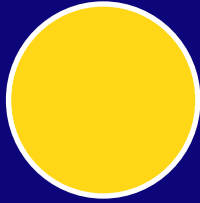
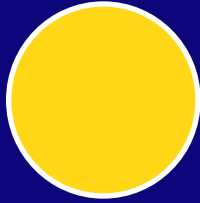




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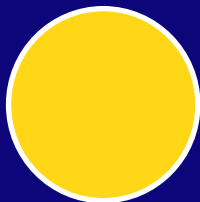
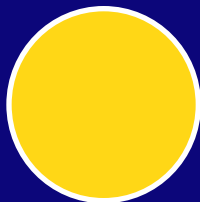
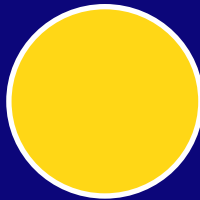
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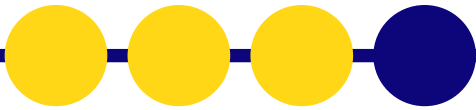
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May 2013



Transportation of U.S. Grains

A Modal Share Analysis 1978-2011 Update





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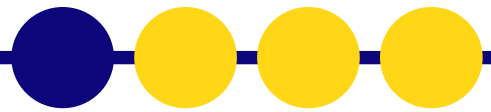
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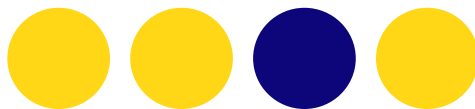


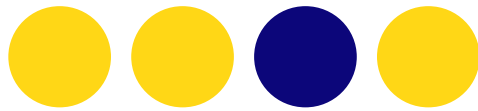
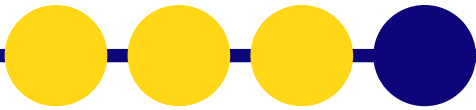
Transportation of U.S. Grains

A Modal Share Analysis 1978-2011 Update

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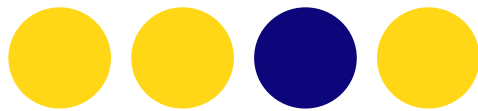






Contents

Introduction	1
Methodology	2
Estimating modal tonnages and shares	2
Corn Modal Shares	8
Wheat Modal Shares	10
Soybean Modal Shares	12
Sorghum Modal Shares	14
Barley Modal Shares	16
Appendix A: Modal Share Methodology	18
Appendix B: FIPS Regions Included in Rail Export Tonnages	20





Introduction

The purpose of this analysis is to examine trends in the type of transportation used to move grains grown for the food and feed industry.¹ Grains produced in the United States move to domestic and foreign markets through a well-developed transportation system. Barge, rail, and truck transportation facilitate a highly competitive market that bridges the gap between U.S. grain producers and domestic and foreign consumers.

Barges, railroads, and trucks often compete head-to-head to supply transportation for grains. Despite a high degree of competition in some markets, these modes also complement each other. Before a bushel of grain reaches its final destination, it has often been transported by two or more modes. This balance between competition and integration provides grain shippers with a highly efficient, low-cost system of transportation. The competitiveness of U.S. grains in the world market and the financial well-being of U.S. grain producers depends upon this competitive balance. A highly competitive and efficient transportation system results in lower shipping costs, smaller marketing margins for middlemen, and more competitive export prices. Such efficiencies also result in lower food costs for U.S. consumers and higher market prices for U.S. producers.

This analysis of the transportation of the final movement of grain, by mode, provides information about changes in market share among the modes. Over several years, such work helps identify critical trends affecting the transportation of grain. It also provides a framework to assess public policies that influence the development and success of the Nation's transportation infrastructure. Public policies that promote an efficient grain transportation system also promote strong U.S. agricultural and rural economies.

Note to reader regarding past versions of this report: This update presents new data for 2011 and revised data for 2010. There was also a minor change that affected wheat imports/exports (less than 4 percent) in 2004.

¹ For this analysis, it is assumed that corn, wheat, soybeans, sorghum, and barley represent all grain movements.

Methodology

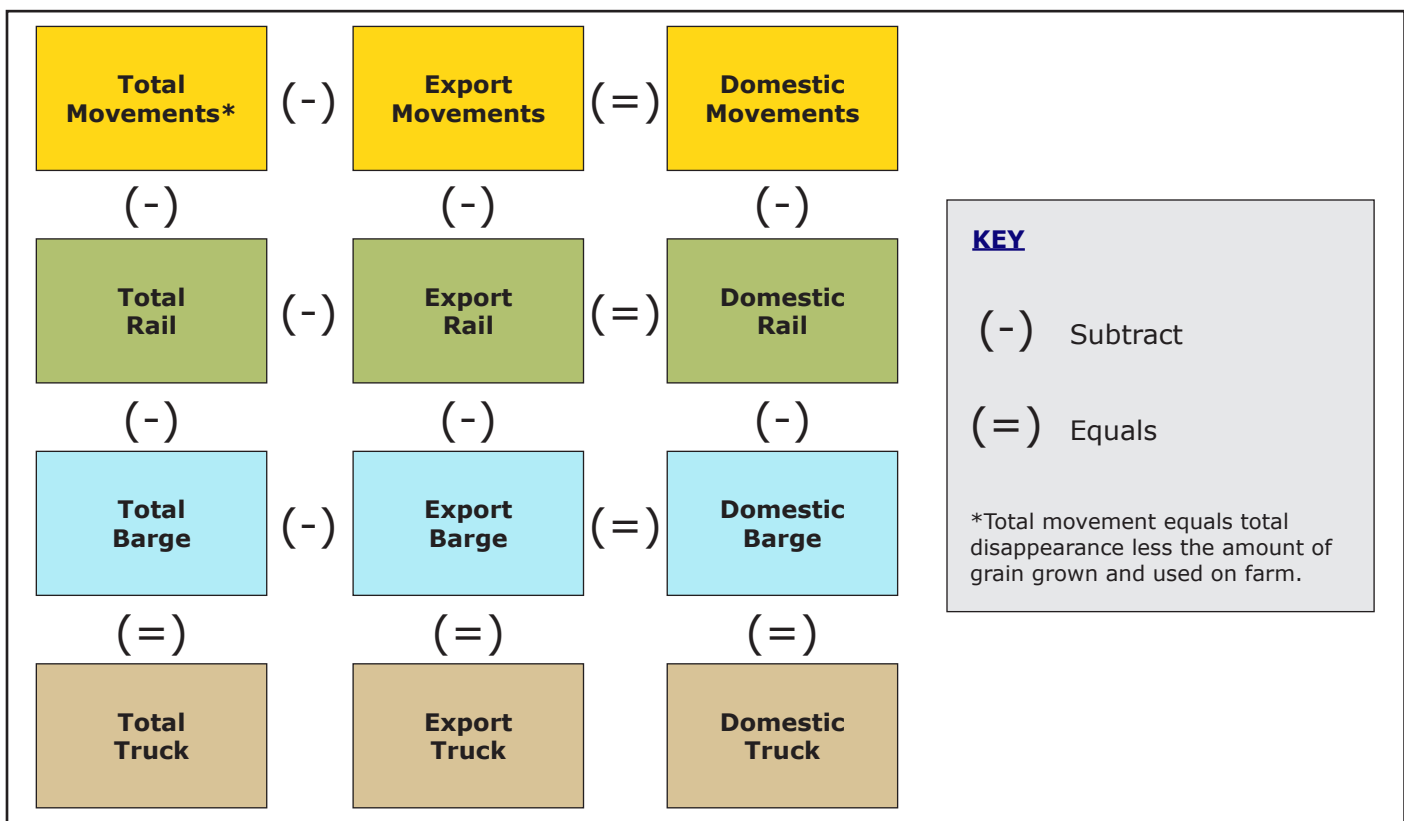
Estimating modal tonnages and shares

Any effort to measure tonnages of grain moved by mode of transport is limited by the absence of information on the total volume of truck movements. Accurate data exist for barge and rail freight tonnages and commodities, but not for trucks. Other analyses of grain movements have relied extensively on survey data to overcome this obstacle. This analysis uses the Waterborne Commerce Statistics of the U.S. Army Corps of Engineers to calculate tonnages of barged grain and uses the Carload Waybill Sample from the Surface Transportation Board to estimate the amount of railed grain. Trucking data are derived from known grain production data, as compared to the estimates of the railed and barged volumes of grain. Estimating these modal grain volumes and modal shares on an annual basis provides a data series that tracks changes in grain transportation over time.

In this analysis, the term “modal share” describes that portion of the total tonnages of grain moved by each mode of transport—barge, rail, or truck. These shares, expressed as percentages, were determined by mode for particular types of grains and movements. Grains identified for this analysis were corn, wheat, soybeans, sorghum, and barley. The 1992 and 1998 versions of this study also included rye and oats. Rye and oats were taken out of the calculations for this report because of unreliability due to small volumes, which total less than 1 percent of all grain movements. Transport modes are categorized according to the final movement going to domestic markets or ports for export.

The estimates of modal tonnages and shares are based on the amount of grain moved to commercial markets. Truck tonnages are estimated by subtracting barge and rail tonnages from total tonnages transported. Figure 1 shows how modal shares are estimated. For each crop, total movements are determined first, and then exports are subtracted from the total to get domestic movements. Total rail and barge volumes are subtracted from total movements to get truck movements. A more detailed description of the methodology is covered in Appendix A.

