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B798: A Census of Maine's Potato Production, Storage, and Packing Operation

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A CENSUS OF MAINE'S POTATO PRODUCTION, STORAGE, AND PACKING OPERATION

By

Raymond J. Nowak, Edward F. Johnston, and Alan S. Kezis

**MAINE AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF MAINE AT ORONO**

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FOREWORD

This census was conducted for the use by and the benefit of the Maine potato industry. Every effort is made by those conducting such studies to keep confidential the information received from each respondent. While the authors acknowledge the fact that cooperation from respondents is purely of voluntary nature, they lament the deficiencies or inaccuracies in analysis of the results that arise from dealing with data that are incomplete due to respondent reluctance.

**MAINE AGRICULTURAL EXPERIMENT STATION
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TABLE OF CONTENTS

PAGE

INTRODUCTION 1

SCOPE OF STUDY 2

METHODS 3

GENERAL RESULTS 4

IDENTIFICATION OF STATE 5

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BUILDING AND MAINTENANCE AND OTHER 11

FOREWORD 12

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WITH AVAILABILITY OF THE RESULTS 13

FACTORS IN THE 14

..... 15

..... 16

..... 17

..... 18

..... 19

..... 20

..... 21

..... 22

..... 23

..... 24

..... 25

..... 26

..... 27

..... 28

..... 29

..... 30

..... 31

..... 32

..... 33

..... 34

..... 35

..... 36

..... 37

..... 38

..... 39

..... 40

..... 41

TABLE OF CONTENTS

	<u>PAGE</u>
INTRODUCTION	1
SCOPE OF STUDY	2
METHODOLOGY	3
CENSUS RESULTS	3
TOTALS FOR THE STATE	5
ACREAGE AND PRODUCTION BY AREA	6
STORAGES, CAPACITIES AND UTILIZATION BY AREA	7
SELECTED CHARACTERISTICS OF MAINE POTATO STORAGES	8
Age Distribution	8
Condition	9
Primary Market Channel	11
BUILDING CHARACTERISTICS AND PRIMARY HEAT SOURCE	11
Building Type	11
Frame Construction	13
Siding Type	13
Heat Source	13
VENTILATION AND HUMIDIFICATION	15
Mechanical Ventilation	15
Humidification	19
WATER AVAILABILITY, WASHING EQUIPMENT, USE OF PALLET BOXES AND PACKING AT THE STORAGE	19
Water Availability	19
Washing Equipment	19
Use of Pallet Boxes	19
Packing at Storage	22
SELECTED CHARACTERISTICS AND OUTPUT OF PACKING LINES	22
Packing Line Characteristics	22
DISCUSSION	29
APPENDIX A - Acreage by Area and Town	31
APPENDIX B - Production by Area and Town	34
APPENDIX C - Storages by Area and Town	37
LITERATURE CITED	40

A CENSUS OF MAINE'S POTATO PRODUCTION STORAGE, AND PACKING OPERATION

Raymond J. Nowak, Edward F. Johnston and Alan S. Kezis*

INTRODUCTION

Both internal and external factors relating to the production and marketing of Maine potatoes continue to influence and often undermine the profitability and market position of this important agricultural industry in the State. Among these factors are the technical aspects related to commercial production, storage and packing of potatoes in Maine; the current market structure; responses by the Maine industry to market preferences; and public policies, both foreign and domestic, affecting financial conditions and promotional activities in Maine and competing production regions. The quality of Maine potatoes in produce outlets in major Eastern U.S. markets is affected by production practices, handling methods, storage conditions, and quality maintenance and control practices. The organizational aspects of the marketing system at least partially determine the level of success in overall product marketing including the accurate and timely transmission of market information. Successful marketing also depends on the ability and willingness of the industry to make use of such information in developing and implementing future marketing plans. Credit availability and policies in Maine and other regions are increasingly important as profit margins are reduced in times of low market prices and increasing production costs for all producers. In order to expand market demand for its product, industry promotional expenditures and activities may be inadequate.

The Maine potato industry has long been characterized as having several hundred commercial potato producing units, with a range from very few acres to several hundred acres produced annually; as having potatoes harvested in a relatively short fall harvest period, with a majority placed directly into storage facilities of various sizes, designs and age for later movement to market; and as having a large number of relatively small packing operations for seed and/or table market preparation. During the past quarter century, upwards to 1/3 of the total production has been stored specifically for marketing in the potato chip or the frozen potato product (French-fry) markets.

In the report, Aroostook County, Maine - Potato Industry Study, Putnam illustrated trends in the profitability and market share for Maine potatoes for the years 1951 through 1979 (7). Putnam also discussed and reported on the impacts of changing markets in Maine, the marketing of Maine tablestock and processing potatoes, and alternative marketing structures for the industry. As a comprehensive review of industry concerns, this report provided a springboard for additional long range planning efforts.

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In March, 1982, the Maine Potato Industry Long Range Plan, 1982-1986 was released. Eight subcommittees of the Long Range Planning Committee had been formed to address certain identified critical areas for the industry including: harvesting, seed and variety development, processing, transportation, storage, agricultural practices, marketing/product specification and finance. The final plan contained status reports, long-term industry objectives and implementation plans in these areas. With respect to storage, the long range plan cited the need for an updated census or assessment of the status of existing Maine potato storage facilities. The plan states: "An up-to-date census of storages is required to quantify industry needs to upgrade existing storages and to construct new storages" (4).

SCOPE OF STUDY

A census was undertaken by the Department of Agricultural and Resource Economics of the University of Maine primarily during the month of February 1982. This census included questions on the number and location of storages, "maximum capacity," "customary capacity" and quantity put into Maine storages in 1981. In addition, data were obtained on the following characteristics of each storage: age, type of building, frame construction, siding material, condition of storage as reported by the respondent, primary market channel, water availability, primary heat source, type of ventilation/humidification, use of pallet boxes, and whether or not packing operations were located at the storage.

Further, the ARE Department census included production data including acres in potatoes by town and variety (round-white and russet), yield for each variety and use of mechanical harvesters for the 1981 crop.

The large number of small packing operations that characterize the Maine potato industry is a crucial element in the marketing of Maine's crop in the fresh market. The quality of the consumer product, of course, largely depends on the success of the grower in the production and storage phases. It is on the packing line, however, that the ultimate quality of the pack leaving Maine shipping points is determined by sorting, grading, washing and packing operations. It is also here that economies of size can be achieved thereby increasing the economic efficiency of potato packing operations (1). The ARE Department census, therefore, also collected data on the number of packing lines and certain characteristics of each packing line including sorting and grading capabilities, size of container packed, type of bag-filling operation, size of labor crew, participation in the "Maine Bag" program, and the daily output capacity and seasonal output of each packing line.

The results reported within this bulletin are meant to be as accurate as possible up-to-date description of Maine's potato production, storage, and packing operations.

In addition to this need for a quantitative assessment of existing facilities, the information contained in this bulletin will aid in determining alternative investment strategies for the Potato Market

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

Improvement Fund, a loan fund created by approval of a state bond issue in 1981 for the new construction and upgrading of potato storage and packing facilities. Thus, the results reported in this bulletin may be of use to all those concerned with improving the overall marketability of Maine potatoes.

METHODOLOGY

The questionnaire used in the census was developed primarily by the Department of Agricultural and Resource Economics (ARE) with technical assistance from the Social Science Research Institute (SSRI) of the University of Maine at Orono. The ARE Department supplied SSRI with names and telephone numbers, and telephone contact was made through SSRI. In addition, personal contacts and follow-up visits were made by ARE staff in March to operators of four or more storages, those who could not be reached by telephone and those who requested such a visit for the collection of the information. Initial coding and keypunching was done by SSRI. Additional interviews, coding, keypunching, tabulation of data, checks for duplication, and data and system file modification were done by the ARE Department. Analysis of the results and some graphics were accomplished with the Statistical Analysis System (SAS) and SASGRAPH computer software packages.

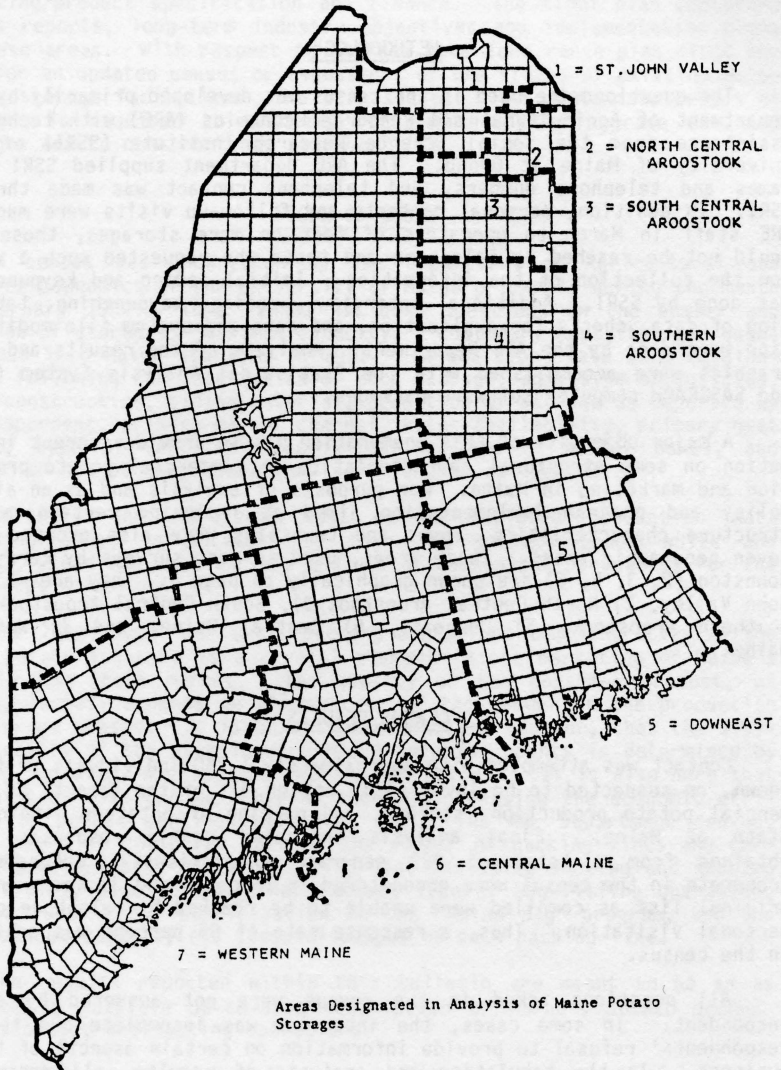
A major objective of this enumeration was to provide current information on some structural characteristics of commercial potato production and marketing in Maine. For purposes of analysis and as an aid in policy and program implementation aimed at improving certain market structure characteristics, towns and townships were also grouped into seven geographic areas. These areas, used in past surveys by Perry and Johnston (2, 3, 5, 6) are shown graphically on page 4. They are 1) St. John Valley, 2) North Central Aroostook 3), South Central Aroostook, 4) Southern Aroostook, 5) Downeast, 6) Central Maine, and 7) Western Maine.

