

A Study of the
**MAINE POTATO
INDUSTRY**

Its Economic Impact

2003



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Executive Summary and Recommendations

The purpose of this study is to answer four questions.

1. What is the Maine potato industry? What activities are involved? How many jobs does it provide and how much income does it generate?
2. What is the full impact of Maine's potato industry on the State of Maine? Beyond those directly involved, how many related businesses depend for a portion of their sales on the potato industry? What is the fiscal impact of the industry on Maine's state and local governments?
3. What is the relative significance of Maine's potato industry within the industry's broader national and international market?
4. What are the keys to the future health of the industry? What can growers, processors, related industries and state policy makers do to enhance the vitality of the industry and thus secure its future as a continuing pillar of Maine's economy?

1. What is the Maine Potato Industry?

The Maine potato industry is a cluster of businesses involved in growing, processing, marketing, and transporting potatoes. It encompasses over 500 businesses generating nearly \$300 million in annual sales, employing over 2,600 people, and providing over \$112 million in income to Maine residents.

2. What is the Impact of the Potato Industry on the Maine Economy?

The Maine potato industry creates an impact that spreads throughout the State. The industry's direct sales of \$293 million create an indirect impact back through its chain of suppliers amounting to another \$179 million in sales and an additional 2,400 jobs. These impacts, in turn, create income for Maine consumers who spend throughout the economy. These induced effects add another \$68 million in sales and 1,100 jobs to the State's economy.

In short, the total impact of the potato industry on Maine's economy is \$540 million in sales, 6,100 jobs, over \$230 million in personal income, and over \$32 million in state and local taxes.

3. What is the Relative Significance of the Maine Potato Industry?

Maine's potato industry has declined in relative size as areas in the western U.S. and maritime Canada have increased production. However, Maine's acreage has stabilized in recent years and tremendous investment has been made in irrigation, storage, and processing. Maine continues to play an important role in the nation's potato industry.

4. What are the Keys to the Future Health of Maine's Potato Industry?

Over the past generation, Maine's potato industry has moved from dependence upon a single, basic commodity to a wider variety of specialized products. The future vitality of the industry depends on recognizing the nature of this change and capturing the opportunities it presents.

These changes have meant the departure of hundreds of growers from the business, and the withdrawal of thousands of acres from potato cultivation. It has not, however, been a death knell for the industry. To the contrary, the removal of marginal land from cultivation provides those growers who remain with an

unprecedented opportunity to build a solid foundation for the future. If the approximately four hundred growers now cultivating approximately 64,000 acres make a commitment to increasing their yields on that land and growing the product their customers want, the industry can maintain its cluster of support businesses and look forward to a bright future. The key factors that will determine this future are:

- Increasing yields through investment in water sources, irrigation equipment, potato storage facilities, and rotation crops;
- Improving product selection and presentation through closer relationships with customers;
- Improving financial health through continuous improvement in business management practices; and
- Strengthening and diversifying the processing sector.

Recommendations

Recommendation One: The Maine Potato Board should sponsor a detailed cost-benefit analysis of investment in irrigation, both in water supply and irrigation equipment, and publicize the results among its members.

Recommendation Two: The Maine Department of Agriculture should expand the “Agricultural Water Source Development Cost Share Program.” Some of the proceeds of proposed economic development bonds should be allocated to expansion of this program. In addition, the program should be expanded to include loans available to farmers to cover the expenses of technical and legal expertise needed to obtain permits to build or expand a water source for irrigation. These loans should be interest-free until a proposed project is either approved or rejected. Loans for approved projects should be rolled into the Cost Share program, and loans for rejected projects should be forgiven up to 75% of funds expended.

Recommendation Three: The Legislature should enact a tax credit, applicable to state corporate income tax, available to any food processor or other agriculture related business who provides matching funds to the Potato Marketing Improvement Fund or the Agricultural Water Source Development Cost Share Program.

Recommendation Four: The Maine Potato Board should seek funding from the Northern Maine Development Commission as part of its Rural Empowerment Zone designation to develop markets for rotation crops for potatoes.

Recommendation Five: The Maine Potato Board should expand its public relations effort in the local community by:

- Standardizing and simplifying its annual survey of student participation in the potato harvest;
- Making annual presentations to local school boards on the community-wide benefits of the potato industry; and
- Modifying its higher-education scholarship program to provide one scholarship for a participant in the potato harvest and another for any student attending a high school participating in the potato harvest recess.

Recommendation Six: The Maine Potato Board and the U.S. Potato Board should undertake a cooperative, on-line, customer relations education program designed to serve as an extended set of eyes and ears for the fresh market potato grower regarding consumer purchasing preferences.

Recommendation Seven: The State’s Tax Increment Financing (TIF) legislation enables a town to use property tax revenues from newly created property to help create that property. In a similar way, Maine’s new Pine Tree Zone legislation should enable a town to use state payroll and income taxes generated by a potato processor to fund marketing research designed to find new products for processing and thus to ensure its future.

1. What is the Maine Potato Industry?

The potato industry has long been one of the pillars of the Maine economy. While less publicized than newer Maine industries such as financial services, medical research, software development, growing and processing potatoes remains one of the state's most important sources of employment and income, particularly in Aroostook County. In 2001, sales of Maine potatoes exceeded \$125 million, making potatoes Maine's number one agriculture crop and rivaling Maine's lobster industry landings of \$153 million.¹ The sale of potatoes by growers, however, is merely a portion of Maine's total potato industry. In the parlance of modern economic development theory, Maine's potato industry constitutes a significant economic cluster. Growing potatoes lies at the center of a complex web of economic interconnections stretching back through a chain of suppliers, forward through a chain of value added processors and indirectly providing sales and jobs to many other businesses throughout the state. These activities, in turn, provide significant tax revenues to both local and state government. The first purpose of this report is to examine this web of interconnections and quantify it, in a word, to identify the full economic impact of the potato industry on the State of Maine. Having done this, a second purpose of the report is to examine recent trends in the industry, both locally and nationally, and suggest ways the industry can maintain and enhance its vitality so as to remain the pillar it has long been for the state's economy.

Because of agriculture's unique treatment under Department of Labor employment legislation and because so much of the industry is operated by family enterprises, it is more difficult to gather the sales and employment data by which most other industries are measured. The following assessment is based on data gathered from a variety of statistical sources including state and national departments of agriculture and labor, the U.S. Bureau of the Census, various trade sources and interviews with a wide variety of industry participants. It is intended to provide a general order of magnitude of the economic activities involved in Maine's potato industry.

What are the Elements of the Maine Potato Industry?

Growing and bringing Maine potatoes to market is a complex task involving many distinct activities. Some are performed by growers; some by separate businesses; and, in more than a few instances, the same activity may be undertaken by both growers and separate businesses. In order to understand the economic impact of the industry it is necessary to understand its operation. Figure 1 presents a summary view.

¹ U.S. Department of Agriculture and Maine Department of Agriculture. See Appendix One for a description of data sources and methods for deriving sales totals used in this report.

Figure 1
Activities Involved in the Production & Marketing of Potatoes

Activity	Description	Timing	Performed By
1. Maintenance	maintaining soil and production facilities	constant	grower
2. Planting	critical decision involving weather, price and financial projections	April-May	grower
3. Cultivating	apply fertilizer, insecticide, water, weed removal	June-Sept.	grower
4. Harvesting	intense activity dictated by weather and growing season, high temporary labor demand, but becoming more mechanized	Sept.-Oct.	grower and temporary labor
5. Grading	sorting potatoes by size and quality	Oct.-June	grower and/or packer/ broker
6. Storing	transporting potatoes to holding facility to await shipment to market; critical to full use of harvest; increasingly sophisticated air control systems	Oct.-June	grower and/or packer/ broker
7. Washing	cleaning potatoes for better presentation	Oct.-June as needed	grower and/or packer/ broker
8. Bagging	assembling desired quantities for marketing	Oct.-June as needed	grower and/or packer/ broker
9. Marketing	finding buyers, arranging conditions of sale and delivery	Oct.-June as needed	grower and/or broker/ wholesaler
10. Delivering	transporting potatoes to wholesaler, processor or other purchaser	Oct.-June as needed	grower and/or broker/ wholesaler and/or truckers

Understanding the last column of Figure 1 is key to understanding the economic structure of the industry in Maine. Some growers perform all ten activities themselves, for instance those who deliver to local processing facilities or directly to grocers. Others limit themselves to the first four or five activities and rely on independent broker/dealers to market their crop and independent truckers to deliver it. More recently, some growers have even taken to marketing specialty potatoes on the internet and relying on UPS or FEDEX to deliver directly to consumers. In any case, Maine's potato industry includes those businesses involved in all ten of the above activities, and any effort to measure the magnitude of the industry must include them all. Figure 2 presents an estimate of this magnitude.

Figure 2
Indices of the Maine Potato Industry, 2001 crop

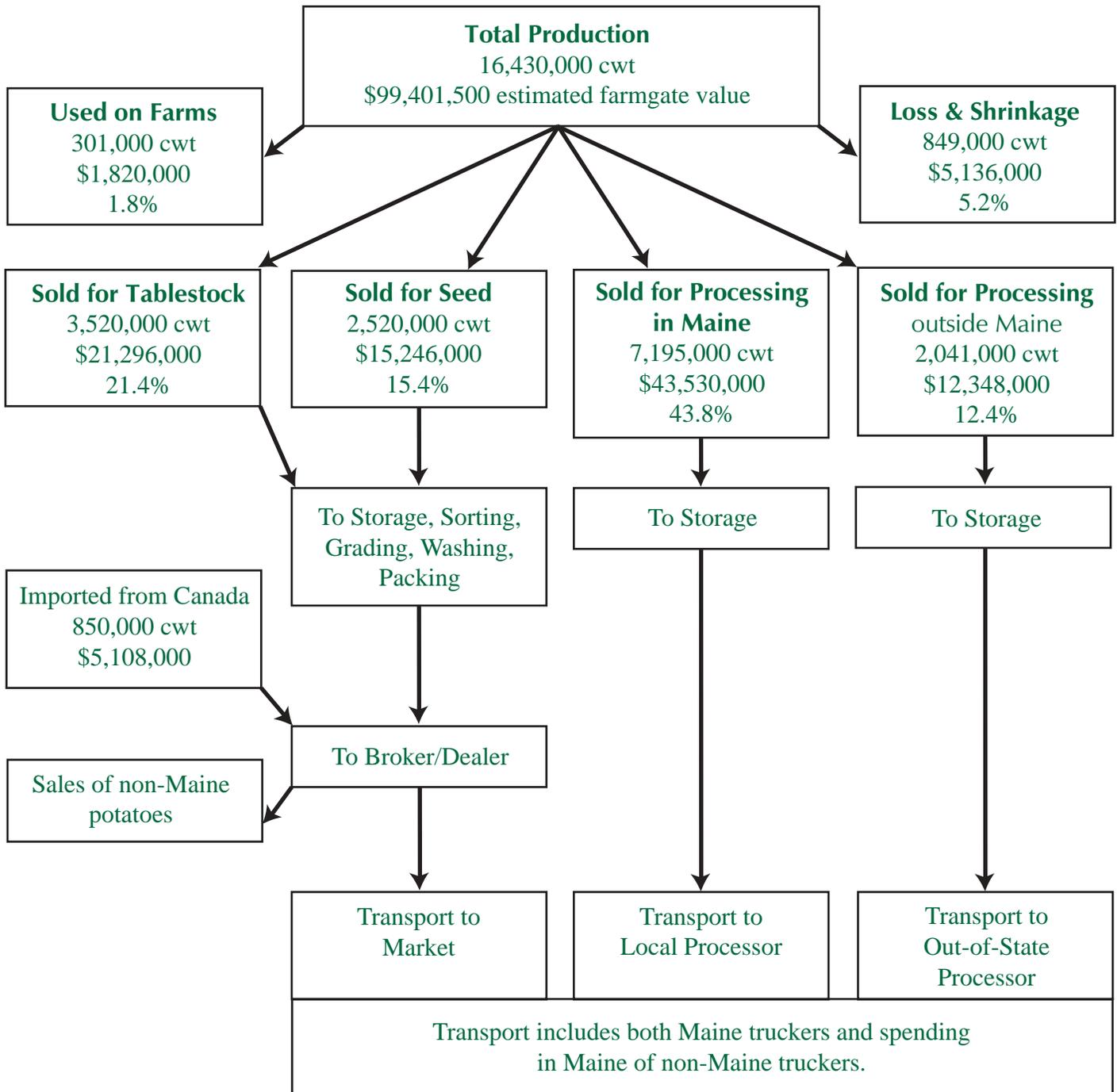


Figure 2 illustrates the so-called farmgate value of the potato crop, that is the value at harvest. It also depicts the additional economic activities that add value to the crop as it moves to market. Some of these activities are performed by growers, some by separate businesses. To the extent that they incur a cost and thus generate an income for whomever performs the activity, they must be included in any estimate of the total economic impact of the industry.