Figure 1: Estimating modal tonnages and share



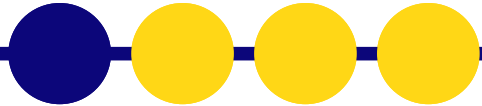


Figure 2: Total grain movements to domestic and export markets, 1978-2011

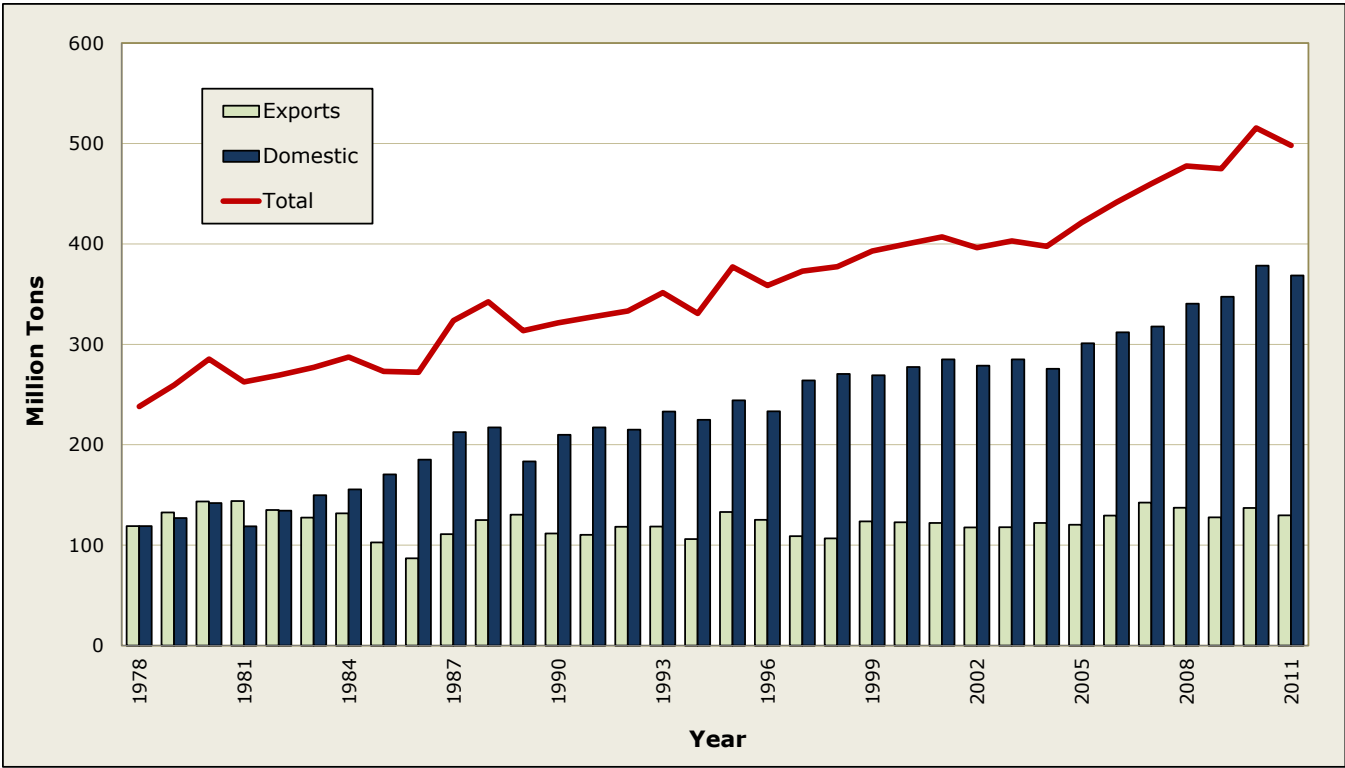


Figure 3: U.S. grain shipments by commodity, 1978-2011

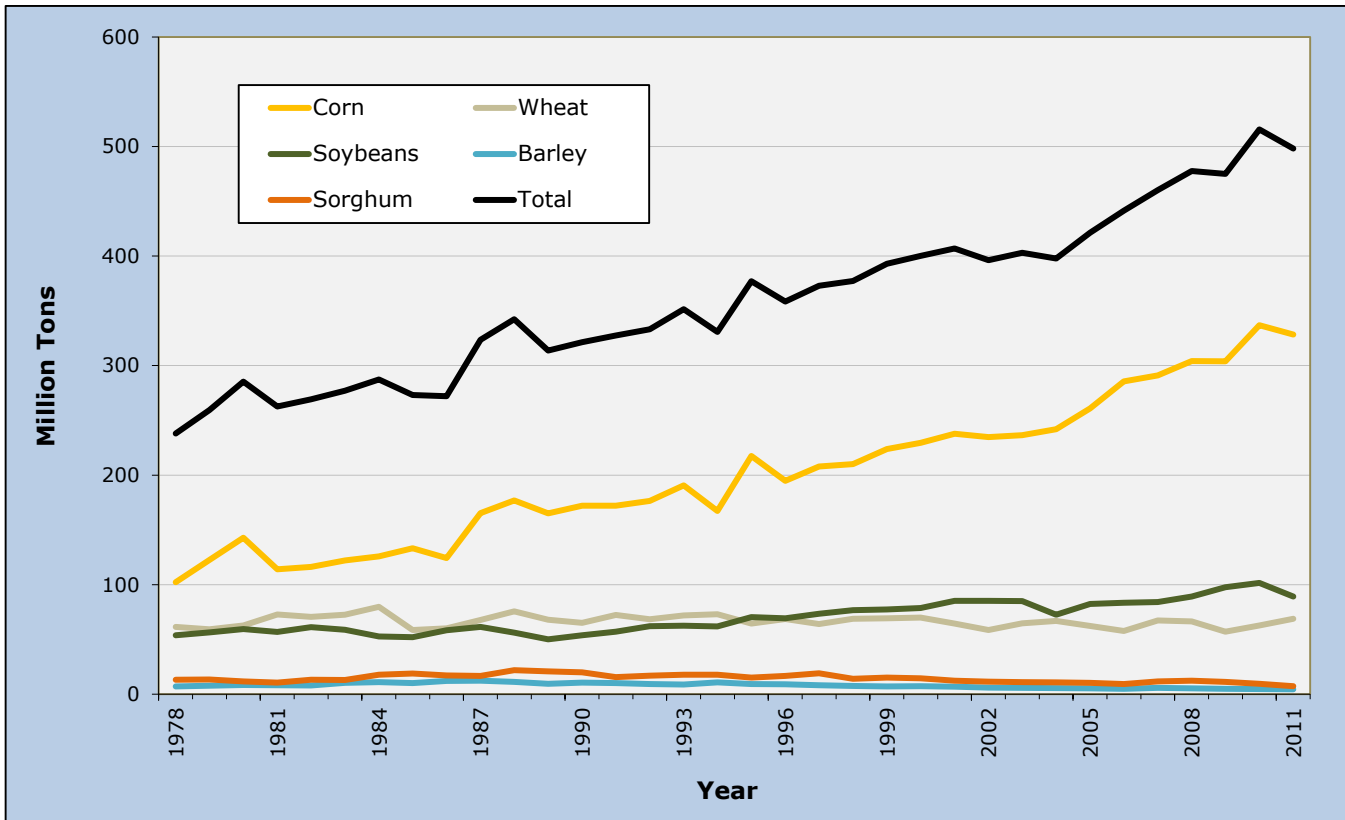


Table 1: Tonnages of U.S. grains transported, by type of crop and type of movement, 1998–2011

Year	Corn	Wheat	Soybeans	Sorghum	Barley	All grains
	1,000 tons					
Total						
1998	209,977	68,859	76,848	14,114	7,477	377,275
1999	223,877	69,227	77,501	15,107	7,136	392,847
2000	229,534	69,904	78,662	14,524	7,400	400,023
2001	237,853	64,481	85,347	12,455	6,805	406,942
2002	234,647	58,668	85,354	11,518	6,044	396,231
2003	236,406	64,790	84,950	11,018	5,742	402,905
2004	241,854	66,834	72,531	10,912	5,539	397,670
2005	260,869	62,289	82,351	10,318	5,483	421,310
2006	285,643	57,825	83,604	9,306	5,030	441,408
2007	290,994	67,424	84,193	11,630	5,869	460,110
2008	304,155	66,501	89,156	12,355	5,389	477,556
2009	303,803	57,138	97,728	11,379	4,850	474,898
2010	336,953	62,690	101,689	9,432	4,716	515,480
2011	328,229	68,841	89,174	7,341	4,524	498,109
Export						
1998	44,865	30,070	25,450	5,507	811	106,703
1999	57,820	33,130	25,509	6,309	915	123,683
2000	52,957	31,780	29,698	7,037	1,256	122,729
2001	53,032	29,410	31,663	6,720	1,189	122,014
2002	52,329	27,580	30,506	6,085	1,008	117,508
2003	47,607	29,390	34,147	5,546	1,167	117,857
2004	53,374	35,209	27,485	5,089	838	121,995
2005	50,615	31,907	31,663	5,062	1,093	120,339
2006	63,420	29,370	30,506	5,205	888	129,390
2007	63,420	37,040	34,147	6,326	1,463	142,396
2008	58,875	33,830	37,338	5,813	1,340	137,195
2009	52,752	25,150	44,616	4,164	908	127,590
2010	54,927	31,220	46,243	4,189	512	137,091
2011	50,437	36,410	38,461	3,732	640	129,680
Domestic						
1998	165,111	38,789	51,398	8,607	6,666	270,572
1999	166,057	36,097	51,992	8,798	6,221	269,164
2000	176,576	38,124	48,964	7,486	6,143	277,294
2001	184,821	35,071	53,685	5,735	5,616	284,928
2002	182,318	31,088	54,848	5,433	5,037	278,724
2003	188,799	35,400	50,802	5,472	4,575	285,048
2004	188,480	31,625	45,046	5,823	4,701	275,675
2005	210,254	30,382	50,688	5,256	4,390	300,971
2006	222,223	28,455	53,098	4,101	4,141	312,018
2007	227,574	30,384	50,046	5,304	4,406	317,714
2008	245,281	32,671	51,818	6,542	4,049	340,361
2009	251,051	31,988	53,112	7,215	3,942	347,308
2010	282,027	31,470	55,446	5,243	4,204	378,389
2011	277,792	32,431	50,713	3,609	3,884	368,429

