111	106
1938	84.0	116	89	119	89	85
1939	91.3	126	109	145	101	96
1940	100.0	138	125	167	109	104
1941	115.5	160	162	216	130	124
1942	129.7	179	199	265	138	131
1943	145.7	202	239	319	137	131
1944	156.9	217	235	313	140	133
1945	153.4	212	203	271	135	129
1946	138.4	191	170	227	132	126
1947	138.6	192	187	249	143	136
1948	143.5	199	192	256	138	131
1949	144.0	199	176	235	116	111
1950	156.2	216	200	267	128	122

Source: Federal Reserve Bulletin, December, 1952, p. 1319
The Economic Almanac 1953 - 1954, p. 370, 490

CHART II: INDICES OF TOTAL TONNAGE OF CARLOAD FREIGHT TERMINATED BY NEW ENGLAND CLASS I RAILROADS AND SELECTED NATIONAL BUSINESS INDICATORS 1931 - 1950

(1931 = 100)



Source: New England tonnage from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950; Business Indicators from "The Economic Almanac 1953-1954", New York, Thomas J. Crowell Co., 1953, pp. 152, 370, and 490.

England total freight and each business indicator to determine if this relationship is only a chance relationship or is due to changes in the same basic factors. The results of this analysis of correlation show that with only 1% chance of error there is a causal relationship between New England total freight and the three business indicators. The computations of the coefficients of correlation (r) will be found on page 87 as will the computations of the least significants value of r which allows us to say with 99% confidence that a causal relationship exists.

Total Industrial Production has the highest coefficient of correlation with New England total freight with an r value of .917 followed closely by U.S. Freight Carloadings with .914. Total Industrial Production has risen more than any other series in the 20 years covered by this study and has had the largest amount of fluctuation. The highest index that Total Industrial Production reached was 319 in 1943, the same year that New England total freight reached its high of 156. The similarity of movements in 1938, 1946, and 1949 are very evident from Chart II. Except for the greater increasing trend of Total Industrial Production it is plain that a change in one series will also produce a similar change in the other.

While U.S. Freight Carloadings and New England total freight have a coefficient of correlation of.914 which definitely shows a more than chance relationship, the index of New England total freight rose above that of U.S. Freight Carloadings during the years 1942 through 1945 and then dropped below again for the rest of the period of this study. The movements of each index show a great deal of similarity

with the exception of the greater influence of the war on the New England region. This relationship is to be expected since the national figures for carloading include those of the New England region.

When Total Gross National Product and New England total freight are analyzed a significant causal relationship is also found to exist with a coefficient of correlation of .828 for the two series. This is the lowest value of r for the three business indicators but is still well above the least significant value for r, .561, and leaves no doubt of this relationship. The index of Gross National Product has the least fluctuation but still the movements reflect the similarity to New England total freight.

The Consumer Price Index and the Wholesale Price Index were converted to a 1931 base and plotted with the index of New England total freight and in each case no similarity of movement was found and no further analysis was made of these two series in this study.

From this analysis of New England total freight and the selected national business indicators it was found that there is a causal relationship between New England total freight and Total Industrial Production, United States Freight Carloadings, and Total Gross National Product, with only one chance in 100 or error, and that the factors which produce changes in the Wholesale Price Index and Consumer Price Index have no influence on the index for New England total freight.

SECTION II

ANALYSIS OF COMMODITY GROUPS

The five commodity groups which comprise the total carload freight figures are those used by the Interstate Commerce Commission and are as follows:

Products of Agriculture
Animals and Products
Products of Mines
Products of Forest
Manufactures and Miscellaneous

The analysis on a group basis will show the actual tonnage terminated by the New England Class I railroads, what part of the total carload freight of the New England region each group has been, and what part the New England tonnage has been of the total United States tonnage for each group. The New England tonnage figures and indices on a 1931 base will be found in Table III on page 27 while Table IV on page 30 gives each group as a per cent of New England total freight and as a per cent of the United States tonnage of each group. The correlation of the index of each group with that of New England total freight has been computed to show the influence of each group on the total figures for New England. The computations for these coefficients will be found on page 88. As would be expected, the tonnage of each group appears to be a major factor in the correlation of each series with the index for total freight. Manufactures and Miscellaneous was the most influencial group with a coefficient of correlation, r, of .968, followed by Products of Mines with .951, Products of Forests

with .893, Products of Agriculture with .853, and Animals and Products about the same with .851. All values of r are well above the least significant value for the 1% level of confidence which is .561. This allows us to say, with the possibility of error being only one in a hundred, that the relationship so measured is not merely due to chance factors. These coefficients will be further discussed under each commodity group.

There has been a slight general increasing trend in all commodity groups over the 20 year period of this study with the possible exception of Products of Mines and Animals and Products which both ended the period close to their lowest index for the period. A definite increase in tonnage is indicated for Products of Forests and Manufactures and Miscellaneous. Products of Agriculture has had the steadiest movement and appears to have a definite downward trend from its high in 1945.

Products of Mines and Manufactures and Miscellaneous were the largest components of total New England freight with Products of Mines being the largest at the beginning of the period but with a downward trend. In 1937 the group Manufactures and Miscellaneous with its rising trend surpassed Products of Mines and thus became the largest group for the remainder of the period. The third largest group was Products of Agriculture with a fairly level but fluctuating trend. The fourth group was Products of Forests with a slightly rising trend and the smallest component of New England total freight was Animals and Products which was decreasing in importance during the period of this study.

The New England tonnage of all five groups when expressed

as a part of the national total for each group show a decline in each case with the possible exception of Animals and Products which held relatively steady. The groups in the order of New England's contribution to the national total of each group are as follows: Animals and Products, Manufactures and Miscellaneous, Products of Forests, Products of Agriculture, and Products of Mines.

Products of Agriculture

The red line in Chart III, page 28, shows the index of tonnage for Products of Agriculture in New England. The movements of this index have been quite regular except for a pronounced dip in 1944. The index falls steadily to a low in 1935 of 77 followed by a steady increase to its highest value of 156 in 1945, a gain of 79 points in 10 years, which is followed by a fairly sharp but constant decline to 90 in 1950, a drop of 66 points in five years. The coefficient of correlation for this group and New England total freight was .853 which is very close to that of Animals and Products. The tonnage base of the 1931 index is 4,792,000 tons, which is the third largest of the groups, while the coefficient of correlation would place this group in fourth place. This can be explained by the pattern of Products of Agriculture not following that of total freight as found in Chart I on page 17. It can be seen from Chart III that Products of Agriculture was not affected by conditions in 1938 and 1949 as were the other groups and New England total freight since the index of this group continued to rise through 1938 and merely continued its steady downward in 1949.

TABLE III: CARLOAD TONNAGE AND INDICES OF FREIGHT COMMODITY GROUPS

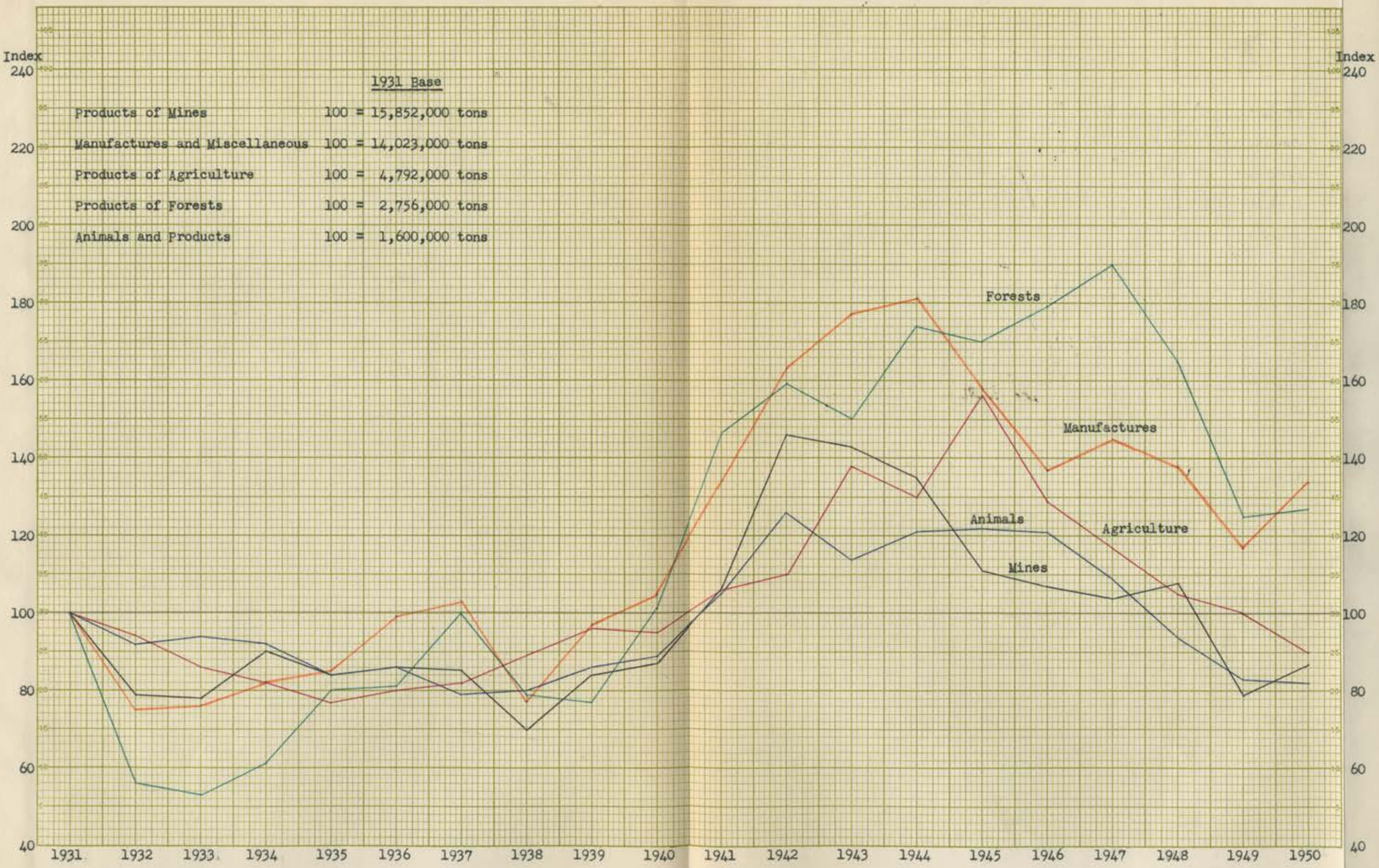
TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

(1931 = 100)

	PRODUCTS OF AGRICULTURE		ANIMALS AND PRODUCTS		PRODUCTS OF FORESTS		PRODUCTS OF MINES		MANUFACTURES AND MISCELLANEOUS	
Year	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index
1931	4,792	100.0	1,600	100.0	2,756	100.0	15,852	100.0	14,023	100.0
1932	4,527	94.4	1,465	91.6	1,534	55.7	12,451	78.5	10,535	75.1
1933	4,107	85.7	1,505	94.1	1,448	52.5	12,437	78.4	10,710	76.4
1934	3,916	81.7	1,466	91.6	1,676	60.8	14,328	90.3	11,419	81.5
1935	3,712	77.4	1,337	83.6	2,206	80.0	13,368	84.3	11,889	84.8
1936	3,827	79.8	1,383	86.4	2,236	81.1	13,705	86.4	13,843	98.7
1937	3,936	82.1	1,271	79.4	2,751	99.8	13,407	84.5	14,416	102.8
1938	4,243	88.5	1,280	80.0	2,168	78.7	11,163	70.4	10,848	77.3
1939	4,618	96.3	1,369	85.6	2,118	76.8	13,303	83.9	13,564	96.8
1940	4,549	94.9	1,420	88.8	2,770	100.5	13,754	86.7	14,663	104.6
1941	5,083	106.3	1,685	105.3	4,031	146.2	16,850	106.3	18,834	134.4
1942	5,283	110.2	2,008	125.5	4,391	159.3	23,136	145.9	22,809	162.7
1943	6,590	137.5	1,822	113.9	4,120	149.5	22,683	143.1	24,822	177.0
1944	6,227	129.9	1,933	120.8	4,793	173.9	21,360	134.6	25,396	181.1
1945	7,485	156.1	1,949	121.8	4,691	170.2	17,652	111.3	22,222	158.4
1946	6,179	128.9	1,929	120.6	4,943	179.3	16,944	106.9	19,183	136.8
1947	5,603	116.9	1,736	108.5	5,246	190.3	16,407	103.5	20,383	145.4
1948	5,013	104.6	1,498	93.6	4,548	165.0	17,146	108.1	19,288	137.6
1949	4,787	99.9	1,325	82.8	3,441	124.8	12,499	78.9	16,387	116.8
1950	4,291	89.5	1,312	82.0	3,509	127.3	13,777	86.8	18,834	134.4

Source: Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART III: INDICES OF CARLOAD TONNAGE OF FREIGHT COMMODITY GROUPS TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950.



Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

Products of Agriculture, the red line on Chart IV on page 31, as a per cent of New England total freight has had peaks in 1932, 1938, 1945, and 1949, with each having a sharp rise followed by a more gradual decline. The over-all trend appears to be a slight decline from an average of 12.5% of the total freight through 1940 to an average of 11.2% for the second half of the period. Products of Agriculture accounted for an average of 11.9% of New England total freight for the 20 year period of this study.

When the tonnage of this group is expressed as a part of the total United States tonnage of Products of Agriculture a clear downward trend in the importance of the New England region in the national transportation of this group becomes evident. There is a rise to 4.8% for 1939-1941 and a rise to 4.5% in 1945, but the average for the first half of the period was 4.6% compared to 3.9% for the second half. The average of 4.6% for the entire period would rank this group fourth as to the importance of the New England region contributing to the national total of each group. It should be noted that the fluctuations in the second part of Chart IV will appear larger than in the first part due to the scales used in presenting these sets of data, the scale of the second part being five times that of the first.