This relationship between the value of farm production and the value consumers ultimately pay for their food is called the marketing bill. Figure 3 depicts this for the U.S. as a whole.

Figure 3
What a dollar spent on food paid for in 2000

Farm value
 \$123.3 billion (19%)

Marketing bill \$537.8 billion (81%)



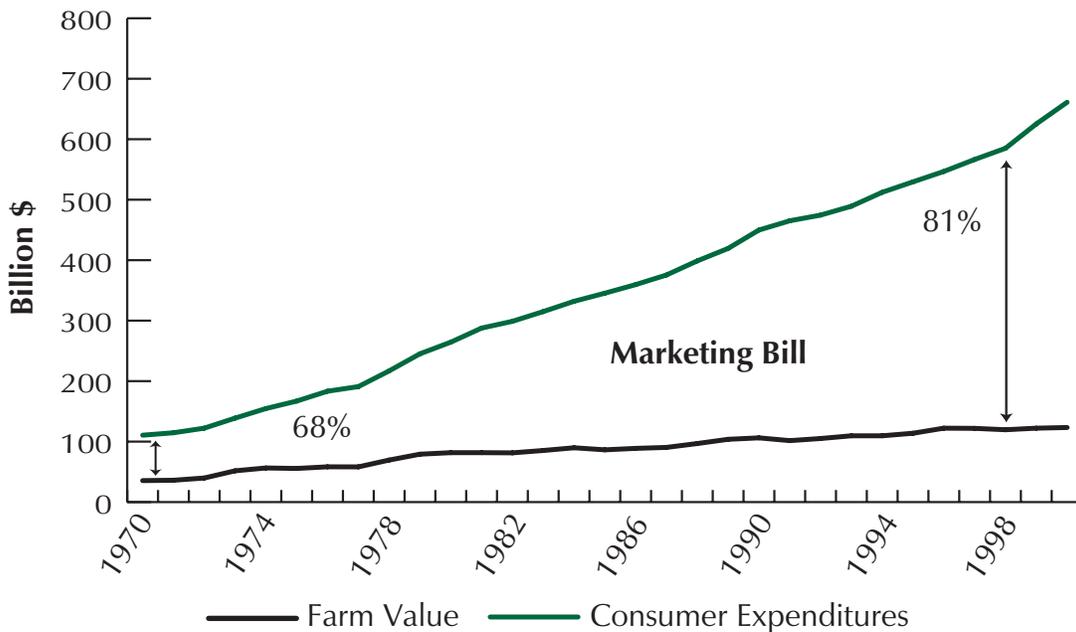
Consumer expenditures, 2000
 \$661.1 billion

Source: USDA, Economic Research Service, <http://www.ers.usda.gov/briefing/foodpricespreads/trends/>

In 2000, consumers in the United States spent over \$660 billion on food products. Of this, just over \$123 billion or approximately 19%, was paid to farmers for producing the basic foodstuff upon which the rest of the industry depends. In short, storing, transporting, processing, and marketing our food products is by far the larger part of the food industry.

Equally significant is the fact that the marketing bill portion of the industry has been growing much more rapidly than the food production portion of the industry.

Figure 4
Distribution of U.S. Food Expenditures, 1970-2000, billion \$



Source: USDA, Economic Research Service, <http://www.ers.usda.gov/briefing/foodpricespreads/trends/>

While consumer expenditure for food has risen nearly 500% over the past generation, farm sales have risen only 250%. As a result, the share of the marketing bill in the total food industry has risen from 68% to 81%.

The implications of this trend for Maine are two:

- That marketing bill businesses represent the greatest source of growth for the food industry; and
- That grower orientation to the needs of the ultimate consumer through attention to marketing will be the key to their continued health.

Figure 5 illustrates the breakdown of these marketing bill businesses at the national level.

Figure 5
Components of the marketing bill, 2000



Source: USDA, Economic Research Service, <http://www.ers.usda.gov/briefing/foodpricespreads/trends/>

Figure 5 represents aggregate national data and cannot, therefore, be applied to Maine. It does, nonetheless, indicate how important the foundation farmers provide is for the much larger food industry and to the overall economy.

To identify these relationships in Maine, Planning Decisions analyzed employment data from the Maine Department of Labor, sales and employment data from the **1997 Census of Business, Census of Agriculture**, and the structure of the **IMPLAN Pro Input-Output Model** of the Maine Economy. In addition, we interviewed growers, processors, dealers, school officials, extension agents, and others knowledgeable in the industry. Figure 6 represents the results of that work. It shows that the total sales of Maine businesses directly involved in producing potatoes, processing them and bringing them at least part of the way to their ultimate consumers is nearly \$280 million. These businesses provide over 2,600 jobs and over \$100 million of income to Maine households.

Figure 6²
Direct Economic Impact on Maine of the Maine Potato Industry, 2001 crop

Implicit Sales to Maine Growers (Home Use, Shrinkage & Waste) 1,150,000 cwt (7%) \$6,957,000				
Sales of Tablestock to Wholesalers 3,520,000 cwt (21%) \$35,552,000	Sales of Seed to Wholesalers 2,520,000 cwt (15%) \$25,492,000	Sales of Processed Potato Products 7,195,000 cwt (44%) \$150,000,000	Sales to Processors outside Maine 2,041,000 cwt (12%) \$12,348,000	
Imports from Canada* \$5,108,000	Wholesale Mark-Up* \$13,250,000	Transport Sales** \$38,400,000	Sales of Starch \$9,000,000	Sales of Animal Feed \$2,000,000
Total Sales of the Maine Potato Industry \$293,000,000				

The \$293 million listed above represents the total sales of all those businesses *in Maine* that grow and add value in some way to the Maine potato (and non-Maine potatoes that are imported to, sold in, or transported through Maine) as it moves toward its ultimate consumer. It includes growers, packers, brokers, and dealers, instate processors and transporters. It includes those producers of starch and animal feed that use waste generated by potato processors.³ In short, the direct impact of the Maine potato industry is the total value of final sales in Maine of those businesses involved in bringing potatoes to market. Table 1 presents an estimate of the employment and income figures accompanying these sales figures.

Table 1
Estimated Sales, Employment, and Income, Maine Potato Industry, 2001

Sector	Sales (\$1,000)	Employment	Income (\$1,000)
Growers	\$80,350*	1,200	\$26,500
Processors	\$161,000	850	\$60,800
Wholesale	\$13,250	300	\$9,300
Transport	\$38,400	300	\$15,400
Total	\$293,000	2,650	\$112,000

Source: See footnote 2.

*Excludes sales to instate processors; these are included under processor sales.

² The values in Figure 6 are derived from figures reported by the U.S. Department of Agriculture and the Maine Department of Labor as well as interviews with a variety of growers, dealers and processors. See Appendix One for a more complete explanation of the derivation of these figures.

*Includes estimated mark-up on sales of Canadian imports and other non-Maine potatoes sold through Maine dealers.

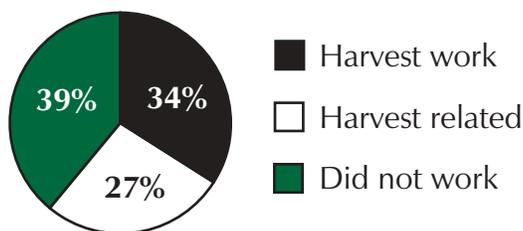
**Estimated at 5.5 times reported payroll for agricultural trucking in Aroostook County based on sales/payroll ratio reported in 1997 Economic Census plus an estimate of \$1 million for sales in Maine of non-Maine trucking companies that transport Maine potatoes.

³ Several starch plants in Maine, while originally created to use potatoes, no longer find it economically feasible to process potatoes. These are not included in the above total. Only the plant using potato starch recovered from the processing for frozen and refrigerated potato products is included as part of the Maine potato industry.

Employment in the growing sector is difficult to determine with any precision. According to the Maine Department of Labor, reported employment in the potato-growing sector was 583 in 2002.⁴ This figure does not include most family labor since sole proprietorships may not report formal employment. The Maine Potato Board estimates that there are approximately 400 potato growers. If each of these had even two people working, then actual employment would be much higher than that reported by the Department of Labor.

Finally, employment in the growing sector must include the seasonal harvest and harvest-support work done by students in Aroostook County during the three-week harvest break. Each year, the Maine Potato Board surveys County school districts to estimate the number of students working either directly in the potato harvest or in support work, such as baby-sitting, that enables others to work in the harvest. Seven districts have reported on the 2002 harvest. They reported 756 students working in the harvest and 597 working in harvest support jobs. Figure 7 shows the share of the total student enrollment by employment category.

Figure 7
Distribution of Reporting Students by Employment Category During Harvest



Source: School Harvest Surveys submitted to the Maine Potato Board, Fall, 2002.

In the seven reporting districts, approximately two-thirds of enrolled students worked either directly or indirectly in the potato harvest.

Two districts reported earnings for each of the two categories of work. The average earnings of those working in the harvest was \$562, while the average of those working in support jobs was \$258. Applying these averages to the number of students working in each category indicates harvest earnings of \$424,872 and harvest support earnings of \$154,026. Assuming further that these districts represented 60% of the total number of students working and that the same averages apply to the 40% who did not report, yields total harvest related earnings of approximately \$752,675 and harvest support related earnings of approximately \$330,970.

In short, over the three-week span of the potato harvest, over 2,000 students earn over \$1 million. While this is clearly not equivalent to a full time job on a farm or in a processing plant, it does represent a significant source of employment and income in the local economy, as well as a chance for students to be a part of a long-standing tradition in their communities.

The total employment of 1,200 listed in Table 1 is a rough estimate of a full time equivalent number that could be compared to employment in the other sectors of the industry. The income figure of \$26.5 million is derived both from earnings reported from covered employment and estimates of farm proprietor's income used by USDA and BEA.⁵

⁴ Private communication with Maine Department of Labor, Division of Labor Market Information Services, February 3, 2003 regarding NAICS Code 111211, Potato Farming.

⁵ Bureau of Economic Analysis (BEA) Local Area Personal Income Table CA 45, Farm Income & Expenses. <http://www.bea.doc.gov/bea/regional/reis/>

The remaining data in Table 1 are derived from Department of Labor covered employment data, employment to sales ratios derived from the *1997 Census of Business*, from interviews with managers at each of Maine's potato processing plants, and with officials involved in and knowledgeable of the wholesaling and transport sectors of the industry. The processing totals include values for starch and animal feed production derived from waste generated at primary processing facilities.

It is important to note here that the figures in Table 1 reflect distributions made to avoid double counting. Thus, row one, Growers, does not include sales of Maine potatoes to instate processors.

Row two, Processors, estimates sales of the plants and thus includes the value paid to growers for the potatoes used.

