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THE MICHIGAN AND U.S. PURPLE PLUM INDUSTRY—TRENDS AND CHANGING MARKETING PATTERNS

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THE MICHIGAN AND U.S. PURPLE PLUM INDUSTRY -- TRENDS AND CHANGING MARKETING PATTERNS

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THE MICHIGAN AND U.S. PURPLE PLUM INDUSTRY -- TRENDS AND CHANGING MARKETING PATTERNS*

by

Donald Ricks**

Plums are an important fruit crop in Michigan. Many growers raise plums in combination with the more widely planted orchard crops of apples and tart cherries. Plums are handled by a number of Michigan processors and fresh fruit packing houses.

Michigan experienced a growth period for plums between the mid-1950s and the early 1970s as production and value of the crop tripled during this span of years. After this growth period, the Michigan crop experienced a more stable trend during much of the 1970s. There has been a downward swing during the most recent years.

Michigan plums are sold both for fresh market and for processing markets. Canned purple plums are the primary processing use, while baby food is also an important processed product. In the past, freezing has been a minor use of plums in Michigan; although there may be some potential for expanding certain market uses for frozen plums.

In both the canning and fresh markets, plums produced in the Pacific Northwest states provide close competition for Michigan plums. Canned purple plums from the Northwestern states are packed primarily in Oregon. In the

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*This report is, in part, a revision and update of a similar earlier report entitled The Michigan and U.S. Purple Plum Industry, by D. Ricks, R. Anderson, and D. Amon, Michigan State University, Agricultural Economics Report No. 293, Dec. 1975.

**Professor, Department of Agricultural Economics, Michigan State University.

fresh market, the most direct competition for Michigan plums has historically been provided by the Northwestern states of Washington, Idaho, and Oregon, because these states produce the same type of plum and market their plums during a similar season.

California produces a large and growing volume of fresh plums. These are substantially different varieties than those from Michigan and are marketed most heavily during an earlier summer season. Expanding supplies of California plums are, on the other hand, providing increasing competition in fresh markets.

Although the word "prunes" is frequently used in reference to Michigan plums, this term is misleading. Most consumers and the general public associate the word "prunes" with the dried product. Michigan plums are not dried into prunes. Dried prunes comprise a product market that is very different from that for Michigan plums. Dried prunes are produced primarily in California, with a smaller percentage of the dried product also coming from Oregon. In order to minimize confusion with dried prunes in this report, the words "plums" or "purple plums" will be used for the Michigan crop and its related products.

Economic and marketing conditions of the Michigan plum industry are related closely to production, pricing, and marketing of the plum industry in the Pacific Northwestern states, and for fresh markets related to the California plum industry. Hence, in analyzing the economic and marketing situation of the Michigan plum industry, it is important to consider the Northwestern states along with the fresh plum situation in California.

Economic conditions affecting the plum industry are changing, both in Michigan and in the Pacific Coast states. Some markets are growing while others are experiencing declining trends. With changing economic conditions

and markets, changes in the competitive position of the various plum-producing regions can be expected.

This report is intended to bring together information on a number of economic and market factors relative to Michigan and Western U.S. plum industries. Another objective is to analyze Michigan's competitive position, particularly relative to the Pacific Northwestern states.

The Michigan Plum Industry

While Michigan has historically sold a high percentage of plums to processing markets, in recent years processing demand has declined and the fresh market share has increased. Fresh market sales now comprise approximately 50% of the state's plum crop. With the decline in the historically predominant processing markets, many growers have become less optimistic about plums and have reduced their acreage and given less emphasis to plums. Others who sell primarily into fresh markets continue with plums as an important component of their farm business.

Plums are grown by many Michigan fruit growers in each of the main commercial fruit-producing regions of the state. For most fruit growers, plums are a less important crop than certain others such as apples, tart cherries, asparagus, or in some cases, peaches or sweet cherries. Thus, plums are a significant, but secondary, crop for most Michigan fruit growers who raise them.

Michigan has a total of about 540 growers who produce plums according to the latest available tree census.[1/] These growers have approximately 3,800

[1/] Michigan Orchard and Vineyard Survey, 1982, Michigan Crop Reporting Service, Lansing, Michigan, Oct. 1983.

acres of plum trees as of the latest tree survey. Plum acreage per farm tends to be relatively small compared to the more major fruit crops such as apples and tart cherries. There are, however, some growers with large plum acreages.

Major Michigan Production Areas

Plum orchards are concentrated in four major production areas in Michigan (Figure 1). Marketing patterns, typical crop combinations, and other characteristics differ somewhat from area to area.

The Southwest Michigan area is the state's largest plum producing region with about 34% of the state's total plum trees (Table 1). Plums produced in Southwest Michigan are sold heavily for fresh market. Fresh sales for plums from this area are encouraged because climatic conditions there usually result in a larger size plum than is produced in the more northern areas of the state. Also, plums are harvested earlier in the Southwest than in other parts of the state which is sometimes an advantage with a stronger early season market. Plums are usually grown in combination with a wide diversity of other fruit and vegetable crops in Southwest Michigan.

The Northwest area has about 30% of the state's total plum trees. Most plums grown in this area have historically been sold for processing, although in some years substantial amounts are also marketed fresh. Plums are typically grown in combination with tart and sweet cherries in the Northwest area.[1/]

The West Central fruit growing area is a third important region for plum production with 26% of the state's trees. Plums grown in this area have historically been sold mostly for processing, while some are also sold into

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[1/] This crop combination is grown in other areas as well, but is especially common in the northwest part of the state.