Animals and Products

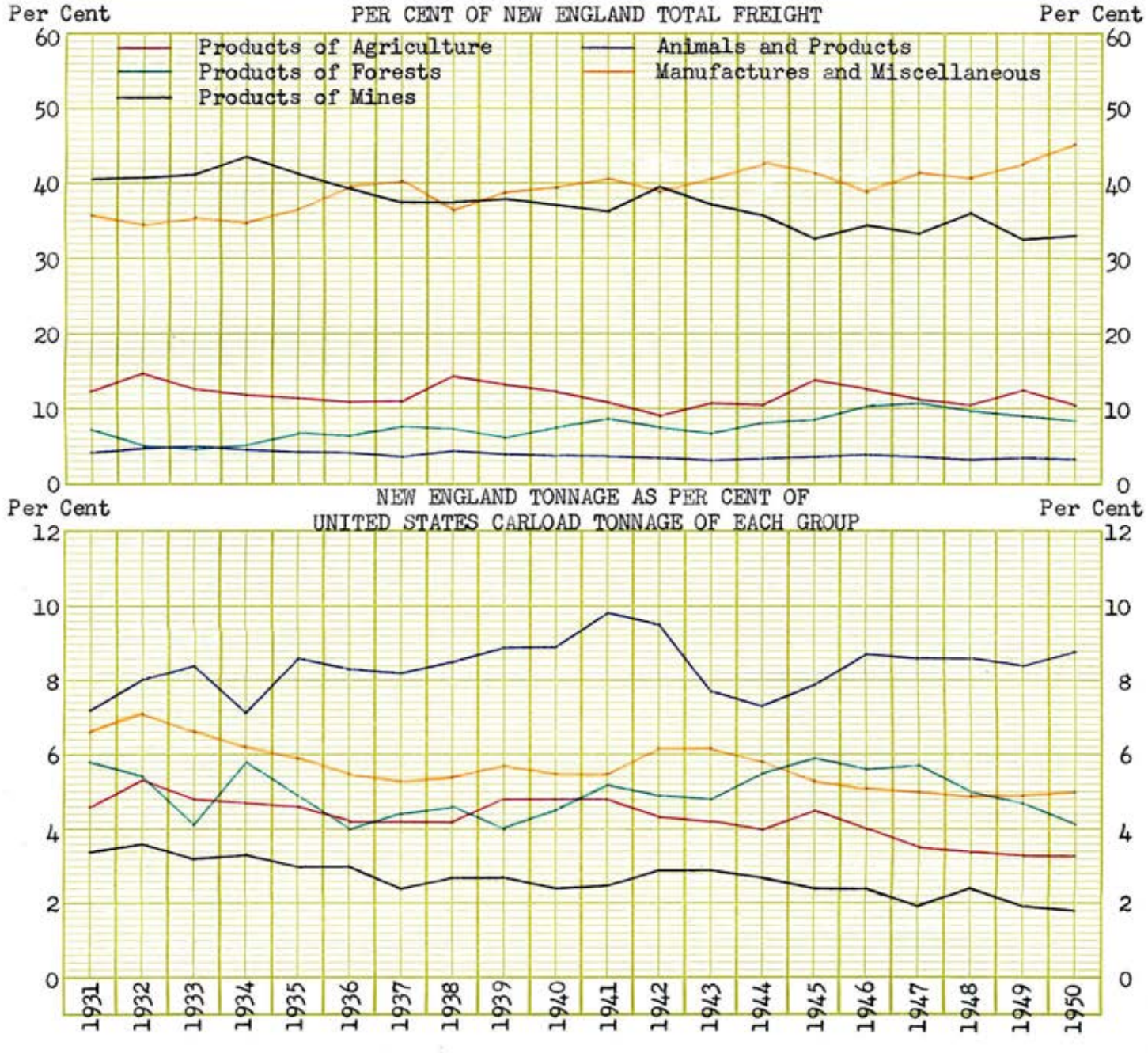
The blue line in Chart III shows the index of New England tonnage of Animals and Products for the period under consideration. This group had a fairly steady drop to a low of 79 in 1937 and rises to

TABLE IV: CARLOAD TONNAGE OF FREIGHT COMMODITY GROUPS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL FREIGHT AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH COMMODITY GROUP 1931 - 1950

	PRODUCTS OF AGRICULTURE		ANIMALS AND PRODUCTS		PRODUCTS OF FORESTS		PRODUCTS OF MINES		MANUFACTURES AND MISCELLANEOUS	
Year	% of NE Total	% of US Group	% of NE Total	% of US Group	% of NE Total	% of US Group	% of NE Total	% of US Group	% of NE Total	% of US Group
1931	12.3	4.6	4.1	7.2	7.1	5.8	40.6	3.4	35.9	6.6
1932	14.8	5.3	4.8	8.0	5.0	5.4	40.8	3.6	34.5	7.1
1933	13.6	4.8	5.0	8.4	4.8	4.1	41.2	3.2	35.5	6.6
1934	11.4	4.7	4.1	7.1	6.8	5.8	41.1	3.3	36.6	6.2
1935	11.4	4.6	4.1	8.6	6.8	4.9	41.1	3.0	36.6	5.9
1936	10.9	4.2	4.0	8.3	6.4	4.0	39.2	3.0	39.6	5.5
1937	11.0	4.2	3.6	8.2	7.7	4.4	37.5	2.4	40.3	5.3
1938	14.3	4.2	4.3	8.5	7.3	4.6	37.6	2.7	36.5	5.4
1939	13.2	4.8	3.9	8.9	6.1	4.0	38.0	2.7	38.8	5.7
1940	12.2	4.8	3.8	8.9	7.5	4.5	37.0	2.4	39.5	5.5
1941	10.9	4.8	3.6	9.8	8.7	5.2	36.2	2.5	40.5	5.5
1942	9.0	4.3	3.4	9.5	7.5	4.9	39.5	2.9	38.9	6.2
1943	10.8	4.2	3.0	7.7	6.7	4.8	37.1	2.9	40.6	6.2
1944	10.4	4.0	3.2	7.3	8.0	5.5	35.8	2.7	42.5	5.8
1945	13.9	4.5	3.6	7.9	8.7	5.9	32.7	2.4	41.2	5.3
1946	12.6	4.0	3.9	8.7	10.1	5.6	34.5	2.4	39.0	5.1
1947	11.3	3.5	3.5	8.6	10.6	5.7	33.2	1.9	41.3	5.0
1948	10.5	3.4	3.1	8.6	9.5	5.0	36.0	2.4	40.8	4.9
1949	12.5	3.3	3.4	8.4	9.0	4.7	32.5	1.9	42.6	4.9
1950	10.3	3.3	3.1	8.8	8.4	4.1	33.0	1.8	45.2	5.0

CHART IV: CARLOAD TONNAGE OF FREIGHT COMMODITY GROUPS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL FREIGHT AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH COMMODITY GROUP 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



its highest point of 126 in 1942. The index holds fairly constant until 1946 when it starts to decline to a 1950 index of 82. This group has the least fluctuation from its 1931 base of any of the other groups, ranging from a low of 79 to a high of 126, and presents the smoothest curve. The coefficient of correlation for this group and New England total freight was .851, the smallest of the five. The 1931 base of the index was also the smallest, 1,600,000 tons, which indicates the minor role of Animals and Products in influencing the New England total tonnage of carload freight. The tonnage of this group did not decrease in the early 1930's to the extent that total tonnage did and there was no decrease for this group in 1938.

In Chart IV the blue line represents this group as a part of the New England total freight. It is quite evident that this group has declined in almost a straight line from an average of 4.2% for 1931-1940 to 3.4% for 1941-1950. The average for the entire period is 3.8% which is the lowest of any group as is the coefficient of correlation and actual tonnage in the base year.

In the second part of Chart IV it will be found that Animals and Products is the group in which New England contributed the largest amount to the total United States tonnage. New England accounted for an average of 8.4% of the total for the period 1931-1950, 8.2% for the first half and 8.5% for the second. There appears to be a slight upward trend in the importance of New England in this group but there are also more relative fluctuations than in any other group which may be caused by the great influence of wool in the figures for this group. There was a sharp drop to 7.1% in 1938 which was quickly recovered in

1939. The decline during World War II is also evident but it also is recovered for the last five years of the period.

Products of Mines

The index of tonnage for Products of Mines is shown by the black line on Chart III and has the highest 1931 base, 15,852,000 tons. This index has had more erratic movements than the two previously discussed groups. There was a drop in the index to 79 and 78 in 1932 and 1933 respectively. However, it recovered to and remained in the middle 80's until 1941, except for a drop in 1938. The high point was reached in 1942 when the index went to 146, and declined in the next seven years to 79 in 1949, while ending the period in 1950 with an index of 87. This group closely followed the pattern of New England total freight although it was lower than total freight for the period 1945 through 1947 and again in 1949 and 1950. Products of Mines and New England total freight had a coefficient of correlation of .951, the second highest of the groups. The large increase in 1942, 1943, and 1944 can be accounted for by the increase in the rail transportation of crude petroleum which could not be carried by coastal water carriers due to war conditions and also by the increase in the tonnage of bituminous coal, the major commodity in this group.

The black line in Chart IV plainly shows a decline in Products of Mines as a part of New England total freight. At the beginning of the period it was the largest group but after 1942 it ranked second to Manufactures and Miscellaneous. The average per cent of New England total freight from 1931 to 1940 was 39.4% while in the

second half of the period of this study it accounted for only 35.1%. The decline is constant except for 1934, 1942, and 1940 which are the years in which the tonnage index for New England Products of Mines made its peaks. Although Products of Mines started the period as the largest component of the total, in only 1942 was it above Manufactures and Miscellaneous after 1938.

The importance of New England Products of Mines as a part of the United States total for this group has also declined. During the entire period 1931-1950 the New England region's contribution to total tonnage of Products of Mines in the United States has been the smallest of any group, accounting for only 2.7% of the total. The trend downward is revealed by the first half average of 3.0% of the total, dropping to 2.4% in the second half. While this group comprises a large part of the New England total freight, the New England tonnage does not make up a large part of the total tonnage of this group in the United States.

Products of Forests

The tonnage of Products of Forests in New England, as shown by the green line in Chart III, has had the greatest fluctuation of any group during the period 1931-1950. In the early 1930's it had a sharp fall to an index of 53 in 1933, while not reaching its highest point of 190 until 1947. This can probably be attributed to the fact that this group is almost entirely dependent on two commodities, Pulpwood and Lumber, shingle and lath, which make up over 80% of this group. The drop in 1938 continued through 1939 but was followed by

a rapid rise until 1942, when it tended to level out except for a drop in 1943. The fall from 1947 to 1949 was the sharpest postwar decline of all the groups, falling from 190 to 124 in just two years. This series and New England total freight had the third highest coefficient of correlation, .892, of all the groups which does not agree with the fourth ranking of the 1931 base of 2,756,000 tons. The movements in the index for Products of Forests have been very similar to those of New England total freight except that total freight reached its high in 1943, while there was a drop in Products of Forests which did not reach its peak until 1947, four years later.

The tonnage of Products of Forests expressed as a per cent of New England total freight, the green line in Chart IV, has had a rising trend. Although it is the second smallest group in New England, it has increased from only 6.5% of the total from 1931 through 1940 to 8.7% from 1941 through 1950, an increase of 2.2%. The movements of this series have been relatively smooth over the entire period with the per cent being just above that of Animals and Products, the lowest group, in the early 1930's, and rising to just below that of Products of Agriculture, the third lowest, in the late 1940's. The increase of 2.2% appears to account fairly well for the decreases of 1.3% in Products of Agriculture and .8% in Animals and Products, the other two relatively small groups.

The New England tonnage when expressed as per cent of the total United States tonnage of Products of Forests shows a rather erratic pattern of movement. The averages of the two halves of the period of this study would indicate a slight upward trend since there

is an increase from 4.8% to 5.1% in these averages. The trend from 1945 to 1950 seems to be falling rather sharply, with the 1950 figure of 4.1% barely above the two previous lows of 4.0% in 1936 and 1939.

Manufactures and Miscellaneous

The last group to be considered is Manufactures and Miscellaneous which is represented in Charts III and IV by an orange line. The 1931 base of 14,023,000 tons for the tonnage index is the second largest of the five groups, Products of Mines being first, while the coefficient of correlation with New England total freight is the highest, .968. This can be explained by the shift from ranking second in tonnage during the first part of the period to becoming the largest group in the later part. There is a decline in the index during the depression years with a smooth increasing rise, except for 1938, which reached its highest point of 181 in 1944. The index appears to be leveling off higher than the 1931 level with the influence of 1949 apparent by the drop to 117, followed by a 1950 index of 134. Of the five groups, Manufactures would appear to have had the steadiest increase in tonnage for the period.

The orange line in Chart IV shows the increase of Manufactures in the New England region. The increase has been fairly constant for the entire period, rising from a 1931-1940 average of 37.4% of the New England total freight to 41.3% for 1941-1950, an increase of 2.9%. It can also be seen from Chart IV that this group has replaced Products of Mines as the largest component of New England freight, with the increase of 2.9% almost counteracting the similar decrease of 3.7% for

Products of Mines. It can also be seen that the movements of one group result in counter-movements in the other. These two groups are by far the largest groups and their movement would be expected to be important to each other as well as to the figure for total freight.

The second part of Chart IV reveals a decline in the importance of New England Manufactures and Miscellaneous as a part of the United States total tonnage. The decline is almost a straight line from 1932 to 1937 with a rise in 1942 and 1943, followed by a decline to 1950. The rise to 6.2% during the war years was influenced by the sharp increase in New England rail transportation of petroleum products. The average of 6.0% of the United States total for the first half of the 20 year period dropped to 5.4% in the second half. The extent of this decline, as shown by the two averages, appears to be reduced by the influence of the war years on the second average. The importance of the New England region in contributing to the national total tonnage of each group for Manufactures and Miscellaneous is exceeded only by Animals and Products and is followed by Products of Forests, Products of Agriculture, and Products of Mines, the group in which New England make the smallest contribution to the national total.

SECTION III

ANALYSIS OF SELECTED COMMODITIES IN EACH GROUP

The complete list of commodities selected will be found in the Introduction on page 10. The three commodities which made the largest contribution to the total New England tonnage of the commodity group of which each is a part have been selected for use in this analysis. In the case of Products of Forests it was found the two commodities; Pulpwood and Lumber, shingle and lath; contributed more than 80% of the tonnage while each other commodity in this group contributed an insignificant amount. For a description of groupings of commodity classes for use in this analysis see page 13. This analysis includes the actual tonnage of carload freight terminated by the New England Class I railroads, each commodity as a part of the New England commodity group, and the New England tonnage as a part of the total tonnage of each commodity in the United States.

PRODUCTS OF AGRICULTURE

The three commodities of greatest importance to the New England total tonnage of Products of Agriculture are Flour, wheat; Mill products, NOS; and Oranges and grapefruit. The figures for these commodities will be found in Table V on page 39 and Table VI on page 42.