Row three, Wholesale, includes only the estimated wholesale markup added to the price of potatoes sold by Maine broker/dealers. This figure includes sales of Maine potatoes in the seed and tablestock market as well as non-Maine potatoes for those markets either imported into Maine or simply sold by these Maine dealers. The mark-up was derived from covered employment reported by the Maine Department of Labor in Aroostook County for NAICS Codes 42248, Fresh Fruit and Vegetable Wholesalers, and 4225, Farm Product Raw material Wholesaler, the ratio of payroll to sales reported for these sectors in the *1997 Census of Business*, and data on farm to consumer price spread data prepared by the USDA Economic Research Service.⁶

Row four, Transport, was derived from covered employment reported by the Maine Department of Labor in Aroostook County for NAICS Codes 4842202, Local Agricultural Product Trucking and 4842302, Long Distance Agricultural Products Trucking, the ratio of payroll to sales reported for these sectors in the *1997 Census of Business*. The value for sales here is 5.5 times the reported payroll. Row four also includes an estimate of sales to Maine businesses by non-Maine truckers who haul Maine potatoes. This includes fuel, tire and other supply sales as well as repair services.

Finally, Column Four, Income, in Table 1 includes not just payroll for covered employment but also proprietor's income of self employed sole proprietors, farm income and estimated profits of incorporated businesses.

⁶ USDA, ERS, Table 73. Season average price spreads, Boston and Washington, D.C. markets. NAICS refers to the North American Industrial Classification System which has replaced the old Standard Industrial Classification (SIC) System.

2. What is the Economic Impact on Maine of the Potato Industry?

This direct economic impact of Maine's potato industry reported in Figure 6 and Table 1 above does not constitute the total impact of the industry on the State of Maine. Each of the direct industries noted above purchases a wide variety of inputs to produce its products. These purchases represent sales to other businesses, many located in Maine. Figure 8 illustrates these indirect effects.

Figure 8
Examples of Indirect Effects of the Maine Potato Industry

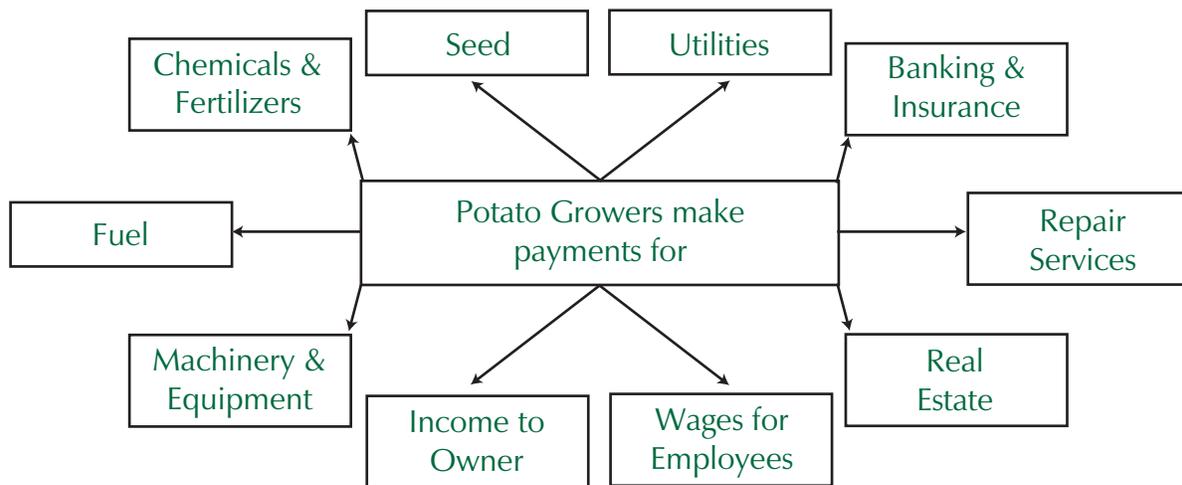


Figure 8 is by no means exhaustive. Potato growers make numerous other smaller purchases in the economy. Similarly, the other direct elements of the Maine potato industry make their own purchases. Processors purchase fuel and water and oil and transportation services. Packers purchase bags and twine and repair services for building and machinery. Truckers purchase fuel and insurance and vehicle parts, etc. All these related industries, in turn, make their own purchases. The machinery and equipment dealer maintains a payroll, buys insurance, borrows from the local bank. All of these purchases back down the supply chain from the original production of potato products are called the *indirect* effects of the potato industry.

As a result of these direct and indirect effects, households throughout the economy earn incomes and make consumption purchases. The consumption effects of both the direct and indirect impacts throughout the business sector are called the *induced* effects of the potato industry.

In sum, the total economic impact of the potato industry on the State of Maine is made up of three components:

1. The *direct* effects; these are the final sales of the industries directly involved in the potato industry, those listed in Table 1 above;
2. The *indirect* effects; these are the purchases made by industries down the supply chain that can be attributed to the direct sales of the potato industry;
3. The *induced* effects; these are the household consumption expenditures that can be attributed to the direct and indirect effects of the potato industry.

Attempting to measure all these effects directly would be virtually impossible. While all businesses know their major customers, they track sales for accounting and management purposes not for the sake of tracing the flows of industrial sectors throughout the economy. While a trucker could relatively easily determine how much of his sales came from the transport of potatoes, the gas station owner who sold him his fuel could almost certainly not make a similar determination. Imagine how much more difficult it would be for the owner of the coffee shop in southern Maine where the trucker stops for a break to answer the question, “How much of your sales is attributable to the production of potatoes?”

The web of economic inter-connection is so complex, and spending, like ripples in a pond, moves so quickly from the point of original impact, that the only way to provide an answer to the hypothetical question put to the coffee shop owner is to use an input-output model. As part of the process by which it gathers the data to prepare the numbers that comprise the Gross National Product and other national income accounts, the U.S. Department of Commerce gathers vast amounts of information on inter-industry purchases. With these data, it creates a national input-output table that distributes the entire output of the economy into a vast matrix that links the sales of each industry to the purchases of all other industries.⁷

The IMPLAN Pro Model is an input-output table adjusted to the particular industrial structure and pattern of inter-industry purchases of each state. Based on interviews with growers, processors and other participants in Maine’s potato industry, Planning Decisions further adjusted this model to the particular purchases of the Maine industries identified above as those providing the direct impact of the potato industry. Table 2 illustrates the results of this analysis.

Table 2
Economic Impact of the Potato Industry

Industrial Sector	Sales (\$1,000)	Employees	Income (\$1,000)
Direct Impact			
"Sales" to Growers	\$6,958	110	\$3,000
Sales to Chippers	\$12,348	180	\$5,200
Fresh Pack Sales	\$35,552	530	\$10,400
Seed Sales	\$25,492	380	\$7,900
Processors	\$150,000	800	\$58,100
Starch	\$9,000	30	\$2,000
Cattle Feed	\$2,000	20	\$700
Wholesale Margin	\$13,250	300	\$9,300
Transport Sales	\$38,400	300	\$15,400
Sub-total	\$293,000	2,650	\$112,000
Indirect Impact	\$179,200	2,400	\$82,700
Induced Impact	\$67,800	1,100	\$38,800
Total Impact	\$540,000	6,150	\$233,500

Source: IMPLAN Pro model run by Planning Decisions. “Sales” to growers is the production value of waste and on-farm use of potatoes.

⁷ See Bureau of Economic Analysis [National Input-Output Table](#) for more information.

The direct impact of the potato industry in Maine amounts to \$293.0 million in industrial sales and approximately 2,650 jobs. The indirect impact of the industry amounts to \$179.2 million in business sales and approximately 2,400 jobs, and the induced impact amounts to \$67.8 million in sales and approximately 1,100 jobs. The total impact amounts to \$540 million in business sales and over 6,100 jobs.

In addition to the sales and employment impacts of the industry, potatoes have a substantial fiscal effect on the state. The total income earned from the sales of \$540 million amounted to \$233 million. This includes wages paid for labor, proprietor’s income earned by small enterprises not covered by labor reporting requirements, and corporate profits. This income generates substantial revenue for Maine’s state and local governments. Table 3 illustrates the figures.

Table 3
Fiscal Impact of the Maine Potato Industry

Local Taxes	Amount
Local Property	\$11,880,000
Other Local Taxes	\$300,000
Sub-total Local	\$12,180,000
State Taxes	
General Sales	\$6,380,000
Motor Fuel	\$1,360,000
Other Selective Sales	\$1,220,000
Individual Income	\$8,100,000
Corporate Income	\$1,130,000
Motor Vehicles	\$590,000
Other State Taxes & Fees	\$1,600,000
Sub-total State	\$20,380,000
Total Tax Revenue	\$32,560,000

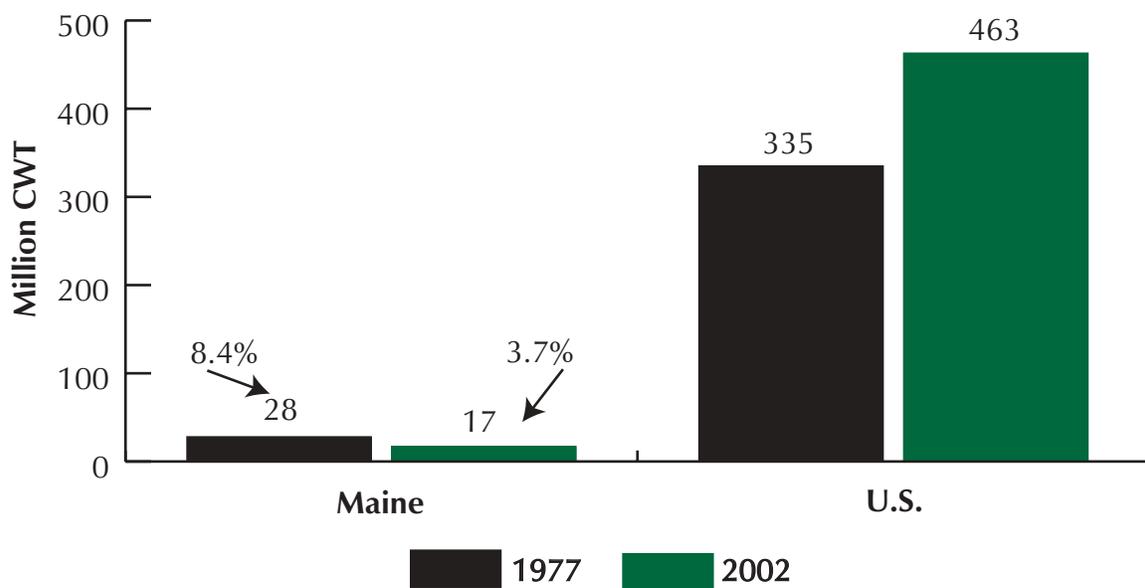
Applying Maine’s current average rate per dollar of personal income to the \$233 million in personal income attributable to the potato industry yields total annual state and local tax revenue attributable to the potato industry of approximately \$32.6 million.

3. Where Does the Maine Potato Industry Stand in National and World Markets?

A. Production

The first point to be made about the relative standing of Maine’s potato industry is that it constitutes a small portion of the U.S. industry and has, over the past generation, seen its share of national production decline. Figure 9 illustrates this overall trend.