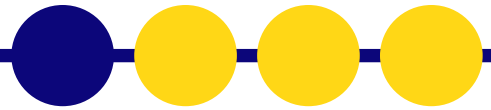
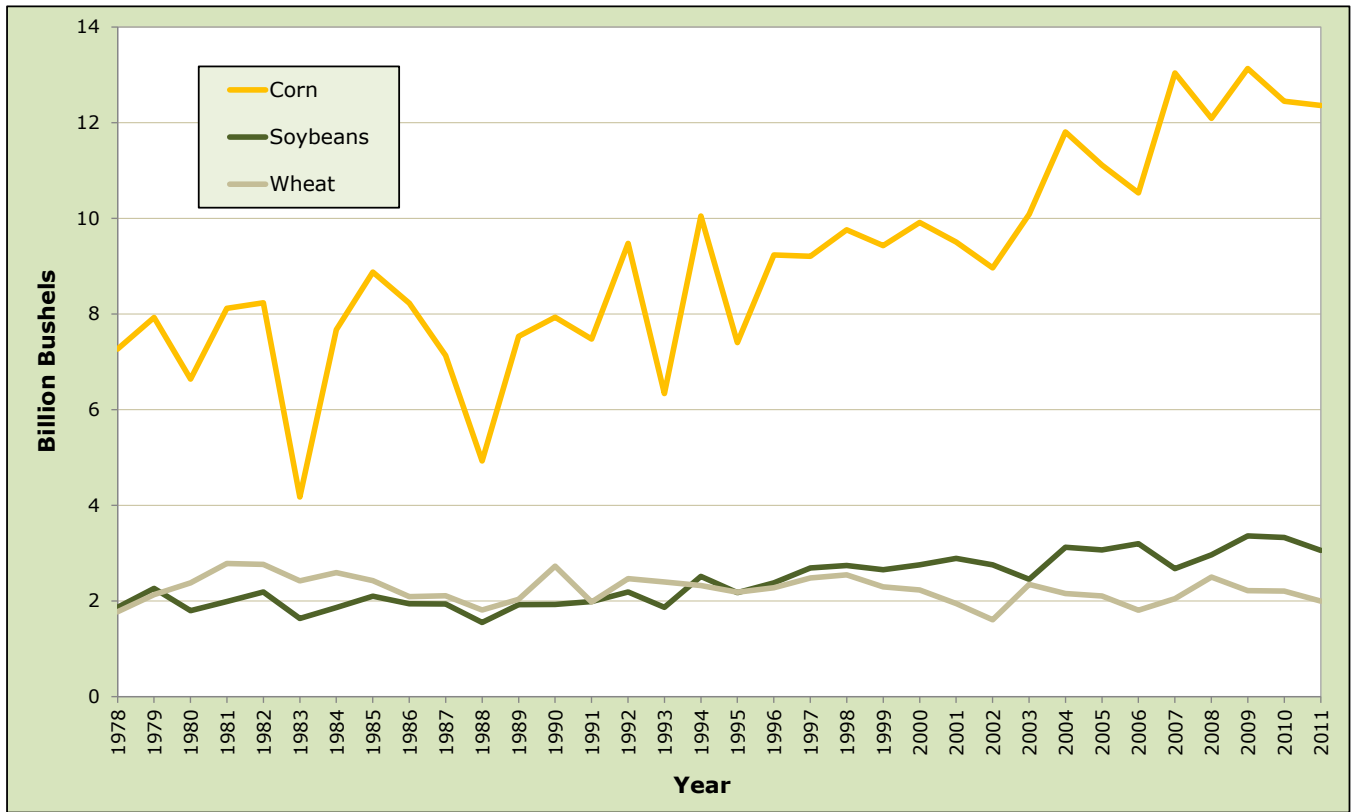


Figure 4: U.S. corn, soybeans, and wheat production, 1978-2011



Source: National Agricultural Statistics Service, USDA

Figure 5: U.S. grain modal shares, 1978-2011

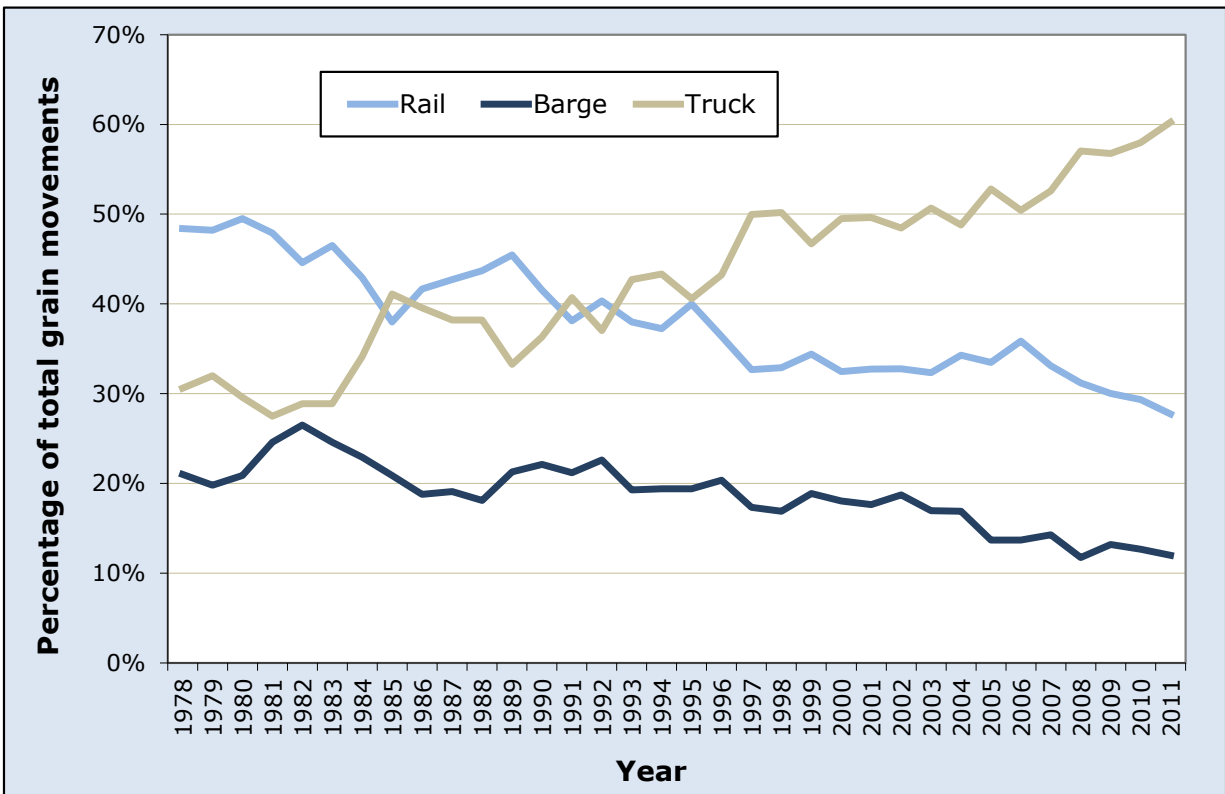


Table 2: Tonnages and modal shares for all U.S. grains, 1998–2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	125,021	33	64,199	17	190,727	50
1999	135,232	34	74,174	19	183,441	47
2000	129,824	32	72,197	18	198,002	49
2001	133,233	33	71,808	18	201,901	50
2002	129,915	33	74,267	19	192,049	48
2003	130,356	32	68,396	17	204,153	51
2004	136,317	34	67,274	17	194,079	49
2005	141,130	33	57,668	14	222,512	53
2006	158,287	36	60,484	14	222,637	50
2007	152,423	33	65,750	14	241,938	53
2008	149,061	31	56,118	12	272,377	57
2009	142,663	30	62,689	13	269,546	57
2010	151,251	29	65,428	13	298,800	58
2011	138,159	28	59,789	12	300,160	60
Export						
1998	41,700	39	57,509	54	7,369	7
1999	50,876	41	67,949	55	4,647	4
2000	46,196	38	67,556	55	8,849	7
2001	47,196	39	67,189	55	7,383	6
2002	44,030	38	68,506	59	4,505	4
2003	45,571	39	62,776	53	9,029	8
2004	48,482	40	61,729	51	10,805	9
2005	55,544	47	52,981	45	10,060	8
2006	62,715	50	56,617	45	7,034	6
2007	62,055	44	61,613	43	18,113	13
2008	68,050	50	51,765	38	16,633	12
2009	59,853	47	59,095	47	7,870	6
2010	67,732	50	61,371	45	7,667	6
2011	53,539	41	55,877	43	19,816	15
Domestic						
1998	83,322	30	6,690	2	183,357	67
1999	84,356	31	6,225	2	178,794	66
2000	83,628	30	4,641	2	189,154	68
2001	86,037	30	4,619	2	194,518	68
2002	85,884	31	5,761	2	187,545	67
2003	84,786	30	5,620	2	195,123	68
2004	87,835	32	5,544	2	183,274	66
2005	85,586	28	4,686	2	212,452	70
2006	95,572	30	3,867	1	215,603	68
2007	90,368	28	4,137	1	223,824	70
2008	81,011	24	4,353	1	255,745	75
2009	82,810	24	3,594	1	261,676	75
2010	83,519	22	4,057	1	291,133	77
2011	84,621	23	3,912	1	280,344	76

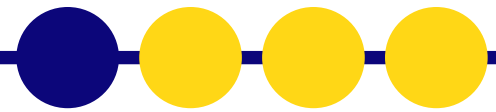


Table 3: Modal Share Summary: 2011 and 5-year average, percent

Mode/ Year	Corn			Wheat			Soybeans			All grains		
	Exports	Domestic	All corn	Exports	Domestic	All wheat	Exports	Domestic	All soybeans	Exports	Domestic	All grains
Rail												
2011	34	20	22	63	63	63	31	14	21	41	23	28
5-yr avg	38	23	26	70	74	72	42	12	24	48	26	32
Barge												
2011	54	1	9	26	2	14	49	2	22	43	1	12
5-yr avg	53	1	11	28	1	15	46	2	20	44	1	13
Truck												
2011	12	80	69	12	35	23	20	84	56	15	76	60
5-yr avg	9	76	63	2	25	14	13	86	55	9	73	55