Flour, wheat

The tonnage index of Flour, wheat, is represented in Chart V on page 40 by the green line and has a 1931 tonnage base of 695,000

TABLE V: CARLOAD TONNAGE AND INDICES OF SELECTED PRODUCTS OF AGRICULTURE TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

(1931 = 100)

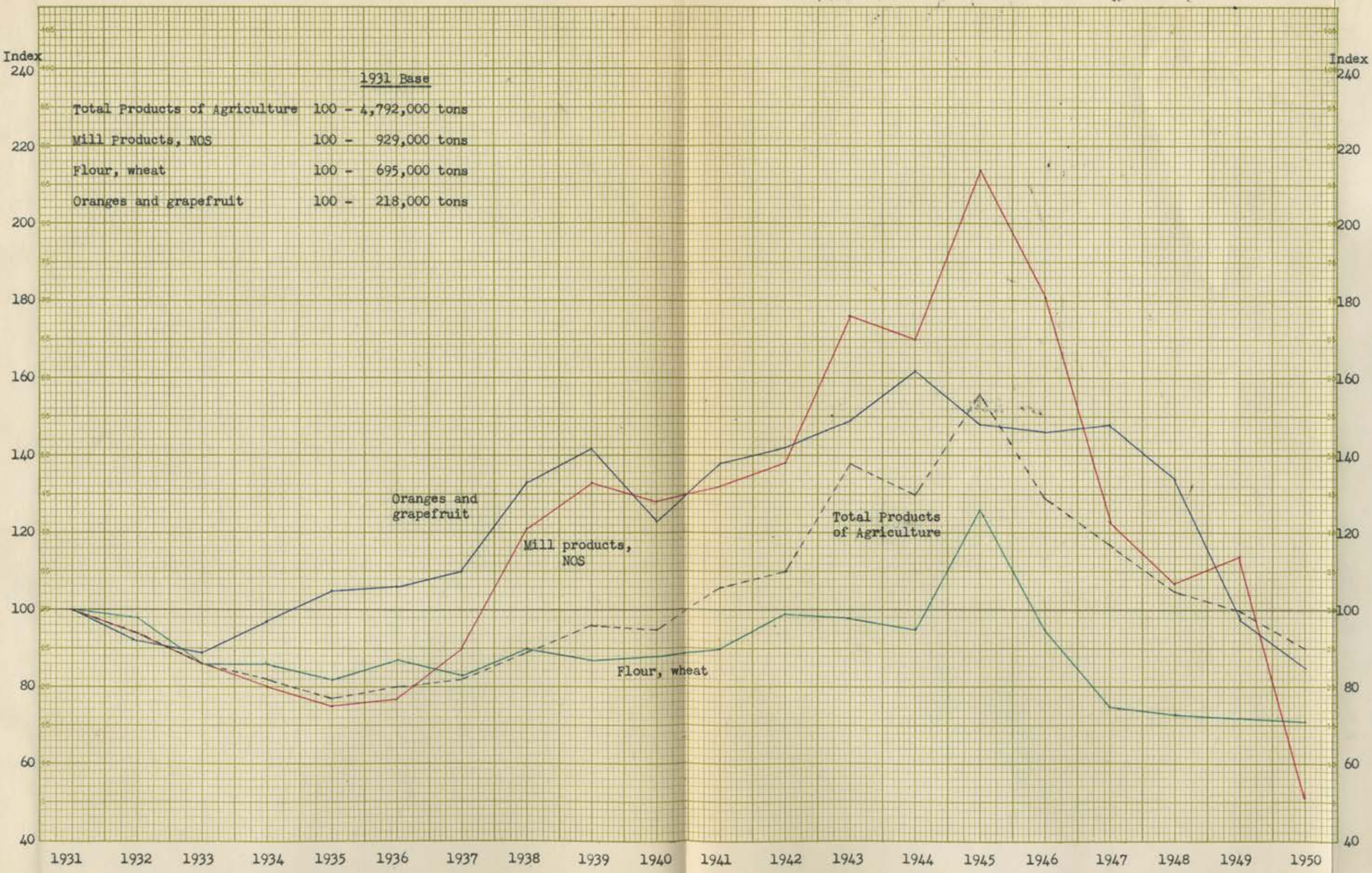
Year	FLOUR, WHEAT		MILL PRODUCTS NOS		ORANGES AND GRAPEFRUIT	
	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index
1931	695	100.0	929	100.0	218	100.0
1932	678	97.6	872	93.9	200	91.7
1933	597	85.9	798	85.9	195	89.4
1934	599	86.2	747	80.4	211	96.8
1935	572	82.3	700	75.3	228	104.6
1936	603	86.8	714	76.9	232	106.4
1937	576	82.9	832	89.6	239	109.6
1938	623	89.6	1,122	120.8	289	132.6
1939	605	87.1	1,238	133.3	310	142.2
1940	608	87.5	1,185	127.6	268	122.9
1941	623	89.6	1,223	131.6	301	138.1
1942	689	99.1	1,286	138.4	309	141.7
1943	679	97.7	1,633	175.8	325	149.1
1944	659	94.8	1,577	169.7	354	162.4
1945	878	126.3	1,992	214.4	323	148.2
1946	662	95.3	1,679	180.7	319	146.3
1947	522	75.1	1,138	122.5	322	147.7
1948	507	73.0	998	107.4	291	133.5
1949	501	72.1	1,063	114.4	213	97.7
1950	493	70.9	471	50.7	186	85.3

Source: Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART V: INDICES OF CARLOAD TONNAGE OF TOTAL AND SELECTED PRODUCTS OF AGRICULTURE

TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

	1931 Base
Total Products of Agriculture	100 - 4,792,000 tons
Mill Products, NOS	100 - 929,000 tons
Flour, wheat	100 - 695,000 tons
Oranges and grapefruit	100 - 218,000 tons



Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

tons, the second largest of the three commodities. This index has the lowest trend, rising above the 1931 base in only one year, 1945. This series also has the smoothest curve with only minor movements, except for a jump to 126 in 1945. The index remained in the 80's from 1933 until 1941 when it rose to the 90's until 1947, with the exception of 1945. In the last four years of the period it dropped to the low 70's. The broken line on Chart V is the index of total Products of Agriculture in New England and it can be seen that Flour, wheat, fairly well follows the pattern set by the entire commodity group.

In Chart VI, page 43, the green line shows Flour, wheat, as a per cent of the New England tonnage of Products of Agriculture. A steady decline in the importance of this commodity is readily apparent. The average per cent of Products of Agriculture for the first ten years was 14.6% which dropped to 11.0% in the last ten year period, a decrease of 3.6%. In the composition of the total group this is the second largest commodity.

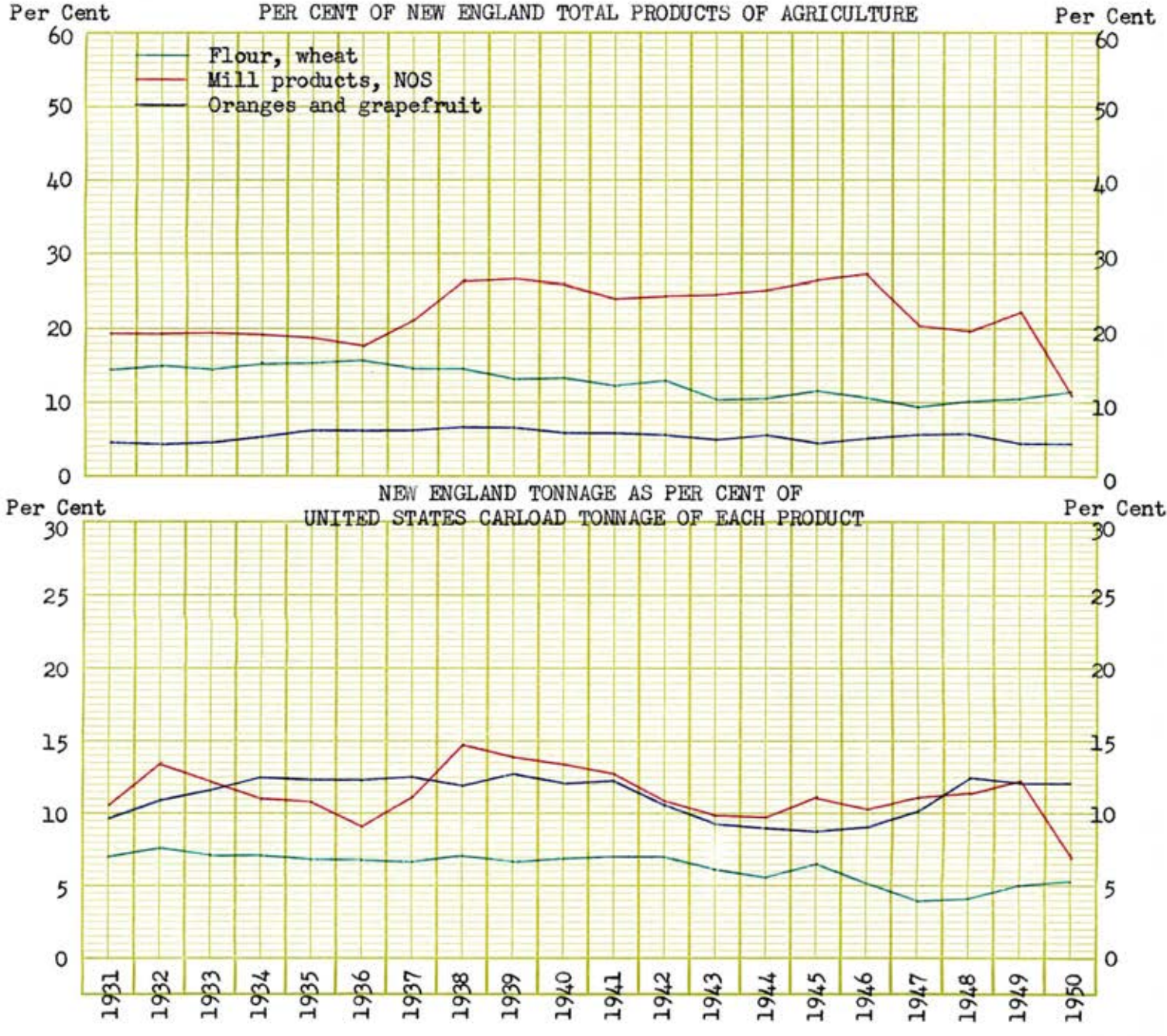
When New England Flour, wheat, is considered as part of the national total tonnage it is evident that in this commodity New England furnishes the lowest amount of the total and, like the other two commodities, has a slight downward trend. All three commodities suffered a decrease in the semi-averages for the period of approximately 1.4% but the decline in Flour, wheat, has been the most constant. Its decrease was gradual until 1945 when it dropped from 6.5% to 3.9% in 1947, followed by a steady increase to 5.3% in 1950.

TABLE VI: CARLOAD TONNAGE OF SELECTED PRODUCTS OF AGRICULTURE TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF AGRICULTURE AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

	FLOUR, WHEAT		MILL PRODUCTS NOS		ORANGES AND GRAPEFRUIT	
Year	% of NE Group	% of US Product	% of NE Group	% of US Product	% of NE Group	% of US Product
1931	14.5	7.0	19.4	10.6	4.5	9.7
1932	15.0	7.6	19.3	13.4	4.4	10.9
1933	14.5	7.1	19.4	12.2	4.7	11.6
1934	15.3	7.1	19.1	11.0	5.4	12.5
1935	15.4	6.9	18.9	10.8	6.1	12.3
1936	15.8	6.8	17.7	9.1	6.1	12.3
1937	14.6	6.7	21.1	11.1	6.1	12.5
1938	14.7	7.1	26.4	14.7	6.8	11.9
1939	13.1	6.7	26.8	13.9	6.7	12.7
1940	13.4	6.9	26.0	13.4	5.9	12.1
1941	12.3	7.0	24.1	12.7	5.9	12.3
1942	13.0	7.0	24.3	10.9	5.8	10.5
1943	10.3	6.1	24.8	9.9	4.9	9.3
1944	10.6	5.6	25.3	9.8	5.7	9.0
1945	11.7	6.5	26.6	11.2	4.3	8.7
1946	10.7	5.1	27.2	10.3	5.2	9.1
1947	9.3	3.9	20.3	11.1	5.7	10.1
1948	10.1	4.2	19.9	11.4	5.8	12.5
1949	10.5	5.0	22.2	12.3	4.4	12.2
1950	11.5	5.3	11.0	6.9	4.3	12.2

CHART VI: CARLOAD TONNAGE OF SELECTED PRODUCTS OF AGRICULTURE TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF AGRICULTURE AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



Mill products, NOS

The largest component of Products of Agriculture in New England has been Mill products, NOS, which is shown as a red line in Chart V with a 1931 tonnage index base of 929,000 tons. This index has had a fairly constant movement, falling gradually to 75 in 1935, from which it rose to 133 in 1939 where it leveled off before starting its rapid wartime increase in 1941. The wartime increase in tonnage sent the index from 132 in 1941 to 214 in 1945, but this was soon lost with the index falling to 123 by 1947 and to a low for the entire 20 year period of only 51 in 1950, which was preceded by a slight recovery to 114 in 1949 before the final extreme drop. The great influence of this commodity on the total for Products of Agriculture is evidenced by the similarity of their patterns as shown in Chart V except for 1950 when Mill products, NOS, had a very low tonnage.

In Chart V the red line represents Mill products as a per cent of New England Products of Agriculture. This figure shows a gradual decline from 19.4% of the total in 1931 to 17.7% in 1936 when a relatively sharp increase occurred, increasing the figure to 26.4% in 1938 where it remained fairly constant for a period of three years. In 1941 this percentage dropped to 24.1% which was followed by a gradual increase to 27.2% in 1946, the highest for the 20 year period. From this peak there was a drop in 1947 to 20.3% and a further drop from 22.2% in 1949 to only 11.0% of the total in 1950. This commodity seems to have fairly long gradual movements between short sharp movements. The final figure of 11.0% in 1950 is below

that for Flour, wheat, but Mill products is definitely the largest component of Products of Agriculture in New England.

In the second part of Chart VI Mill products in New England is shown to have a downward trend in contributing to the national total for Mill products. After the rise to 13.4% in 1932 there was a steady decline to 9.1% in 1936, after which it rose to 14.7% in 1938 but declined again to 9.8% in 1944. The percentage figure rose slowly to 12.3% in 1949 but in 1950 it dropped to only 6.9% of the national total. The averages for the two halves of the period under study show a decline from 12.0% in the first half to 10.7% in the second half, with an over-all average of 11.3% for the entire period. This figure would rank this commodity as the one in which New England contributed the greatest amount to the national commodity total.

Oranges and grapefruit

Oranges and grapefruit has the smallest tonnage base of the three commodities, 218,000 tons in 1931, and the movements of this index are portrayed by the blue line in Chart V. The index did not fall as far or for as long during the early 1930's as the other two commodities and the total for Products of Agriculture in New England. It made its low of 89 in 1933 while the others reached their lows of approximately 80 in 1935 when the index of Oranges and grapefruit was at 150, on its rise to a peak made in 1939. There was a drop in the index from 142 to 123 in 1940 and the rise is continued to its highest point of 162 in 1944. The early postward decline was relatively gradual until 1946 when it started a sharp decline to a low for the

entire period of 85 in 1950.

Oranges and grapefruit as a part of New England Products of Agriculture, as shown by the blue line in Chart VI, has been almost constant as measured by the averages for 1931-1940 and 1941-1950. These averages show a decline of only .5% for the two half periods with an average for the full period of 5.4%. The trend during the first period was upward to a peak of 6.8% in 1938, while after that year there was a slow decline to 4.3% in 1950. This has been the smallest commodity of this group in New England.

The New England tonnage of Oranges and grapefruit as a part of the United States total shows an over-all decline. There is a rise from 9.7% in 1931 to 12.5% in 1934 where it levels off until it drops gradually from 12.3% in 1941 to 8.7% in 1945. This drop is recovered fairly rapidly while ending the period at 12.2% for 1949 and 1950. The average for the years through 1940 was 11.9% while the postwar decline influenced the average of the second half and resulted in an average of 10.6%. Oranges and grapefruit ranks about the same as Mill products, NOS, with respect to New England's share in producing the total tonnage of each commodity in the United States. Both these groups averaged a little over 11% for the entire period with Mill products being only very slightly higher than Oranges and grapefruit.