Figure 9
Maine’s Share of U.S. Potato Production, 1977 and 2002



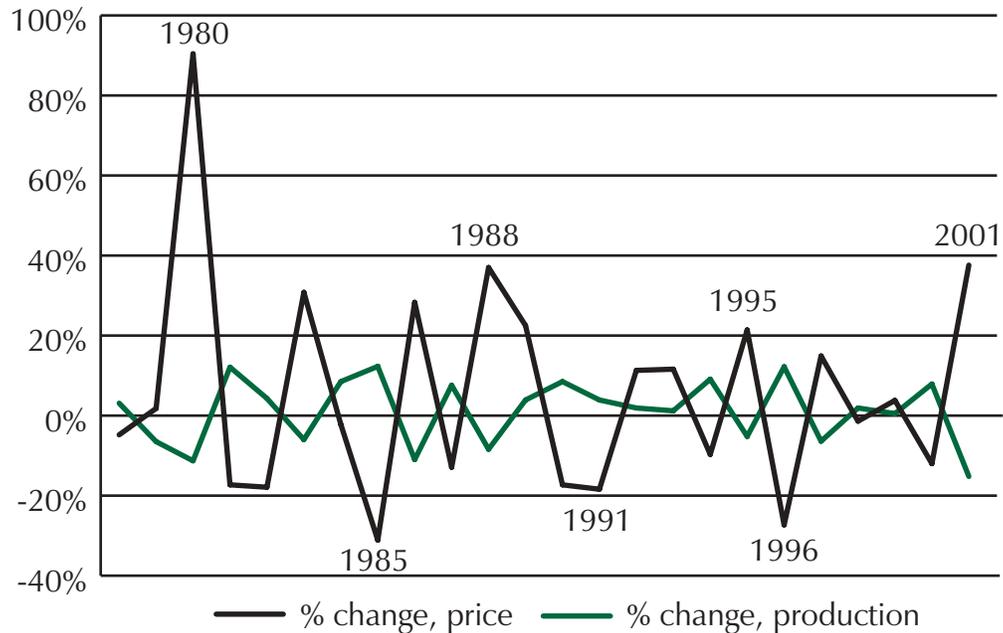
Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

Over the past quarter century, U.S. production of potatoes has increased nearly 40% to 463 million hundredweight. Over this same period, Maine’s production fell by nearly 40% from 28 to 17 million hundredweight, and its share of national production fell from 8.4% to 3.7%. The major reason for this relative decline was the vast increases in production in the western states of Washington, Idaho, and Colorado resulting from Federal water resource investments that enabled the extension of irrigation to this land, thus enabling cultivation of potatoes.

The point to be drawn from this trend is not that the potato industry is on its way out in Maine, but that Maine is a small player in the industry and thus a price taker. What Maine produces has little effect on the national market. Maine growers and producers must operate within the larger market forces affecting the industry as a whole.

Figure 10 illustrates this harsh fact of life in the potato industry.

Figure 10
Year to Year Percent Change in Potato Production & Prices, U.S. 1980-2000



Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 55 Grower Prices for All U.S. Potatoes, <http://www.nass.usda.gov:81/ipedb/>

No other picture can so clearly demonstrate the demands on the management skills of the potato grower. National production tends to vary year to year by 10% to 20%, and annual price swings of over 40% are common. Each year growers must make investment decisions involving hundreds of thousands of dollars in the face of this tremendous price volatility. The risks involved in competing in this market are the primary reason for the decline in Maine’s production over the past generation.

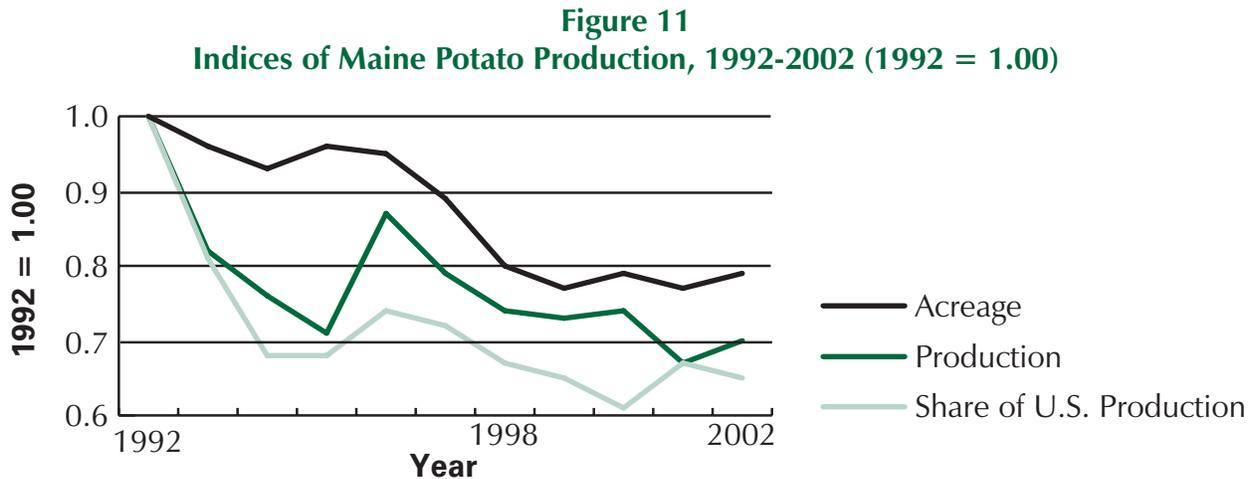
In more recent years, however, there is evidence that the potato industry in Maine is stabilizing.

Table 4
Maine Potato Acreage, Production and Market Share, 1992-2000

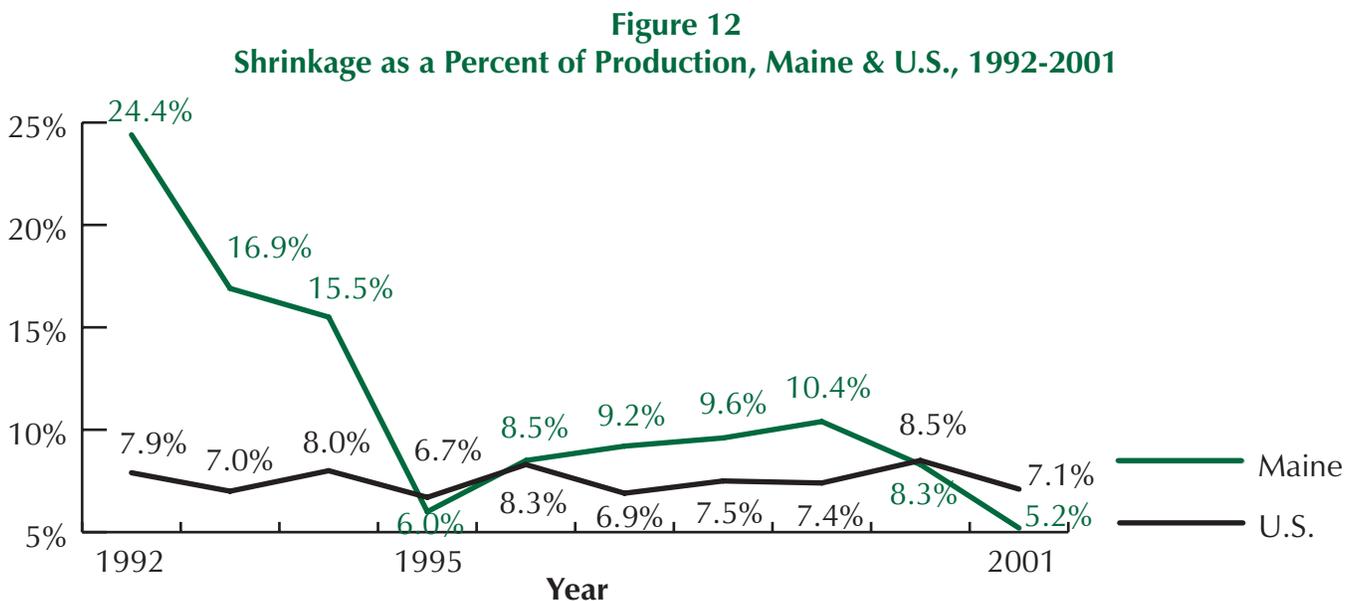
Year	Acres (1,000)	Production (million cwt)	Share of U.S. Production	Rank
1992	81	24	5.7%	7th
1993	78	20	5.1%	7th
1994	75	18	4.4%	8th
1995	78	17	4.2%	8th
1996	77	21	4.7%	8th
1997	72	19	4.5%	8th
1998	65	18	4.2%	8th
1999	63	18	4.1%	8th
2000	64	18	3.8%	8th
2001	62	16	4.2%	8th
2002	64	17	4.1%	8th

Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

Through the early 1990's, the long trend of decline in acreage, production, and share of U.S. production continued. However, since 1998, Maine's acreage has stabilized between 62,000 and 65,000 acres, its production has stabilized between 16 and 18 million hundredweight, and its share of total national production of Fall potatoes has stabilized around 4%. Figure 11 illustrates this pattern.



Perhaps even more important is the progress Maine growers have made over the past decade in reducing their shrinkage. Figure 12 illustrates the trend.



Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

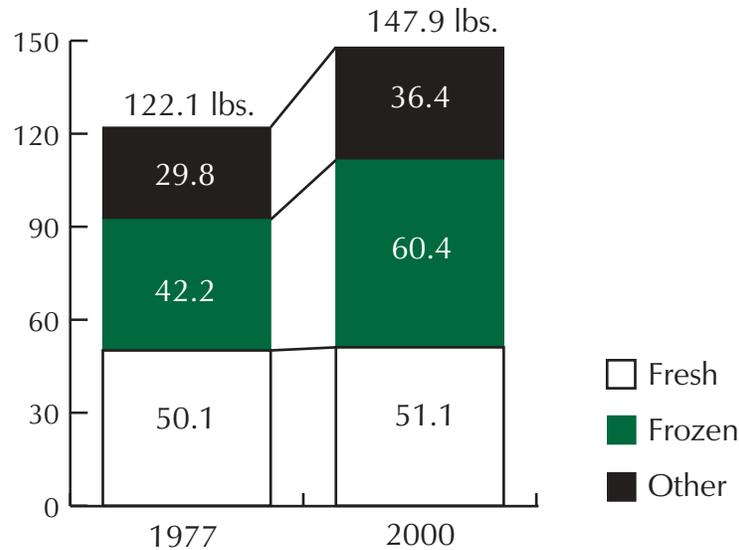
During the early 1990's, Maine growers reduced their loss from shrinkage and waste from over 24% to about 5%.⁸ While it rose again to just over 10% in 1999, it fell in 2001 to 5.2%, a level below the national average of 7.1%. This trend reflects two important changes in the Maine potato industry: their greatly improved storage facilities and the movement from the fresh market to the value-added processing market.

Improved storage reflects the success of the Potato Marketing Improvement Fund (PMIF) which provides long-term, fixed-rate loans at low interest rates to potato growers and packers to construct modern storages, modernize existing storages, and purchase packing lines as part of the industry's plan to improve the quality and marketing of Maine potatoes.

The movement to processing reflects Maine's participation in the overall trend of the industry. Figures 13, 14 and 15 illustrate this trend.

⁸ It must be noted here that Maine's unusually high shrinkage rates in the early 1990's were caused in large part by a severe outbreak of late blight fungus.