Corn Modal Shares

Table 4: Tonnages and modal shares for U.S. corn, 1998–2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	63,470	30	33,995	16	112,511	54
1999	71,807	32	40,620	18	111,449	50
2000	68,984	30	37,831	16	122,718	53
2001	70,773	30	38,864	16	128,217	54
2002	71,488	30	41,598	18	121,561	52
2003	69,775	30	36,488	15	130,143	55
2004	74,766	31	37,302	15	129,787	54
2005	75,261	29	31,739	12	153,869	59
2006	87,314	31	34,587	12	163,742	57
2007	78,650	27	37,407	13	174,937	60
2008	75,652	25	30,088	10	198,415	65
2009	69,803	23	32,147	11	201,853	66
2010	74,909	22	33,134	10	228,910	68
2011	72,059	22	29,434	9	226,736	69
Export						
1998	12,240	27	30,592	68	2,033	5
1999	18,307	32	37,533	65	1,980	3
2000	15,213	29	35,150	66	2,594	5
2001	14,676	28	35,904	68	2,452	5
2002	13,157	25	38,125	73	1,048	2
2003	13,207	28	32,872	69	1,528	3
2004	16,055	30	33,974	64	3,345	6
2005	18,380	36	28,778	57	3,457	7
2006	24,735	39	31,941	50	6,744	11
2007	20,478	32	34,689	55	8,252	13
2008	24,615	42	27,457	47	6,803	12
2009	19,801	38	30,013	57	2,938	6
2010	22,070	40	31,174	57	1,682	3
2011	17,237	34	27,331	54	5,868	12
Domestic						
1998	51,230	31	3,403	2	110,478	67
1999	53,501	32	3,087	2	109,469	66
2000	53,771	30	2,681	2	120,124	68
2001	56,097	30	2,960	2	125,765	68
2002	58,331	32	3,473	2	120,513	66
2003	56,568	30	3,616	2	128,615	68
2004	58,711	31	3,328	2	126,441	67
2005	56,881	27	2,961	1	150,412	72
2006	62,579	28	2,646	1	156,998	71
2007	58,171	26	2,718	1	166,684	73
2008	51,037	21	2,631	1	191,612	78
2009	50,002	20	2,135	1	198,915	79
2010	52,839	19	1,960	1	227,228	81
2011	54,822	20	2,102	1	220,868	80

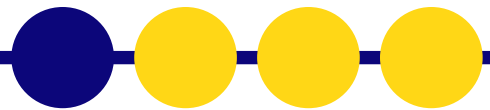


Figure 6: U.S. corn domestic shipments by mode, 1995–2011

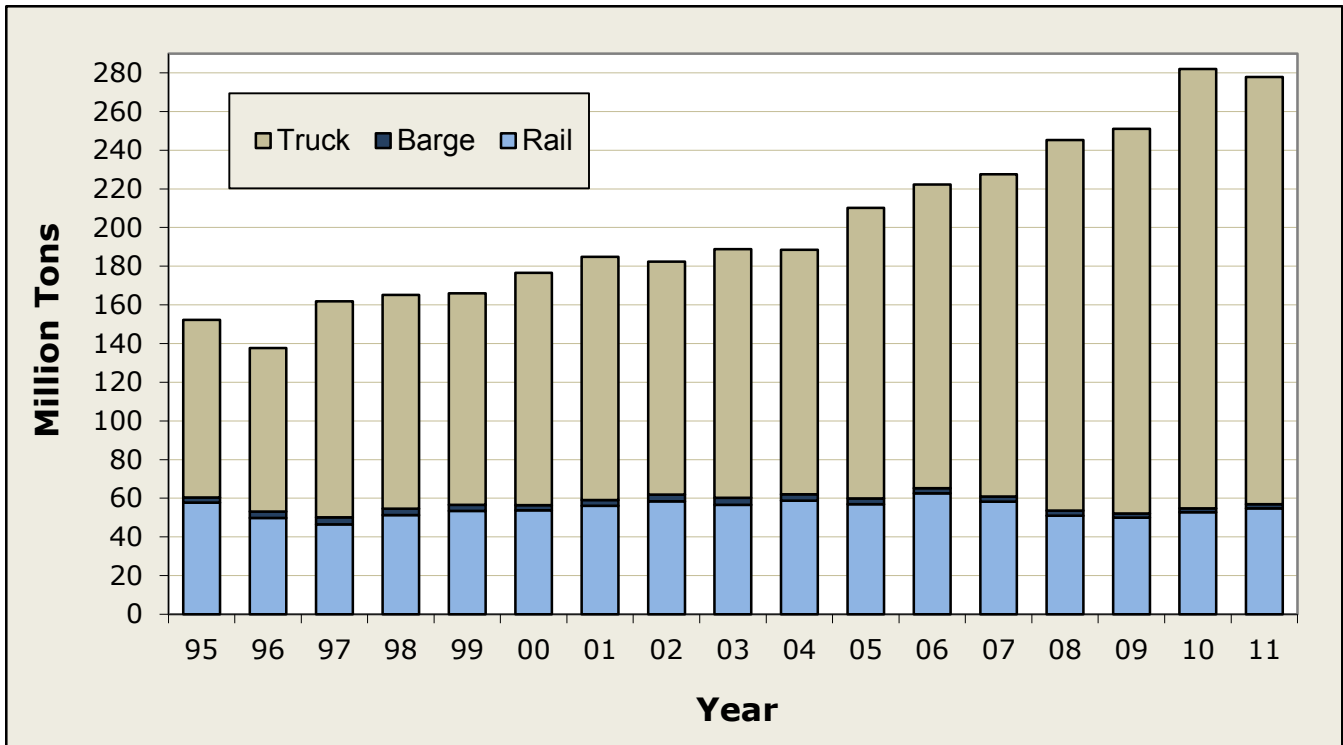
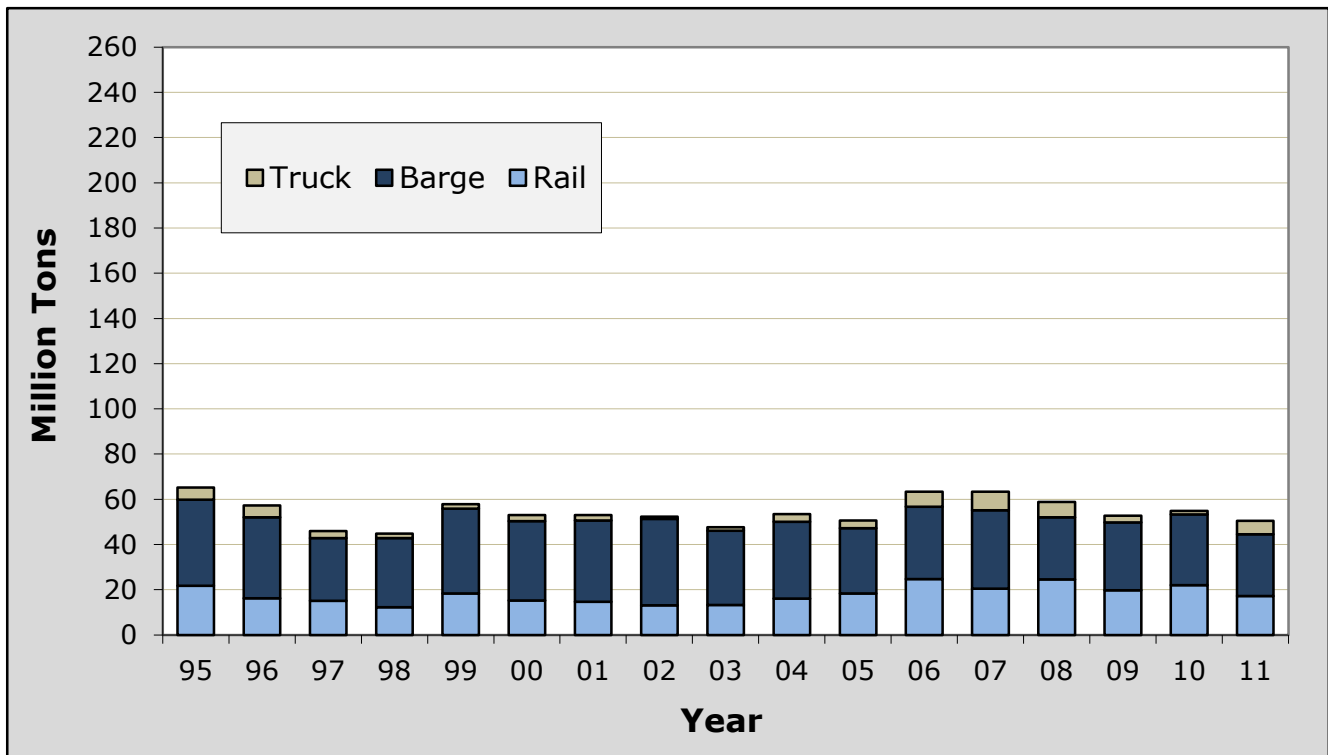


Figure 7: U.S. corn export shipments by mode, 1995–2011



Wheat Modal Shares

Table 5: Tonnages and modal shares for U.S. wheat, 1998-2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	37,119	54	10,756	16	20,984	30
1999	37,599	54	12,038	17	19,590	28
2000	35,380	51	12,391	18	22,132	32
2001	35,809	56	11,534	18	17,138	27
2002	34,523	59	9,876	17	14,270	24
2003	36,900	57	10,180	16	17,710	27
2004	40,924	61	11,937	18	13,973	21
2005	44,180	71	8,668	14	9,441	15
2006	44,735	77	8,767	15	4,324	7
2007	47,777	71	10,515	16	9,132	14
2008	45,670	69	8,872	13	11,959	18
2009	41,094	72	8,462	15	7,582	13
2010	44,017	70	8,471	14	10,202	16
2011	43,417	63	9,844	14	15,580	23
Export						
1998	18,824	63	10,083	34	1,162	4
1999	19,556	59	11,558	35	2,016	6
2000	17,934	56	11,975	38	1,871	6
2001	16,657	57	11,099	38	1,654	6
2002	16,966	62	9,367	34	1,247	5
2003	18,348	62	9,726	33	1,316	4
2004	21,439	61	11,370	32	2,400	7
2005	23,613	74	8,294	26	0	0
2006	20,804	71	8,566	29	0	0
2007	24,806	67	10,229	28	2,004	5
2008	24,519	72	8,428	25	883	3
2009	17,117	68	7,970	32	63	0
2010	22,369	72	8,013	26	838	3
2011	22,845	63	9,333	26	4,232	12
Domestic						
1998	18,295	47	672	2	19,822	51
1999	18,043	50	480	1	17,573	49
2000	17,446	46	416	1	20,262	53
2001	19,152	55	435	1	15,484	44
2002	17,556	56	509	2	13,023	42
2003	18,552	52	454	1	16,394	46
2004	19,485	62	566	2	11,573	37
2005	20,567	68	375	1	9,441	31
2006	23,931	84	200	1	4,324	15
2007	22,971	76	286	1	7,127	23
2008	21,151	65	444	1	11,076	34
2009	23,977	75	493	2	7,519	24
2010	21,647	69	458	1	9,364	30
2011	20,572	63	511	2	11,348	35