Figure 1. Location of Plum Production in Michigan

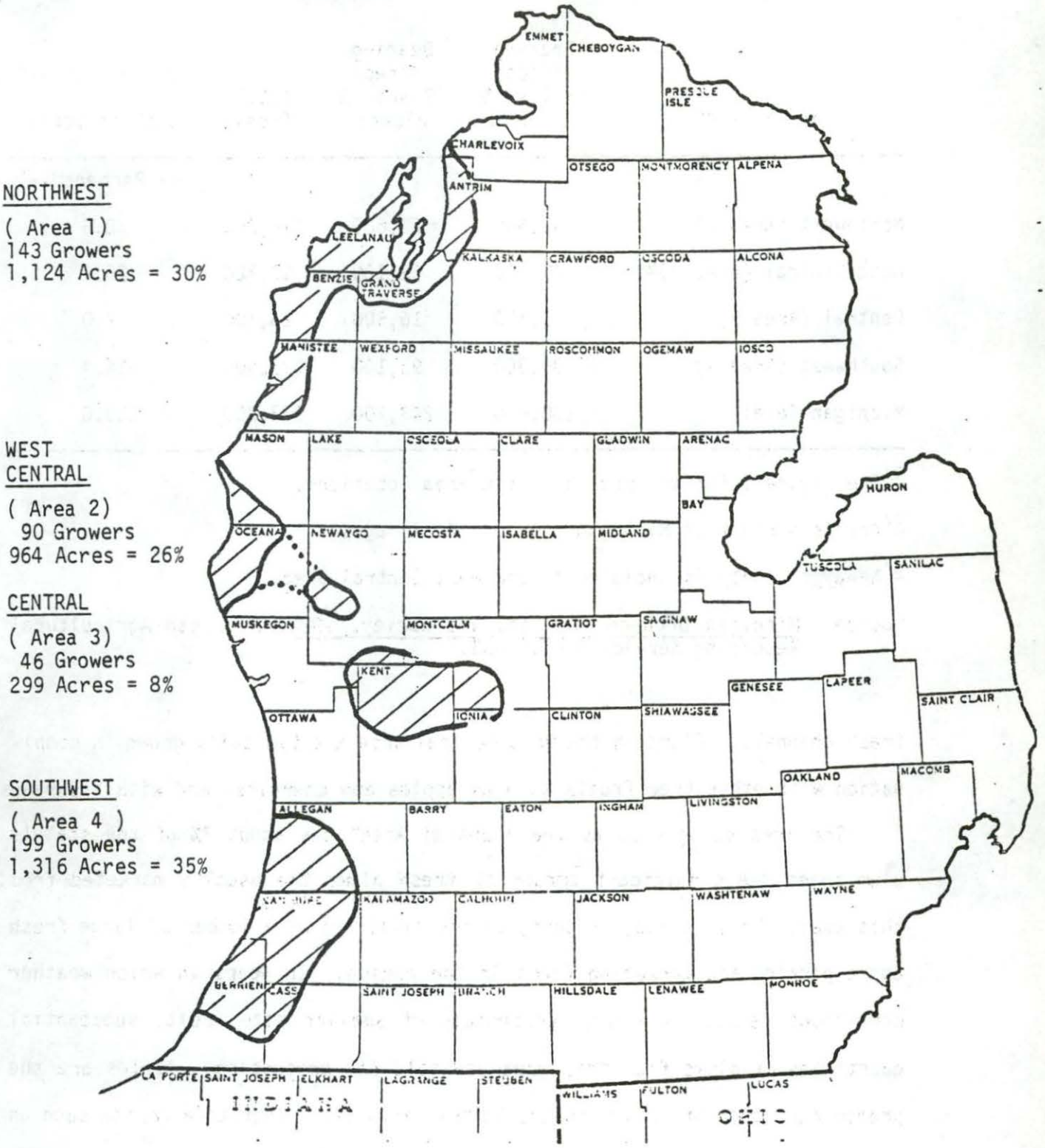


Table 1. Michigan Plum Tree Numbers by Area, 1982

State Areas[a/]	Non-Bearing Trees (6 yrs. & younger)	Bearing Trees (7 yrs. & older)	Total Trees	Area's Share[b/] of State's Total
				-- Percent --
Northwest (Area 1)	43,600	70,600	114,200	30.6
West Central (Area 2)[c/]	39,600	58,100	97,700	26.1
Central (Area 3)	9,600	16,500	26,100	7.0
Southwest (Area 4)	35,300	93,100	128,400	34.4
Michigan Total	130,600	243,200	373,800	100.0

[a/] See Figure 1 for the four Michigan area locations.

[b/] Area's percent of Michigan's trees of all ages.

[c/] Newaygo County is included in the West Central area.

Source: Michigan Orchard and Vineyard Survey, 1982, Michigan Agricultural Reporting Service, Oct. 1983.

fresh channels. Plums in the West Central area are typically grown in combination with other tree fruits such as apples and cherries, and with asparagus.

The area designated as the "Central Area" has about 7% of the state's plum trees. A significant amount of fresh plums are usually marketed from this area. This is due, in part, to the existence of a number of large fresh apple packing and marketing firms in the region. In years in which weather conditions result in a high percentage of smaller size fruit, substantial quantities of plums from this area are sold for processing. Apples are the predominant crop of fruit growers in this area with other tree fruits such as plums usually grown as secondary crops.

Table 2. Number and Size of Plum Growers in Michigan by Area, 1973 and 1982

Areas	Farms with Plums		Average Plum Acreage Per Farm	
	1973	1982	1973	1982
			------ Acres ------	
Southwest	670	199	4.8	6.6
Central	160	46	6.7	6.5
West Central	190	90	8.0	10.7
Northwest	280	143	7.7	7.9
Michigan	1400	542	5.9	7.0