CENSUS RESULTS

Contact was attempted with approximately 1,750 individuals or firms known, or suspected to be involved in any or all of the aspects of commercial potato production, storage, and packing of potatoes within the State of Maine. Final analysis indicated usable responses were obtained from a total of 922 separate enterprises. Refusals to cooperate in the census were encountered in 15 cases and 31 names on the original list as compiled were unable to be reached by telephone or by personal visitation. Thus, a response rate of 95 percent was achieved in the census.

All questions asked in the census were not answered by every respondent. In some cases, the interview was incomplete due to the respondents' refusal to provide information on certain aspects of their business. In the tabulation and analysis of results, all responses obtained were utilized. All results in this bulletin are presented in a form that avoids disclosure of information pertaining to an individual or firm. In presenting the location and distribution of potato produc-

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798



MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

tion, storages and packing operations, some grouping of data was done to preserve confidentiality.

TOTALS FOR THE STATE

A total of 97,978 acres of potatoes¹ raised in 124 Maine towns in 1981 was reported by 764 individuals or firms. These producers reported raising 69,179 acres of round white and 28,799 acres of russet potatoes. Total production was computed by summing the products of a respondent's reported acreage and corresponding yield figures. This calculated, reported production was composed of 18,737,000 hundredweight (cwt.) of round white and 8,107,000 cwt. of russet potatoes for a total reported production in 1981 of 26,844,000 cwt.

Data on storage facilities were obtained from 856 individuals or firms owning or operating one or more storages. A total of 1,453 storages was reported in the state with a total customary capacity of 32,265,000 cwt. Total maximum capacity for these storages, defined as what "could" be put in storage if excess production occurred, was reported to be 36,492,000 cwt. For the 1981 crop year, 26,662,000 cwt. were put into storage facilities as reported in the census. Thus, utilization of the customary capacity at the start of the 1981-82 potato marketing season was approximately 83 percent. Some respondents did not report either customary capacity or amount put into storage in 1981. When considering only those storages for which both customary capacity and quantity put into storage in 1981 were given, utilization of storage capacity was determined to be 90 percent.

Packing operations were reportedly performed at 758 or 52 percent of the 1,453 storages reported. Packing lines were thus operated at storages with a combined customary capacity of 19,725,000 cwt., which is about 61 percent of the total by storage capacity. A total of 559 packing lines was reported by 521 individuals or firms owning or operating at least one packing line, with 273 of these lines reported as being moved at some point in the marketing season to at least one other location. Approximately 456 or 80 percent of the individuals or firms engaged in packing Maine potatoes reported packing only their own crop. About 12 percent packed both their own and others' potatoes, and 16 individuals or three percent of those responding packed only those potatoes produced by others. The approximate seasonal output was reported for 556 of the 559 packing lines. The responses for this question during enumeration were recorded in predetermined categories of seasonal output. There were six lines reported to have a seasonal output greater than 500 truckloads. The largest response by number was in the 31 to 100 truckloads category with 245 lines reported in this range. Of the 556 lines for which this information was reported, 136 were in the 11 to 30 truckload category. Combined, these latter two ranges (11 to 100 truckloads) included 381 packing lines or 68 percent of the total number of packing lines reported. Thirty-three lines reported a seasonal output of 10 truckloads or less.

¹This acreage represents about 95% of that estimated by the Crop Reporting Board for 1981.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

ACREAGE AND PRODUCTION BY AREA

Of the seven selected geographic areas within the State (map on page 4), North Central Aroostook contained the most potato acreage with 36,769 acres, or 37 percent of the 97,978 acres reported in the census (Table 1 and Appendix A). The other three Aroostook County areas followed in acreage in the order of South Central, the Saint John Valley and Southern Aroostook with 26, 16, and 13 percent respectively. Therefore, approximately 92 percent of the State's acreage reported in

TABLE 1

Maine Potato Acreage by Variety and Area,¹ 1981

Area	Round White		Russet		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
St. John Valley	12,170	18	3,641	13	15,811	16
N.C. Aroostook	21,564	31	15,205	53	36,769	37
S.C. Aroostook	17,381	25	7,970	27	25,351	26
S. Aroostook	11,480	17	1,207	4	12,687	13
Downeast	852	1	161	*	1,013	1
Central Maine	3,499	5	171	1	3,670	4
Western Maine	2,233	3	444	2	2,677	3
Total	69,179	100	28,799	100	97,978	100

*Less than one percent.

¹See Appendix A for acreage by town.

1981 was located within Aroostook County. The three remaining potato producing areas in the State - that is, Maine excluding Aroostook County - comprised the remaining eight percent with acreages equaling about four, three, and one percent of the total reported for Central Maine, Western Maine, and Downeast, respectively.

The North Central Aroostook area not only was reported to have the largest acreage of russet potatoes (all russet types), which totaled more than all other areas combined, but it also contained more russet potato acreage, proportionately, than any of the other areas. Forty-one percent of the North Central Aroostook acreage was in russet potatoes, as compared to 31 percent for South Central Aroostook, 23 percent for the Saint John Valley, about 16 percent for Western Maine and for Downeast, and less than 10 percent for Southern Aroostook and for Central Maine. The State total of 28,799 acres of russet potatoes represented 29 percent of the total acreages reported in this census. (It should be noted that the processing segment of the industry utilizes more russet type potatoes than do the table and chip segments, and Maine's potato processing plants are located in the Central Aroostook areas.)

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

Production by area had a geographic distribution similar to that for acreages (Table 2 and Appendix B). About 17.1 million cwt. of the calculated 26.8 million cwt. for the State were produced in North and South Central Aroostook. These two areas combined also produced about 82 percent of the total russet volume. Average yields by area (all potatoes) appeared fairly consistent, except that yields in those of Western Maine and Downeast were slightly higher than the other five areas.

TABLE 2
Maine Potato Production¹ by Variety and Area,² 1981

Area	Round White		Russet		Total	
	Production (1,000 Cwt.)	Per- cent	Production (1,000 Cwt.)	Per- cent	Production (1,000 Cwt.)	Per- cent
St. John Valley	18,737	16	910	11	3,921	15
N.C. Aroostook	5,921	32	4,330	53	10,251	38
S.C. Aroostook	4,561	24	2,308	28	6,869	25
S. Aroostook	3,191	17	326	4	3,517	13
Downeast	301	2	49	1	350	1
Central Maine	972	5	46	1	1,018	4
Western Maine	780	4	138	2	918	4
Total	18,737	100	8,107	100	26,844	100

¹Production computed from acreage and yield/variety data collected in census.

²See Appendix B for production by town.

STORAGES, CAPACITIES AND UTILIZATION BY AREA

The North Central Aroostook area contained the largest number of storages, the largest maximum and customary capacities, and the largest volume put into storage in 1981. As with acreage and production, the seven areas of the State, when arranged largest to smallest in these categories, were: North Central Aroostook, South Central Aroostook, Southern Aroostook and St. John Valley about equal, Central Maine, Western Maine and Downeast. The four Aroostook County areas combined accounted for 92 percent of the total reported customary capacity and 92 percent of the total volume placed in storage in 1981. The comparison of maximum capacity to customary capacity could not be made directly for areas, or for the State, but it would appear that maximum capacity was about 110 percent of customary capacity. By areas, average capacity per storage was indicated as highest in Western Maine, followed by South Central Aroostook. Downeast had the smallest average capacity per storage (Table 3 and Appendix C).

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

The 1981 utilization of available customary capacity, for areas, was analyzed using only those storages for which both customary capacity and volume placed in storage were reported. Thus calculated, the Central Maine area utilized the highest proportion of the storage available at 94 percent, while Western Maine utilized the lowest proportion at 86 percent. All other areas were at or very close to the average for the State at 90 percent (Table 4).

SELECTED CHARACTERISTICS OF MAINE POTATO STORAGES

Age Distribution

By Number. About one-fourth of all storages reported in the census were over 40 years old. North Central Aroostook had 33 percent of its storages in this category, the largest percentage among all areas. Eleven percent of the storages reported in Western Maine were over 40 years old, the lowest percentage among the areas. As a measure of new storage construction, twelve percent of the storages in Central Maine were built since 1976, the largest proportion in this category among all areas, followed by the St. John Valley with 10 percent of its storages

TABLE 3

Maximum Capacity and Customary Capacity in Maine Potato Storages by Area,¹ 1981

Area	Maximum Capacity		Customary Capacity	
	Number	1,000 Cwt.	Number	1,000 Cwt.
St. John Valley	220	5,493	218	4,848
N. Central Aroostook	517	12,431	508	11,052
S. Central Aroostook	338	9,751	332	8,828
Southern Aroostook	252	5,881	243	4,861
Downeast	25	388	24	347
Central Maine	61	1,524	58	1,399
Western Maine	26	1,024	25	930
Total	1,439	36,492	1,408	32,265
Unreported	14		45	

¹See Appendix C for storage capacities by town.

reported to be five years old or less. No storages were reported built in the Downeast area after 1975. For all storages in Maine, seven percent were reported to have been constructed in the last five years (Table 5).