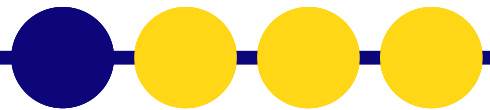


Figure 8: U.S. wheat domestic shipments by mode, 1995–2011

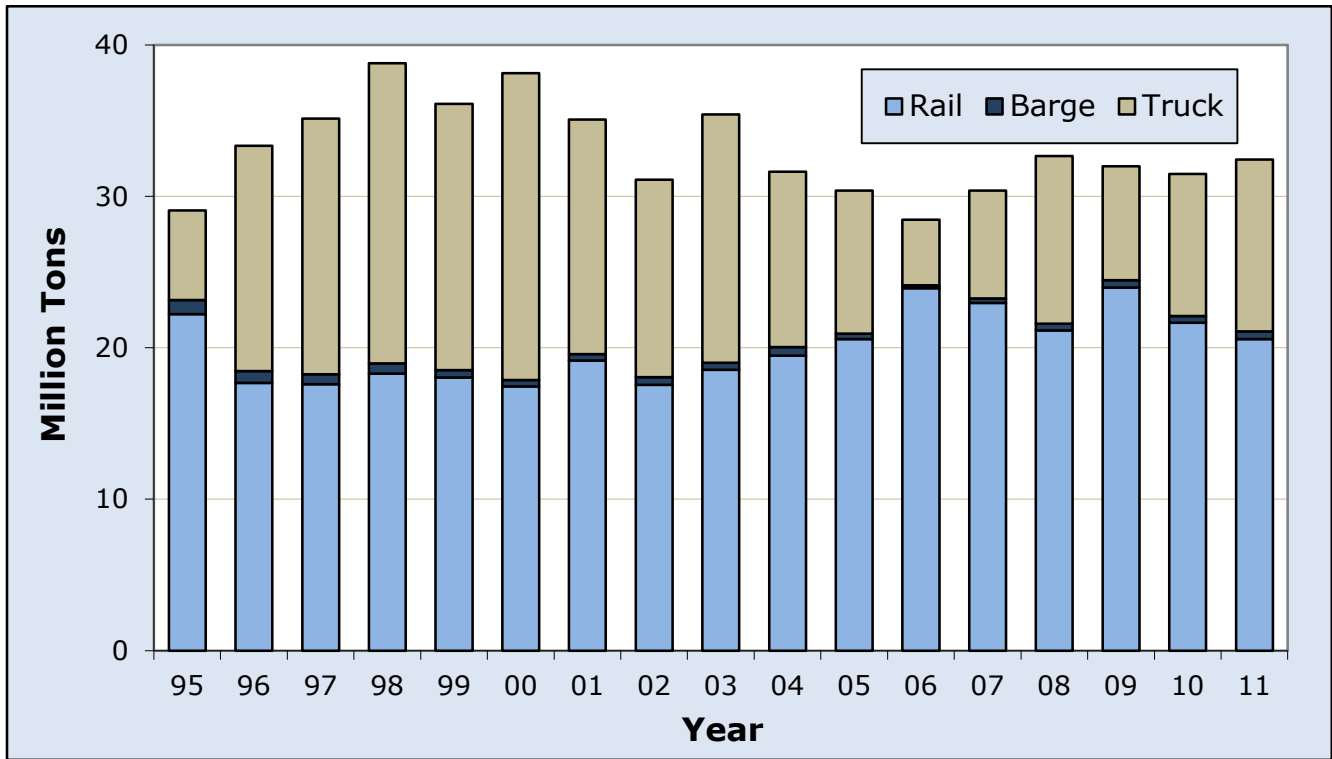
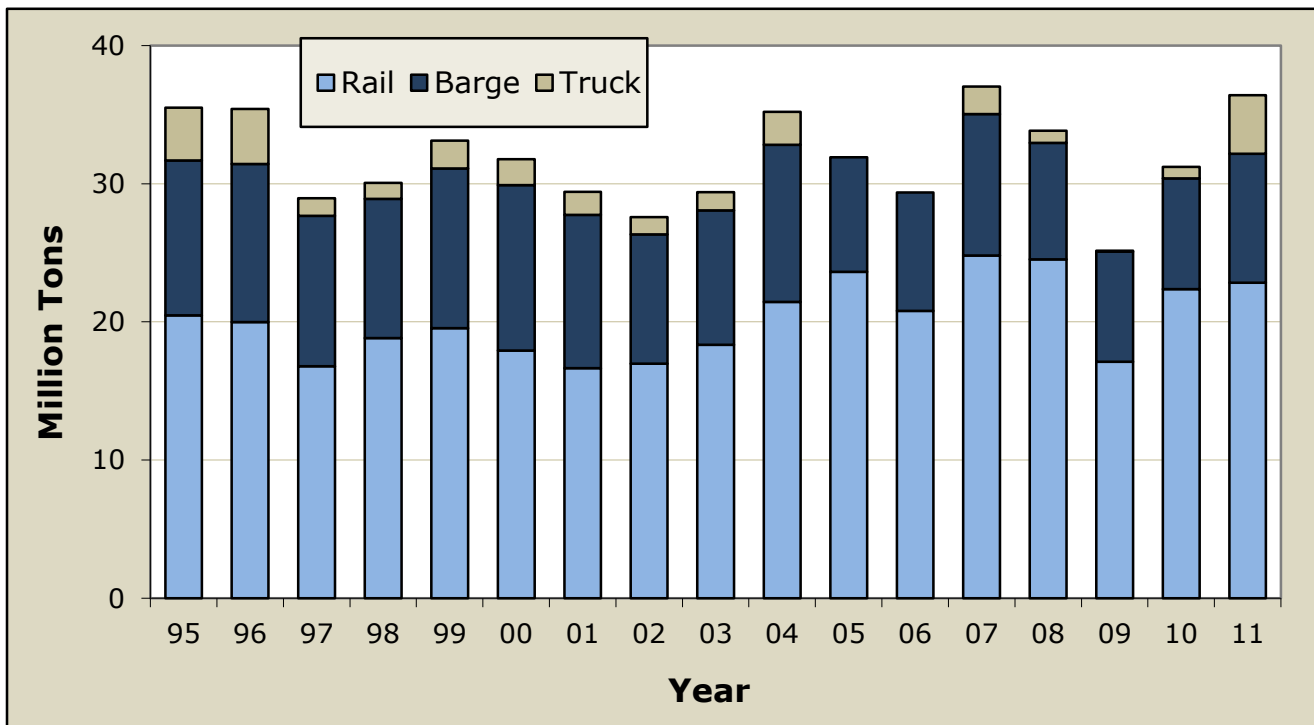


Figure 9: U.S. wheat export shipments by mode, 1995-2011



Soybean Modal Shares

Table 6: Tonnages and modal shares for U.S. soybeans, 1998-2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	16,476	21	18,000	23	42,372	55
1999	16,685	22	19,875	26	40,941	53
2000	17,257	22	20,174	26	41,231	52
2001	18,699	22	19,872	23	46,777	55
2002	16,550	19	21,399	25	47,405	56
2003	17,735	21	20,167	24	47,047	55
2004	15,029	21	17,053	24	40,449	56
2005	16,141	20	16,332	20	49,878	61
2006	19,862	24	16,221	19	47,521	57
2007	19,478	23	16,327	19	48,388	57
2008	20,899	23	16,326	18	51,931	58
2009	25,745	26	21,569	22	50,413	52
2010	26,778	26	23,472	23	51,439	51
2011	19,055	21	19,962	22	50,156	56
Export						
1998	7,299	29	15,410	61	2,741	11
1999	8,189	32	17,240	68	80	0
2000	8,591	29	18,665	63	2,442	8
2001	11,047	35	18,689	59	1,926	6
2002	9,477	31	19,642	64	1,387	5
2003	11,270	33	18,632	55	4,245	12
2004	8,496	31	15,412	56	3,578	13
2005	10,676	34	15,030	47	5,956	19
2006	13,541	44	15,240	50	1,725	6
2007	12,524	37	15,242	45	6,381	19
2008	14,492	39	15,089	40	7,757	21
2009	19,694	44	20,634	46	4,288	10
2010	20,484	44	21,864	47	3,895	8
2011	12,041	31	18,793	49	7,627	20
Domestic						
1998	9,177	18	2,590	5	39,631	77
1999	8,496	16	2,636	5	40,861	79
2000	8,666	18	1,510	3	38,789	79
2001	7,651	14	1,183	2	44,851	84
2002	7,072	13	1,758	3	46,018	84
2003	6,465	13	1,535	3	42,802	84
2004	6,533	15	1,641	4	36,872	82
2005	5,465	11	1,302	3	43,922	87
2006	6,321	12	982	2	45,795	86
2007	6,953	14	1,086	2	42,007	84
2008	6,407	12	1,237	2	44,174	85
2009	6,051	11	936	2	46,125	87
2010	6,294	11	1,608	3	47,544	86
2011	7,015	14	1,169	2	42,529	84