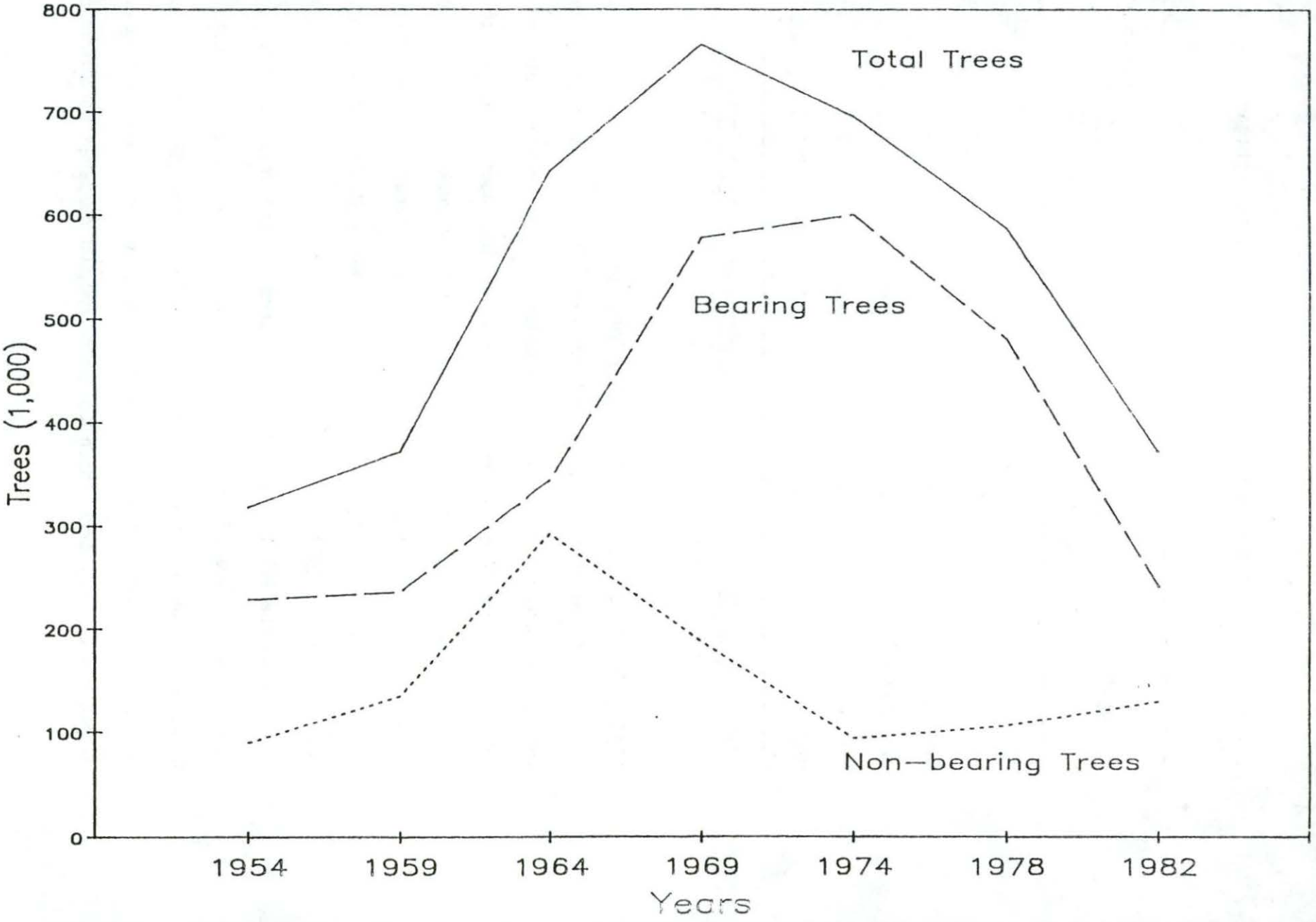
Source: Michigan Fruit Tree Survey, 1978, and Michigan Orchard and Vineyard Survey, 1982, Michigan Agricultural Reporting Service.

Trends in Michigan Tree Numbers and Production

A large number of new plum orchards were planted in Michigan in the early 1960s. Nonbearing trees more than doubled in the five years between 1959 and 1964, while the total number of plum trees increased by 173% during this period (Figure 2). Nonbearing trees reached a peak in 1964. These high numbers of nonbearing trees led to substantial increases in the state's bearing tree numbers during the late 1960s and early 1970s, reaching a peak for bearing trees in 1974.

During the 1970s, nonbearing plum tree numbers dropped substantially as growers reduced new plantings. Bearing tree numbers decreased considerably between 1974 and the latest tree census in 1982. The 1982 tree survey showed an especially large drop in bearing plum trees of 7 years and older with Michigan's bearing trees down to about 300,000 compared to a high of about

Figure 2. Trends in Michigan Plum Trees



600,000 trees in 1974. This drop in bearing trees occurred both because of fewer young trees coming into bearing and because growers removed many older orchards due to discouragement from weakening markets for canning plums.

Production from Michigan's expanding bearing plum acreage trended upward during the 1960s and into the early 1970s. Then during much of the 1970s, plum production fluctuated on a plateau without a distinct upward or downward trend (Figure 3). In the most recent years, there has been a downward trend in Michigan's production.

All of the decrease in plum acreage between 1978 and 1982 was in bearing age trees of 7 years and older (Table 3). The largest decrease by age category was for trees in the mature bearing ages of 12-21 years. Acreage of plums of this age decreased from 2,650 acres in 1978 to 1,380 acres in 1982.

Table 3. Michigan Plum Acres by Age

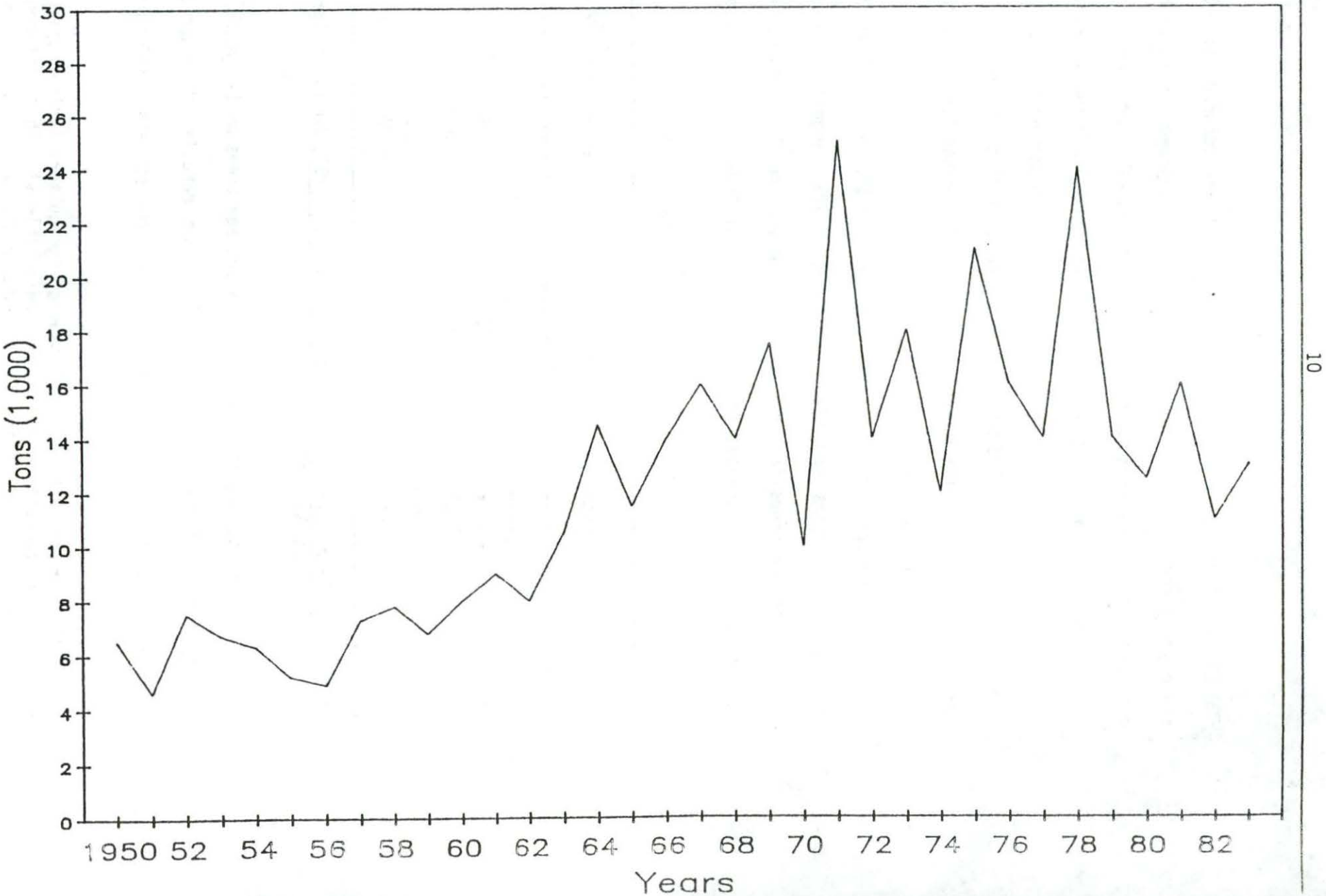
Age	1978		1982	
	Acres	Percent	Acres	Percent
1- 6	1,260	23	1,330	35
7-11	1,020	19	760	20
12-21	2,650	49	1,380	37
22+	490	9	320	8
	5,420		3,790	