Looked at another way, for all storages reported, 38 percent were 21 years old or less. Western Maine reported the largest number of storages in this age range with 64 percent. Central Maine, the St. John Valley and South Central Aroostook areas had 53, 44, and 39 percent

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

respectively of storages built since 1960. Thirty-six percent of the number of storages in both North Central and Southern Aroostook have been constructed in the last 21 years as reported in this enumeration (Table 5).

TABLE 4
1981 Storage Volume and Utilization of Customary Capacity, By Area¹

Area	1981 Storage		1981 Utilization
	Number	1,000 Cwt.	of Customary Capacity ² Percent
St. John Valley	201	4,036	89
N. Central Aroostook	452	9,263	90
S. Central Aroostook	273	7,087	90
Southern Aroostook	210	4,000	90
Downeast	19	275	92
Central Maine	49	1,197	94
Western Maine	25	804	86
State	1,229	26,662	90

¹See Appendix C for storage capacities by town.

²Only those storages which reported 1981 storage volume and customary capacity were included in this part of the analysis (1,229 out of 1,453).

By Capacity. Fourteen percent of the total customary capacity reported was over 40 years old. North Central Aroostook had the largest percentage, by area, in this age group with 19 percent of its customary capacity built before 1941. Southern Aroostook reported 14 percent in this category and South Central reported 13 percent.

A total of 59 percent of the customary capacity reported for the state was 21 years old or less. Central Maine reported 75 percent of its customary capacity in this age range. Sixty-eight percent of the customary capacity in Western Maine was reported built since 1960. While the St. John Valley had the third largest percentage in this group by number, only 52 percent of the reported customary capacity was 21 years old or less, the second lowest percentage for all areas (Table 6).

Condition

By Number. Owners/operators of Maine potato storages were asked in the census to rate the "condition" of their storage(s) as excellent, good, fair, poor or currently unusable. They rated 21 percent of the storages as excellent. In Central Maine, 36 percent were reported in excellent condition. Among Aroostook County areas, Southern Aroostook reported the smallest proportion in the excellent category, 17 percent,

TABLE 5

Age, Condition and Primary Market Channel of Maine
Potato Storages by Number, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Age:																
5 yrs. or less	21	10	34	7	30	9	14	6	0	0	7	12	1	4	107	7
6 to 11 yrs.	28	13	48	9	33	10	20	8	1	4	10	16	4	14	144	10
12 to 21 yrs.	46	21	102	20	70	20	57	22	7	27	15	25	13	46	310	21
22 to 31 yrs.	45	20	69	13	55	16	46	18	5	19	8	13	6	21	234	16
32 to 40 yrs.	46	21	82	16	48	14	50	20	8	31	10	16	1	4	245	17
Over 40 yrs.	34	15	175	33	96	28	65	25	5	19	10	16	3	11	388	27
Don't know	1	*	10	2	9	3	2	1	0	0	1	2	0	0	23	2
Total	221	100	520	100	341	100	254	100	26	100	61	100	28	100	1451	100
Not Reported	0		2		0		0		0		0		0		2	
Condition:¹																
Excellent	45	20	103	20	79	23	44	17	2	8	22	36	8	29	303	21
Good	92	42	233	44	151	44	106	42	11	42	27	44	14	50	634	44
Fair	65	30	139	27	89	26	79	31	10	38	11	18	6	21	399	28
Poor	18	8	39	8	19	6	16	6	2	8	0	0	0	0	94	6
Unusable	1	*	6	1	3	1	9	4	1	4	1	2	0	0	21	1
Total	221	100	520	100	341	100	254	100	26	100	61	100	28	100	1451	100
Not Reported	0		2		0		0		0		0		0		2	
Primary Market Channel:																
Seed	58	28	129	28	96	32	72	33	14	74	13	26	7	26	389	30
Tablestock	98	47	218	46	129	43	133	60	4	21	20	41	12	44	614	48
Processing	47	23	119	25	69	23	8	4	0	0	0	0	0	0	243	19
Chips	1	1	2	1	0	0	4	2	1	5	16	33	8	30	32	2
Don't know	3	1	2	*	5	2	2	1	0	0	0	0	0	0	12	1
Total	207	100	479	100	299	100	219	100	19	100	49	100	27	100	1290	100
Not Reported	14		52		42		35		7		12		1		163	

*Less than one percent.

¹Condition as reported by owner/operator.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

with the largest percentage of its storages, 42 percent, in good condition. Sixty-five percent of all storages were described by respondents as being in good or excellent condition. Six percent of all storages for which responses were obtained to this question, were reported in poor condition while one per cent was described as currently unusable (Table 5).

By Capacity. Forty-five percent of the customary capacity reported in the census was said to be in good condition while 32 percent was described as being in excellent condition. By area, Central Maine, Western Maine and South Central Aroostook had the largest percentages of customary capacity in good or excellent condition with 89, 88 and 83 percent respectively. The Downeast area among all areas reported the lowest percentage of its customary capacity in good or excellent condition, with 65 percent in this combined category (Table 6).

Primary Market Channel

By Number. Storage owners/operators were asked to indicate the primary market channel for potatoes in each storage. Responses showed that for all storages reported, 48 percent were specified as storages primarily for tablestock, 30 percent for seed, 19 percent for processing (frozen and dehydrated) and 2 percent of the number of storages contained potatoes that were mostly for processing into potato chips. With the exception of Southern Aroostook, Aroostook County areas all had a similar distribution of storages holding potatoes for the various market channels. As expected, Central and Western Maine areas had the largest number of storages containing potatoes whose primary market channel was for processing into potato chips. These figures were 33 and 30 percent respectively. Information on primary market channels was not provided for 11 percent of the total number of storages reported (Table 5).

By Capacity. Responses to this question in the census pertain to the market channel for most of the potatoes in each storage as noted above. Therefore, analysis with respect to customary capacity would be misleading and too generalized.

BUILDING CHARACTERISTICS AND PRIMARY HEAT SOURCE

Building Type

By Number. About one-third of the total number of storages reported was designated as being "above ground." About one-fourth were "above and below ground," and the same amount was said to be of "below ground" construction. Western and Central Maine reported the largest percentage of "above ground" storages with 61 and 53 percent respectively. Among all Aroostook County areas, Southern Aroostook had the largest percentage of "above ground" storages with 35 percent and the lowest percentage of "below ground" storages at 11 percent (Table 7).

TABLE 6

Age and Condition of Maine Potato Storages
By Customary Capacity, 1981

Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent	1000 Cwt.	Per-cent
Age:																
5 yrs. or less	477	10	977	9	1585	18	358	7	0	0	236	17	20	2	3633	11
6 to 11 yrs.	630	13	1691	15	924	12	459	9	16	5	215	15	43	5	3978	12
12 to 21 yrs.	1405	29	3571	32	3221	36	1811	37	169	49	591	43	580	61	11348	36
22 to 31 yrs.	1049	22	1372	13	999	11	835	17	59	17	130	9	173	18	4617	14
32 to 40 yrs.	781	16	1162	11	787	9	708	15	71	20	151	11	46	5	3706	12
Over 40 yrs.	491	10	2115	19	1196	13	658	14	32	9	74	5	88	9	4654	14
Don't know	15	*	109	1	116	1	32	1	0	0	2	*	0	0	274	1
Total	4848	100	10997	100	8828	100	4861	100	347	100	1399	100	930	100	32210	100
Not Reported	0		55		0		0		0		0		0		55	
Condition:¹																
Excellent	1128	23	3460	32	3547	40	1226	25	136	40	597	43	291	31	10385	32
Good	2228	47	4921	44	3781	43	2325	49	88	25	649	46	529	57	14521	45
Fair	1280	26	2184	20	1237	14	1036	21	100	29	145	10	110	12	6092	19
Poor	205	4	377	3	212	2	207	4	15	4	0	0	0	0	1016	3
Unusable	7	*	55	1	51	1	67	1	8	2	8	1	0	0	196	1
Total	4848	100	10997	100	8828	100	4861	100	347	100	1399	100	930	100	32210	100
Not Reported	0		55		0		0		0		0		0		55	

*Less than one percent.

¹Condition as reported by owner/operator.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

By Capacity. Western and Central Maine again had the largest percentage of storages in the "above ground" category with 76 and 77 percent respectively. The Downeast area had 23 percent of the older "in-bank" storages and 29 percent of the "above ground" storages. For all other areas and for the state, the percentage of customary capacity in "in-bank" storages was less than 19 percent. Forty-seven percent of the total customary capacity in the state was reported to be "above ground" (Table 8).

Frame Construction

By Number. Wood frame construction was the predominant type of frame construction reported in each area with 64 percent of all the storages reported in this category. For all areas except the St. John Valley, concrete was the second most popular type of frame construction, with 19 percent of all storages reported in this category (Table 7).

By Capacity. In all areas, with the exception of South Central Aroostook, wood was also the predominant type of frame construction by customary capacity. South Central Aroostook reported 42 percent of its storages with metal frame construction, by far the largest percentage in this category among the areas. The Downeast area had only one percent of its customary capacity in storages with metal frames, while 38 percent was reported to be in storages with concrete walls. This, of course, corresponds with the large number of storages and amount of customary capacity that was of "in-bank" (old farm storage) construction. Fifty-seven percent of the total customary capacity was reported to be in storages with wood frames while 29 percent was in storages of metal frame construction (Table 8).

Siding Type

By Number. Wood siding was reported on more than half of all storages included in this census. Western and Central Maine, however, reported more storages with metal siding. "Other" types of siding, including asphalt shingles and storages of concrete construction, accounted for 11 percent of the total number reported (Table 7).

By Capacity. In contrast, 58 percent of the total customary capacity was reported to have metal siding while 35 percent had wood siding. It appears from the data, then, that larger storages were constructed with metal siding, commensurate with the observable trend in new storage construction. Western and Central Maine had the largest percentage of customary capacity by area in storages with metal siding, with 85 and 79 percent respectively. For the St. John Valley, this figure was 48 percent, the lowest among all areas (Table 8).