Figure 13
U.S. Consumption of Potatoes by Category (lbs./year), 1977 and 2000

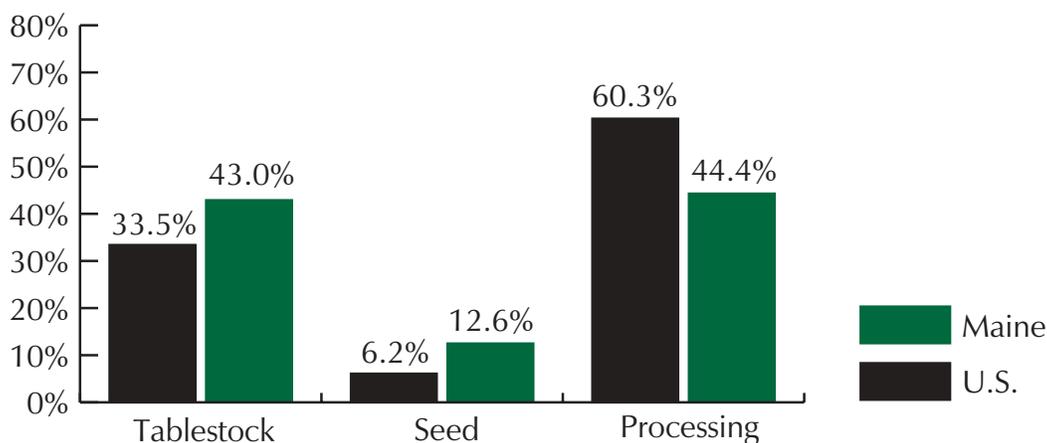


Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 111 Potatoes, U.S. per capita consumption by category, <http://www.nass.usda.gov:81/ipedb/>

Between 1977 and 2000, U.S. per capita consumption of potatoes increased by over 20% to nearly 148 lbs. Per capita consumption of fresh potatoes, however, remained virtually unchanged at about 50 lbs, while consumption of frozen potato products increased over 40% to approximately 60 lbs. per person. Consumption of all other potato products increased approximately 22% to just over 36 lbs. per person.

This change in the pattern of consumption led to a change of production in Maine that was even greater than the national average.

Figure 14
Distribution of Sales by Category, Maine & U.S., 1992

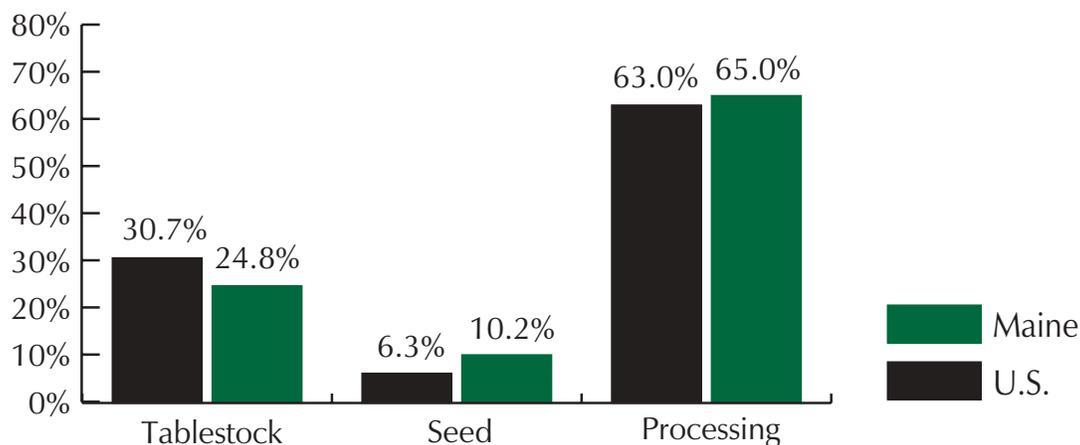


Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

In 1992, Maine allocated nearly equal shares of its potato sales to the fresh market (43%) and to the processing market (44.6%). Compared to the national average, this was a larger share to the fresh market and a smaller share to the processed market.

By 2001, this pattern had reversed.

Figure 15
Distribution of Sales by Category, Maine & U.S., 2001



Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

In 2001, Maine devoted a smaller share of its production to the fresh market than the national average and a slightly higher percentage to the processed market than the U.S. average. The share of Maine’s production devoted to seed potatoes fell slightly, but remained significantly above the national average.

B. Farms

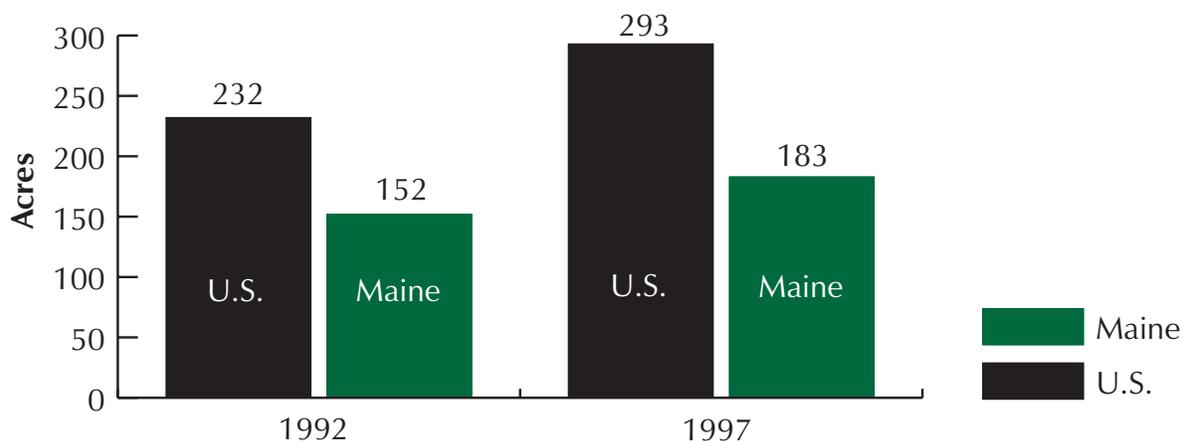
A second indication of Maine’s relative standing within the national potato industry can be obtained by examining data on the characteristics of farms from the 1992 and 1997 Census of Agriculture.

Nationally, the number of potato farms declined from 14,502 in 1992 to 10,563 in 1997, but the number of acres cultivated remained virtually unchanged at about 1.3 million acres. As a result, the average size farm increased from 93 acres to 129 acres. Excluding those farms of less than 15 acres, which accounted for over 60% of all farms in 1992 but only 1% of all acreage, the change is even more dramatic. Excluding these small farms, the size of the average potato farm nationally increased from 232 acres in 1992 to 293 acres in 1997.

In Maine, the trend was less dramatic. The number of potato farms declined from 770 in 1992 to 586 in 1997. This amounted to a decline of 24%, comparable to the national decline of 27%. However, since the acreage cultivated in Maine also declined by 17%, the change in average farm size was less pronounced, increasing less than 10% from 114 acres to 125 acres. Also, the effect of excluding those farms of less than 15 acres is less in Maine than for the nation as a whole. Excluding these small farms, the size of the average potato farm in Maine increased from 152 acres in 1992 to 183 acres in 1997. In short, Maine has fewer of the very large farms that dominate production in the Western states.

Figure 16 illustrates these patterns.

Figure 16
Size of Average Potato Farm of Over 15 acres, U.S. and Maine, 1992 & 1997



Source: U.S. Department of Agriculture Census of Agriculture, 1992 and 1997, <http://govinfo.kerr.org>

Nationally, the trend toward larger farms was accompanied by increasing productivity.

Table 5
Percent Change in Number of Farms, Acreage & Production, U. S. 1992-97

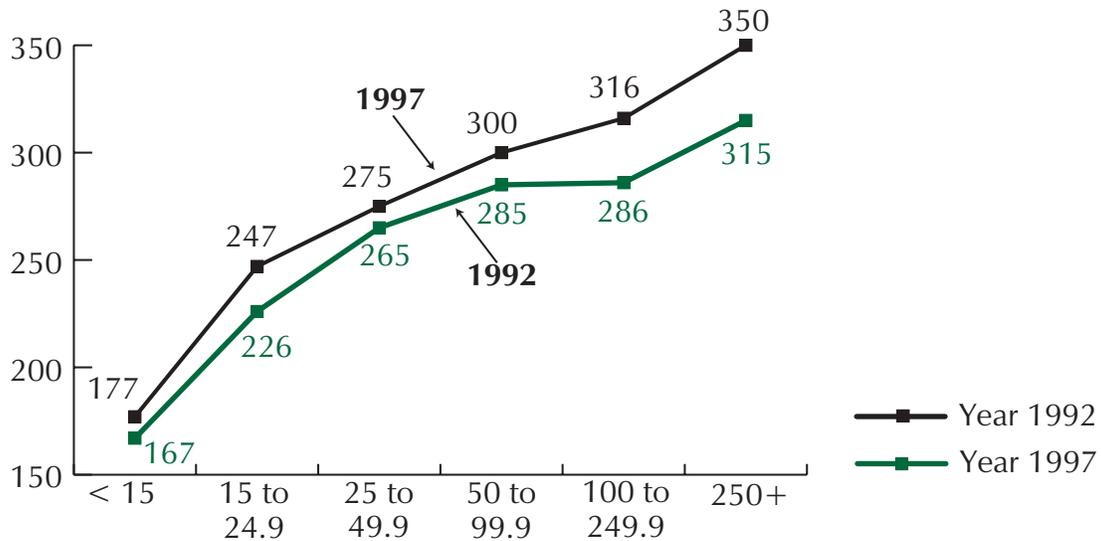
Size In Acres	Farms	Acres	1,000 cwt
< 15	-32.5%	-25.3%	-21.2%
15 to 24.9	-35.7%	-35.8%	-29.7%
25 to 49.9	-31.6%	-31.5%	-28.8%
50 to 99.9	-26.2%	-25.9%	-21.9%
100 to 249.9	-20.3%	-20.1%	-11.7%
250+	-4.7%	10.2%	22.5%
Total	-27.4%	0.3%	12.0%

Source: U.S. Department of Agriculture Census of Agriculture, 1992 and 1997, <http://govinfo.kerr.org>

The number of farms declined in every size category, but the decline in the 250+ category was substantially less. Acreage and production declined in every category except the 250+ category. In addition, the declines were progressively less severe in the 50 to 99 acre and 100 to 249 acre categories.

The result was an accentuating trend toward higher productivity with larger size farms.

Figure 17
Yield per Acre by Farm Size, U.S. 1992 and 1997 (cwt/acre)

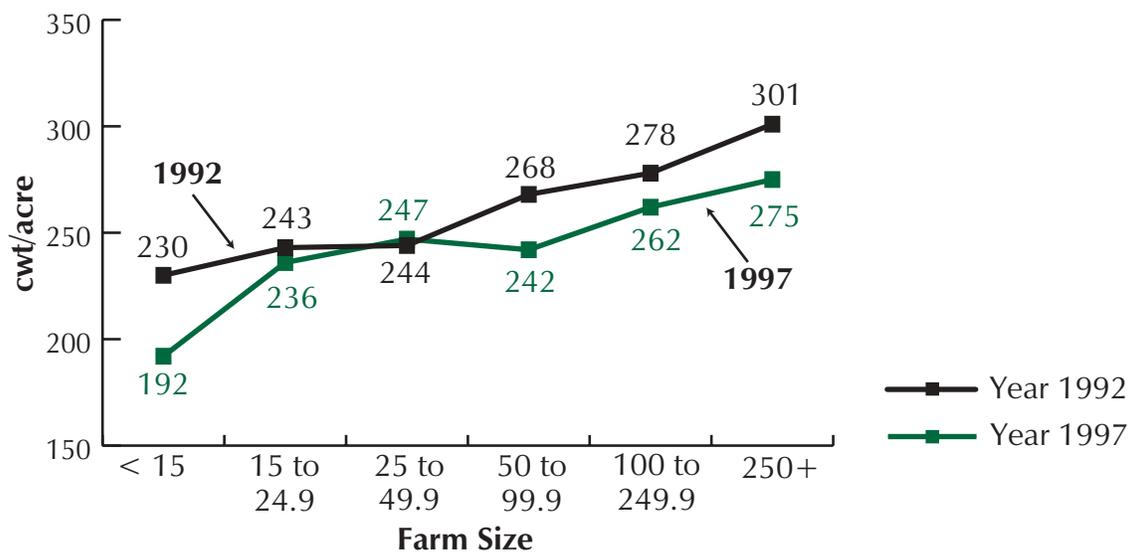


Source: U.S. Department of Agriculture Census of Agriculture, 1992 and 1997

For the U.S. as a whole, the yield per acre increased consistently with size of farm, and the yield in each size category increased between 1992 and 1997.