Source: Michigan Orchard and Vineyard Survey, 1982, Michigan Agricultural Reporting Service, Oct. 1983.

In contrast to bearing trees, nonbearing age trees of 1-6 years increased slightly from 1978 to 1982, according to the detailed Michigan's orchard survey.[1/] These young trees comprise 35% of the state's total plum acreage

[1/] Data from the latest U.S. Census of Agriculture indicate that nonbearing trees have decreased somewhat (Appendix Table 9). This difference is due to a somewhat different definition of nonbearing in the U.S. Census of Agriculture.

Figure 3. Michigan Plum Production



which is up from 23% nonbearing in 1978 (Table 3). The larger proportion of young plums indicates that bearing acreage may not decline as much in future years as has occurred during the last 10 years.

Analysis of the orchard survey data on plum acreage and age distribution indicates that Michigan's future bearing acres of plums may equal about 2,200 acres by the late 1980s (Table 4). This is only a small decrease from the 2,460 bearing acres in 1982. The projected future 2,200 bearing acres is made possible by the somewhat higher percent of young trees and is based upon the assumption that growers will remove old plum orchards at the same rate as during recent years.

Table 4. Michigan Plums --
Acres, Production, and Fresh Utilization

	Bearing Acres	Average Production	Fresh Sales
		-- Tons --	- % -
1973	6,960	19,000	35
1978	4,160	18,000	42
1982	2,460	13,000	53
Late 1980s	2,200	11,500	higher

The extent to which growers keep their older plum orchards will be influenced by the strength of plum markets in the future. If market demand for canned plums continues its decreasing trend, growers may take out a number of older plum blocks. This could lead to continued substantial decreases in future plum acreage despite the increase in nonbearing acreage shown by the latest tree survey.

If fresh markets for plums increase sufficiently in the future, this, along with continued important markets for baby food, may balance the expected continued downward trend in canned plum markets. If this occurs, Michigan's future plum acreage may remain nearly constant or perhaps decline by only a small amount. This suggests Michigan's future plum production may continue to average near 11,000 to 13,000 tons in a normal year.

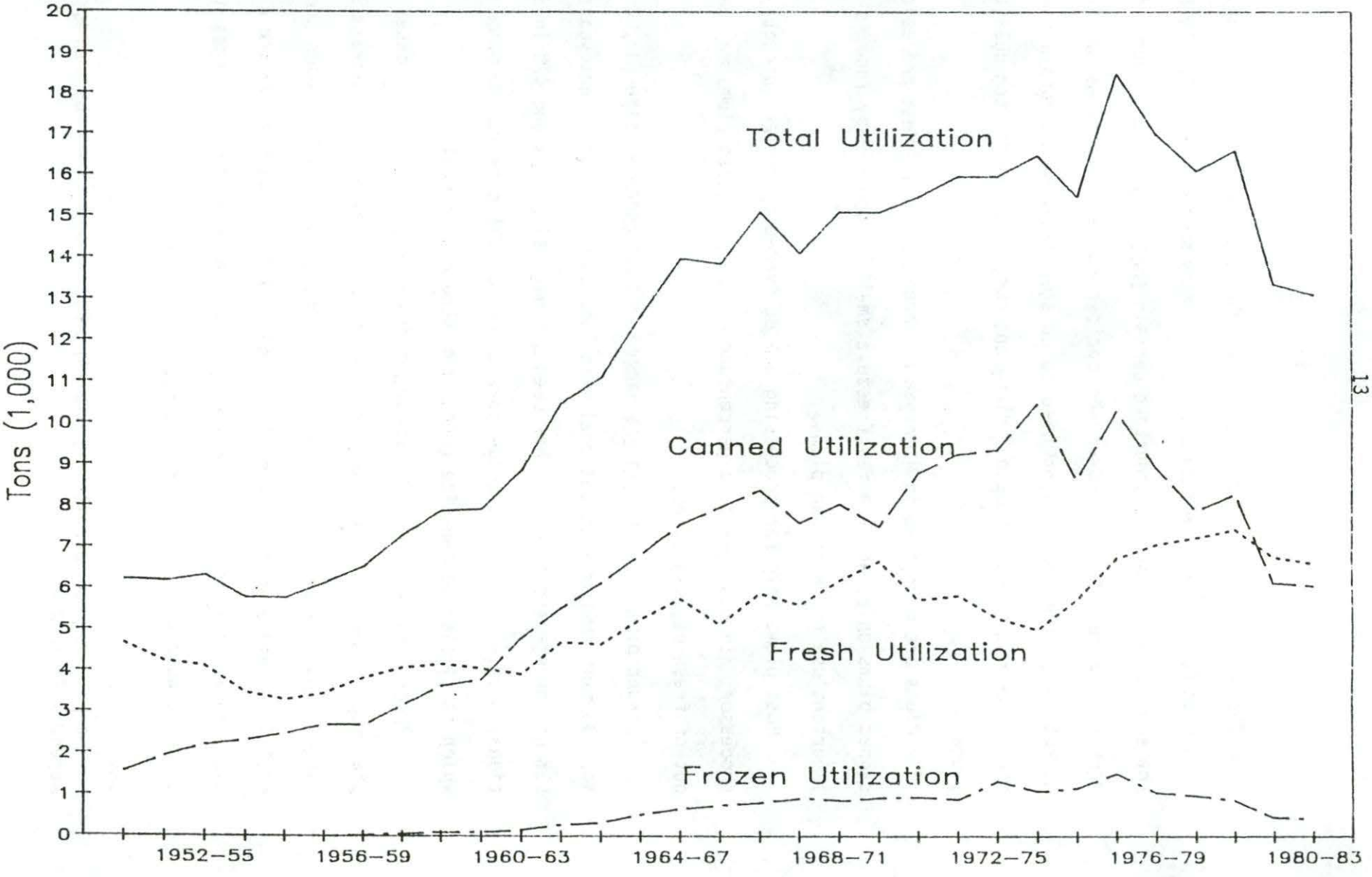
The latest Michigan orchard survey shows a declining acreage of plums. The present 3,800 acres of plums in the state has declined from 5,400 acres in 1978 and from 8,300 acres in 1973.