Heat Source

By Number. When asked what the primary heat source was in storages, owners'/operators' responses indicated that about one-third of all storages were heated primarily with wood and about the same amount with

TABLE 7

BUILDING CHARACTERISTICS AND PRIMARY HEAT SOURCE OF MAINE POTATO STORAGES BY NUMBER, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent
Building Type:																
Above Ground	65	30	155	29	106	32	88	35	5	19	32	53	17	61	468	32
Below Ground	43	19	95	18	63	18	28	11	6	23	12	29	2	7	249	17
Above and Below	51	23	113	22	82	24	70	28	3	12	7	11	6	21	332	23
In-Bank	46	21	143	28	76	22	62	24	10	38	7	11	2	17	346	24
Other	16	7	14	3	14	4	6	2	2	8	3	5	1	4	56	4
Total	221	100	520	100	341	100	254	100	26	100	61	100	28	100	1451	100
Not Reported	0		2		0		0		0		0		0		2	
Frame Type:																
Wood frame	156	70	343	66	197	58	161	64	16	61	40	66	22	79	935	64
Metal frame	39	18	66	13	57	17	39	15	1	4	7	11	2	7	211	15
Concrete	24	11	104	20	78	23	46	18	9	35	9	15	4	14	274	19
Other	2	1	7	1	8	2	8	3	0	0	5	8	0	0	30	2
Total	221	100	520	100	340	100	254	100	26	100	61	100	28	100	1450	100
Not Reported	0		2		1		0		0		0		0		3	
Siding Type:																
Wood Siding	120	56	309	60	167	50	115	45	11	44	14	25	6	21	742	52
Metal Siding	79	36	156	30	133	39	102	40	9	36	32	56	20	72	531	37
Other	15	7	50	10	38	11	37	15	5	20	11	19	2	7	158	11
Don't Know	3	1	0	0	1	*	0	0	0	0	0	0	0	0	4	*
Total	217	100	515	100	339	100	254	100	25	100	57	100	28	100	1435	100
Not Reported	4		7		2		0		1		4		0		18	
Heat Source:																
Wood	67	31	241	47	167	50	76	30	6	23	8	13	3	11	568	40
Oil	106	49	124	24	65	19	118	47	12	46	25	41	19	68	469	33
Electricity	2	1	5	1	7	2	3	1	2	8	1	2	0	0	20	1
Gas	9	4	95	18	57	17	24	10	1	4	14	23	2	7	202	14
Other	31	14	50	10	42	12	31	12	5	19	13	21	4	14	176	12
Don't Know	1	1	1	*	1	*	0	0	0	0	0	0	0	0	3	*
Total	216	100	516	100	339	100	252	100	26	100	61	100	28	100	1438	100
Not Reported	5		6		2		2		0		0		0		15	

*Less than one percent.

oil. Only the North Central and South Central Aroostook areas, however, reported a larger percentage of storages heated primarily with wood heaters as opposed to oil burners (Table 7).

By Capacity. Similarly, one-third of the total customary capacity was reported to be heated primarily with wood. Twenty-nine percent of this capacity was in storages where the primary heat source was oil while 22 percent was in storages heated primarily with gas. The South Central Aroostook area reported the largest use of electricity as a primary heat source with 7 percent of its customary capacity in storages heated primarily with electric heaters. All other areas reported no more than five percent of their customary capacity reported in storages with electricity as the primary heat source (Table 8).

VENTILATION AND HUMIDIFICATION

Mechanical Ventilation

By Number. Slightly more than one-half of all storages reporting had some type of mechanical ventilation system defined as either a simple power exhaust, or as a shell or through circulation system. Western Maine and the St. John Valley had the largest percentage of storages with some type of mechanical ventilation system, with 79 and 70 percent respectively (Table 9).

Of the 765 storages reporting some type of mechanical ventilation, 57 percent were described as a simple power exhaust type. Less than one-half of these 765 storages had a shell circulation or through circulation system. In other words, only 21 percent of all storages included in this census had one or the other of these latter two types of storage ventilation systems. By area, Western Maine and Central Maine had the largest percentage of storages with either one of these two systems with 68 and 51 percent respectively. Only 10 percent of all storages in the census were reported to have the through circulation system (Table 9).

By Capacity. Seventy percent of the customary capacity was in storages with some type of mechanical ventilation system. Western Maine reported 94 percent of its customary capacity in storages with mechanical ventilation. Among all areas, Central Maine had the second largest percentage of its customary capacity in mechanically ventilated storages with 81 percent in this category (Table 10).

Forty-two percent of the customary capacity in storages with mechanical ventilation was being ventilated with simple power exhaust fans. Of all the customary capacity in storages with mechanical ventilation, 26 percent was in storages with the shell circulation system and 29 percent was in storages with the through circulation system. Thus, only slightly more than one-third of the total customary capacity in Maine was in storages with either a shell or through circulation system. Twenty percent of the total customary capacity reported was in storages with a through circulation system (Table 10).

TABLE 8

Building Characteristics and Primary Heat Source of Maine
Potato Storages by Customary Capacity, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent	1,000 Cwt.	Per-cent
Building Type:																
Above Ground	1,784	37	4,966	45	4,266	45	2,319	47	89	26	1,082	77	703	76	15,209	47
Below Ground	709	15	1,052	10	762	10	230	5	51	15	62	4	24	3	2,890	9
Above and Below	1,326	27	2,628	24	1,767	24	1,386	29	21	6	97	7	197	21	7,422	23
In-bank	704	14	2,002	18	1,464	18	806	17	79	23	93	7	6	*	5,154	16
Other	325	7	349	3	569	3	120	2	107	30	65	5	0	0	1,535	5
Total	4,848	100	10,997	100	8,828	100	4,861	100	347	100	1,399	100	930	100	32,210	100
Not Reported	0		55		0		0		0		0		0		55	
Frame Type:																
Wood Frame	3,380	70	6,545	59	3,649	42	2,696	56	210	61	1,044	75	688	74	18,203	57
Metal Frame	1,003	21	2,949	27	3,748	42	1,284	26	4	1	280	20	160	17	9,428	29
Concrete	448	9	1,431	13	1,236	14	782	16	133	38	55	4	82	9	4,167	13
Other	17	*	72	1	188	2	99	2	0	0	20	1	0	0	396	1
Total	4,848	100	10,997	100	8,812	100	4,861	100	347	100	1,399	100	930	100	32,194	100
Not Reported	0		55		1		0		0		0		0		71	
Siding Type:																
Wood Siding	2,178	45	4,572	42	2,561	29	1,431	29	101	29	180	13	121	13	11,144	35
Metal Siding	2,335	48	5,574	51	5,764	66	2,917	60	209	60	1,108	80	793	85	18,700	58
Other	269	6	702	7	468	5	513	11	37	11	95	7	16	2	2,100	7
Don't Know	34	1	0	0	10	*	0	0	0	0	0	0	0	0	44	*
Total	4,816	100	10,848	100	8,803	100	4,861	100	347	100	1,383	100	930	100	31,988	100
Not Reported	32		204		25		0		0		16		0		277	

TABLE 8 (Continued)

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent
Primary Heat Source:																
Wood	1,469	31	4,524	41	3,000	34	1,256	26	49	14	66	5	60	6	10,424	33
Oil	2,403	51	1,975	18	1,309	15	2,209	46	103	30	516	37	627	68	9,142	29
Electricity	35	1	106	1	577	7	31	*	16	5	3	*	0	0	768	2
Gas	236	5	3,128	29	2,106	24	698	14	16	5	550	39	196	21	6,932	22
Don't Know	25	*	15	*	50	*	0	0	0	0	0	0	0	0	90	*
Total	4,714	100	10,907	100	8,748	100	4,854	100	347	100	1,399	100	930	100	51,899	100
Not Reported	134		145		80		7		0		0		0		366	

*Less than one percent.

TABLE 9

Ventilation and Humidification of Maine Potato
Storages, by Number, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Mechanical Ventilation:																
Storages With	154	70	229	44	176	52	139	55	10	38	35	57	22	79	765	53
Storages Without	67	30	290	56	164	48	114	45	16	62	26	43	6	21	683	47
Don't Know	0	0	1	*	0	0	1	*	0	0	0	0	0	0	2	*
Total	221	100	520	100	340	100	254	100	26	100	61	100	28	100	1,450	100
Not Reported	0		2		1		0		0		0		0		3	
Type of Ventilation:¹																
Simple Power Exhaust	81	53	144	63	90	51	87	62	9	90	17	49	7	32	435	57
Shell Circulation	63	41	37	16	28	16	26	19	0	0	6	17	7	32	167	22
Through Circulation	10	6	43	19	49	28	18	13	1	10	12	34	8	36	141	18
Other	0	0	2	1	6	3	8	6	0	0	0	0	0	0	16	2
Don't Know	0	0	2	1	3	2	0	0	0	0	0	0	0	0	5	1
Total	154	100	228	100	176	100	139	100	10	100	35	100	22	100	764	100
Not Reported	0		1		0		0		0		0		0		1	
Humidification:																
Yes	5	2	23	4	32	9	13	5	0	0	6	10	7	25	86	6
No	216	98	494	96	308	91	241	95	26	100	55	90	21	75	1,361	94
Don't Know	0	0	1	*	0	0	0	0	0	0	0	0	0	0	1	*
Total	221	100	518	100	340	100	254	100	26	100	61	100	28	100	1,448	100
Not Reported	0		4		1		0		0		0		0		5	

*Less than one percent.

¹Number and percentage of storages with some type of mechanical ventilation.

Humidification

By Number. For the state, 86 storages or 6 percent of the total number were reported to have humidification equipment. Western Maine, Central Maine and South Central Aroostook reported the largest percentage of the number of storages with humidification with 25, 10 and 9 percent respectively. Only 73 storages out of 1,333 (about 5%) in the four Aroostook County areas were reported to have humidification equipment (Table 9).

By Capacity. The volume of customary capacity in the 86 storages with humidification equipment represented 16 percent of the total customary capacity reported for the state. One-third of the customary capacity in Central Maine was reported to be in storages with this equipment. The four Aroostook County areas combined reported 13 percent of the total customary capacity in storages with humidification equipment (Table 10).