ANIMALS AND PRODUCTS

The three commodities included in the group Animals and Products that are the most important in the New England region are

Fresh meats, NOS; Wool, mohair; and Hides. The figures for these commodities will be found in Table VII on page 48 and Table VIII on page 50. For an explanation of the change in classification in 1947 as it effects Wool, mohair; and Hides, see page 13.

Fresh Meats, NOS

The tonnage index of Fresh meats, NOS, is shown in Chart VII on page 49 by the red line. The 1931 index base is 495,000 tons and is the largest base of the three commodities selected in this group. This index fluctuates the least from the 1931 base although a slight upward trend in tonnage is indicated by Chart VII, except for the war years when a decline would be expected for this commodity. The pre-war high was 114 in 1941, while in 1947 it surpassed this figure and remained above 110 for the remaining years of the period, ending the period at 113 in 1950. The similarity of the patterns of Fresh meat, NOS, and total Animals and Products in New England is as would be expected due to the fairly large tonnage of this commodity, but in the war years the influence of the large increase in tonnage of Wool, mohair, on the total index is apparent.

In Chart VIII, page 51, the red line also represents Fresh meats, NOS. An increase in the importance of Fresh meats to the New England total Animals and Products for the period 1931 through 1940 is plainly indicated. During the war this per cent of the total group took a severe drop, from 38.4% in 1940 to 25.8% in 1942, continuing downward to 22.2% in 1946. In 1947 there was a rapid increase to 34.0% and the highest point of 43.8% of the total was reached in 1949. The large increase in tonnage of Wool, mohair, during the war

TABLE VII: CARLOAD TONNAGE AND INDICES OF SELECTED ANIMALS AND PRODUCTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

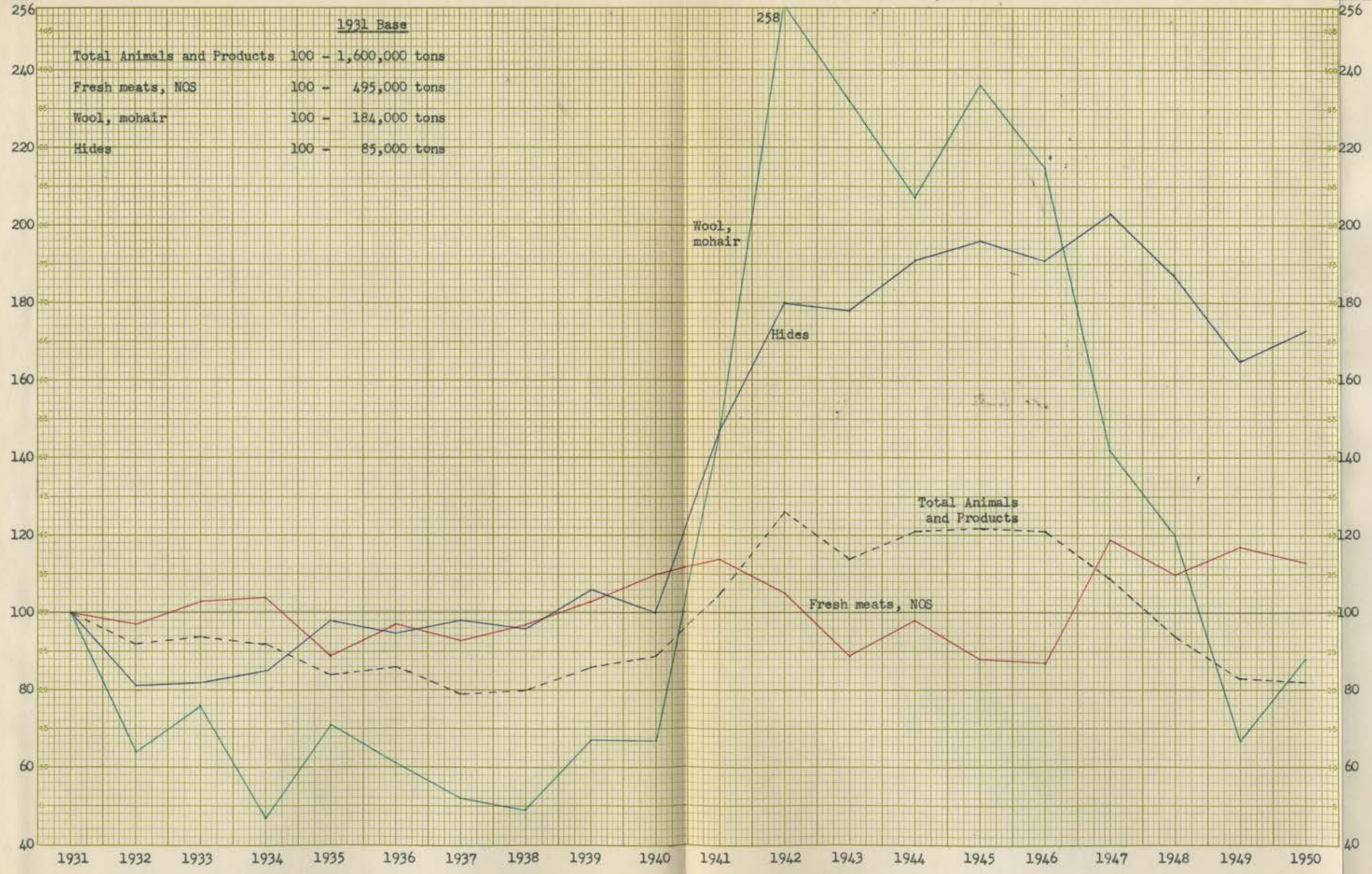
(1931 = 100)

Year	FRESH MEATS, NOS		WOOL, MOHAIR		HIDES	
	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index
1931	495	100.0	184	100.0	85	100.0
1932	482	97.4	117	63.6	69	81.1
1933	512	103.4	139	75.5	70	82.3
1934	513	103.6	86	46.7	72	84.7
1935	439	88.7	130	70.6	83	97.6
1936	481	97.2	112	60.9	81	95.3
1937	459	92.7	95	51.6	83	97.6
1938	482	97.4	91	49.4	82	96.4
1939	510	103.0	123	66.8	90	105.8
1940	546	110.3	123	66.8	85	100.0
1941	562	113.5	268	145.6	125	147.0
1942	519	104.8	474	257.6	153	179.9
1943	438	88.5	426	231.5	151	177.6
1944	487	98.4	380	206.5	162	190.5
1945	437	88.3	435	236.4	167	196.4
1946	428	86.5	395	214.6	162	190.5
1947	590	119.2	262	142.4	173	203.4
1948	542	109.5	220	119.5	159	187.0
1949	580	117.2	123	66.8	140	164.6
1950	559	112.9	161	87.5	147	172.9

Source: Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART VII: INDICES OF CARLOAD TONNAGE OF TOTAL AND SELECTED ANIMALS AND PRODUCTS

TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950



Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

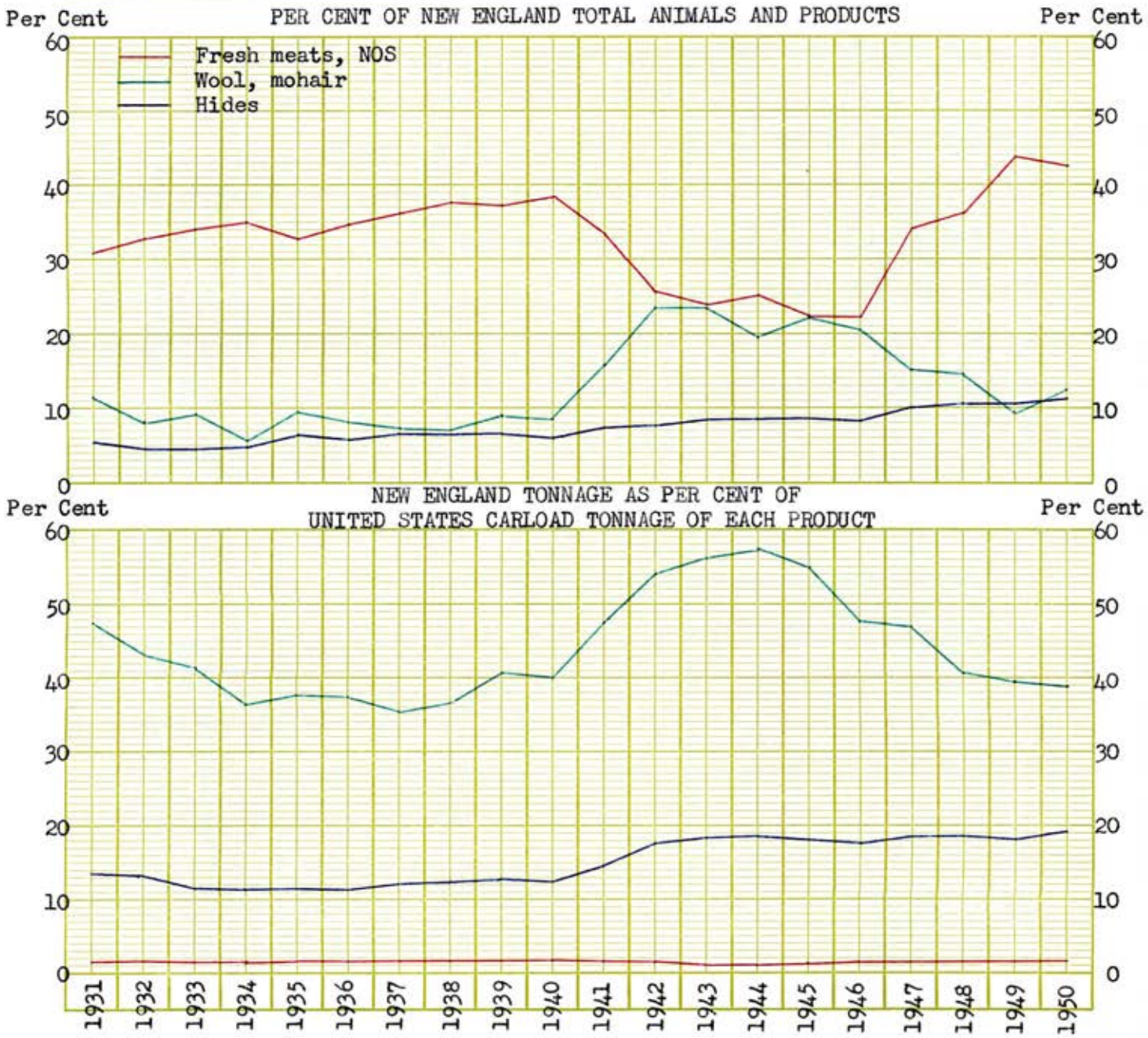
TABLE VIII: CARLOAD TONNAGE OF SELECTED ANIMALS AND PRODUCTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL ANIMALS AND PRODUCTS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT

1931 - 1950

Year	FRESH MEATS, NOS		WOOL, MOHAIR		HIDES	
	% of NE Group	% of US Product	% of NE Group	% of US Product	% of NE Group	% of US Product
1931	30.9	1.7	11.5	47.4	5.3	13.7
1932	32.9	1.8	8.0	43.2	4.7	13.2
1933	34.0	1.7	9.2	41.4	4.7	11.7
1934	35.0	1.6	5.9	36.3	4.9	11.2
1935	32.8	1.7	9.7	37.8	6.2	11.5
1936	34.8	1.6	8.1	37.3	5.9	11.4
1937	36.1	1.7	7.5	35.3	6.5	12.1
1938	37.7	1.7	7.1	36.8	6.4	12.5
1939	37.3	1.7	9.0	40.8	6.6	12.9
1940	38.4	1.7	8.7	40.0	6.0	12.5
1941	33.3	1.6	15.9	47.7	7.4	14.6
1942	25.8	1.4	23.6	54.0	7.6	17.7
1943	24.0	1.0	23.4	56.1	8.3	18.4
1944	25.2	1.0	19.7	57.2	8.4	18.6
1945	22.4	1.1	22.3	54.9	8.6	18.1
1946	22.2	1.3	20.5	47.7	8.4	17.8
1947	34.0	1.4	15.1	47.0	10.0	18.6
1948	36.2	1.5	14.7	40.8	10.6	18.8
1949	43.8	1.6	9.3	39.5	10.6	18.1
1950	42.6	1.7	12.3	38.9	11.2	19.1

CHART VIII: CARLOAD TONNAGE OF SELECTED ANIMALS AND PRODUCTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL ANIMALS AND PRODUCTS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



years largely accounts for the decrease in Fresh meats, NOS, as a per cent of total Animals and Products in New England.

The New England tonnage of Fresh meats, NOS, when expressed as part of the United States total of this commodity shows a very constant movement. For the first half of the period it remained almost constant at 1.7%, the average of the first half. The second half of the period shows a decline to a low in 1.0% of the national total in 1943 and 1944, with the recovery from 1946 at a rate of .1% per year, from 1.3% in 1946 to 1.7%, the average of the first half in 1950. It is very evident that New England has very little importance in the United States transportation of this commodity and that the relationship is very constant.

Wool, mohair

The tonnage index for Wool, mohair has had the largest fluctuations of any of the commodities selected in this group, as can be seen by the green line in Chart VII. The 1931 base of 184,000 tons for this index is the second largest of the three commodities and the fluctuations from this base have been very great, dropping to 47 in 1934 and rising to 258 in 1942. The movements of this index have been severe as indicated by the declines and rises in the early 1930's and the increase of 191 points from 1940 to 1942. The sharp postwar drop of 148 points, from 215 in 1946 to 67 in 1949, indicates the great influence of the war on the tonnage of this commodity terminated in New England. The influence of this increase in tonnage of Wool can be seen in the pattern for total Animals and Products, the broken line in Chart VII. From the actions of the Wool index it

would be very difficult to say that there was a definite trend in the actual tonnage of this commodity in New England.

In Chart VIII, where the green line shows the tonnage of Wool, mohair, as a part of the New England total Animals and Products, it can be seen that this figure remained fairly constant during the 1930's with an average of 8.5% of the total for the first half of the period under study. The average for the second half was 17.7%, but the downward trend since 1945 shows this figure to be approaching its prewar level with figures of 9.3% and 12.2% for 1949 and 1950 respectively. The highest figure for this commodity was 23.4% which was reached in 1942, only 2.2% below that of Fresh meats, NOS.

A fairly well defined reduction in the importance of New England as part of the national total tonnage of Wool, mohair, for the period 1931 to 1937 is shown in the second part of Chart VIII. From a low of 35.3% in 1937 the trend is upward to a peak of 57.2% in 1944. The postwar decline appears to be leveling out at approximatley the prewar average of 39.6% of the national total. The New England contribution to the national totals of each commodity is greatest for Wool, mohair, with Hides and Fresh meats, NOS, following in that order.