Marketing Patterns for Michigan Plums

Both fresh and processing markets are important for Michigan plums. In the past, processing has been the more important of these two markets with an average of 60-65% of the state's crop sold this way until the mid-1970s. In recent years, the percentage sold fresh has been more nearly equal to the amount sold for canning. The volume sold for fresh market has trended upward, particularly in recent years (Figure 4). Michigan processing plum volumes trended upward between the 1950s and the latter part of the 1970s, but have experienced a significant decline during the most recent years. This recent decline is associated primarily with the smaller demand nationally for canned plums.

The existence of major markets for both fresh and processing plums has potential advantages for the Michigan industry. This can provide growers some flexibility and opportunities to sell in different markets depending upon fruit size and other characteristics and upon the relative strength of the two markets. The diversity of markets can add some stability to the industry, although careful attention must be given to meeting the specific needs of each market.

Figure 4. Michigan Plum Utilization Trends



Note: Graph shows four-year moving averages of utilization.

The somewhat different requirements for the two main markets mean there is a need for a grower to decide on his primary market outlet fairly early in the season so that he can undertake certain special practices needed for that market. For example, a grower who decides to sell his plums in the fresh market in a given year might need to do some thinning to obtain the proper fruit size and/or use a somewhat different spray program for top quality fresh plums.

Plums are processed in Michigan by about 20 firms. Most processors pack canned plums only, while a few freeze a small volume. Baby food is also an important use for Michigan plums.

Most plums sold for processing are delivered by growers directly to the processor. In some years, a percentage of the processed plums may be sorted out of fresh packing lines.

Canned plums in Michigan are packed in both consumer size (No. 2 1/2 and No. 303 cans) and in institutional size (No. 10 cans). In recent years, about 53% of the state's plum pack has been consumer size cans and 47% in institutional size.[1/] The percentage packed in No. 303 cans has trended upward, which is similar to can-size trends for many canned fruits.

Processors of plums all pack other fruit crops and in some cases vegetable crops as well. Plums are a minor part of the processing business for most firms. The plum processing season, however, comes at a time when processing facilities would in many cases otherwise be idle. Hence, plums are a desirable supplementary crop for many processors whose primary business is other products such as cherries and apples.

[1/] For further details on the Michigan canned pack by can size, see Appendix Table 20.

Processors may buy plums in several areas of the state as well as in the area located near their processing plant. It is not uncommon, therefore, for plums to be hauled a considerable distance before processing.

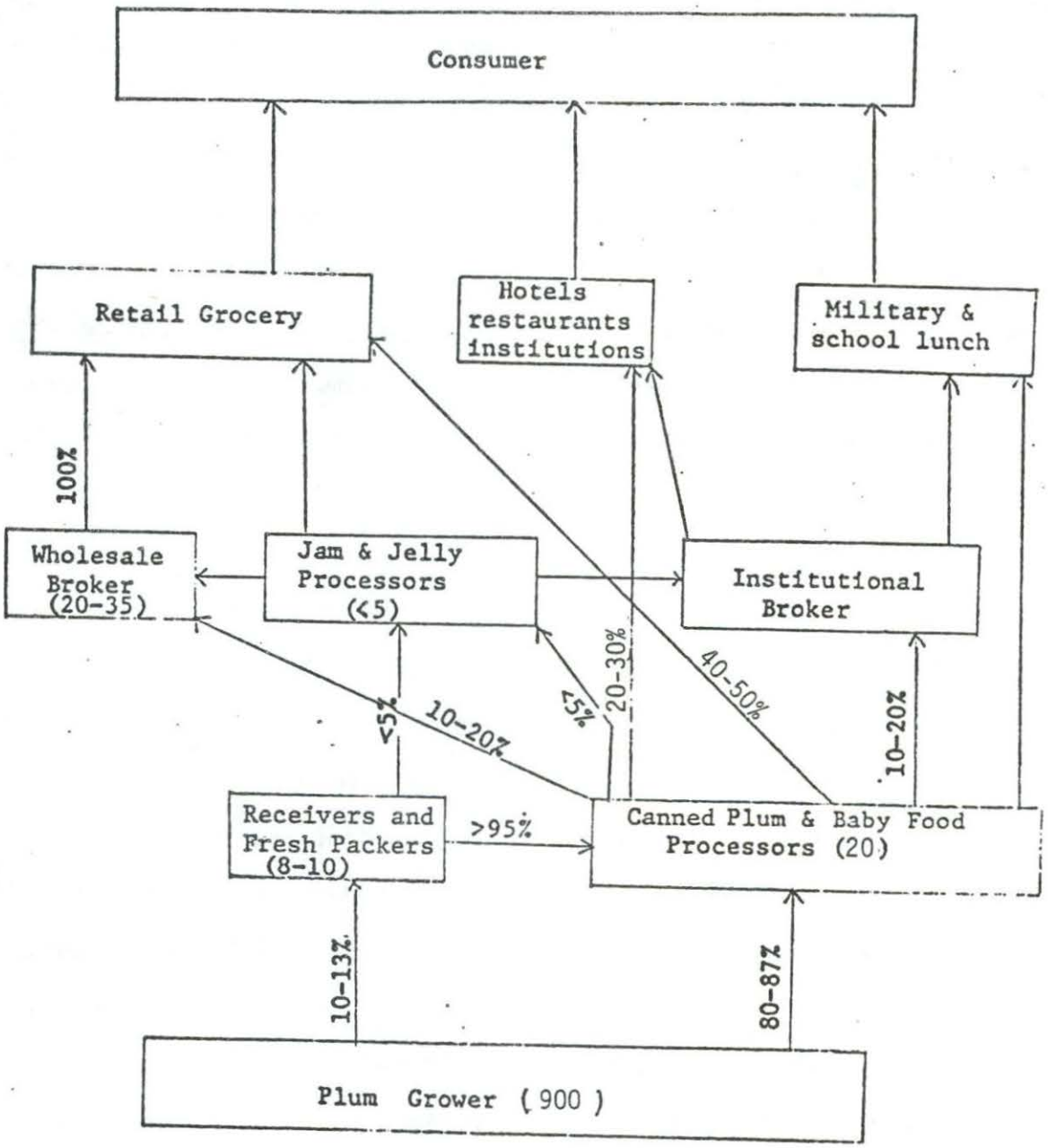
A portion of Michigan's canned plums are packed under private label, although some processors also produce packer labels. Consumer-size canned plums are primarily sold by processors directly to chain stores and other retail grocery buyers (Figure 5). Institutional-sized canned plums are sold both direct to larger institutional users and through institutional brokers as well as to the government for child nutrition and military purchase.