For Maine, however, this trend is much less pronounced, and yields actually fell between 1992 and 1997.

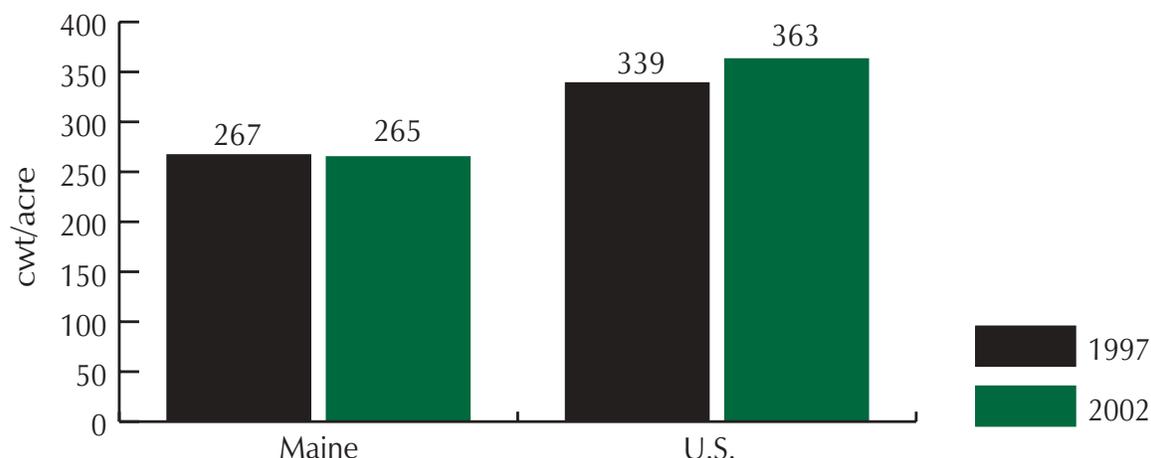
Figure 18
Yield per Acre by Farm Size, Maine, 1992 and 1997 (cwt/acre)



Source: U.S. Department of Agriculture Census of Agriculture, 1992 and 1997, <http://govinfo.kerr.org>

For Maine farms, the tendency for yield to increase with size is more clearly true at either end of the scale, whereas farms in the middle categories tend to have similar yields. In addition, Maine's yields were generally lower in 1997 than in 1992. In large part, this lower productivity was the result of drought conditions in Maine. While more recent data by farm size will not be available until completion of the 2002 Census, it is interesting to note that overall yields for the nation as a whole have continued to rise while those in Maine have stayed approximately level since 1997.

Figure 19
Yield per Acre, Maine and U.S., 1992 and 2002 (cwt/acre)



Source: U.S. Department of Agriculture, National Agricultural Statistics Service, Table 102 Potatoes, all seasons, production by major state, <http://www.nass.usda.gov:81/ipedb/>

One major reason for the increasing yields nationally is the spread of irrigation.

Table 6
Trends in Potato Crop Irrigation, U.S. & Maine, 1978 to 1997

Category	U.S.	Maine
Acres harvested	-1.5%	-38.2%
Acres irrigated	22.4%	207.1%
Production	27.5%	-26.5%
Yield	29.5%	18.8%
% Irrigated in '97	78.9%	11.8%

Source: U.S. Department of Agriculture Census of Agriculture, 1997 Table 51 Number of Potato Farms. Harvested Acres, Percent Irrigated.

Over the two decades from 1978 to 1997, total national potato acreage harvested declined slightly. The number of acres irrigated, the volume of production and the yield per acre all increased by progressively greater percentages. In Maine, over the same period, as was noted above, harvested acreage and production declined, but irrigation and yield increased. However, Maine's large increase in acres irrigated is the result of starting from such a small base. The State's actual number of irrigated acres increased from about 2,800 acres in 1978 to approximately 8,600 acres in 1997. This amounted to less than 12% of Maine's total acreage and helps to explain Maine's lower level and rate of growth of yield.

The importance of irrigation is even more clearly seen by examining the pattern for the major potato producing states.

Table 7
Production, Irrigation, and Yield, Major Fall Potato Producing States, 1997

State	Acres	% Irrigated	Yield
Idaho	394,977	100.0	355
Colorado	85,446	100.0	323
Oregon	57,653	99.4	474
Nebraska	24,630	97.6	390
Washington	155,074	94.7	569
Wisconsin	85,304	91.6	354
Michigan	44,931	74.6	300
Minnesota	72,434	52.1	282
New York	23,923	33.0	275
North Dakota	109,777	26.0	200
Maine	73,085	11.8	261

Source: U.S. Department of Agriculture Census of Agriculture, 1997 Table 51 Number of Potato Farms. Harvested Acres, Percent Irrigated.

Of all the major potato producing states, Maine clearly has the lowest percent of its acreage irrigated. It is also clear that those states with a lower percentage of their acreage irrigated have lower yields. This pattern is evident by looking at Maine's ranking among the eleven major Fall potato producing states with respect to each of these categories.

Table 8
Maine's Ranking Among Major Fall Potato States, 1997

Category	Rank
Acreage	6th
Production	8th
% Irrigated	11th
Yield	10th

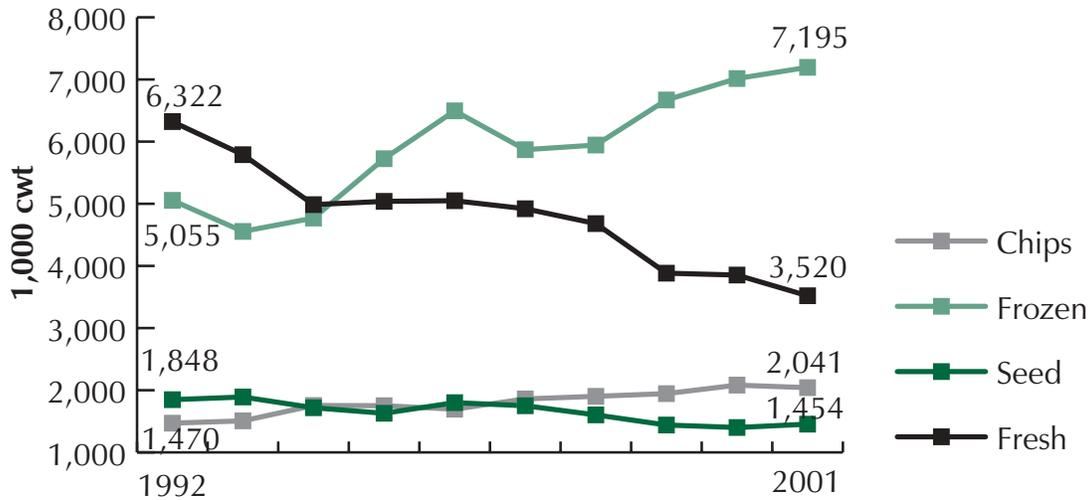
Source: U.S. Department of Agriculture Census of Agriculture, 1997 Table 51 Number of Potato Farms. Harvested Acres, Percent Irrigated.

While Maine ranks 6th in acreage harvested, it ranks 8th in production. Clearly this is because it ranks 10th in yield, and this ranking is at least in part caused by its lowest ranking among major potato producing states in irrigation.

C. Market Position

As noted above, Maine's potato industry is divided between the fresh market, the seed market, and the processing market. The State's relative position must be considered separately in each.

Figure 20
Maine Potato Production, 1992 – 2001 (1,000 cwt)

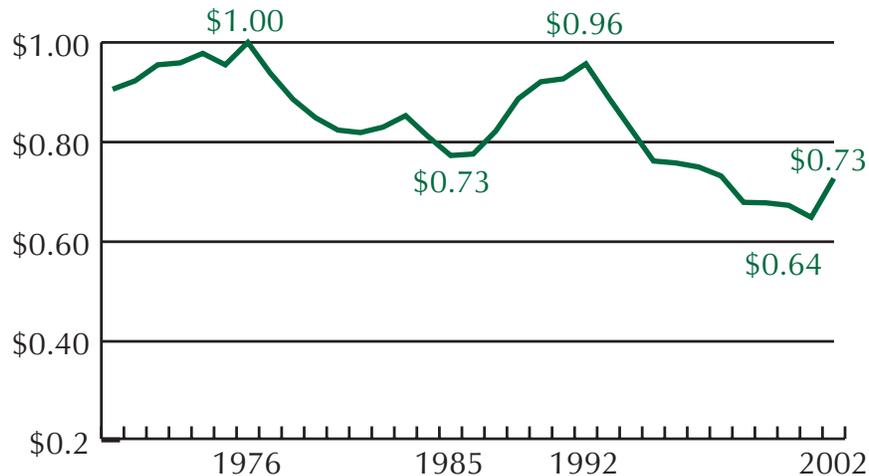


Source: U.S. Department of Agriculture, National Agricultural Statistics Service, *Potatoes Final Estimates, 1992-97 and 2001 Summary*.

1. The Fresh Market

Maine production for the fresh market has declined by 44% over the past decade. Apart from the ongoing difficulty of operating a capital intensive business in a market of extreme price volatility, the primary reason for this decline has been the strong dollar and consequent increase in the flow of Canadian imports.

Figure 21
Value of Canadian Dollar in U.S. Dollars, 1970 to 2002

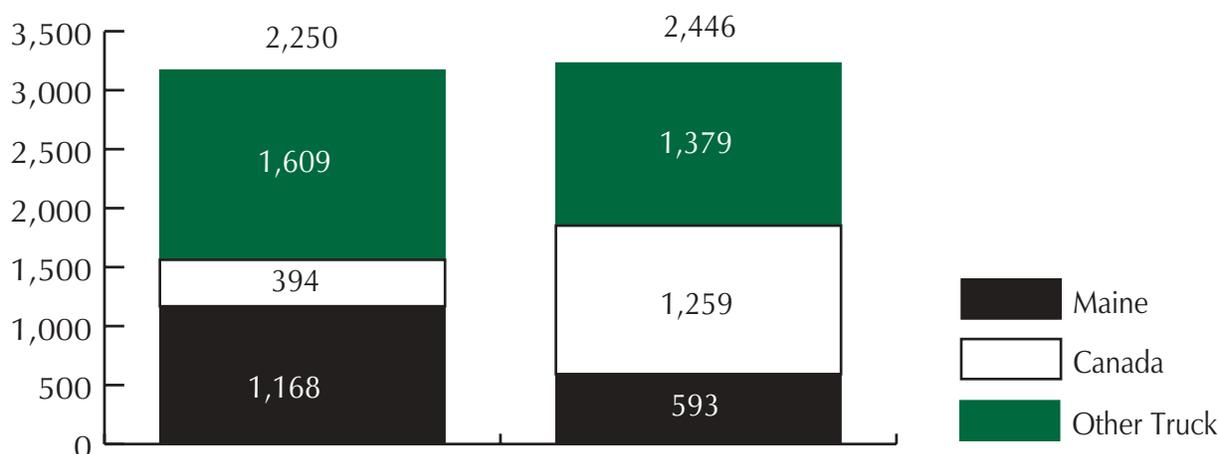


Source: U.S.D.A. Economic Research Service *Real Annual Country Exchange Rates*, <http://www.ers.usda.gov/data/exchangerates/>

After reaching a peak of \$1.00 in 1976, the Canadian dollar fell to \$0.73 in 1985, rose to \$0.96 in 1991 and then fell steadily through the 1990's to \$0.64 in 2001 before recovering to \$0.73 in 2002.

The effect of this price advantage to Canadian producers can be seen most dramatically in the Boston fresh market, traditionally Maine's primary outlet for fresh potatoes.

Figure 22
Potato Arrivals by Truck, Boston, 1990 & 1998



Source: U.S.D.A. Market News Service *Arrivals by Commodities*.