Hides

The third commodity in this group, Hides, is represented by the blue line in Chart VII and Chart VIII. The 1931 tonnage index is based on 85,000 tons and is the smallest of the three commodities, indicating its relative minor position in New England Animals and Products. From its low of 81 in 1932 the index rose fairly gradually

to 100 in 1940 when it took a sharp turn upwards to 180 in 1942 when its rise became more gradual to a peak in 1947 of 203. The decline from this peak has not been too great, having an index in 1950 of 173. This index does not appear to move consistently with the index of Animals and Products but it should be remembered that Hides is the smallest of the three major commodities in this group, being only one sixth the size of Fresh meats, NOS, in 1931.

In Chart VII the blue line shows Hides to be constantly increasing as a part of its commodity group in New England. The average per cent of total Animals and Products from 1931-1940 was 5.7% while from 1941-1950 it increased to 9.1%, a gain of 3.4%. The figures for 1931 and 1950 were 5.3% and 11.2% respectively. Hides is definitely in third place for all years except 1949 when it accounted for 10.6% of the total while Wool, mohair, accounted for 9.3%.

Expressing the tonnage of Hides in New England as a part of the United States total for Hides also shows an apparent increase but of a different nature. For the first half of the period it averaged 12.3% of the total with only a slight upward trend, from 11.7% in 1933 to 12.5% in 1940. From 1940 to 1942 there was a sharp increase to 14.6% which was followed by a very gradual increase to 19.1% in 1950, resulting in an average for the second half of the period of 18.0% of the total United States tonnage. Hides terminated in New England accounted for an average of 15.1% of the national total for the entire period but there was a definite upward trend in this figure during the period of this study.

PRODUCTS OF MINES

The three commodities selected in Products of Mines are Anthracite coal, Bituminous coal, and Coke. The figures for these three commodities will be found in Table IX on page 56 and Table X on page 58. It should be noted that Coke is a relatively minor commodity in this group.

Anthracite coal

The index for the tonnage of Anthracite coal terminated in New England is shown by the green line in Chart IX on page 57 and has the second largest 1931 base, 7,205,000 tons. This index remains below the 1931 base for every year except 1944 when it went to 106. A low of 70 was reached in 1932 with the index recovering to 85 in 1933 and a constant decline following to another low of 66 in 1938. The highest index was 106 in 1944, reached after a constant increase, while the postwar decline was characterized by irregular movements which terminate in an index of 69 for 1950. The fluctuations in this index have been the least of the three commodities and the influence of Anthracite coal is evident in both the pattern and magnitude of the index for total Products of Mines.

In Chart X on page 59 the green line representing Anthracite coal as a part of New England Products of Mines shows a general decline in the importance of this commodity. The average per cent of the total for the first half of the period was 35.2% with a fairly distinct downward trend. The sharp drop to 18.0% in 1943 is due mainly to the tremendous increase in the tonnage of Crude petroleum transported by

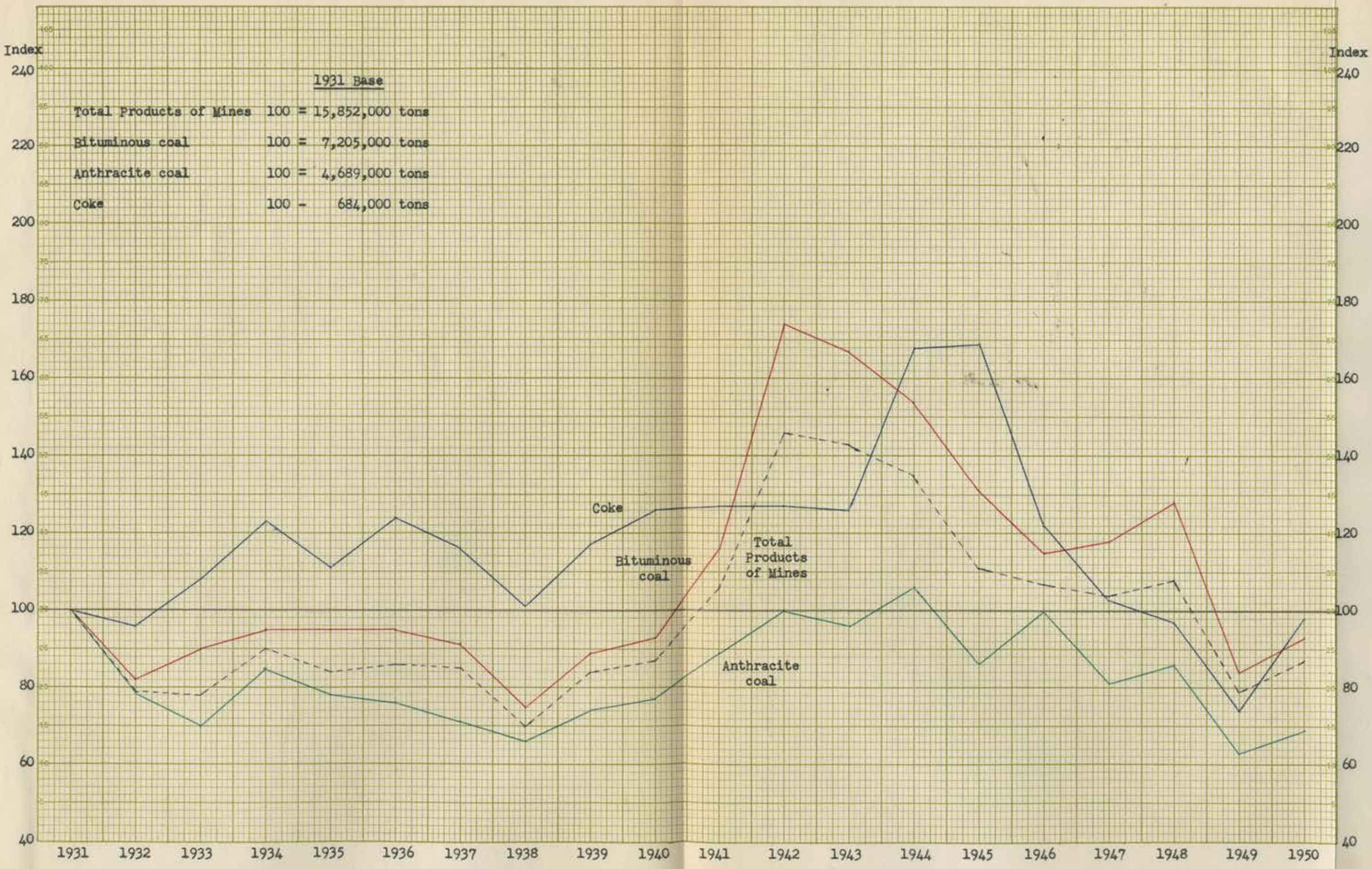
TABLE IX: CARLOAD TONNAGE AND INDICES OF SELECTED PRODUCTS OF MINES TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

(1931 = 100)

Year	ANTHRACITE COAL		BITUMINOUS COAL		COKE	
	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index
1931	6,104	100.0	6,554	100.0	699	100.0
1932	4,812	78.8	5,403	82.4	672	96.1
1933	4,296	70.4	5,863	89.5	755	108.0
1934	5,216	85.4	6,254	95.4	856	122.5
1935	4,744	77.7	6,246	95.3	779	111.4
1936	4,633	75.9	6,218	94.9	865	123.7
1937	4,347	71.2	5,960	90.9	813	116.3
1938	4,034	66.1	4,932	75.3	704	100.7
1939	4,521	74.1	5,842	89.1	814	116.5
1940	4,674	76.6	6,077	92.7	877	125.5
1941	5,458	89.4	7,588	115.8	886	126.8
1942	6,074	99.5	11,391	173.8	887	126.9
1943	5,881	96.3	10,938	166.9	881	126.0
1944	6,647	105.9	10,087	153.9	1,177	168.4
1945	5,261	86.2	8,601	131.2	1,180	168.8
1946	6,075	99.5	7,562	115.4	852	121.9
1947	4,971	81.4	7,719	117.8	723	103.4
1948	5,274	86.4	8,396	128.1	678	97.0
1949	3,822	62.6	5,502	83.9	520	74.4
1950	4,181	68.5	6,067	92.6	684	97.9

Source: Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART IX: INDICES OF CARLOAD TONNAGE OF TOTAL AND SELECTED PRODUCTS OF MINES TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950



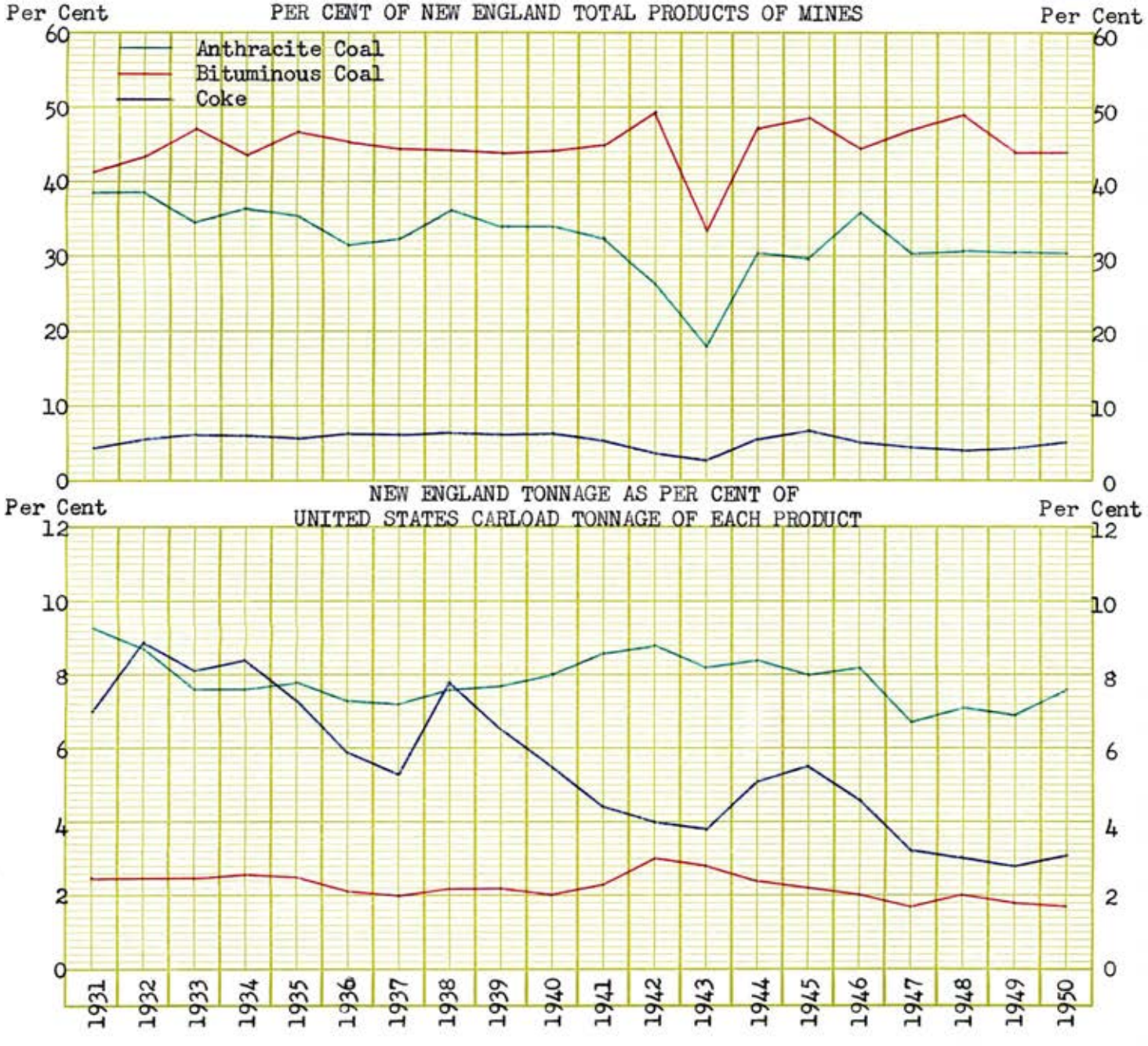
Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

TABLE X: CARLOAD TONNAGE OF SELECTED PRODUCTS OF MINES TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF MINES AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

	ANTHRACITE COAL		BITUMINOUS COAL		COKE	
Year	% of NE Group	% of US Product	% of NE Group	% of US Product	% of NE Group	% of US Product
1931	38.5	9.3	41.3	2.5	4.4	7.0
1932	38.6	8.7	43.4	2.5	5.4	8.9
1933	34.5	7.6	47.1	2.5	6.1	8.1
1934	36.4	7.6	43.6	2.6	6.0	8.4
1935	35.5	7.8	46.9	2.5	5.8	7.3
1936	31.7	7.3	45.4	2.1	6.3	5.9
1937	32.4	7.2	44.5	2.0	6.1	5.3
1938	36.1	7.6	44.2	2.2	6.3	7.8
1939	34.0	7.7	43.9	2.2	6.1	6.5
1940	34.0	8.0	44.2	2.0	6.4	5.5
1941	32.4	8.6	45.0	2.3	5.3	4.4
1942	26.3	8.8	49.3	3.0	3.8	4.0
1943	18.0	8.2	33.5	2.8	2.7	3.8
1944	30.3	8.4	47.2	2.4	5.5	5.1
1945	29.8	8.0	48.7	2.2	6.7	5.5
1946	35.9	8.2	44.6	2.0	5.0	4.6
1947	30.3	6.7	47.0	1.7	4.4	3.2
1948	30.8	7.1	49.0	2.0	4.0	3.0
1949	30.6	6.9	44.0	1.8	4.2	2.8
1950	30.3	7.6	44.0	1.7	5.0	3.1

CHART X: CARLOAD TONNAGE OF SELECTED PRODUCTS OF MINES TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF MINES AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



rail in that year because war conditions prevented its shipment by water carrier, the usual mode of transportation for this commodity. If 1943 is eliminated as an erratic factor from the second half of the period, the average for Anthracite coal becomes 30.7% instead of 29.5%, which would decrease the difference from 5.7% to 5.1% between the averages for the two halves. The figures for the last four years of the period were very constant, remaining between 30.3% and 30.9% of the total tonnage of Products of Mines in New England.

The New England tonnage of Anthracite coal as a part of the national tonnage of this commodity shows almost no decline when measured by the semi-averages since the average for the first half was 7.9% compared to 7.8% for the second. From the green line in the second part of Chart X it can be seen that the figure dropped to 7.6% in 1933 and remained fairly constant until 1939, when it began to rise to its peak of 8.8% in 1942. The decline from this peak was irregular with a sharp drop being made in 1947, followed by a slow, irregular increase to 7.6% in 1950. For Products of Mines, Anthracite coal is the commodity in which New England contributes the largest portion of the United States tonnage of each commodity.

Bituminous coal

The index of Bituminous coal is portrayed by the red line in Chart IX and has the largest tonnage base in this group, 7,205,000 tons. This index has had fairly regular movements, except for the drops to 82 in 1932 and to 75 in 1938. The index stayed in the 90's and high 80's from 1932 to 1940, except for 1938, and then rose sharply to its highest point of 174 in 1942. There was a regular decline from this

peak to an index of 115 in 1945, after which it turned upward for two years but fell sharply from 128 in 1948 to 84 in 1949, while ending the period at 93 in 1950. The patterns of Bituminous coal and total Products of Mines are very similar and the great influence of Bituminous coal on the total figures is what would be expected from so large a component of the total.