WATER AVAILABILITY, WASHING EQUIPMENT, USE OF PALLET BOXES
AND PACKING AT THE STORAGE

Water Availability

By Number. Water from either a municipal or domestic source was available at almost one-half of all storages for which this information was reported. Responses to this question were "not reported" for almost one-third of the storages included in the census. For all Aroostook County areas, 45 percent of the storages had water available from at least one source. Of the four Aroostook County areas, South Central Aroostook reported the largest percentage of storages with water available (59 percent). Western Maine and Central Maine reported 67 and 58 percent respectively (Table 11).

By Capacity. Water was available at storages that accounted for 65 percent of the total customary capacity in the state. Western Maine, South Central Aroostook and Central Maine reported the largest amount of storage capacity located near a water supply with 86, 78 and 71 percent respectively. In North Central Aroostook, 65 percent of the customary capacity was near a domestic or municipal water supply (Table 12).

Washing Equipment

Respondents in the census were reluctant to give information concerning the availability of potato washing equipment. In all areas, the number of storages for which this information was "not reported" was equal to or exceeded the number for which it was reported. Of those reported, 56 percent of the number and 70 percent of the customary capacity had washing equipment at the storage (Tables 11 and 12).

Use of Pallet Boxes

By Number. While pallet boxes were used in only 6 percent of the total number of storages reported, they were used in 22 and 20 percent of the storages in Western and Central Maine respectively (Table 11).

TABLE 10

Ventilation and Humidification of Maine Potato Storages by
Customary Capacity, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent
Mechanical Ventilation:																
Customary Capacity With	3,774	78	6,731	61	6,231	71	3,554	73	233	67	1,127	81	871	94	22,511	70
Customary Capacity Without	1,074	22	4,252	39	2,574	29	1,317	27	114	33	272	19	59	6	9,662	30
Don't Know	0	0	14	*	0	0	0	0	0	0	0	0	0	0	14	*
Total	4,848	100	10,997	100	8,805	100	4,861	100	347	100	1,399	100	930	100	32,187	100
Not Reported	0		55		23		0		0		0		0		78	
Type of Ventilation:¹																
Simple Power Exhaust	1,863	50	3,298	49	1,853	31	1,697	48	142	61	547	49	144	17	9,544	42
Shell Circulation	1,636	43	1,410	21	1,344	21	1,060	30	0	0	167	15	275	32	5,892	26
Through Circulation	275	7	1,949	30	2,747	44	603	17	91	39	413	36	452	52	6,530	29
Other	0	0	20	*	211	3	184	5	0	0	0	0	0	0	415	2
Don't Know	0	0	28	*	76	1	0	0	0	0	0	0	0	0	104	1
Total	3,774	100	6,705	100	6,231	100	3,544	100	233	100	1,127	100	871	100	22,485	100
Not Reported	0		26		0		0		0		0		0		26	
Humidification:																
Yes	170	4	1,280	12	2,145	24	537	11	0	0	470	34	474	51	5,076	16
No	4,678	96	9,650	88	6,660	76	4,324	89	347	100	929	66	456	49	27,044	84
Don't Know	0	0	15	*	0	0	0	0	0	0	0	0	0	0	15	*
Total	4,848	100	10,945	100	8,805	100	4,861	100	347	100	1,399	100	930	100	32,135	100
Not Reported	0		107		23		0		0		0		0		130	

*Less than one percent.

¹Cwt. and percentage of customary capacity with some type of mechanical ventilation.

TABLE 11

Water Availability, Washing Equipment, Use of Pallet Boxes and Packing
at Maine Potato Storages by Number, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Water Availability:																
Yes	57	33	149	46	128	59	75	38	7	29	25	58	14	67	455	46
No	113	66	173	54	89	41	124	62	17	71	18	42	7	33	541	54
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>*</u>
Total	171	100	322	100	217	100	199	100	24	100	43	100	21	100	997	100
Not Reported	50		200		124		55		2		18		7		456	
Washing Equipment:																
Yes	37	66	80	55	70	56	37	50	1	14	13	52	11	79	249	56
No	<u>19</u>	<u>34</u>	<u>66</u>	<u>45</u>	<u>56</u>	<u>44</u>	<u>37</u>	<u>50</u>	<u>6</u>	<u>86</u>	<u>12</u>	<u>48</u>	<u>3</u>	<u>21</u>	<u>199</u>	<u>44</u>
Total	56	100	147	100	125	100	74	100	7	100	25	100	14	100	448	100
Not Reported	165		375		216		180		19		36		14		1,005	
Use of Pallet Boxes:																
Yes	4	2	21	4	25	9	13	6	0	0	10	20	6	22	79	6
No	<u>203</u>	<u>98</u>	<u>452</u>	<u>96</u>	<u>277</u>	<u>91</u>	<u>208</u>	<u>94</u>	<u>19</u>	<u>100</u>	<u>39</u>	<u>80</u>	<u>21</u>	<u>78</u>	<u>1,219</u>	<u>94</u>
Total	207	100	473	100	302	100	221	100	19	100	44	100	27	100	1,298	100
Not Reported	14		49		39		33		7		12		1		155	
Packing at Storage:																
Yes	145	70	239	51	162	54	156	71	11	61	25	51	20	74	758	59
No	61	29	232	49	139	46	64	29	7	39	24	49	7	26	534	41
Don't Know	<u>1</u>	<u>1</u>	<u>2</u>	<u>*</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>*</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>	<u>*</u>
Total	207	100	473	100	301	100	221	100	18	100	49	100	27	100	1,296	100
Not Reported	14		49		40		33		8		12		1		157	

*Less than one percent

By Capacity. The use of pallet boxes is more prevalent in larger storages. Thus, while this method of handling and storing potatoes was used in only 10 storages in Central Maine, these storages accounted for 46 percent of the customary capacity in this area. For all areas combined, 11 percent of the total customary capacity was in storages where pallet boxes were used for handling and storage of potatoes. Pallet boxes are oftentimes used for only a portion of the crop placed in a particular storage (Table 12).

Packing at Storage

Data on packing operations were collected both with respect to storage facilities where packing lines were located and on individual packing lines. Results of the analysis pertaining to individual packing lines are presented in a later section of this bulletin.

By Number. Packing lines were located at 59 percent of the total number of storages reported in the census. Among Aroostook County areas, Southern Aroostook and the St. John Valley had the highest "increase of packing" at storages, with 71 and 70 percent, respectively (Table 11).

By Capacity. Aroostook County's incidence of packing at storages was 67 percent. For the state, packing lines were located at 65 percent of all storages reported (Table 12).

SELECTED CHARACTERISTICS AND OUTPUT OF PACKING LINES

The large number (559) of small packing operations in Maine is an important structural dimension of the industry. This dimension of the industry has been and will continue to be a central issue in attempts by the industry to reduce excess capacity in Maine packing operations, capture economies of size in these operations, lengthen the marketing season and improve overall product quality.

Packing Line Characteristics

By Number. With respect to packing line capabilities, 84 percent of the packing lines reported could pack Chef's Specials (or 3-inch minimum and 4-inch maximum) and 36 percent of all lines reported could pack more than two tablestock sizes. Southern Aroostook and South Central Aroostook areas had the largest percentage of packing lines in both of these categories among Aroostook County areas (Table 13).

One-half of all bag-filling operations were described as machine and manually operated. Of the 79 reported machine operated baggers, 23 were in North Central Aroostook, 18 in the St. John Valley, 17 in South Central Aroostook and 14 in Southern Aroostook.

Five packing lines reported a labor crew of 20 or more people. Four of these were reported in the North Central Aroostook area (Table 13).

TABLE 12

Water Availability, Washing Equipment, Use of Pallet Boxes, and Packing at
at Maine Potato Storages by Customary Capacity, 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent	1,000 Cwt.	Per- cent
Water Availability:																
Yes	1,922	50	5,241	65	4,881	78	2,175	54	143	44	499	71	528	86	15,389	65
No	<u>1,893</u>	<u>50</u>	<u>2,775</u>	<u>35</u>	<u>1,410</u>	<u>22</u>	<u>1,889</u>	<u>46</u>	<u>184</u>	<u>56</u>	<u>201</u>	<u>29</u>	<u>88</u>	<u>14</u>	<u>8,440</u>	<u>35</u>
Total	3,815	100	8,016	100	6,291	100	4,064	100	327	100	700	100	616	100	23,829	100
Not Reported	1,033		3,306		2,537		797		20		699		314		8,436	
Washing Equipment:																
Yes	1,423	77	3,426	66	3,103	70	1,606	74	91	64	271	54	465	88	10,385	70
No	<u>433</u>	<u>23</u>	<u>1,706</u>	<u>34</u>	<u>1,368</u>	<u>30</u>	<u>569</u>	<u>26</u>	<u>52</u>	<u>36</u>	<u>228</u>	<u>46</u>	<u>63</u>	<u>12</u>	<u>4,419</u>	<u>30</u>
Total	1,856	100	5,132	100	4,471	100	2,175	100	143	100	499	100	528	100	14,804	100
Not Reported	2,992		5,920		4,357		2,686		204		900		420		17,461	
Use of Pallet Boxes:																
Yes	97	2	777	7	1,157	14	486	11	0	0	579	46	165	18	3,261	11
No	<u>4,542</u>	<u>98</u>	<u>9,741</u>	<u>93</u>	<u>7,115</u>	<u>86</u>	<u>3,874</u>	<u>89</u>	<u>299</u>	<u>100</u>	<u>693</u>	<u>54</u>	<u>765</u>	<u>82</u>	<u>27,029</u>	<u>89</u>
Total	4,639	100	10,518	100	8,272	100	4,360	100	299	100	1,272	100	930	100	30,290	100
Not Reported	209		534		556		501		48		127		0		1,975	
Packing at Storage:																
Yes	3,439	74	6,650	63	4,967	60	3,442	79	209	74	402	32	616	66	19,725	65
No	<u>1,190</u>	<u>26</u>	<u>3,810</u>	<u>37</u>	<u>3,300</u>	<u>40</u>	<u>918</u>	<u>21</u>	<u>73</u>	<u>26</u>	<u>870</u>	<u>68</u>	<u>314</u>	<u>34</u>	<u>10,475</u>	<u>35</u>
Don't Know	<u>10</u>	<u>*</u>	<u>58</u>	<u>*</u>	<u>0</u>	<u>0</u>	<u>7</u>	<u>*</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>75</u>	<u>*</u>
Total	4,639	100	10,518	100	8,267	100	4,367	100	282	100	1,272	100	930	100	30,275	100
Not Reported	209		534		561		494		65		127		0		1,990	

*Less than one percent.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

Fifty-pound bags were packed at more lines than any other bag size. Packing of 50-pound bags was reported for about 87 percent of all lines, while packing of 20-pound and 10-pound bags was reported for 67 and 62 percent of all lines. Five-pound bags were reported packed for 34 percent of all lines. Over one-half of the lines packed 10-, 20-, and/or 50-pound bags in all the Aroostook areas and in Central Maine, while 50-pound was the predominant bag size in the Downeast area and 10-pound bags the predominant one in Western Maine (Table 13).