Because the Market News Service ceased publication of its *Arrivals by Commodity* reports, figures are not available for the last several years. However the trend between 1990 and 1998 is clear. While total truck arrivals in the Boston market increased only 8.7%, shipments from Canada increased nearly 300% to increase market share from 12% to 39%. Shipments from Maine, in contrast, fell by 50% from 1.2 million cwt to 0.6 cwt, representing a fall in market share from 37% to 24%. It is interesting to note here that even rail shipments to Boston (coming almost entirely from Idaho and California) decreased nearly 15% over this period.

A similar pattern is evident in other major Eastern markets.

Table 9
Maine's Share of Potato Arrivals by Truck by City, 1990 and 1998

City	% Decline in Shipments	Change in Market Share
New York	-45%	20% to 9%
Baltimore	-51%	22% to 10%
Atlanta	-62%	2% to >1%

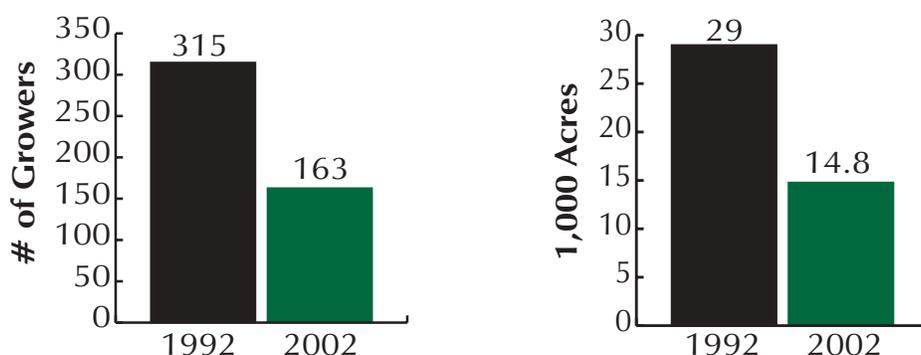
Source: U.S.D.A. Market News Service *Arrivals by Commodities*.

2. The Seed Market

While figures on seed shipments by destination point are not gathered, the same competitive forces at work in the fresh market apply to the seed market as well. As is evident in Figure 18 above, production of seed potatoes in Maine has declined throughout the 1990's. Over the past decade, the number of seed growers certified by the Maine Department of Agriculture, and the number of certified acres have both declined by approximately 50%.⁹

⁹ Maine Department of Agriculture *Maine Seed Potatoes Certified 2002* no date.

Figure 23
Maine Certified Seed Growers & Acreage, 1992 and 2002



At the same time, the value and volume of seed potatoes imported from Canada increased substantially.

Table 10
Seed Potato Imports from Canada by Destination State, 1998 & 2002

Destination	1998 1,000 cwt	2001 1,000 cwt	1998 \$1,000	2001 \$1,000
Florida	364	566	\$2,509	\$3,425
North Carolina	384	482	\$2,650	\$2,914
Maine	237	333	\$1,636	\$2,015
New York	31	27	\$215	\$165
Pennsylvania	26	22	\$177	\$193
Massachusetts	8	13	\$58	\$38
Ohio	8	12	\$53	\$81
Rhode Island	8	11	\$53	\$27
Maryland	20	10	\$135	\$71
Delaware	9	8	\$59	\$19
New Jersey	16	3	\$108	\$33

Source: Statistics Canada Total Exports, HS 070110 - POTATOES - FRESH OR CHILLED - SEED
http://strategis.ic.gc.ca/sc_mrkti/tdst/tdo/tdo.php#tag

In spite of this decline, those Maine seed growers still in the business remain healthy. In the past, many growers would submit acreage for seed certification primarily as a risk management tool. If fresh prices fell, they would sell to the seed market. If fresh prices were high, they would sell on the fresh market. In short, the number of certified growers and acreage were not an entirely accurate picture of the seed industry alone. The decline over the past decade reflects, in large part, the departure of the marginal seed growers. Those remaining are more thoroughly committed to the seed market and to maintaining and enhancing Maine's ongoing competitive advantages in this market, namely a reputation for thoroughly tested, high quality seed, and a wide selection of varieties. The growth of the processing market has led many seed producers, especially those in the West, to produce only those varieties used for processing. Maine, in contrast, maintains over 100 certified seed varieties. While the number of growers and acreage has declined over the past decade, the number of varieties has not. In addition, Maine's continuing support of both the Porter Seed Farm and the University of Maine Agricultural Experiment Station enables Maine seed growers to develop new varieties or recall old ones more quickly than other areas. In short, Maine's seed potato industry is well positioned to serve a number of niche markets by providing a wide variety of high quality seed to customers with whom they maintain close personal relationships.

3. The Processed Market

In contrast to the fresh and seed markets, the processed market has proven to be one of substantial growth for Maine potato farmers. As illustrated in Figure 15 above, production for the processed market increased 42% to more than 7 million cwt. over the past decade. Production for processing surpassed that for the fresh market in 1995 and has continued to grow since.

The primary reason for this growth has been the enormous investment in processing facilities made in the state over the past decade. McCain Foods, Inc. invested over \$70 million in its French fry plant in Easton. Naturally Potatoes invested over \$25 million in its state-of-the-art facility in Mars Hill.

The primary reason behind this investment has been the increase in French fry consumption. As was illustrated in Figure 9 above, while national per capita consumption of fresh potatoes has remained basically stable over the past generation, per capita consumption of frozen potato products has increased 50% to over 60 lbs. This steady increase has made frozen potato production a world-wide industry. Maine's position near both a major growing area and the huge market of the Northeastern United States was a major reason for McCain's investment in its Easton plant.

More recently, the fast food business, and with it, the French fry business has hit a plateau. The aging U.S. population stops less frequently at the fast food outlet, and concerns about the health effects of French fry consumption have led to a slow-down in that market. In this more stable market, inter-plant competition becomes more important. For the moment, the McCain plant in Maine has the advantages of having a state-of-the-art production facility, and of being able to run more lines, produce more varied products, and thus serve a wider variety of customers. It still bears the costs of Maine's relatively lower yields compared to western facilities, so its future depends on increased productivity, both in the plant and in the field.

While the French fry business has slowed in recent years, the restaurant and food business has not. Just as the aging population is moving from fast food restaurants, it is moving toward eating establishments that provide higher quality and more variety in their potato products. This has created new opportunities for the food processor willing to work with its customers to develop new products. From potato puffs, to hash browns, to a whole range of frozen and fresh refrigerated products, this segment of the food business offers Maine the opportunity to diversify and strengthen its potato processing sector.

Penobscot Frozen Foods and The NorSun Food Group have continued to develop new frozen potato products. In addition, the joint venture between Maine's Atlantic Custom Processors and Simplot, one of the world's largest frozen potato manufacturers, may be revisited as the overall economy recovers and consumption of French fries resumes its growth pattern.

The primary impact on the grower of the investment in potato processing facilities has been the opportunity for price stability. People eat year round, plants want to operate year round, and they want to be able to predict their costs for the year. This, together with Maine's agricultural bargaining legislation, has led to a system of negotiated prices. Growers commit a certain number of acres, and processors commit to a certain price with quality standards and bonuses. Compared to the price volatility illustrated in Figure 6 above, this enables the grower to plan for his planting and estimate his costs with a relatively certain return. This relative price stability has been a second reason for the trend toward increased acreage for processing.

4. What are the Keys to the Future Vitality of Maine's Potato Industry?

Over the past generation, Maine's potato industry has moved from dependence upon a single, basic commodity to a wider variety of specialized products. The future vitality of the industry depends on recognizing the nature of this change and capturing the opportunities it presents.

There are two essential characteristics of a commodity industry. First, the source of the product is indistinguishable and largely unimportant to the customer. Second, price is the predominant factor in determining whose product a customer buys. Throughout the 1940's, 50's and 60's, these factors served the Maine potato industry well. Fresh potatoes were a staple of virtually all consumers' diets, and bags of fresh potatoes from Maine were a good buy for households throughout the Northeast.

Since at least the 1970's, three factors have drastically reduced Maine's advantage in this market. First, the vast movement of women into the labor force changed the nature of household food preparation and, with it, the formerly steady growth in demand for fresh potatoes. Second, the development of much larger farms in the Pacific Northwest, supported by irrigation from the hydroelectric power developments of the Depression, and potatoes brought to the Northeast in huge volumes by rail, eroded Maine's relative price advantage (an effect compounded by the increase in Canadian imports in the 1990's) Third, the vast expansion of fast food outlets and with them the growth in demand for frozen French fries, further eroded the position of Maine's basic potato product--the standard household round white potato.

These factors explain much of the change in Maine's market position, noted in Part 3 above, and set the stage for the future of Maine's potato industry.

These changes have meant the departure of hundreds of growers from the business, and the withdrawal of thousands of acres from potato cultivation. It has not, however, been a death knell for the industry. To the contrary, the removal of marginal land from cultivation provides those growers who remain with an unprecedented opportunity to build a solid foundation for the future. If the approximately four hundred growers, now cultivating approximately 64,000 acres, make a commitment to increasing their yields on that land, and growing the product their customers want, the industry can maintain its cluster of support industries and look forward to a bright future. The key factors that will determine this future are:

- Increasing yields through investment in water sources, irrigation equipment, potato storage facilities, and rotation crops;
- Improving product selection and presentation through closer relationships with customers;
- Improving financial health through continuous improvement in business management processes; and
- Strengthening and diversifying the processing industry.

The remainder of this section consists of an examination of each of these key issues.

Increasing Yields

A. Irrigation

Long term weather studies demonstrate that, on average, two or three years in ten will see too little or poorly timed precipitation that causes severe damage to Maine's potato crop.¹⁰ Thus, investing in a water source, and irrigation equipment can, at a minimum, eliminate or minimize this risk and increase long term yield by 20%. In addition, regular irrigation can reduce deformities, size variations, and other partial damage that reduces the value of a potato crop.

A survey of potato growers conducted by Market Decisions as part of this study, found that 60% of growers currently have a water source for irrigation, but that only 56% of these use the water for irrigation. In addition, those who do irrigate do so only on an average of 27% of the land they devote to potato production.¹¹ In short, only about 30% of growers irrigate their land.

The survey also shows that willingness to make an investment in irrigation increases with experience using irrigation. Only 35% of growers without a water supply are currently considering an investment in irrigation. For those with a water source, the percentage considering an investment in irrigation is 64%, and for those already irrigating, the percentage jumps to 80%. In short, those who have made the investment apparently feel it has been successful.

Interestingly, among those not considering an investment in building or expanding a water source, the primary reason for their negative response is that they do not believe the benefits will justify the cost (75% of respondents). Only 27% cited inability to finance the investment as the reason for responding negatively. Even when investment in equipment rather than water source is considered, the primary reason cited by those answering negatively (54%) was the belief that the benefits would not justify the costs.

The second most common reason cited for rejection of an investment in irrigation was the perception that costs and delays in obtaining necessary permits would be excessive. Also, over half of the growers who said they would not consider an investment in irrigation said they would consider such an investment if needed permits could be obtained within six months.

Recommendation One: The Maine Potato Board should sponsor a detailed cost-benefit analysis of investment in irrigation, both in water supply and irrigation equipment, and publicize the results among its members.

Recommendation Two: The Maine Department of Agriculture should expand the "Agricultural Water Source Development Cost Share Program." Some of the proceeds of proposed economic development bonds should be allocated to expansion of this program. In addition, the program should be expanded to include loans available to farmers to cover the expenses of technical and legal expertise needed to obtain permits to build or expand a water source for irrigation. These loans should be interest-free until a proposed project is either approved or rejected. Loans for approved projects should be rolled into the Cost Share program, and loans for rejected projects should be forgiven up to 75% of funds expended.

¹⁰ Conversation with Cooperative Extension Service official.

¹¹ Market Decisions Potato Growers Survey, March 5, 2003.