When the tonnage of Bituminous coal is expressed as a per cent of New England total Products of Mines, as shown by the red line in Chart X, the influence of Crude petroleum in 1943 is very evident, as in Anthracite coal, by the drop to 33.5% in 1943 from 49.3% the previous year. The importance of Bituminous coal increased from 41.3% of the total in 1931 to 47.1% in 1933, from which point it had a smooth decline, except for 1934, to 43.9% in 1939 when it started its climb to the 1942 peak. Following the dip in 1943, the per cent of total rode again in 1944 to almost its 1942 figure. The figure of 44.0% for 1950 is the same as for 1949 and was reached after a drop from 49.0% in 1948. The increase in trend as measured by the averages for the two halves of the period indicate an increase of .7% if the year 1943 is eliminated as an erratic factor. The averages were 44.5% for the first half and 45.2% for the second half, 1943 being included, or 46.5%, 1943 being omitted. Bituminous coal is the largest commodity in Products of Mines in New England.

From the second part of Chart X a decline is shown in the importance of the New England tonnage of Bituminous coal as part of the national tonnage. This percentage was almost constant at 2.5% from 1931 to 1936, when it dropped to 2.0% and remained fairly

constant until 1941, when an upswing started which reached a peak of 3.0% in 1942. This peak was followed by a very constant decline to 1.7% in 1947. The final figure was also 1.7% in 1950 after a small increase to 2.0% in 1948. The average for the first half of the period was 2.3% and dropped only .1% to 2.2% for the second half, but this does not give the same picture that Chart X reveals since the trend is down in both halves with the wartime increase offsetting the low percentages at the end of the period in computing the average for the 1940's.

Coke

The blue line in Chart IX shows the index of tonnage for Coke in New England and its 1931 base of only 684,000 tons indicates that this is the least important of the three commodities in this group. This index does not make the usual decline in the 1930's but rises to 108 in 1933 and remains above 100 until 1948. The index would indicate an upward trend to 1942 with erratic movements in the 1930's. In 1944 and 1945 there was a large increase, from 126 in 1943 to 168 and 169 in 1944 and 1945, but the index returned to 122 in 1945. This was followed by a further sharp decline to a low point for the entire period of 74 in 1949 with an index of 98 for the last year of the period, 1950. When comparing this index to that of total Products of Mines, the broken line in Chart IX, it is plain that the movements of the total index are not greatly affected by the tonnage of Coke in New England.

Coke as a per cent of New England Products of Mines is also shown as a blue line in Chart X. From 4.4% of the total in 1931, Coke

rose to 6.1% in 1933 where it remained almost constant until 1940 when it started a decline to a low of 2.7% in 1943. There was a rapid rise to 6.7% in 1945, followed by a steady decline to 4.0% by 1948, with a final figure of 5.0% in 1950. The average per cent of Total Products of Mines for the first half of the period was 5.9%, while the second half average was 4.7%, a drop of 1.2%, which appears to represent fairly well the trend of this commodity, since the drop during the war years was made up by the postwar increase with its subsequent decline. The chart clearly shows Coke's third ranking as a component of New England Products of Mines.

There was a very marked decline in the New England tonnage of Coke as a part of the United States total, as shown in the second part of Chart X. This per cent figure rose from 7.0% in 1931 to a high point of 8.9% in 1932, but was followed by a decline to 5.3% in 1937. After an increase to 7.8% in 1938, the figure declines again to a figure of 3.8% in 1943. The increase in New England tonnage of Coke in 1944 and 1945 influences the rise as a part of the national total, but there is an immediate decline to 2.8% in 1949, the lowest point during the period, with a final figure of 3.1% in 1950. The movements are fairly constant following the peaks in 1932, 1938, and 1945. This decline is also shown by the drop in the averages for the first and second halves of the period from 7.1% to 4.0%, indicating a decline in the importance of Coke terminated in New England as a part of the national tonnage of Coke.

PRODUCTS OF FORESTS

Due to the fact that two commodities account for over 80% of the tonnage of Products of Forests in New England and all other commodities have relatively insignificant tonnages, only the two major components are analyzed in this group. The two commodities are Pulpwood and Lumber, shingle and lath. The figures for these commodities will be found in Table XI on page 65 and Table XII on page 61.

Pulpwood

The index of the tonnage of Pulpwood in New England will be found in Chart XI on page 66 and is represented by the red line. The tonnage indices for these two commodities have approximately the same 1931 base, that for Pulpwood being 1,129,000 tons which is only 4,000 tons larger than that for Lumber, shingle and lath. The index for Pulpwood takes a sharp drop to 51 in 1932 and 44 in 1934, with a sharp recovery to 100 in 1935. After a minor drop in 1936 it reaches a peak of 119 in 1937 and is followed by another drop to 80 in 1938. The rise from this year is fairly constant and reaches a peak of 257 in 1947, after which it begins a sharp decline to end the period in 1950 with an index of 155. The influence of this index on the index of total Products of Forests is almost equal to that of Lumber, shingle and lath, as can be seen by the broken line in Chart XI, being between the indices of these two commodities in most years.

The red line in Chart XII on page 68 shows the tonnage of Pulpwood as part of the total Products of Forests in New England. The movements in this figure have been rather erratic with a fall from 41.0% in 1931 to 34.0% in 1933, followed by a rise to 51.4% in 1935,

TABLE XI: CARLOAD TONNAGE AND INDICES OF SELECTED PRODUCTS OF FORESTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

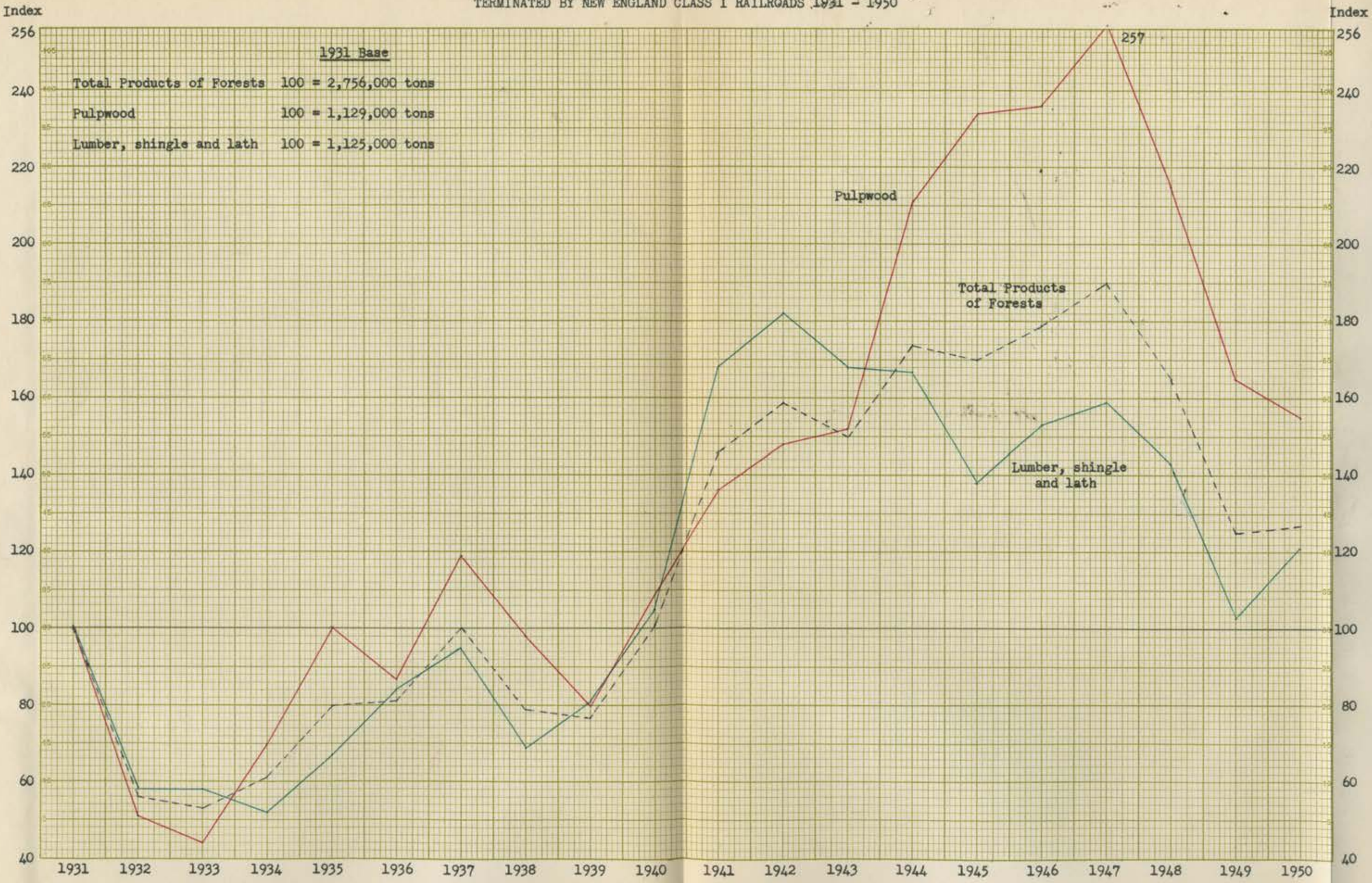
(1931 = 100)

Year	PULPWOOD		LUMBER, SHINGLE AND LATH	
	Tons (000)	Index	Tons (000)	Index
1931	1,129	100.0	1,125	100.0
1932	580	51.4	647	57.5
1933	492	43.6	655	58.2
1934	785	69.5	586	52.1
1935	1,134	100.4	752	66.8
1936	982	87.0	941	83.6
1937	1,347	119.3	1,066	94.7
1938	1,110	98.3	781	69.4
1939	901	79.8	910	80.9
1940	1,233	109.2	1,179	104.8
1941	1,536	136.0	1,885	167.5
1942	1,665	147.5	2,046	181.8
1943	1,719	152.3	1,889	167.9
1944	2,386	211.3	1,857	165.1
1945	2,640	233.8	1,548	137.6
1946	2,660	235.6	1,718	152.7
1947	2,900	256.9	1,788	158.9
1948	2,423	214.6	1,612	143.3
1949	1,860	164.7	1,158	102.9
1950	1,751	155.1	1,365	121.3

Source; Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART XI: INDICES OF CARLOAD TONNAGE OF TOTAL AND SELECTED PRODUCTS OF FORESTS

TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950



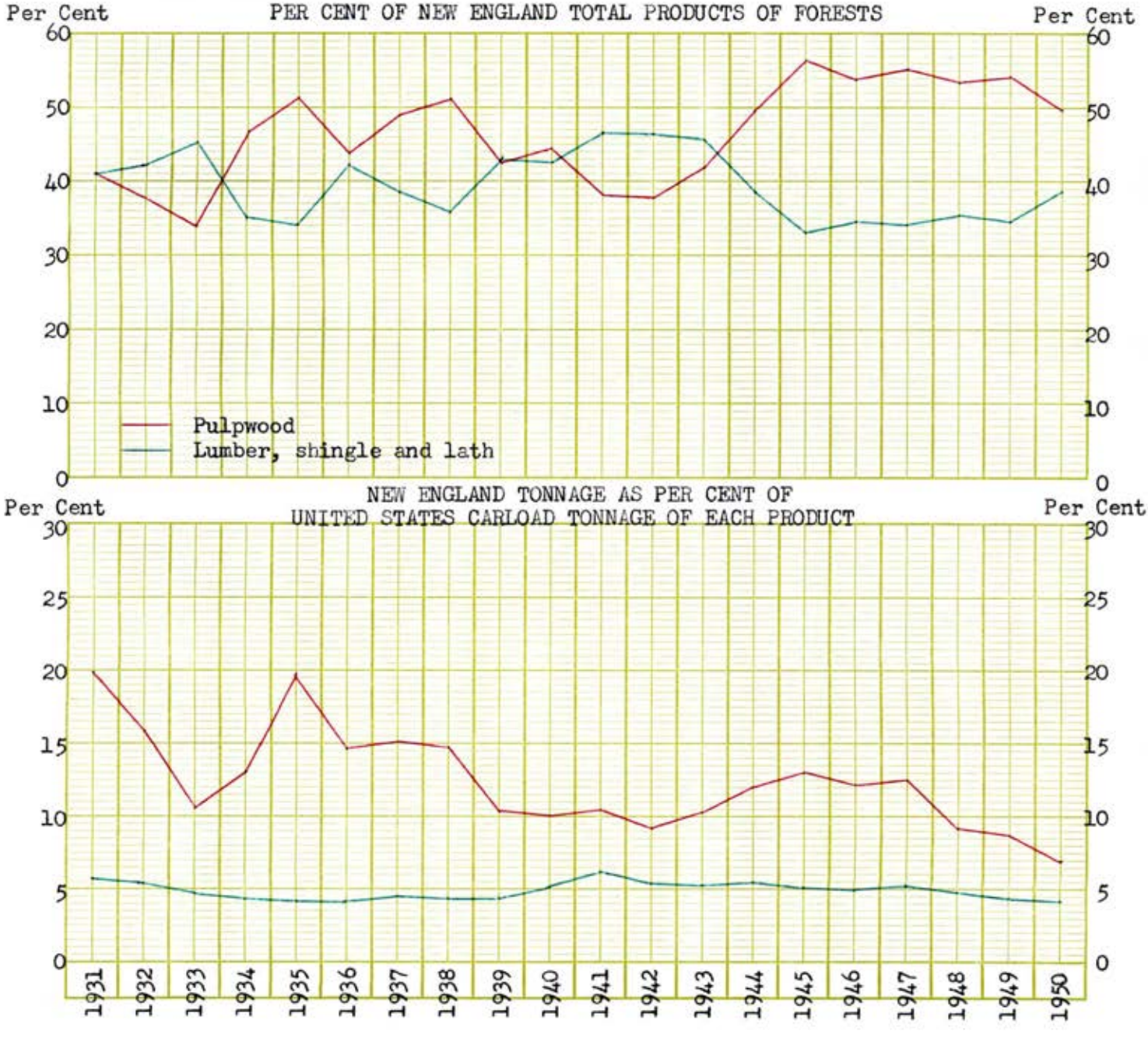
Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

TABLE XII: CARLOAD TONNAGE OF SELECTED PRODUCTS OF FORESTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF FORESTS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Year	PULPWOOD		LUMBER, SHINGLE AND LATH	
	% of NE Group	% of US Product	% of NE Group	% of US Product
1931	41.0	19.9	41.0	5.7
1932	37.8	15.9	42.2	5.4
1933	34.0	10.7	45.2	4.7
1934	46.8	13.1	35.0	4.3
1935	51.4	19.8	34.1	4.2
1936	43.9	14.7	42.1	4.2
1937	49.0	15.1	38.7	4.5
1938	51.2	14.8	36.0	4.4
1939	42.5	10.4	43.0	4.4
1940	44.5	10.0	42.6	5.1
1941	38.1	10.5	46.7	6.2
1942	37.9	9.2	46.6	5.4
1943	41.9	10.3	45.8	5.3
1944	49.8	12.1	38.7	5.5
1945	56.3	13.0	33.0	5.1
1946	53.8	12.2	34.8	4.9
1947	55.3	12.5	34.1	5.2
1948	53.3	9.2	35.4	4.8
1949	54.1	8.7	33.7	4.4
1950	49.9	7.0	38.9	4.2

CHART XII: CARLOAD TONNAGE OF SELECTED PRODUCTS OF FORESTS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL PRODUCTS OF FORESTS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



and another fall to 43.9% in 1936. Another peak was made in 1938 when the per cent rose to 51.2% but was followed by a more severe drop, ending in 1942 at 37.9%. The highest point for the period was reached in 1946, when Pulpwood accounted for 56.3% of the total Products of Forests and the decline following this peak was relatively gradual, ending the period with a figure in 1950 of 49.9% of the total. The trend of this commodity was rising as measured by the averages of the two halves of the period. The average of 44.2% for the first half increased to 49.0% in the second, a gain of 4.8%. Pulpwood had an average for the entire period of 46.6% of the total Products of Forests in New England.