Twenty-seven packing lines were reported capable of packing count boxes. Seventeen of these were located in the Southern and North Central Aroostook areas, with nine and eight lines respectively. South Central Aroostook reported four lines that packed count boxes while the St. John Valley reported three, Western Maine reported two and Central Maine one in this category.

Also, among Aroostook County areas, by number of packing lines, bulk shipping was more common at packing lines in the St. John Valley with almost three-fourths of the packing lines in this area reporting bulk shipping at some point in the marketing season (Table 13).

By Volume. About three-fourths of all packing lines in the state reported a seasonal output of less than 100 truckloads. Only 18 or three percent of the total number of packing lines reported a seasonal output of more than 300 truckloads. Nine of these were located in North Central Aroostook, five were in Southern Aroostook, three were in South Central Aroostook and one was in the St. John Valley (Table 13).

Sixty-two percent or 336 of the total number of packing lines in Maine reported a daily output of about one truckload. Thirty percent or 164 lines reported a daily output of about two truckloads. Forty-three lines or about eight percent of all packing lines reported in the census had a daily output of three truckloads or more (Table 13).

By Seasonal Output Category. All of the six packing lines with a seasonal output of over 500 truckloads could pack Chef's Specials and four packed more than two tablestock sizes. Five of these lines had machine and manual bagging operations and all but one employed more than 10 people (Table 14). All six packed 5-pound, 10-pound, and 20-pound bags. Five of the six packed 50-pound bags, three packed count boxes and five shipped bulk loads.

Of the 27 packing lines that packed count boxes and reported a seasonal output, nine were in the 31 to 100 truckload output category. Only one of the remaining 19 was in a smaller output category. Ninety-three percent of all packing lines which had a seasonal output of greater than 100 truckloads reported packing Chef's Specials. Fifty-one percent of all packing lines in this category packed more than two tablestock sizes (Table 14).

TABLE 13

Selected Characteristics of Maine Potato Packing Lines,
By Number and Area,¹ 1981

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine ²	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Pack Chef Specials:																
Yes	69	70	148	86	106	88	109	95	11	100	16	64	10	63	470	84
No	29	30	24	14	15	12	5	4	0	0	9	36	6	37	88	16
Don't Know	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	*
Total	98	100	172	100	121	100	115	100	11	100	25	100	16	100	559	100
Pack More Than 2 Tablestock Sizes:																
Yes	20	20	66	38	51	42	52	45	4	36	6	24	2	13	202	36
No	77	79	106	62	70	58	61	53	6	55	19	76	14	87	353	63
Don't Know	1	1	0	0	0	0	2	2	1	9	0	0	0	0	4	1
Total	98	100	172	100	121	100	115	100	11	100	25	100	16	100	559	100
Dagfilling Operation:																
Manual	37	38	52	30	37	31	38	34	7	64	7	35	4	31	183	34
Machine	18	19	23	13	17	14	14	12	0	0	2	10	5	38	79	14
Machine & Manual	41	43	97	57	66	55	60	53	4	36	11	55	4	31	283	52
Don't Know	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	*
Total	96	100	172	100	120	100	113	100	11	100	20	100	13	100	546	100
Not Reported	2		0		1		2		0		5		3		13	
Size of Labor Crew:																
5 or Less	10	10	25	14	36	30	34	30	5	45	16	64	7	44	133	24
6 to 10	80	83	128	74	68	56	67	58	6	55	8	32	7	44	364	66
11 to 14	7	7	8	5	14	12	7	6	0	0	1	4	1	6	39	7
15 to 19	0	0	5	3	1	1	6	5	0	0	0	0	1	6	13	2
20 to 24	0	0	3	2	1	1	0	0	0	0	0	0	0	0	4	1
25 and Over	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	*
Don't Know	0	0	1	1	0	0	1	1	0	0	0	0	0	0	2	*
Total	97	100	171	100	120	100	115	100	11	100	25	100	16	100	556	100
Not Reported	1		1		1		0		0		0		0		3	

TABLE 13 (Continued)

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Pack 5 Lb. Bags:																
Yes	35	36	54	31	43	36	46	40	1	9	5	20	7	44	191	34
No	61	63	118	69	78	64	68	59	10	91	20	80	9	56	365	66
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	97	100	172	100	121	100	115	100	11	100	25	100	16	100	558	100
Not Reported	1		0		0		0		0		0		0		1	
Pack 10 Lb. Bags:																
Yes	77	79	92	53	67	55	80	69	2	18	16	64	10	62	345	62
No	19	20	80	47	54	45	34	30	9	82	9	36	6	38	211	38
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	97	100	172	100	121	100	115	100	11	100	25	100	16	100	558	100
Not Reported	1		0		0		0		0		0		0		1	
Pack 20 Lb. Bags:																
Yes	80	82	119	69	78	64	75	65	2	18	13	52	7	44	375	67
No	16	17	53	31	43	36	39	34	9	82	12	48	9	56	181	33
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	97	100	172	100	121	100	115	100	11	100	25	100	16	100	558	100
Not Reported	1		0		0		0		0		0		0		1	
Pack 50 Lb. Bags:																
Yes	87	89	162	94	102	84	97	84	9	82	17	68	9	56	484	87
No	10	10	10	6	19	16	17	15	2	18	8	32	7	44	73	13
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	98	100	172	100	121	100	115	100	11	100	25	100	16	100	559	100

TABLE 13 (Continued)

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Pack Count Boxes:																
Yes	3	3	8	5	4	3	9	8	0	0	1	4	2	12	27	5
No	92	96	164	95	117	97	105	91	11	100	24	96	14	88	528	95
Don't Know	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	96	100	172	100	121	100	115	100	11	100	25	100	16	100	557	100
Not Reported	2		0		0		0		0		0		0		2	
Ship Bulk:																
Yes	71	72	112	65	84	69	70	61	9	82	12	48	9	56	368	66
No	27	28	60	35	37	31	43	37	2	18	13	52	7	44	189	34
Don't Know	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>*</u>
Total	98	100	172	100	121	100	115	100	11	100	25	100	16	100	559	100
Seasonal Output:																
10 Truckloads or Less	6	6	8	5	5	4	8	7	2	20	3	12	1	7	33	6
11 to 30 Truckloads	29	30	40	24	23	19	33	29	6	60	3	12	1	7	136	25
31 to 100 Truckloads	47	48	67	39	63	52	47	41	2	20	11	44	8	53	245	44
101 to 200 Truckloads	10	10	24	14	14	12	9	8	0	0	5	20	3	20	65	12
201 to 300 Truckloads	2	2	7	4	9	8	5	4	0	0	1	4	0	0	24	4
301 to 500 Truckloads	0	0	4	2	3	2	5	4	0	0	0	0	0	0	12	2
Over 500 Truckloads	1	1	5	3	0	0	0	0	0	0	0	0	0	0	6	1
Don't Know	<u>3</u>	<u>3</u>	<u>16</u>	<u>9</u>	<u>4</u>	<u>3</u>	<u>8</u>	<u>7</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>8</u>	<u>2</u>	<u>13</u>	<u>35</u>	<u>6</u>
Total	98	100	171	100	121	100	115	100	10	100	25	100	15	100	556	100
Not Reported	0		1		0		0		1		0		1		3	

TABLE 13 (Continued)

Selected Characteristics	St. John Valley		N. Central Aroostook		S. Central Aroostook		Southern Aroostook		Downeast		Central Maine		Western Maine		Total Maine	
	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent	No.	Per- cent
Daily Output:																
Less than 1 Truckload	0	0	0	0	0	0	1	1	1	10	1	5	2	13	5	1
About 1 Truckload	69	70	84	49	80	66	77	69	4	40	13	65	8	50	336	62
About 2 Truckloads	27	28	68	39	32	27	25	23	3	30	4	20	5	31	164	30
About 3 Truckloads	1	1	12	7	4	3	6	5	2	20	0	0	1	6	26	5
About 4 Truckloads	1	1	3	2	4	3	2	2	0	0	2	10	0	0	12	2
About 5 Truckloads	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	*
About 6 Truckloads	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	*
About 7 Truckloads	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	*
About 10 Truckloads	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	*
About 12 Truckloads	0	0	1	*	0	0	0	0	0	0	0	0	0	0	1	*
Total	98	100	171	100	121	100	111	100	10	100	20	100	16	100	548	100
Not Reported	0		1		0		4		1		5		0		11	

*Less than one percent.

¹The specific location of packing lines was not obtained in the census. However, by matching storage location and packing line data for each respondent, an area location was thus obtained for all but one packing line. The assumption was made that the largest packing line is located at the largest storage where a respondent owns/operates more than one storage/packing line.

²One packing line not able to be placed in a specific area is included in figures for the Maine total.

DISCUSSION

The potato producing lands in the State of Maine are in much the same geographical location as they were at the turn of the century. Advances or changes in technology and facilities over time have, therefore, had to be assimilated, mingled with, or replacing, those already in use. Nowhere is this more evident in the Maine potato industry than in the area of potato storage structures that exist in the State.