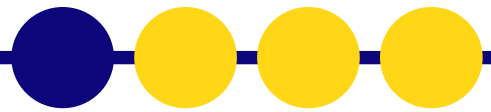


Figure 10: U.S. soybean domestic shipments by mode, 1995-2011

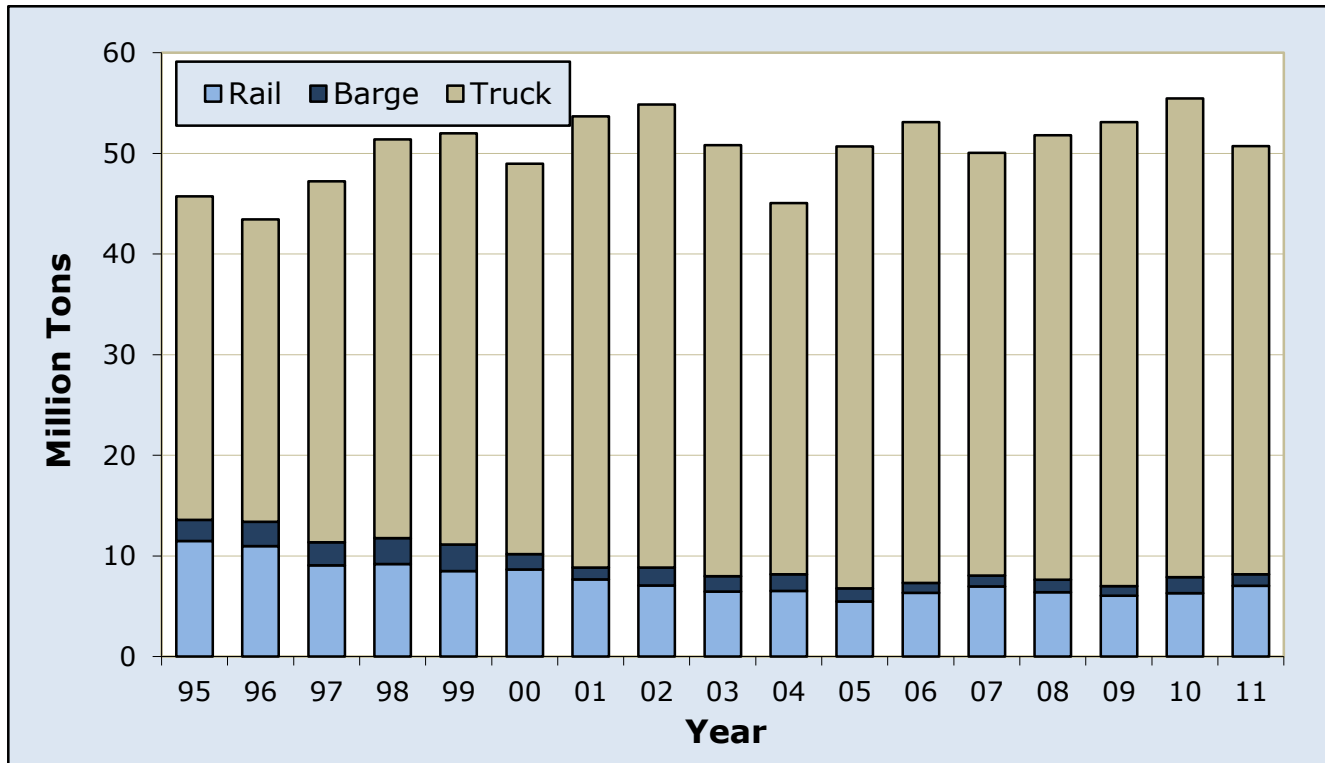
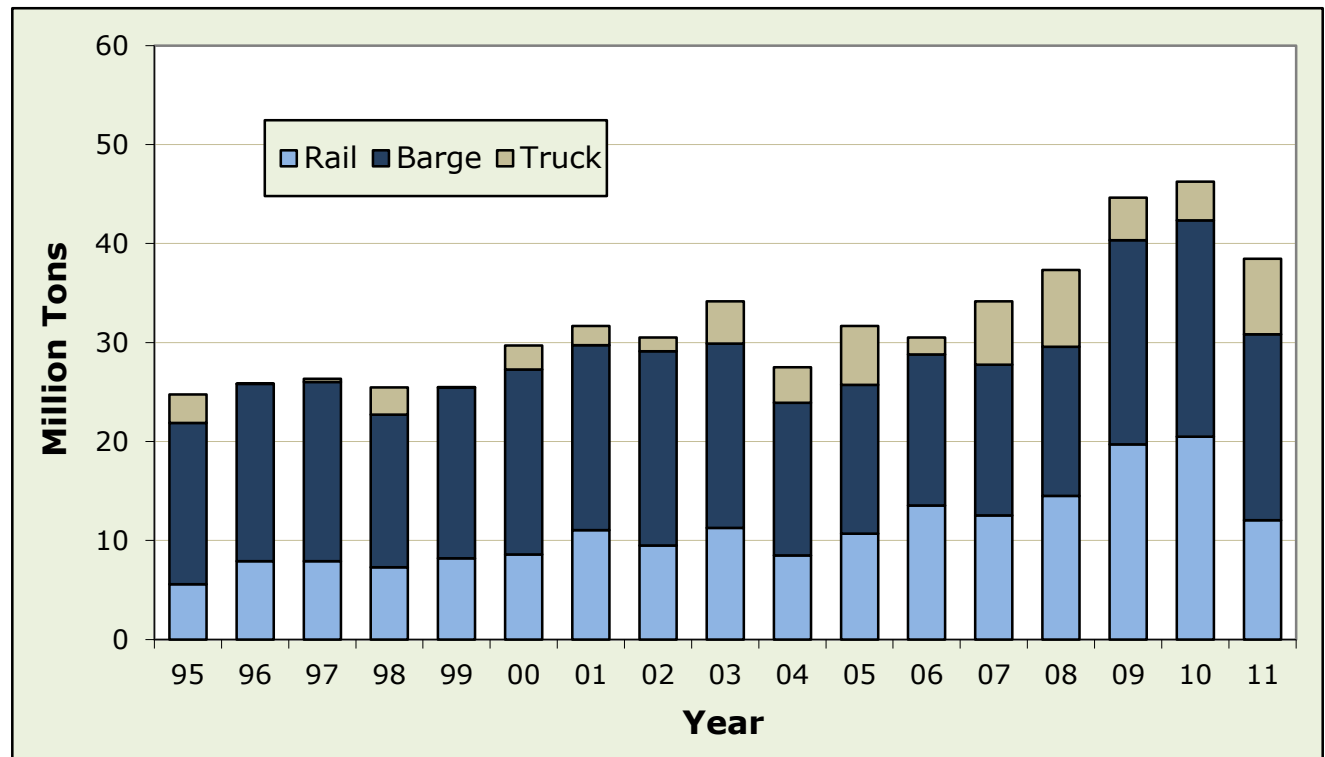


Figure 11: U.S. soybean export shipments by mode, 1995-2011



Sorghum Modal Shares

Table 7: Tonnages and modal shares for U.S. sorghum, 1998-2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	4,710	33	1,168	8	8,236	58
1999	5,222	35	1,333	9	8,552	57
2000	4,626	32	1,322	9	8,576	59
2001	4,541	36	1,335	11	6,580	53
2002	4,100	36	1,225	11	6,194	54
2003	2,121	19	1,365	12	7,533	68
2004	2,334	21	852	8	7,725	71
2005	2,366	23	721	7	7,231	70
2006	3,407	37	730	8	5,169	56
2007	3,490	30	1,252	11	6,887	59
2008	3,779	31	634	5	7,942	64
2009	3,218	28	442	4	7,719	68
2010	2,886	31	315	3	6,231	66
2011	1,078	15	427	6	5,836	79
Export						
1998	3,065	56	1,165	21	1,277	23
1999	4,197	67	1,331	21	782	12
2000	3,650	52	1,317	19	2,070	29
2001	3,798	57	1,326	20	1,596	24
2002	3,578	59	1,218	20	1,289	21
2003	1,763	32	1,362	25	2,421	44
2004	1,776	35	852	17	2,460	48
2005	1,941	38	721	14	2,399	47
2006	2,886	55	730	14	1,590	31
2007	2,989	47	1,246	20	2,091	33
2008	3,253	56	622	11	1,938	33
2009	2,372	57	440	11	1,352	32
2010	2,307	55	309	7	1,573	38
2011	776	21	420	11	2,536	68
Domestic						
1998	1,645	19	3	0	6,959	81
1999	1,025	12	2	0	7,771	88
2000	976	13	5	0	6,506	87
2001	743	13	8	0	4,984	87
2002	522	10	6	0	4,904	90
2003	358	7	3	0	5,112	93
2004	558	10	0	0	5,265	90
2005	425	8	0	0	4,832	92
2006	521	13	0	0	3,580	87
2007	502	9	6	0	4,797	90
2008	527	8	11	0	6,004	92
2009	846	12	2	0	6,367	88
2010	579	11	5	0	4,659	89
2011	302	8	7	0	3,299	91