A major share of Michigan's fresh market plums are packed and sold by packing and marketing firms whose major business is fresh apples. For fresh plum sales, these firms market substantial quantities to grocery chain and other buyers.

The Benton Harbor market was at one time an important fresh market channel for Michigan plums. In 1960, approximately 50% of the fresh Michigan plums moved through the Benton Harbor market. However, since that time, the percentage of fresh plum sales through this traditional market has steadily declined (Table 5). In recent years, only 5-7% of the state's fresh plum sales have been sold over this market. The importance of the Benton Harbor market in fresh plum sales will probably continue at a relatively low percentage in the future.

The volume of Michigan plums moving through roadside fruit stands and direct from growers to consumers may be increasing somewhat, although definitive data on the volume of plums sold in these ways are not readily available. The percent of the plum crop sold through roadside and direct-to-consumers probably remains relatively minor in relation to total fresh plum sales.

Figure 5. Marketing Channels for Michigan Processing Plums[1/]



1/The numbers on the arrows are percentage estimates of that group's plum products moving in the direction of the arrow. The numbers in parentheses are numbers of firms. These estimates are approximations that were made by Dr. Robert Anderson in his thesis entitled "Michigan's Purple Plum Industry" and are based primarily upon the situation at that time. Baby food percentages were not reported separately to avoid disclosure of individual operations.

Table 5. Benton Harbor Market Plum Sales

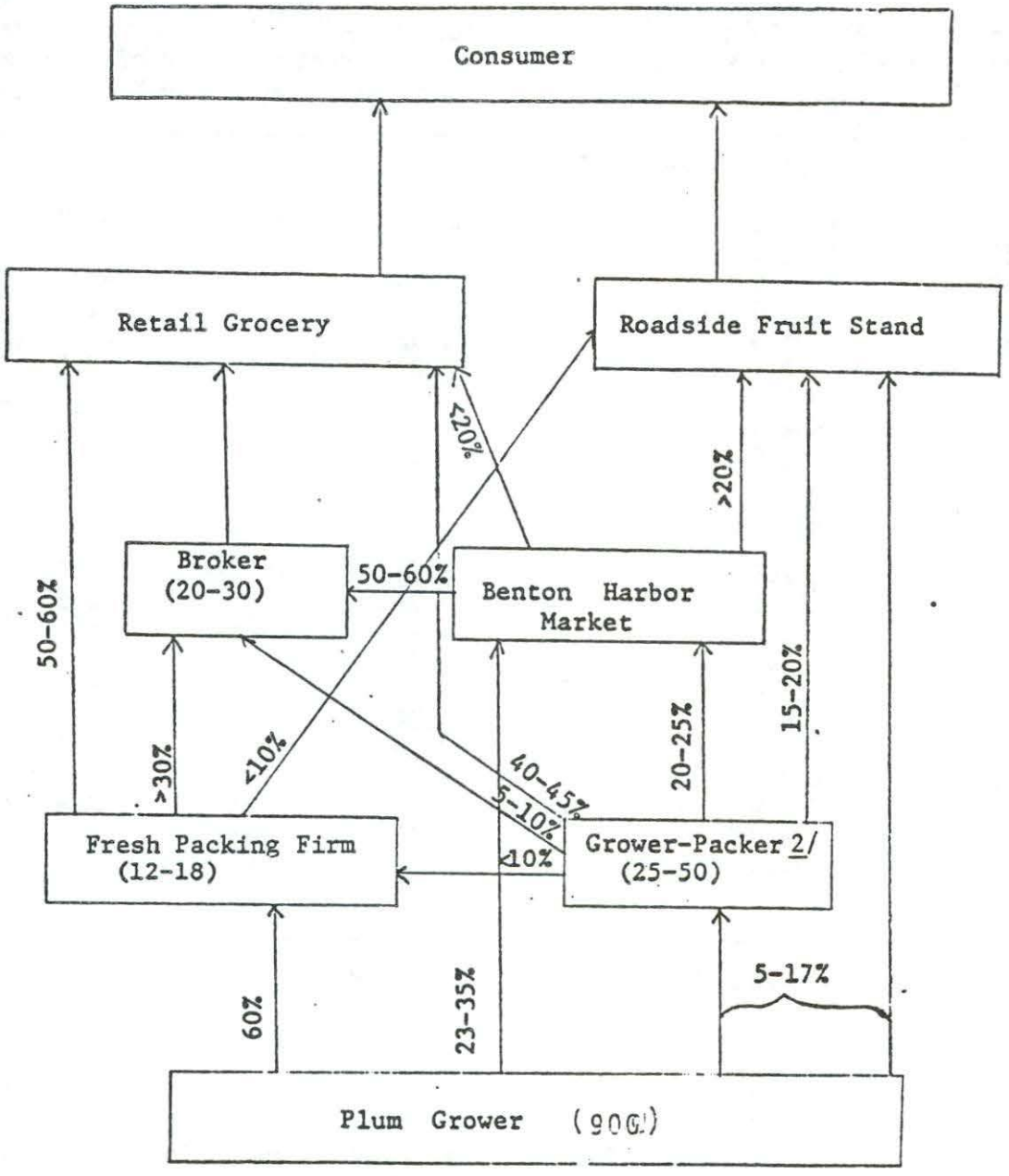
Crop Year	Plums Sold Benton Harbor Market	Average Price Benton Harbor Market (Per 1/2 Bushel)	Benton Harbor Market Share of Total Mich. Fresh Plum Sales
	------- Tons -------	----- Dollars -----	----- Percent -----
1960	1890.0	$2.34	51.9
1961	1767.5	1.98	39.3
1962	1557.5	2.15	44.1
1963	1505.0	2.37	41.8
1964	2625.0	1.43	38.8
1965	1592.5	2.28	37.0
1966	2117.5	2.23	34.2
1967	1802.5	2.41	31.1
1968	1032.5	3.12	24.6
1969	1767.5	1.80	23.9
1970	1225.0	2.60	24.5
1971	1785.0	1.71	21.8
1972	1032.5	3.54	16.9
1973	612.5	4.01	16.8
1974	875.0	4.15	16.5
1975	857.1	3.07	15.9
1976	279.9	4.90	5.6
1977	498.8	4.39	7.6
1978	769.7	3.68	8.2
1979	433.5	4.00	5.9
1980	361.9	5.21	6.5
1981	498.0	4.53	6.7
1982	494.5	5.84	7.4
1983	345.9	5.38	5.1