The second part of Chart XII shows a decline in the part New England played in supplying the total Pulpwood tonnage for the United States. In 1931 New England was 19.9% of the total tonnage, but this dropped to 10.7% in 1933. The percentage rose to 19.8% in 1935 but it then decreased fairly gradually to 9.2% in 1942, followed by a minor recovery which reached its highest point of 13.0% in 1945. Another decline followed to a low for the entire period of 7.0% in 1950. The averages for the first and second halves of the period were 14.4% and 10.5% respectively, with an over-all average of 12.5%. New England contributed more to the national total of Pulpwood than to the national total of Lumber, shingle and lath.

Lumber, shingle and lath

The green line in Chart XI shows the tonnage index of Lumber, shingle and lath, hereafter referred to as Lumber. The 1931 base of 1,125,000 tons is only slightly less than that of Pulpwood. The movements of this index appear more constant than in the index for Pulpwood.

The decline in 1932 lasted through 1934, when the index reached 52, and then rose constantly to a peak of 95 in 1937, but a drop in 1938 brought it back to 69. There was a fairly constant rise to the highest point that the index reached, 182 in 1942, and the decline was also fairly constant, except for a recovery in 1947, to an index of 103 in 1949 and 121 in 1950. The influence of the war appears to have been felt by Lumber in 1942 but not by Pulpwood until later, in 1947.

Chart XII shows Lumber as a green line and the per cent of New England Products of Forests for Lumber and for Pulpwood vary inversly since they are by far the two largest components of the group tonnage. A greater increase in the tonnage of one commodity causes the other to become a smaller part of the total, while a smaller decrease has the same effect. The average of Lumber for the first half of the period was 40.0% of the total and for the second half was 38.8%, showing a slight decline in the importance of Lumber to New England Products of Forests.

When the New England contribution to the national tonnage of Lumber is considered, it is evident that there has been only a gradual change in the percentage of the United States tonnage accounted for by the New England railroads. The second part of Chart XII shows a gradual decline from 5.7% in 1931 to 4.3% in 1934 where it levels off, not changing more than .2% until 1940 when it starts up to a peak of 6.2% in 1941. The decline from this peak is gradual and reaches 4.2% in 1950. The average for the first half of the period was 4.7% while this figure increased to 5.1% in the second half. While New England contributes less to the national total for Lumber than for Pulpwood, the trend in Lumber

is slowly rising while the trend in Pulpwood is definitely downward.

MANUFACTURES AND MISCELLANEOUS

The three commodities in this group that are the most important to New England are Petroleum products, Manufactured iron and steel, and Cement, natural and Portland. For a description of the classes included in Petroleum products and the change in 1947 in the classification of Manufactured iron and steel, see pages 10 and 13 in the Introduction. The figures for these commodities will be found in Table XIII on page 72 and Table XIV on page 75.

Petroleum products

For the purposes of this analysis all petroleum products have been grouped together and the index of this total is portrayed by the red line in Chart XIII on page 73. This commodity has the largest 1931 tonnage base, 3,616,000 tons, of the three commodities, but this is only a small part of the total Manufactures and Miscellaneous in New England, which was 14,023,000 tons in 1931. The movements of this index have been very regular, falling from 100 in 1931 to 67 in 1938 with a gradual recovery to 79 in 1941 when a sharp wartime increase is evident, reaching a peak of 223 in 1943. There was a rapid drop which by 1946 found the index back at its prewar level, and the decline from 1946 to an index of 51 in 1950 continues the long term downward trend for the entire period. The influence of this commodity on the pattern of the total tonnage of Manufactures and Miscellaneous is shown by the similarity of the red and broken lines in Chart XIII, but the influence of the other two commodities is also evident.

TABLE XIII: CARLOAD TONNAGE AND INDICES OF SELECTED MANUFACTURES AND MISCELLANEOUS TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

(1931 = 100)

Year	PETROLEUM PRODUCTS		MANUFACTURED IRON AND STEEL		CEMENT, NATURAL AND PORTLAND	
	Tons (000)	Index	Tons (000)	Index	Tons (000)	Index
1931	3,616	100.0	708	100.0	1,399	100.0
1932	3,112	86.0	423	59.7	880	62.9
1933	2,969	82.1	641	90.5	676	48.3
1934	3,162	87.4	661	93.3	841	60.1
1935	2,874	79.4	824	116.3	743	53.1
1936	3,003	83.0	1,119	158.0	987	70.5
1937	2,832	78.3	1,203	169.9	1,069	76.4
1938	2,434	67.3	655	92.5	980	70.0
1939	2,651	73.3	1,191	168.2	1,286	91.9
1940	2,628	72.7	1,450	204.7	1,340	95.8
1941	2,838	78.5	2,332	329.3	1,555	111.1
1942	6,751	186.7	2,778	392.3	1,437	102.7
1943	8,060	222.9	2,800	395.4	853	61.0
1944	6,936	191.8	2,811	396.9	623	44.5
1945	5,363	148.3	2,046	388.9	752	53.7
1946	2,672	73.9	1,774	250.5	1,368	97.8
1947	2,467	68.2	1,824	257.5	1,460	104.3
1948	1,966	54.4	1,820	257.0	1,675	119.7
1949	1,733	47.9	1,416	199.9	1,649	117.9
1950	1,842	50.9	1,514	213.8	1,841	131.6

Source: Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

CHART XIII: INDICES OF CARLOAD TONNAGE OF TOTAL AND SELECTED MANUFACTURES AND MISCELLANEOUS

TERMINATED BY NEW ENGLAND CLASS I RAILROADS 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950

When Petroleum products is expressed as a per cent of New England Manufactures and Miscellaneous, the red line in Chart XIV on page 76, the decline in importance of this commodity is very clear. The decline is quite constant from 25.8% in 1931 to 15.1% in 1941, and again from 13.9% in 1946 to 9.8% in 1950, with an increase during the war which reached its highest point of 32.5% in 1943. Due to the influence of the war on this commodity the averages of the two halves of the period do not appropriately measure the trend in this relationship which is more adequately shown by Chart XIV.

The influence of the war is also very clear when New England Petroleum products is expressed as a per cent of the United States total. The trend in the importance of New England's contribution to the national total is also definitely downward. The percentage figure fell from 6.6% in 1932 to 5.1% in 1941. The influence of the war increased it to 14.8% by 1943, but the constant decline is again evidenced by the fall from 5.6% in 1946 to 4.9% in 1950. The increase in New England's importance during the war in the transportation of Petroleum products can partially be accounted for by the exports of this commodity from New England during that period. For this commodity the averages for the two half-periods give the erroneous conclusion of a rise in trend, produced by the wartime increase in percentages due to the increased rail transportation of this commodity during World War I.

Manufactured iron and steel

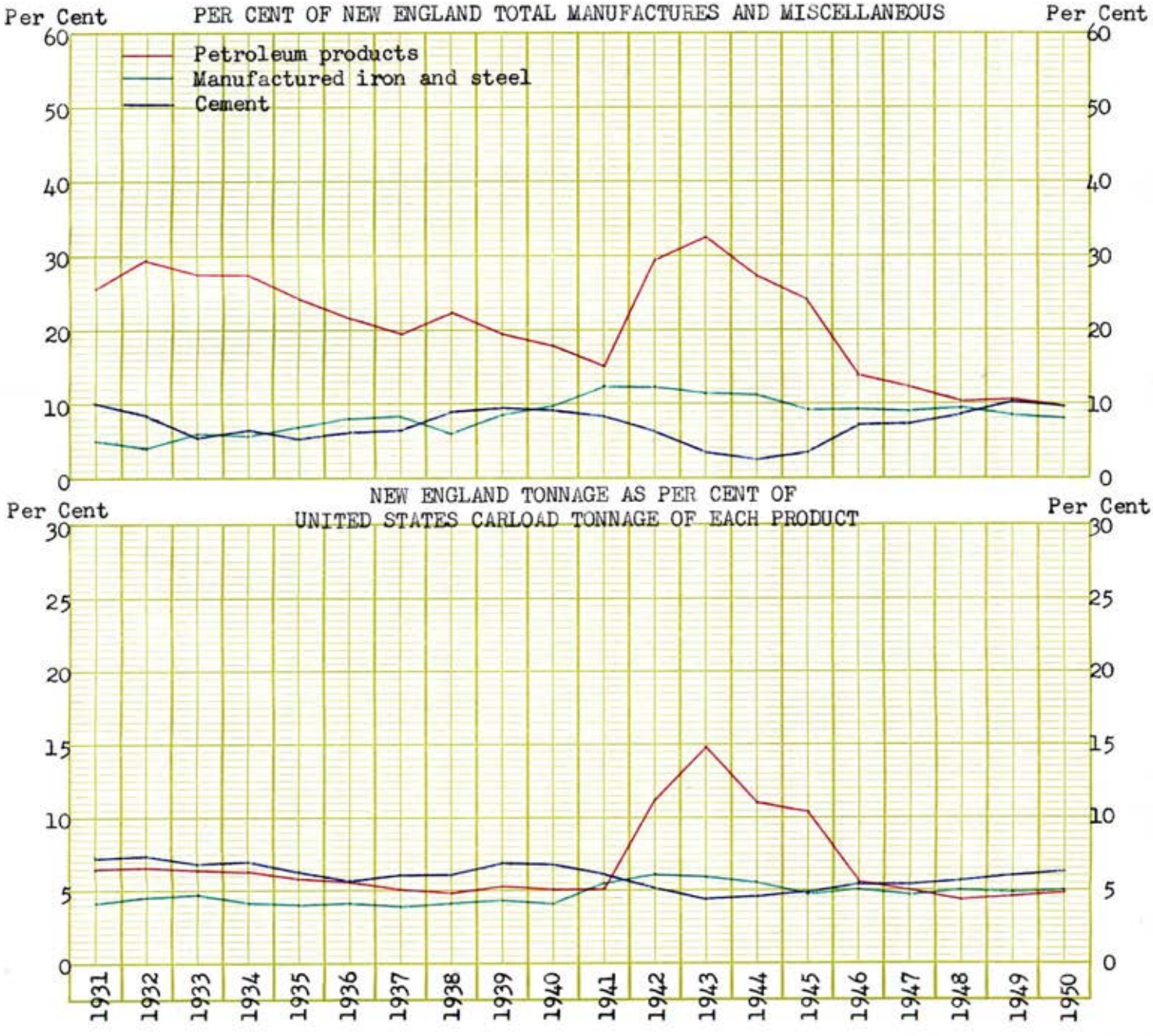
From Chart XIII it can be seen from the green line that there has been an upward trend in the tonnage of Manufactured iron and steel in New England. This index has a base of 708,000 tons in 1931, the

TABLE XIV: CARLOAD TONNAGE OF SELECTED MANUFACTURES AND MISCELLANEOUS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL MANUFACTURES AND MISCELLANEOUS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Year	PETROLEUM PRODUCTS		MANUFACTURED IRON AND STEEL		CEMENT, NATURAL AND PORTLAND	
	% of NE Group	% of US Product	% of NE Group	% of US Product	% of NE Group	% of US Product
1931	25.8	6.4	5.0	4.2	10.0	7.3
1932	29.5	6.6	4.0	4.5	8.4	7.4
1933	27.7	6.4	6.0	4.7	6.3	6.8
1934	27.7	6.3	5.8	4.1	7.4	7.0
1935	24.2	5.8	6.9	4.0	6.2	6.3
1936	21.7	5.6	8.1	4.1	7.1	5.6
1937	19.6	5.1	8.3	3.9	7.4	6.1
1938	22.4	4.9	6.0	4.1	9.0	6.1
1939	19.5	5.3	8.8	4.8	9.5	6.9
1940	17.9	5.1	9.9	4.6	9.1	6.8
1941	15.1	5.1	12.4	5.5	8.3	6.2
1942	29.6	12.4	12.2	6.1	6.3	5.1
1943	32.5	14.8	11.3	5.9	3.4	4.4
1944	27.3	12.0	11.1	5.6	2.5	4.6
1945	24.1	10.4	9.2	4.7	3.4	4.8
1946	13.9	5.6	9.2	5.0	7.1	5.4
1947	12.2	5.0	9.0	4.7	7.2	5.4
1948	10.2	4.4	9.4	5.0	8.7	5.7
1949	10.6	4.6	8.6	4.9	10.1	6.0
1950	9.8	4.9	8.0	5.0	9.8	6.3

CHART XIV: CARLAOD TONNAGE OF SELECTED MANUFACTURES AND MISCELLANEOUS TERMINATED BY NEW ENGLAND CLASS I RAILROADS AS PER CENT OF NEW ENGLAND TOTAL MANUFACTURES AND MISCELLANEOUS AND AS PER CENT OF UNITED STATES CARLOAD TONNAGE OF EACH PRODUCT 1931 - 1950

Source: Tonnage figures from Interstate Commerce Commission, "Freight Commodity Statistics", 1931 - 1950



smallest of the three commodities, but the increase in tonnage in later years greatly increased the importance of this commodity in influencing total Manufactures and Miscellaneous. This index for Manufactured iron and steel took a sharp decline to 60 in 1932 and then climbed rather steadily until it reached 205 in 1940, except for a very sharp drop to 93 in 1938. From 1940 the index climbed rapidly to 392 in 1942 where it leveled off and reached its highest point of 397 in 1944, by far the highest index of any commodity in this study on the basis of 1931 tonnage. The decline from 1944 to an index of 251 in 1946 shows this great increase to be due to the war. The index continues its rise very gradually to 257 in 1948, when it dropped to 200 for 1949 but ended the period in 1950 at 214. The influence of business conditions in 1938 and 1949 is very evident in the commodity.