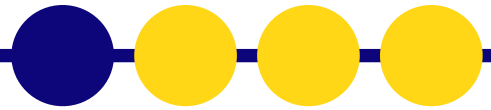


Figure 12: U.S. sorghum domestic shipments by mode, 1995–2011

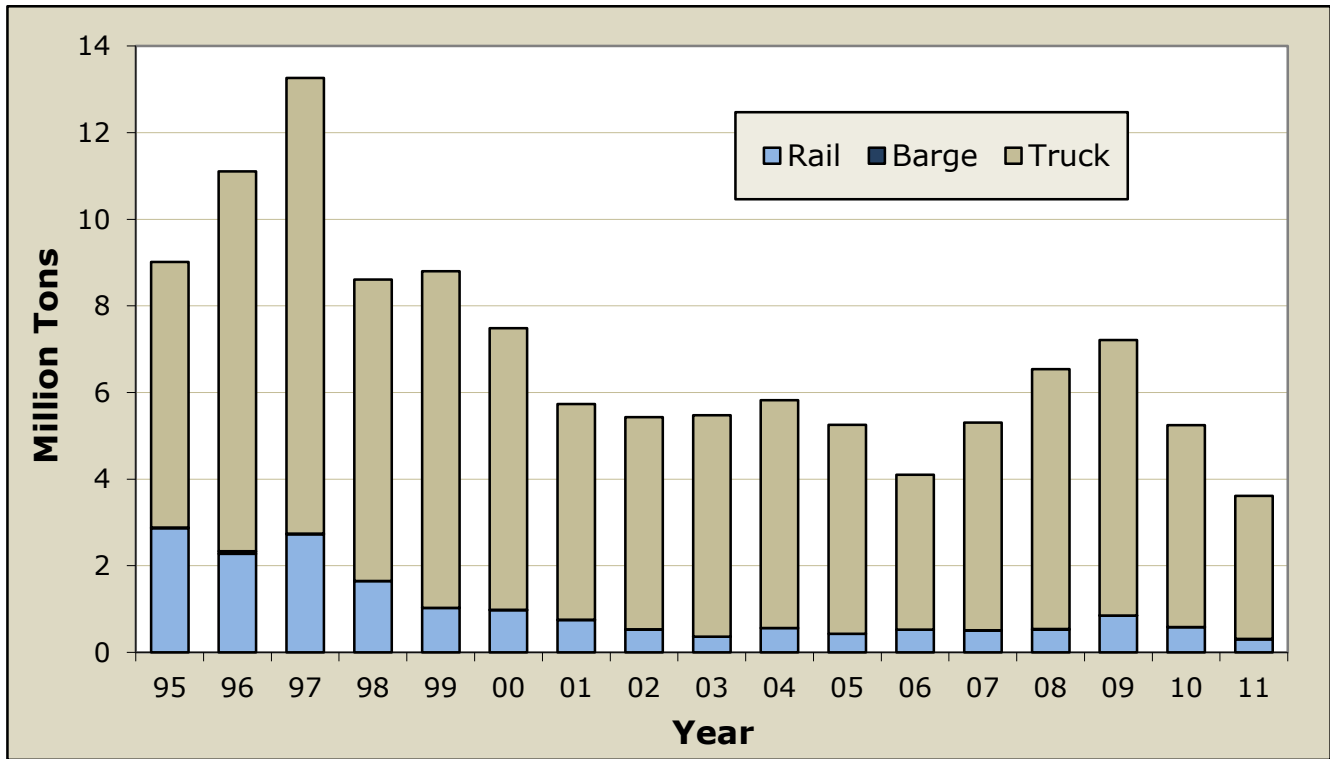
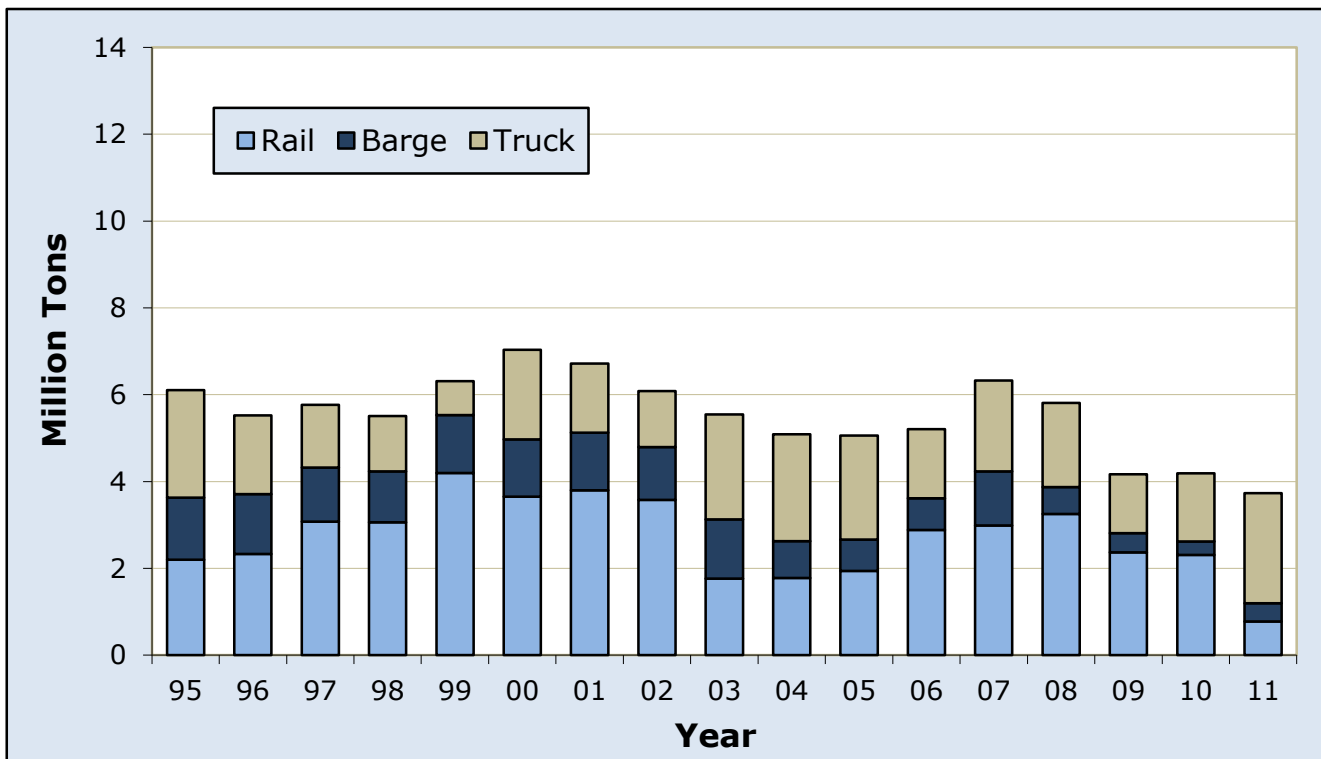


Figure 13: U.S. sorghum export shipments by mode, 1995–2011



Barley Modal Shares

Table 8: Tonnages and modal shares for U.S. barley, 1998-2011

Year & type of movement	Mode of transport					
	Rail		Barge		Truck	
	1,000 tons	Percent	1,000 tons	Percent	1,000 tons	Percent
Total						
1998	3,246	44	280	4	3,819	52
1999	3,919	55	307	4	2,909	41
2000	3,577	48	478	6	3,345	45
2001	3,412	50	204	3	3,189	47
2002	3,254	54	170	3	2,620	43
2003	3,826	67	196	3	1,720	30
2004	3,264	59	130	2	2,144	39
2005	3,182	58	207	4	2,093	38
2006	2,969	59	179	4	1,881	37
2007	3,028	52	247	4	2,594	44
2008	3,061	57	198	4	2,130	40
2009	2,803	58	68	1	1,978	41
2010	2,661	56	36	1	2,018	43
2011	2,550	56	123	3	1,852	41
Export						
1998	271	41	259	39	126	19
1999	628	69	287	31	0	0
2000	807	64	449	36	0	0
2001	1,018	86	171	14	0	0
2002	852	85	155	15	0	0
2003	983	84	183	16	0	0
2004	716	86	121	14	0	0
2005	934	85	159	15	0	0
2006	748	84	140	16	0	0
2007	1,257	86	206	14	0	0
2008	1,172	87	168	13	0	0
2009	869	96	39	4	0	0
2010	501	98	11	2	0	0
2011	640	100	0	0	0	0
Domestic						
1998	2,975	44	21	0	3,693	55
1999	3,291	53	20	0	2,909	47
2000	2,769	45	29	0	3,345	54
2001	2,393	43	33	1	3,189	57
2002	2,402	48	15	0	2,620	52
2003	2,842	62	13	0	1,720	38
2004	2,548	54	9	0	2,144	46
2005	2,249	51	48	1	2,093	48
2006	2,221	54	39	1	1,881	45
2007	1,771	40	41	1	2,594	59
2008	1,889	47	29	1	2,130	53
2009	1,934	49	29	1	1,978	50
2010	2,160	51	26	1	2,018	48
2011	1,910	49	123	3	1,852	48

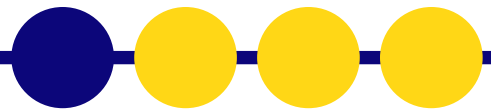


Figure 14: U.S. barley domestic shipments by mode, 1995–2011

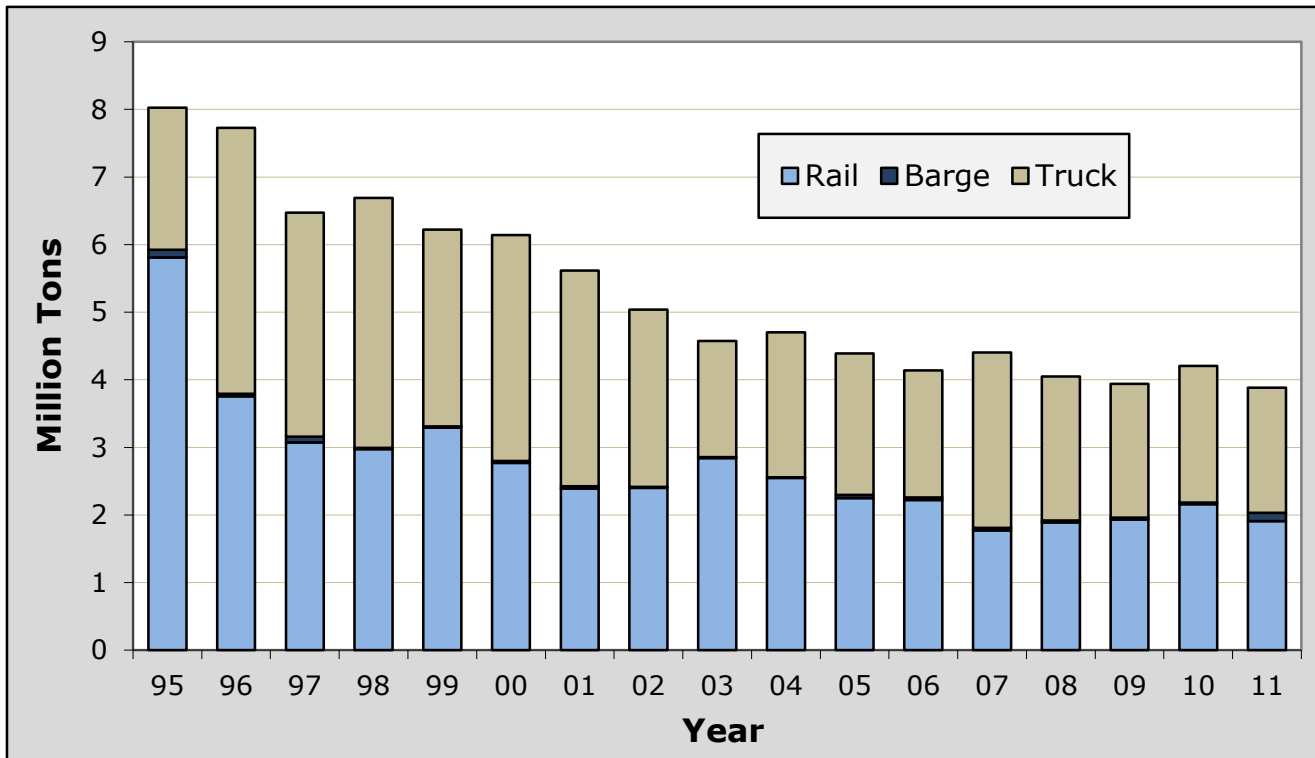
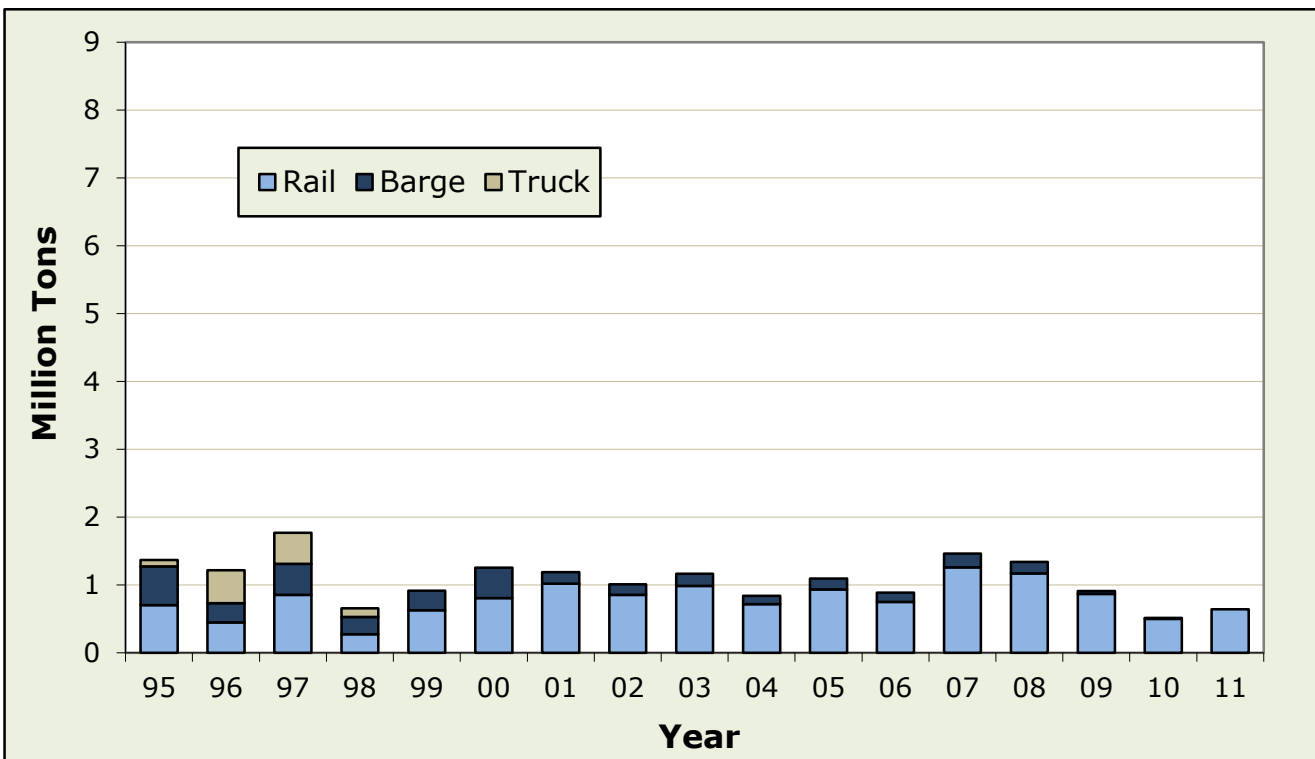