Source: Benton Harbor Fruit Market Annual Summary.

Relationship to Other Crops

Plum growers typically grow several other crops which mainly include other tree fruits and asparagus. In regard to certain farm management aspects, plums and cherries constitute an advantageous crop combination. One reason for this is because plums, especially those sold for processing, can be mechanically harvested with the same equipment used for harvesting cherries. This allows the grower to spread to another crop some of the large overhead

Figure 6. Marketing Channels for Michigan Fresh Plums[1/]



1/ The percentages shown on the market flow lines are estimates of the plums moving in the direction of the arrows. The numbers in parentheses are numbers of firms. These estimates are approximations made by Dr. Robert Anderson during his Ph.D. thesis study entitled "Michigan's Purple Plum Industry" and are based upon the situation in 1969.

2/ Growers who pack plums for other growers as well as their own fruit.

costs associated with expensive harvesting machinery. Plums can also provide an additional crop to reduce risks from the weather and from price fluctuations such as are typically associated with tart cherries.

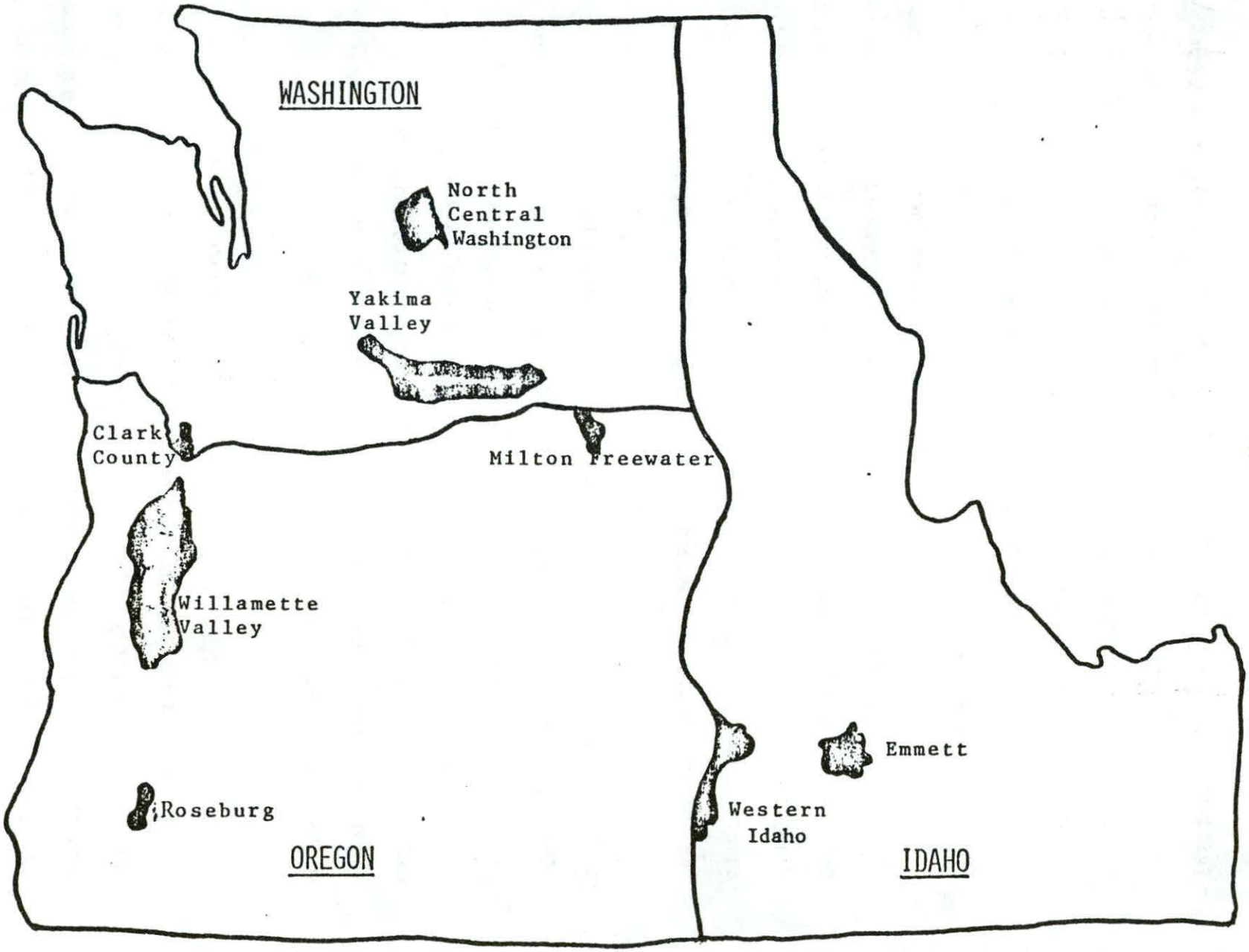
Changes in marketing methods for other crops may affect the marketing of plums. For example, Northwestern Michigan growers historically sold both their plums and their tart cherries to canning firms whose primary business was cherry processing. During the 1970s, there was an increase in the number of cherry processing firms, including a number of grower-owned, freezer processors, while at the same time the number of processors of plums decreased. Since most of these new cherry processing firms involve freezing only (no canning), and since plums are primarily canned, growers have had to adjust to the changing processor patterns in marketing their canning plums.