B. Storage

The second most important factor in increasing the marketable yield of Maine's potato crop is to increase the quality of storage facilities so that more of the crop that is harvested actually makes it to market.

The Potato Marketing Improvement Fund, administered jointly by the Maine Department of Agriculture and the Finance Authority of Maine, has been very successful in increasing investment in potato storage facilities, and last year's \$500,000 re-capitalization of the Fund insures that it will continue.

Recommendation Three: The Legislature should enact a tax credit, applicable to state corporate income tax, available to any food processor or other agriculture related business who provides matching funds to the Potato Marketing Improvement Fund or the Agricultural Water Source Development Cost Share Program.

C. Rotation Crops

The third most important factor in increasing the yield of Maine's potato crop is to develop a rotation crop that will provide some income to growers making the effort to maintain the fertility of their soil by planting alternative crops to potatoes every other or even two of every three years. Barley and oats are currently grown on about 60,000 acres as rotation crops, and much smaller areas are devoted to canola, soybeans, and broccoli.¹²

The key to success in establishing a rotation crop is finding contracts for the harvest. Currently, this task is undertaken by farmers' cooperatives and by the Agricultural Bargaining Council (ABC). In neither case, is it the full-time or first priority of the responsible party.

Recommendation Four: The Maine Potato Board should seek funding from the Northern Maine Development Commission as part of its Rural Empowerment Zone designation to develop markets for rotation crops for potatoes.

D. Labor

As the number of acres planted in potatoes has declined and the size and complexity of planting, cultivation and harvesting equipment has increased, fears of a labor shortage in the industry have declined. In the future, the vitality of the industry will depend on the entrepreneurial spirit and business acumen of the 400 or so growers who remain in the industry. As they make the investments in irrigation, storage, and rotation crops needed to produce the highest quality product, these mostly family enterprises will be able to pay competitive wages for the workers they need on an ongoing basis.

The matter of harvest labor, however, remains another question. Even as it stabilizes and thrives, the potato industry will continue to decline in relative terms as a source of employment in Aroostook County. It, therefore, becomes all the more important for the industry to make clear its *fundamental* importance to the health of the entire local community.

Recommendation Five: The Maine Potato Board should expand its public relations effort in the local community by:

- Standardizing and simplifying its annual survey of student participation in the potato harvest;
- Making annual presentations to local school boards on the community-wide benefits of the potato industry; and
- Modifying its higher-education scholarship program to provide one scholarship for a participant in the potato harvest and another for any student attending a school participating in the potato harvest recess.

¹² Interview with Matt Williams, Cooperative Extension Service, Houlton, Maine. February 7, 2003.

Development of Customer Relationships

The key to success in niche marketing is to know your customers. This imperative holds true for all components of Maine's potato industry, from the smallest road-side stand operator to the world-wide, multi-billion dollar food processor. The road-side operator listens to his customers and one year stocks 50 lb. bags of winter storage potatoes. The next year he sells 3 lb. baskets. In the same way, the frozen fry producer sells multi-sized fries to a fast food outlet one day and precisely circled rings to a family restaurant the next. One Maine processor feared war in Iraq would cut its sales, then saw its business jump as Americans sat in front of their TV sets munching potato wedges while watching war coverage.

In all cases, the point is the same, the successful business is the one closely attuned to its customers. While most processing businesses maintain either a paid sales force or commissioned sales representatives across the country, most potato growers selling in the fresh market cannot afford this extra help. Most rely on dealers or personal relationships for customer contact.

Recommendation Six: The Maine Potato Board and the U.S. Potato Board should undertake a cooperative, on-line, customer relations education program designed to serve as an extended set of eyes and ears for the fresh market potato grower regarding consumer purchasing preferences.

Continuous Improvement in Business Management Practices

Growing potatoes is relatively easy. Operating a successful potato farm is extraordinarily difficult. It involves an investment of hundreds of thousands of dollars in capital, equipment, careful consideration of price trends six to nine months into the future, decisive action in a very short time frame regarding acreage and varieties to plant, intense physical labor to cultivate and harvest the crop, a sharp feel for the market and, usually, a friendly banker to provide the funds to buy the seed, fertilizer and fuel to put the cycle in motion.

The future health of the industry depends on the business acumen of the approximately 400 growers who form the core of the industry.

Diversification of the Processing Industry

The bulk of the value generated in Maine's potato industry comes not from the potatoes themselves, but from the processed food products they become. A strong processing sector provides a stable outlet for Maine's growers, a more stable price than that found on the fresh market, and good jobs for residents of the potato growing area.

While long run prospects for the potato processing industry are good, several immediate problems are of concern. First, demand for French fries has slowed, so at least two major processors have put planned investments on hold. Second, Maine's other processors are continuously searching for new types of potato products while hoping that they can win contracts to produce those that are successful. Third, slow population growth and new business expansion in the Belfast area has tightened the labor market in that area. Fourth, high energy costs are pressuring the operating margins of Maine's potato waste to animal feed operation.

All of these factors put a premium on the ability of Maine's potato processors, both to find new products well suited to the consumer's changing tastes and to control costs, so Maine's plants can compete for business with other regions of the country.

Recommendation Seven: The State's Tax Increment Financing (TIF) legislation enables a Town to use property tax revenues from newly created property to help create that property. In a similar way, Maine's new Pine Tree Zone legislation should enable a Town to use state payroll and income taxes generated by a potato processor to fund marketing research designed to find new products for processing and thus to ensure its future.

Appendix One: Derivation of Production & Sales Data

Aggregate data on the potato industry generally come from two main sources: the USDA National Agricultural Statistics Service (NASS) annual crop reports summary; and the USDA Market News Service report on shipments. Figure A1 below compares these two sources for the 2001 Maine potato crop.

Figure A1
Sources of Data on Maine's 2001 Potato Crop

	<u>NASS data</u>	<u>MNS data</u>	
Production (1,000 cwt)	16,430		
- on-farm seed use	-230		
- on-farm home use	-71		
- loss & shrinkage	-849		
Sold (1,000 cwt)	15,280	- 14,210	= 1,070
seed	1,114	1,454	→ 2,524
tablestock		3,520	→ 3,520
chipping		2,041	→ 2,041
other processing	7,195	7,195	→ 7,195
			→ 15,280

Columns one and two are from NASS Potatoes Final Summary, 1992-1997 and Potatoes, 2001 Summary

The figures within the box are from Market News Service <http://www.nass.usda.gov:81/ipedb/>

Adding the NASS total for “other processing” to the Market News Service figures yields a total of 14,210 thousand cwt. This is 1,070 thousand cwt. less than the total crop sold quantity of 15,280 cwt. reported by NASS. Since the Market News Service figure does not include seed sales made within the state, Planning Decisions added the differential of 1,070 thousand cwt. to the 1,454 thousand cwt. seed total reported by Market News Service. This yields the adjusted totals in column five. These are the totals used for calculating the economic impact of this crop.

A similar reporting problem arises in calculating a dollar value for the crop. NASS uses “the point of first sale” for reporting the value of sales. This results in a mixing of true “farm-gate” sales, i.e., those sales made directly by a grower with no further value-added activity beyond storage, with sales to processors, and sales made from a packing plant (which may be operated by a grower). For the 2001 Maine crop, NASS reported an average price of \$7.65 per cwt. To apply this price to tablestock and seed sales would undervalue the cost of sorting, grading, washing, and packing. Conversely, to apply this price to potatoes sold directly from harvest to a processor would overvalue that portion of the crop. To differentiate between these values, Planning Decisions examined the differential between fresh and processed prices in those states where both were reported. For the U.S. as a whole, the differential was 2.1 to 1. For Idaho, it was 1.67 to 1. See Table A1 on the next page.

Table A1

Potatoes: Prices Received, Monthly and Marketing Year Average
by State and U.S., 2001 1/ (continued)

State	Jul	Aug	Sep	Oct	Nov	Dec	MYA
Dollars per Cwt							
AL	9.70	11.80					10.40
AK							20.30
AZ							15.50
CA - All	12.60	15.70	14.80	11.00	13.20	17.10	14.20
Winter					18.40	19.50	19.70
Spring	12.60						12.40
Summer	15.50	15.70	14.80	11.00			15.10
Fall	8.00				7.40	7.50	8.15
CO - All	6.35	8.75	8.35	7.15	7.40	7.70	9.35
Fresh	7.40	12.50	9.05	8.05	8.10	8.60	10.60
DE							9.00
FL							11.20
ID - All	5.15	6.05	5.75	5.05	5.05	5.45	6.15
Fresh	5.60	9.40	8.50	6.40	6.00	6.40	8.35
Processing	5.10	4.70	4.80	4.60	4.60	4.90	4.95
IL							5.65
IN							5.35
KS							12.00
ME	7.90	6.20	5.70	6.05	6.65	7.50	7.65
MD							8.50
MA							6.90
MI	6.50	6.90	6.35	6.45	7.10	7.20	7.65
MN		8.70	6.80	4.90	5.15	5.25	5.60
MO							5.10
MT							9.15
NE							6.60
NV							6.55
NJ							6.00
NM							7.10
NY		10.50	10.30	10.40	9.60	9.80	9.90
NC	5.95						6.00
ND - All			5.40	5.55	5.55	6.40	6.00
Fresh			9.50	8.45	8.00	9.35	9.25
Processing			4.80	4.80	4.65	4.95	4.85
OH	13.20	7.70	7.30	7.40	8.00	8.15	7.90
OR	6.45	6.35	5.35	4.70	5.60	5.85	6.40
PA		6.70	6.70	7.20	7.55	8.20	8.05
RI							6.70
SD							4.85
TX	10.60	12.10					10.30
UT							8.05
VA	6.90	6.90					6.85
WA - All	4.30	6.55	5.25	4.50	5.30	5.95	5.85
Processing	5.05	4.20	4.20	4.10	4.40	4.80	4.65
WI - All	6.40	7.25	5.80	5.75	6.40	6.45	7.10
Fresh	6.40	9.15	8.70	7.30	8.25	8.20	8.85
Processing		5.20	4.00	4.70	4.70	4.35	5.00
US - All	6.37	7.61	6.04	5.15	5.96	6.66	6.99
Fresh	8.94	13.50	10.20	8.13	8.28	9.22	10.79
Processing	5.24	4.73	4.58	4.42	4.77	5.04	5.05

1/ State Marketing Year Average Prices are computed by weighting state monthly prices by estimated sales for the month during the crop year. U.S. Marketing Year Average Price is computed by weighting state Marketing Year Average Prices by estimated sales for the crop year. Monthly prices refer to all potatoes sold in a given month regardless of the year harvested.

For purposes of this analysis, Planning Decisions used the ratio of 1.67 to 1. Figure A2 illustrates the adjustments made to NASS data to build the basis for the direct economic impact.

Figure A2
Derivation of Direct Economic Value of Maine's Potato Production

	(1,000 cwt)	Average Price Per cwt		
		\$7.65	\$6.05	\$10.10
Total Production	16,430	\$125,690		
- on-farm seed use	-230	-\$1,760	\$1,392	
- on-farm home use	-71	-\$543	\$430	
- <u>loss & shrinkage</u>	<u>-849</u>	<u>-\$6,495</u>	\$5,136	
Sold (1,000 cwt)	15,280	<u>\$116,892</u>		\$116,892
seed	2,524	\$19,309		\$25,492
tablestock	3,520	\$26,928		\$35,552
chipping	2,041	\$15,614	\$12,348	
other processing	7,195	\$55,042	\$43,530	

In order to maintain a 1.67 to 1 ratio of fresh price to processed price and maintain the reported total crop sales value of \$116,892,000, given the reported distribution of that production, the processed price must be \$6.05 per cwt. and the fresh price must be \$10.10 per cwt. Applying these prices to the reported sales distribution of the crop, yields the values listed in the shaded boxes in columns four and five. These are the values.



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