The green line in Chart XIV shows Manufactured iron and steel as a per cent of New England Manufactures and Miscellaneous and presents a regular movement for this figure. From being only 4.0% of the total in 1932, Manufactured iron and steel increased to a high of 12.4% in 1941 with a one year drop in 1938 to 6.0%. The decline from this high was fairly gradual with a figure for 1950 of 8.0%. The average of the 1930's was 6.9% of the total with an upward trend, while the downward trend from 1941 produced an average for the 1940's of 10.0%. The average for the whole period was 8.5% which would rank Manufactured iron and steel second to Petroleum products in the composition of New England Manufactures and Miscellaneous.

The second part of Chart XIV shows New England tonnage of Manufactured iron and steel as part of the United States total of this

commodity. The green line shows a slight increase to 4.7% in 1933 but this figure then fell to around 4.0% until 1938 when it began to rise to a high of 6.1% in 1942. From this figure there was a gradual decline to 5.6% in 1944, after which it took a sharp drop to 4.7% in 1945 where it stayed relatively level, ending the period at 5.0% in 1950. The average for the first half of the period was 4.3% of the national total while it was slightly higher, 5.2%, in the second half. This increase is affected by the influence of the war years on the average of the second half of the period. The average for the 20 year period of 4.8% of the national total tonnage of Manufactured iron and steel would rank this commodity third as to New England contributing to the national tonnage of commodities in Manufactures and Miscellaneous.

Cement, natural and Portland

The index of the New England tonnage of Cement, natural and Portland, hereafter called Cement, terminated by New England railroads, will be found as the blue line in Chart XIII. This index has the second largest 1931 base, 708,000 tons, but in 12 of the 20 years of this study it has had the third largest tonnage. The index for Cement fell to 48 in 1933 and had a slow but fairly constant recovery for the rest of the period, except for the reduction in tonnage during the war years, as shown by the drop from 111 in 1941 to 45 in 1944, with a return to 98 in 1946. This index ended the period with an index of 132 in 1950 following a fairly constant rise from 1946. The index for Cement fairly well followed the pattern of total Manufactures and Miscellaneous, except that it declined during the war while the total index rose during this period.

The tonnage of Cement as a part of New England Manufactures and Miscellaneous is shown by Chart XIV. The blue line fell from 10.0% in 1931 to 6.3% in 1933 and 6.2% in 1935 and then climbed to a peak of 9.5% in 1938, when it began a decline. The low point of this decline was reached in 1944 at 2.5% with a fairly rapid recovery to 5.4% in 1946, when the rise became more gradual, with Cement accounting for 9.8% of New England Manufactures and Miscellaneous in 1950. The influence of the war on the tonnage of Cement, as in Manufactured iron and steel, accounts for the averages for the two halves of the period, giving an erroneous impression of the trend, falling from 8.0% in the first to 6.7% in the second half. If the wartime decrease is eliminated from Chart XIV the picture appears to be a relatively constant increase in the importance of Cement from 1933 to 1950.

When New England tonnage of Cement is presented as a per cent of the total for the United States it appears to have had a fairly constant decline for the entire period. From accounting for 7.3% of the national total in 1931 this percentage dropped to 5.6% in 1936 with a subsequent rise to 6.9% in 1939. There was a decrease in New England's importance during the war years, reaching a low of 4.4% in 1943, while the rise from this low to 6.3% in 1950 was almost a straight line. The average for the first half of the period was 6.6% of the total and in the second half it was 5.4% which resulted in an average for the whole period of 6.0% of the National total tonnage of Cement. This average would rank this commodity as the one in which New England contributed the second largest amount to the national total of each commodity except that the great influence of the war on Petroleum products falsely raises

this commodity to a mathematical ranking of first place as measured by the averages. From Chart XIV it can plainly be seen that Cement is the first ranking commodity in all years except 1942-1946, and that Petroleum products in 1950 was the lowest of the three commodities selected in this group.

SUMMARY AND CONCLUSIONS

The index of total carload freight terminated by New England Class I railroads on a 1931 base shows a decline during the early 1930's which has a fairly constant recovery, except for 1938, when it goes below its depression low made in 1933, until 1941 when the influence of the war sent it rapidly to a peak of 157 in 1943, from which it had returned to approximately the 1931 level by 1950. There has been a constant decrease in the percentage of the United States carload freight accounted for by New England. This decline is shown by New England contributing an average of 4.4% of the national total for the period 1931-1935, while only contributing 3.3% for 1946-1950. The New England tonnage index has a high correlation with three of the national business indicators. The highest correlation was with Total Industrial Production, followed closely by Freight Carloadings with Total Gross National Product having the lowest of the three business indicators, but still having a highly significant coefficient of correlation. The effects of the business recessions in 1933, 1938, and 1949 are plainly indicated in all indices as are the rises during the middle 1930's and the war years. An upward secular trend is evident in all series with that of Industrial Production being the most pronounced, followed by Gross National Product, Freight Carloadings, and New England total carload freight.

The analysis on a commodity group basis reveals a general slight increase in tonnage during the period for all commodity groups except possibly Animals and Products and Products of Mines. The in-

crease in Manufactures as a part of New England total freight is very evident and apparently is offsetting the decrease in Products of Mines, the second largest component of the total. The other three groups have had relatively less fluctuation as a percentage of the total, although Products of Forests has had a fairly large and constant increase which has made up for the declines in Products of Agriculture and Animals and Products. The order of importance in New England of the tonnage of these groups in 1950 is Manufactures and Miscellaneous with 45.2% of the total, followed by Products of Mines with 33.0%, Products of Agriculture with 10.3%, Products of Forests with 8.4%, and Animals and Products with only 3.1%. The order is the same as in 1931 except that Manufactures and Miscellaneous has replaced Products of Mines as the largest group.

The New England tonnage of the commodity groups as a per cent of the United States total for each group have had fairly regular movements except for the effects of 1934 and the war years. There are indications of a slight decline in the importance of New England in all commodity groups with the possible exception of Animals and Products, in which New England contributes the largest amount - 8.8% in 1950 - to the national total. The group in which New England contributes the second largest amount, 5.0%, appears to be Manufactures and Miscellaneous and is followed by Products of Forests, Products of Agriculture, and Products of Mines, in which New England contributed only 1.8% of the national total in 1950.

The two most important commodities in New England Products of Agriculture were Mill products, NOS, and Flour, wheat. The indices

reveal a very similar pattern for these two commodities except that Mill products had a relatively larger increase in tonnage during the middle part of the period, while Flour, wheat, surpassed its 1931 index in only one year, 1945. The index of Oranges and grapefruit fairly well followed the other two indices but had a significant drop in 1940 and an increase in 1944 when the others had a decrease. All indices ended the period below the 1931 level, with the drop of Mill products to its 1950 index being very steep. As a part of the New England total Products of Agriculture, only Mill products has increased in importance while New England as part of the United States tonnage of each commodity has declined in all three commodities. The movements of these figures have all been constant and have clearly indicated the downward trends. Mill products is the largest component of the New England total group and is also the commodity in which New England has had the most importance in the national commodity total. Flour, wheat is the second largest commodity in New England Products of Agriculture while ranking third in national importance. In New England, Oranges and grapefruit is a minor part of the group, but ranks a close second to Mill products as part of the total commodity tonnage in the United States.

Fresh meats, NOS, is by far the largest single commodity in New England total Animals and Products and is followed by Wool, mohair, and Hides. The tonnage of Fresh meats has remained fairly level while Hides has had a fairly constant increase. Wool, mohair has had such large fluctuations that a definite trend is difficult to determine, the index being very low in the 1930's and very high in the war years. All

three commodities have had slight increases as components of the New England group total with that of Hides being the most constant. During the war Fresh meats had a large decrease while Wool, mohair became a greater part of the New England total. The postwar figures continued the previous trend. New England contributed the largest amount to the national tonnage of Wool, mohair with a declining trend until 1940 and a large increase during the war, followed by a return to the prewar level by 1950. Next came Hides which had a two step increase, one to 1940 when it experienced a sharp rise, and the other from 1941-1950. New England's contribution to the national tonnage of Fresh meats, NOS, was very small but was very stable.

Bituminous and Anthracite coal were by far the largest components of New England Products of Mines with Coke being only a small part. The tonnage index for both Bituminous and Anthracite coal had about the same pattern except for the greater wartime increase in Bituminous coal. The index for Coke remained above 100 from 1933 through 1947 and all indices ended the period below the 1931 base. The business recessions in 1933, 1938, and 1949 influenced all indices, causing drops in those years. As a part of the New England total Products of Mines, the great increase in Crude petroleum in 1943 caused a very sharp drop in both coals, but Bituminous coal ended the period showing a slight over-all increase while Anthracite coal and Coke both decreased slightly. There was a decrease in New England's contribution to the national tonnage of all three commodities, with the greatest contribution being made to Anthracite coal, followed by Coke and Bituminous coal. New England tonnage of Coke had a sharp increase in

importance in 1938 and the war years.

In Products of Forests, where only two commodities were analyzed, the tonnage of Pulpwood was the largest component and was followed closely by Lumber, shingle and lath. The indices of these two commodities show very close movements until the war, when Lumber made its highest index in 1942, while Pulpwood did not have its sharp increase until 1944, reaching its peak in 1947. The fluctuations as a part of New England total Products of Mines show the inverse relationship in this figure for the two commodities, but this is to be expected since these two alone make up well over 80% of the total. New England has contributed more to the national tonnage of Pulpwood, although this figure has had a downward trend while the trend of Lumber has been slowly rising.

In the composition of New England Manufactures and Miscellaneous, Petroleum products has been the largest commodity, followed by Manufactured iron and steel, and Cement, natural and Portland. The index of Petroleum products shows a definite decline but had a large wartime increase in tonnage. Cement appears to have had an increasing trend from 1934 onward, excluding the dip in the war years. Manufactured iron and steel has had the most fluctuation with a severe drop in 1938 but a very high peak during the war, ending the period well above the 1931 base. There has been a definite and fairly sharp decline in Petroleum products as a part of New England Manufactures and Miscellaneous. Both Manufactured iron and steel and Cement have had increases, with Cement being a larger part of the group than Manufactured iron and steel in 1950. The exports of Petroleum products

from New England and the inability to ship by water transportation had a very large influence on New England's contribution to the national tonnage of this commodity during the war, but the trend for the period is definitely down, as it is for Cement, natural and Portland. There is an upward trend in Manufactured iron and steel from a third ranking in this figure in 1931 to a second ranking in 1950.

There has been a definite downward trend in carload freight terminated by New England Class I railroads as a part of the United States total carload freight from 1931-1950. The actual tonnage in New England has followed general national business conditions as measured by Gross National Products, Industrial Production, and U.S. Freight Carloadings, except for the degree of rising secular trend of these indicators, with all commodity groups showing fairly similar patterns. There has been no major change in the rankings of the three largest components of the New England total tonnage for each commodity group. On a group basis, Manufactures and Miscellaneous has replaced Products of Mines as the largest group in New England, while the rankings of the other groups have remained the same.

APPENDIX A: COMPUTATIONS

The correlation of the indices of the three national business indicators and the indices of the five commodity groups with the index of New England total carload freight was measured by use of the coefficient of simple correlation. In both instances the index of New England total freight was designated by the independent variable, X, with each other series being the independent variable, Y. The following formula was used for all values of the coefficient of correlation: $r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$ where $\Sigma xy = \Sigma XY - \bar{X}\Sigma Y$, $\Sigma x^2 = \Sigma X^2 - \bar{X}\Sigma X$, and $\Sigma y^2 = \Sigma Y^2 - \bar{Y}\Sigma Y$. The values of r were obtained by substituting the figures for each series in the above formula with the results shown below:

Total Industrial Production

$$\Sigma xy = 36,065 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 177,117$$

$$r = \frac{36,065}{\sqrt{(13,214)(117,117)}} = \frac{36,065}{39,338} = .9167$$

Total Gross National Product

$$\Sigma xy = 20,073 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 44,513$$

$$r = \frac{20,073}{\sqrt{(13,214)(44,513)}} = \frac{20,073}{24,256} = .8276$$

Freight Carloadings

$$\Sigma xy = 9,336 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 7,949$$

$$r = \frac{9,336}{\sqrt{(13,214)(9,336)}} = \frac{9,336}{10,248} = .9139$$

The figures and coefficients of correlation for the analysis of New England total freight and freight commodity groups are as follows:

Products of Agriculture

$$\Sigma xy = 8,078 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 6,790$$

$$r = \frac{8,078}{\sqrt{(13,214)\ (6,790)}} = \frac{8,078}{9,472} = .853$$

Animals and Products

$$\Sigma xy = 6,721 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 4,652$$

$$r = \frac{6,721}{\sqrt{(13,214)(4,652)}} = \frac{6,721}{7,898} = .851$$

Products of Forests

$$\Sigma xy = 20,223 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 38,835$$

$$r = \frac{20,223}{\sqrt{(13,214)\ (38,835)}} = \frac{20,223}{22,653} = .893$$

Products of Mines

$$\Sigma xy = 10,392 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 9,065$$

$$r = \frac{10,392}{\sqrt{(13,214)(9,065)}} = \frac{10,392}{10,926} = .951$$

Manufactures and Miscellaneous

$$\Sigma xy = 16,984 \quad \Sigma x^2 = 13,214 \quad \Sigma y^2 = 23,251$$

$$r = \frac{16,984}{\sqrt{(13,214)(23,251)}} = \frac{16,984}{17,528} = .968$$

The reliability of the coefficients of correlation was tested by solving the formula for the F test for the least significant values of r at the .05 and .01 levels of confidence. In all cases the number of series was two and each series contained 20 items, N. The value of F for .05 is 4.41 and for .01 it is 8.28 which when put into the formula $F = \frac{r^2}{1 - r^2} \times (N - 2)$ resulted in a least significant value of r at the .05 level of .444 and at the .01 level of .561.

BIBLIOGRAPHY

I. Books

1. Croxton, F. E. and Cowden, D. J., Applied General Statistics, New York, Prentice-Hall, Inc., 1939.

2. Davies, G. R. and Yoder, Dalem, Business Statistics, New York, John Wiley and Sons, Inc., 1949.

3. Jones, Frederick W., ed., The Economic Almanac 1953-1954, New York, Thomas J. Crowell Company, 1953, p. 490.

4. White, Joseph L., Analysis of Railroad Operations, New York, Simmons-Boardman Publishing Corporation, 1946.

II. Publications of Governmental Agencies

5. Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, December, 1952, p. 1319.

6. U.S. Department of Commerce, Office of Business Economics, Business Statistics, 1947 Biennial Edition, Statistical Supplement to the Survey of Current Business, Washington D.C., U.S. Government Printing Office, 1947.

7. U.S. Department of Commerce, Office of Business Economics, Business Statistics, 1953 Biennial Edition, Statistical Supplement to the Survey of Current Business, Washington, D.C.,

8. U.S. Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Freight Commodity Statistics, Class I Steam Railways in the United States, Years Ending December 1931 through 1950, Washington D.C., U. S. Government Printing Office, 1931 through 1950.

III. Personal Sources of Information

Records Made Available by the Boston and Albany R.R., Boston, Mass.

9. I.C.C. Schedule 541 for 1949 and 1950

Persons Interviewed

10. Asst. to Freight Traffic Manager, New York Central System, Boston, Mass.