In the 1950's and 1960's, significant changes occurred in potato harvesting and handling methods and considerable growth occurred also in the Maine potatoes-for-processing market. State-of-the-art technology and methods caused obsolescence of many storages during this period, but for reasons primarily economic, mass abandonment of the existing facilities did not occur in favor of state-of-the-art facilities. The census of potato storages in 1981 has indicated that about 44 percent of 1,453 structures currently in use were built before 1950, with 37 percent built between 1950 and 1969, and 17 percent built in the 1970-81 period.

The total need for storage capacity has generally decreased in the past several years in direct relationship with harvested acreage. Customary storage capacity available in the State has been reported as about 43.8 M. cwt. in 1966, 34.6 M. cwt. in 1976, and 32.3 M. cwt. in 1981 (2, 8). Much of the reduced capacity stemmed from loss or abandonment of older storages. Comparison of the 1976 census with the 1981 census, since these were the only ones which included storage age as an item, indicates a reduction of pre-1950 structures from about 890 to 630, representing a decrease of about 3.9 M. cwt. in capacity; of 1950's storages from about 302 to 234, representing an approximate 1.2 M. cwt. reduction; and of 1960's storages from about 333 to 310, for about 0.3 M. cwt. reduction capacity. The storages of 1970-75 vintage were approximately of the same number and capacity in the two censuses, and 107 storages representing 3.6 M. cwt. were constructed in the 1976-81 period. Total changes indicated, between 1976 and 1981, are a reduction of about 243 in number of storage structures and about 2.3 M. cwt. of customary capacity.

During 1976-81, the 3.6 M. cwt. of "new storage" may be considered as having replaced 3.6 M. cwt. of "old" storage with about 2.3 M. cwt. of "old" storage capacity lost or abandoned during this time. Replacing 3.6 M. cwt. of a 32.3 M. cwt. total capacity in a 5-year period indicates a replacement rate of about 2¼ percent per year.

It is somewhat typical of the Maine potato industry to have a comparatively large number of packing operations (about 560 in 1981), partially because of the relatively high proportion of producers who are growers of certified seed potatoes. Of Maine's potato storages about 30 percent was designated "primarily for seed" in 1981. Primarily for phytosanitary reasons, seed producers pack their own seed, and therefore have equipment available for packing that portion of their production that moves into the tablestock market. Packing of tablestock at the storage is generally as U.S. No. 1 in 50-pound bags (3) which require a

minimal amount of grading and packing equipment. Packing at the storage occurred in 59 percent of the potato storages in 1981, down somewhat from the 68 percent in 1976. With 31 percent of all packing lines having an (1981) output of 30 truckloads or less per season and 63 percent packing no more than one truckload per day, the industry has constraints on its capability to offer in adequate volume a wide range of services to the market.

With over one-quarter of the 1981 storage capacity in structures in excess of 30 years of age, and packing capability less than adequate for today's competitive market, it appears expedient for the industry to explore various avenues for bringing its technologies and facilities more nearly to a state-of-the-art condition as rapidly as possible.

APPENDIX A

Maine Potato Acreage by Area and Town, 1981

Area and Town	Acres		
	Roundwhite	Russet	Total
1. St. John Valley	12,170	3,641	15,811
Cyr Plantation	522	515	1,037
Fort Kent	2,365	65	2,430
Frenchville	1,405	70	1,475
Grand Isle	203	481	684
Hamlin Plantation	292	677	969
Madawaska	984	1,171	2,155
New Canada Plantation	1,390	50	1,440
St. Agatha	2,061	407	2,468
St. Francis	310	6	316
St. John Plantation	340	--	340
T16-R5 - Included with T17-R5			
T17-R4 - Included with T17-R5			
T17-R5#	1,243	64	1,307
Van Buren	530	105	635
Wallagrass Plantation#	525	30	555
Winterville Plantation - Included with Wallagrass			
2. North Central Aroostook	21,564	15,205	36,769
Caribou	5,234	3,211	8,445
Caswell Plantation	93	1,100	1,193
Conner	705	598	1,303
Fort Fairfield	8,100	4,387	12,487
Limestone	2,039	3,098	5,137
New Sweden	321	82	403
Perham	720	250	970
Stockholm	73	61	134
Wade	369	160	529
Washburn	2,691	1,532	4,223
Woodland	1,219	726	1,945
3. South Central Aroostook	17,381	7,970	25,351
Ashland#	204	1,146	1,350
Blaine#	1,842	133	1,975
Bridgewater	1,667	170	1,837
Castle Hill	914	90	1,004
Chapman	590	56	646
E. Plantation - Included with Blaine			
Easton	1,756	1,686	3,442
Garfield Plantation - Included with Ashland			
Mapleton	1,912	733	2,645
Mars Hill	2,635	471	3,106
Masardis - Included with Ashland			
Nashville Plantation - Included with Ashland			
Portage Lake - Included with Ashland			
Presque Isle	4,737	2,722	7,459
Westfield	1,124	763	1,887

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX A (CONTINUED)

Area and Town	Acres		
	Roundwhite	Russet	Total
4. Southern Aroostook	11,480	1,207	12,687
Amity#	134	76	210
Benedicta	177	--	177
Crystal#	812	4	816
Dyer Brook	210	--	210
Hammond Plantation - Included with Ludlow			
Haynesville - Included with Amity			
Hersey - Included with Crystal			
Hodgdon	980	107	1,087
Houlton	1,719	316	2,035
Island Falls - Included with Crystal			
Linneus	577	4	581
Littleton	2,311	152	2,463
Ludlow#	349	51	400
Merrill	465	--	465
Monticello	1,603	315	1,918
New Limerick	532	56	588
Oakfield	110	--	110
Patten	315	70	385
Sherman#	869	11	880
Silver Ridge Township - Included with Sherman			
Smyrna	72	30	102
Stacyville	245	15	260
5. Downeast	852	161	1,013
Carroll Plantation - Included with Prentiss			
Chester - Included with Winn			
Cooper - Included with Prentiss			
Lee	357	38	395
Prentiss Plantation#	228	25	253
Robbinston - Included with Prentiss			
Springfield - Included with Webster			
Webster Plantation#	73	97	170
Winn#	194	1	195
6. Central Maine	3,499	171	3,670
Albion - Included with Freedom			
Atkinson	190	94	284
Benton - Included with Freedom			
Charleston#	293	--	293
Corinna	625	25	650
Corinth#	390	5	395
Dexter - Included with Charleston			
Dover Foxcroft#	233	--	233
Exeter	991	12	1,003
Freedom#	137	1	138
Garland - Included with Charleston			
Hudson - Included with Corinth			
Jackson - Included with Waldo			

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX A (CONTINUED)

Area and Town	Acres		Total
	Roundwhite	Russet	
6. Central Maine (Continued)			
Newport#	255	34	289
Orono - Included with Corinth			
Palermo - Included with Freedom			
Palmyra - Included with Newport			
Pittsfield - Included with Newport			
Sangerville - Included with Dover Foxcroft			
Stetson - Included with Newport			
Thorndike#	135	--	135
Troy - Included with Thorndike			
Unity - Included with Thorndike			
Waldo#	250	--	250
7. Western Maine			
Auburn - Included with Durham	2,233	444	2,677
Bethel - Included with Rumford			
Buckfield - Included with Rumford			
Buxton - Included with Standish			
Canton#	264	3	267
Dayton - Included with Standish			
Dixfield - Included with Canton			
Dresden - Included with Durham			
Durham#	276	36	312
Farmington - Included with Canton			
Fryeburg	570	370	940
Gorham - Included with Gray			
Gray#	368	24	292
Hartford - Included with Rumford			
Jay - Included with Canton			
Lewiston - Included with Durham			
Limerick - Included with Standish			
North Yarmouth - Included with Gray			
Peru - Included with Rumford			
Rumford#	459	1	460
Scarborough - Included with Gray			
Standish#	296	10	306
Starks - Included with Canton			
Wayne - Included with Canton			
Windham - Included with Gray			
Woolwich - Included with Durham			

#Indicates data includes other townships also.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX B

Maine Potato Production¹ by Area and Town, 1981

Area and Town	Hundredweight		
	Roundwhite	Russet	Total
1. St. John Valley	3,011,354	909,819	3,921,173
Cyr Plantation	134,532	118,830	253,362
Fort Kent	527,735	11,750	539,485
Frenchville	367,700	16,170	383,870
Grand Isle	50,983	147,019	198,002
Hamlin Plantation	79,132	192,353	271,485
Madawaska	324,376	313,144	637,520
New Canada Plantation	332,570	10,420	342,990
St. Agatha	468,578	42,920	511,498
St. Francis	79,830	1,488	81,318
St. John Plantation	86,830	--	86,830
T16-R5 - Included with T17-R5			
T17-R4 - Included with T17-R5			
T17-R5#	305,473	16,125	321,598
Van Buren	129,885	29,700	159,585
Wallagrass Plantation#	127,730	9,900	133,630
Winterville Plantation - Included with Wallagrass			
2. North Central Aroostook	5,920,544	4,329,962	10,250,506
Caribou	1,476,094	948,384	2,424,478
Caswell Plantation	19,893	304,547	324,440
Conner	164,750	173,178	337,928
Fort Fairfield	2,372,428	1,262,598	3,635,026
Limestone	546,552	873,547	1,420,099
New Sweden	71,912	22,382	94,294
Perham	208,296	63,680	271,976
Stockholm	15,846	14,626	30,472
Wade	82,859	42,200	125,059
Washburn	644,182	402,789	1,046,971
Woodland	317,732	222,031	539,763
3. South Central Aroostook	4,560,809	2,308,622	6,869,431
Ashland#	42,556	329,425	371,981
Blaine#	447,738	35,920	483,658
Bridgewater	424,433	95,927	520,360
Castle Hill	286,779	30,000	316,779
Chapman	157,078	7,805	164,883
E. Plt. - Included with Blaine			
Easton	444,785	503,747	948,532
Garfield Plt. - Included with Ashland			
Mapleton	471,662	209,640	681,302
Mars Hill	751,125	152,350	903,475
Masardis - Included with Ashland			
Nashville Plt. - Included with Ashland			
Portage Lake - Included with Ashland			
Presque Isle	1,245,895	735,716	1,981,611
Westfield	288,758	208,092	496,850

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX B (CONTINUED)