Figure 15: U.S. barley export shipments by mode, 1995–2011





Appendix A: Modal Share Methodology

Modal shares are calculated for all grains and each grain type, based on the estimated modal tonnages. These modal shares are determined for total, export, and domestic movements.

Total Tonnages. The approach used to estimate modal tonnages and shares requires that total tonnages of grain transported to market be determined. It is also necessary to determine the portions of total tonnages transported to domestic and export markets. Total tonnages are defined as total disappearance minus grain that was grown and used on-farm. Total disappearance for this study is calculated using the ERS *Wheat Outlook*, *Feed Outlook*, and *Oil Crop Outlook* reports. These reports include marketing year supply and disappearance tables that list domestic use and exports. The *Oil Crop Outlook* lists these numbers by marketing year. The other two reports break the numbers down on a quarterly basis. To get disappearance numbers by calendar year, monthly totals are calculated from the marketing year data and added together into respective calendar year totals.

Total Export. Total exports are calculated using export numbers reported in the ERS *Outlook* reports.

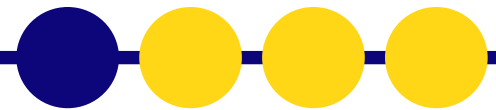
Total Domestic. Total domestic tonnages are estimated by subtracting total export tonnages from total disappearance.

Grown and Used-on-Farm Totals. Grown and used-on-farm data are provided by ERS. These data are reported in percentages by year and commodity. Production numbers for each commodity are multiplied by the grown and used-on-farm percentages. Those numbers are then subtracted from total disappearance to get total transported grain tonnages. Grain grown and used on-farm must be deducted from total disappearance because it generates no commercial transportation demand.

Rail Total. Annual rail movements come from the STB Master Carload Waybill Sample. STB's Waybill Sample is a stratified sample of carload waybills for terminated shipments by railroad carriers. The STB collects operating statistics on U.S. railroads, which can be used to estimate rail traffic volumes and railroad characteristics. Total tonnages are calculated using the billed weight in tons from the Waybill Sample and multiplying it by an expansion factor to estimate the tonnages for all grain movements by all railroads. Movements that originated and terminated in the same five-digit, Federal Information Processing Standards (FIPS) region are assumed to be short hauls, which would be double-counted and, thus, were deleted.

Some grain is moved by a combination of rail and barge. Since this represents a relatively small amount of grain, these movements are not included in the rail calculations. Instead, they are counted in the barge movements—the final mode used to transport the grain. There are other instances in which grain shipments are rebilled from one railroad to another at terminal markets. Such a movement would be considered a double-count of grain movements. An attempt is made to minimize the rebilled movements. Again, as with the rail-to-barge movements, these types of shipments represent a small portion of total rail shipments.

Rail Export. Export regions are defined by five-digit FIPS codes and are listed in Appendix B. The regions chosen are based on methodology from the 1998 modal share report as those regions with ports in the Pacific Northwest, Atlantic Coast, and Gulf of Mexico. Rail exports to the Great Lakes are determined from grain delivery information at Duluth-Superior, MN, and Toledo, OH. Total tonnages exported are then calculated using the designated export regions. Movements that originated and terminated in the same five-digit FIPS region are assumed to be short hauls, which would be double-counted and, thus, were deleted.



Rail Domestic. Domestic rail tonnages are estimated by subtracting export grain tonnages moved by rail from total grain tonnages moved by rail.

Barge Total. Annual barge movement data, which are collected and compiled by the U.S. Army Corps of Engineers, are obtained from *Waterborne Commerce of the United States*. The categories used to calculate modal shares for barge are river shipping range (origin) and river receiving range (destination). Total movements are determined by summing the total of all receiving ranges. As explained in the Rail Total section above, when barge and rail are used in combination to ship grain, with barge being the final mode in the transportation route, only the barge movement is included.

Barge Export. The following river receiving ranges are used to find barge export movements: Atlantic, Pacific, Central Gulf, East Gulf, and West Gulf. Any movement that is received into a port in the defined regions is determined to be an export movement. The receiving ranges are based on the 1998 report's methodology. For that report, export barge modal shares were calculated using barge export tonnages based on internal grain and oilseed receipts reported on the inland waterways. Movements were defined as those to: 1) Kalama and Vancouver, WA, and Portland, OR, on the Columbia-Snake River system; 2) Baton Rouge through New Orleans, LA, to the mouth of the passes on the Mississippi River system; 3) Lake Charles, LA, on the Calcasieu River; 4) Mobile, AL, on the Tennessee-Tombigbee River system; 5) Pascagoula, MS, on the Gulf Intracoastal Waterway; 6) Beaumont and Port Arthur, TX; 7) Galveston Bay (including Houston), TX; 8) Corpus Christi, TX, and the Gulf Intracoastal Waterway ports between Corpus Christi and the Mexican border; and 9) Hampton Roads and Norfolk, VA, on the Chesapeake Bay.

Barge Domestic. Domestic barge movements are calculated by subtracting export barge movements from total barge movements.

Truck Total. Total truck tonnages are estimated by subtracting total rail and total barge from total disappearance. The method for estimating truck grain tonnages and modal shares assumes that all barge and rail tonnages represent "long-haul" movements. "Short-haul" movements (farm-to-elevator) that originate on the farm are almost exclusively done by truck. Such farm-to-elevator movements are considered gathering movements. Unlike barge or rail movements that typically end at the point of domestic consumption or export, these truck movements represent only the first and shortest segment of the entire shipping route for grain.

Truck Export. Truck export tonnages are estimated by subtracting rail export and barge export tonnages from total export tonnages.

Truck Domestic. Domestic truck tonnages are estimated by subtracting domestic rail and domestic barge tonnages from total domestic tonnages.

Appendix B: FIPS Regions Included in Rail Export Tonnages²

State/country	FIPS code	County
Canada & Mexico	0	All areas
Alabama	1003	Baldwin
Alabama	1097	Mobile
Arizona	4023	Santa Cruz
California	6025	Imperial
California	6073	San Diego
Georgia	13051	Chatham
Georgia	13127	Glynn
Louisiana	22019	Calcasieu
Louisiana	22023	Cameron
Louisiana	22033	East Baton Rouge
Louisiana	22051	Jefferson
Louisiana	22063	Livingston
Louisiana	22071	Orleans
Louisiana	22075	Plaquemines
Louisiana	22089	St. Charles
Louisiana	22093	St. James
Louisiana	22095	St. John the Baptist
Louisiana	22121	West Baton Rouge
Minnesota	27137	St. Louis
Mississippi	28045	Hancock
Mississippi	28047	Harrison
Mississippi	28059	Jackson
Ohio	39043	Erie
Ohio	39095	Lucas
Oregon	41009	Columbia
Oregon	41051	Multnomah
South Carolina	45019	Charleston
South Carolina	45053	Jasper
Texas	48061	Cameron
Texas	48141	El Paso
Texas	48167	Galveston
Texas	48201	Harris
Texas	48245	Jefferson
Texas	48323	Maverick
Texas	48355	Nueces
Texas	48361	Orange
Texas	48377	Presidio
Texas	48409	San Patricio
Texas	48479	Webb
Virginia	51710	Norfolk
Washington	53011	Clark
Washington	53015	Cowlitz
Washington	53033	King
Washington	53053	Pierce
Wisconsin	55031	Douglas
Wisconsin	55079	Milwaukee

2 Bureau of Transportation Statistics, 2002. United States Department of Transportation, *Atlas Databases 2002*, CD-ROM: BTS.

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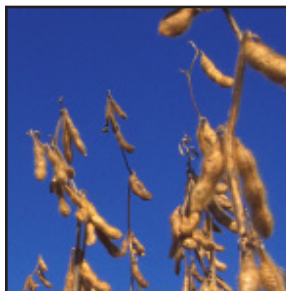
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