Area and Town	Hundredweight		
	Roundwhite	Russet	Total
4. Southern Aroostook	3,190,956	326,327	3,517,283
Amity#	39,828	16,008	55,836
Benedicta	36,402	--	36,402
Crystal#	239,634	1,988	241,622
Dyer Brook	49,050	--	49,050
Hammond Plt. - Included with Ludlow			
Haynesville - Included with Amity			
Hersey - Included with Crystal			
Hodgdon	269,052	21,888	290,940
Houlton	498,799	86,923	585,722
Island Falls - Included with Crystal			
Linneus	150,726	826	151,552
Littleton	677,050	41,429	718,479
Ludlow#	89,504	13,882	103,386
Merrill	127,830	--	127,830
Monticello	455,932	99,020	554,952
New Limerick	138,228	9,146	147,374
Oakfield	26,215	--	26,215
Patten	80,735	22,175	102,910
Sherman#	230,406	3,142	233,548
Silver Ridge Township - Included with Sherman			
Smyrna	17,010	6,930	23,940
Stacyville	64,555	2,970	67,525
5. Downeast	301,054	48,974	350,028
Carroll Plt. - Included with Prentiss			
Chester - Included with Winn			
Cooper - Included with Prentiss			
Lee	11,660	12,540	124,200
Prentiss Plantation#	53,948	7,100	61,048
Robbinston - Included with Prentiss			
Springfield - Included with Webster			
Webster Plantation#	22,546	29,062	51,608
Winn#	112,900	272	113,172
6. Central Maine	971,744	45,924	1,017,668
Albion - Included with Freedom			
Atkinson	54,000	26,156	80,156
Benton - Included with Freedom			
Charleston#	88,456	--	88,456
Corinna	178,075	7,225	185,300
Corinth#	114,560	1,300	115,860
Dexter - Included with Charleston			
Dover Foxcroft#	67,214	--	67,214
Exeter	276,920	3,564	280,484
Freedom#	30,133	165	30,298
Garland - Included with Charleston			
Hudson - Included with Corinth			
Jackson - Included with Waldo			

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX B (CONTINUED)

Area and Town	Hundredweight		Total
	Roundwhite	Russet	
6. Central Maine (Continued)			
Newport#	77,390	7,514	84,904
Orono - Included with Corinth			
Palermo - Included with Freedom			
Palmyra - Included with Newport			
Pittsfield - Included with Newport			
Sangerville - Included with Dover Foxcroft			
Stetson - Included with Newport			
Thorndike#	30,186	--	30,186
Troy - Included with Thorndike			
Unity - Included with Thorndike			
Waldo#	54,810	--	54,810
7. Western Maine	780,632	137,686	918,318
Auburn - Included with Durham			
Bethel - Included with Rumford			
Buckfield - Included with Rumford			
Buxton - Included with Standish			
Canton#	222,482	990	223,472
Dayton - Included with Standish			
Dixfield - Included with Canton			
Dresden - Included with Durham			
Durham#	58,076	9,102	67,178
Farmington - Included with Canton			
Fryeburg	158,050	112,600	270,650
Gorham - Included with Gray			
Gray#	137,084*	13,174*	150,258*
Hartford - Included with Rumford			
Jay - Included with Canton			
Lewiston - Included with Durham			
Limerick - Included with Standish			
North Yarmouth - Included with Gray			
Peru - Included with Rumford			
Rumford#	138,890	*	138,890
Scarborough - Included with Gray			
Standish#	66,050*	1,820	67,870*
Starks - Included with Canton			
Wayne - Included with Canton			
Windham - Included with Gray			
Woolwich - Included with Durham			

¹Production computed from acreage and yield/variety data collected in census.

*Incomplete data, as some respondents did not report yield data.

#Indicates data includes other townships also.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX C

Number and Capacity¹ of Storages Reported by Area and Town, 1981

Area and Town	No.	Hundredweight		
		Maximum Capacity	Customary Capacity	1981 Storage
1. St. John Valley	219	5,462,140	4,816,495	4,030,165
Cyr Plantation	13	164,650	152,275	136,550
Eagle Lake	1	Included with Wallagrass	Plantation	
Fort Kent	37	1,109,625	1,026,300	884,235
Frenchville	23	677,325	601,425	481,143
Grand Isle	13	509,850	413,325	347,250
Hamlin Plantation	9	251,625	218,625	221,100
Madawaska	32	546,315	509,190	467,775
New Canada Plantation	5	108,900	90,750	78,375
St. Agatha	33	655,875	577,170	527,835
St. Francis	4	102,300	102,300	44,550
St. John Plantation	4	72,600	57,750	54,780
T17-R4	3	34,650	32,175	28,875
T17-R5	6	250,800	240,900	196,350
Van Buren	18	565,125	469,425	282,150
Wallagrass Plantation#	17	412,500	324,885	279,197
Winterville Plantation	1	Included with Wallagrass	Plantation	
2. North Central Aroostook	522	12,430,547	11,050,911	9,348,002
Caribou	127	2,887,585	2,639,450	1,943,305
Caswell Plantation	14	294,525	266,475	259,050
Conner	11	209,550	156,750	138,600
Fort Fairfield	149	4,015,842	3,546,000	3,153,480
Limestone	66	1,751,165	1,607,780	1,475,450
New Sweden#	23	203,610	182,903	141,571
Perham	20	318,120	280,830	244,837
Stockholm	10	69,465	65,505	31,350
Wade	5	61,875	57,420	49,335
Washburn	55	2,003,525	1,757,180	1,556,134
Westmanland Plantation	1	Included with New Sweden		
Woodland	41	615,285	490,618	354,890
3. South Central Aroostook	339	9,676,289	8,760,695	7,051,606
Ashland#	6	358,050	273,240	165,990
Blaine	18	446,325	361,350	348,117
Bridgewater	20	315,480	279,180	193,545
Castle Hill	5	150,225	127,950	127,125
Chapman	4	54,200	47,590	11,550
Easton	80	1,946,774	1,729,130	1,553,660
Garfield Plantation	1	Included with Ashland		
Mapleton	36	1,391,550	1,295,000	952,400
Mars Hill	53	1,632,055	1,559,280	1,290,995
Masardis	3	55,275	51,975	46,200
Nashville Plantation	1	Included with Ashland		
Portage Lake	1	Included with Ashland		
Presque Isle	95	2,734,005	2,517,900	1,933,849
Westfield	16	592,350	518,100	428,175

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX C (CONTINUED)

Area and Town	No.	Hundredweight		
		Maximum Capacity	Customary Capacity	1981 Storage
4. Southern Aroostook	255	5,917,120	4,891,065	4,050,550
Amity	2	33,000	27,225	21,450
Benedicta	6	209,550	173,250	145,200
Crystal	11	197,175	179,850	141,900
Dyer Brook	4	80,025	74,250	69,300
Hersey	1	Included with Island Falls		
Hodgdon	21	323,620	270,270	200,170
Houlton	66	1,549,515	1,271,820	1,084,132
Island Falls#	4	92,400	82,500	64,350
Linneus	7	154,275	141,075	123,420
Littleton	39	1,049,400	870,870	795,960
Ludlow	2	18,150	18,150	17,738
Merrill	1	Included with Smyrna		
Monticello	34	1,025,970	834,045	729,570
New Limerick	12	305,415	221,925	127,380
Oakfield	1	Included with Island Falls		
Patten	9	327,525	267,300	138,600
Sherman	17	210,375	181,500	142,395
Smyrna#	7	165,825	152,625	144,375
Stacyville	11	174,900	124,410	104,610
5. Downeast	26	391,793	347,407	278,315
Alexander	1	Included with Meddybemps		
Cooper	1	Included with Meddybemps		
Danforth	1	Included with Prentiss Plt.		
Lee	6	175,725	147,170	143,550
Lincoln	2	19,800	14,025	12,375
Meddybemps#	2	50,078	41,662	1,775
Prentiss Plantation#	2	31,515	30,525	16,665
Robbinston	1	Included with Meddybemps		
Webster Plantation	6	69,300	69,300	69,300
Winn	4	45,375	43,725	34,650
6. Central Maine	61	1,524,238	1,399,108	1,197,015
Atkinson	5	57,750	55,275	47,935
Charleston	2	27,225	27,225	22,605
Corinna	9	194,025	164,325	157,725
Corinth	3	116,000	116,000	116,000
Dover Foxcroft	6	135,630	77,600	71,000
Exeter	9	311,650	298,750	242,225
Freedom#	3	87,450	81,675	64,020
Guilford	3	27,225	26,400	18,645
Hudson	2	33,000	31,350	11,550
Newport#	4	382,400	374,400	344,000
Palermo	1	Included with Freedom		
Pittsfield	2	33,000	28,050	28,050
Sangerville	3	42,900	42,900	42,900
St. Albans	1	Included with Newport		
Troy	1	Included with Unity		

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 798

APPENDIX C (CONTINUED)

Area and Town	No.	Hundredweight		
		Maximum Capacity	Customary Capacity	1981 Storage
6. Central Maine (Continued)				
Unity#	6	75,983	75,158	30,360
Waldo	1	Included with Freedom		
7. Western Maine				
Auburn#	2	1,024,075	930,425	805,540
Bethel	2	87,900	76,875	60,690
Buckfield	2	18,000	18,000	18,000
Canton	1	Included with Auburn		
Cape Elizabeth#	1	Included with Farmington		
Dayton	2	84,150	82,500	83,925
Dresden	1	Included with Cape Elizabeth		
Durham	1	Included with Auburn		
Farmington#	2	49,500	49,500	47,850
Fryeburg	1	151,800	146,850	120,450
North Yarmouth	2	240,000	220,000	185,000
Phippsburg	2	28,000	24,000	28,000
Rumford	7	274,725	227,700	185,625
Scarborough	3	90,000	85,000	76,000
	1	Included with Cape Elizabeth		
Total State	1,450 ²	36,426,202	32,196,106	26,761,193

¹Some respondents did not report one or more of these capacities. Capacities presented here represent the total of all capacities reported by respondents in the census.

²Town locations were not given for three (3) storages.

#Indicates data includes other townships also.

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