Since Michigan fresh plum marketing relies heavily on fresh packing and selling firms whose primary business is apples, changes in apple marketing can affect plum marketing as well. As markets for fresh apples expand and as packers and shippers continue to gear up to most effectively compete in apple marketing, they may also become increasingly effective for marketing fresh plums. On the other hand, because of the increased production of early apple varieties, such as Paula Red, some apple shippers may decide to concentrate exclusively on apples and discontinue handling plums.

The Plum Industry in Pacific Northwestern States

Plums from the Pacific Northwestern states of Oregon, Washington, and Idaho compete directly with Michigan plums in both the canned and the fresh markets. In earlier years, plum production from the Northwestern states dominated the markets for this type of plum while Michigan's production was quite minor. During the 1950s and 1960s, however, plum production in the

Figure 7. Major Plum Production Areas in the Northwestern States



Northwestern states experienced a noteworthy downward trend while Michigan's production was trending upward. Thus, the dominance of plums from the Northwestern states was much less by the early 1970s than during previous periods, such as during the 1950s. Since the early 1970s, plum production in the Northwest has shown a fairly stable trend while Michigan has experienced a gradual downward trend (Figure 8).

Plum sales in Washington and Idaho are heavily oriented toward the fresh market. Processing markets, including both drying and canning, are of much greater importance in Oregon. Canning markets have been declining in volume in recent years while drying has increased. Thus, the balance has shifted to a greater emphasis on drying in Oregon and less canning in all Northwestern states than in earlier years.

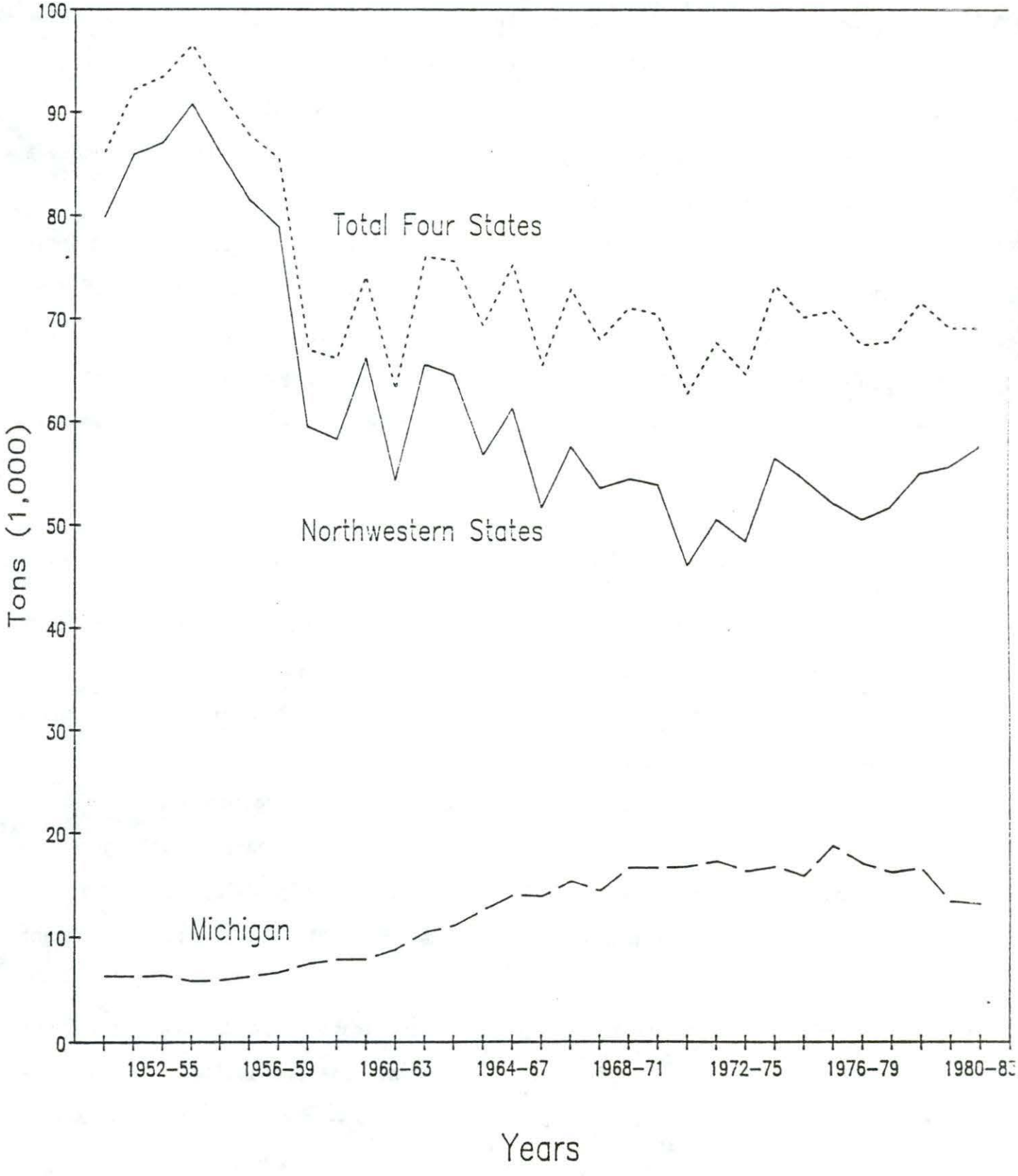
Trends in Northwestern States' Production and Tree Numbers

After experiencing a declining trend during the 1950s and 1960s, plum production in the Pacific Northwest states has shown a relatively stable to slightly upward trend since the early 1970s. Some changes in production among the three states have occurred.

Oregon is the single most important state producing purple plums with an average of approximately 34,000 tons during recent years. Washington and Michigan produce somewhat similar quantities at 13,000-16,000 tons on the average. Idaho has produced an average of 7,200 tons of plums in recent years.

Idaho's plum production declined significantly between the early 1960s and the mid-1970s. During this period, average production in that state decreased from about 20,000 tons to 7,500 tons -- a decrease to about 37% of

Figure 8. Plum Production Trends



Note: Graph shows four-year moving averages of production.

previous levels within this period. Since the mid-1970s, Idaho's plum production has been stable. (For further detail on Idaho's plum production, see Appendix Table 5.)

Oregon production has exhibited somewhat of an upward trend in recent years with especially large crops in 1980, 1981, and 1982. Oregon's plum production has also been more stable from year to year during recent years than during the 1960s and early 1970s. (Appendix Table 3 has further data on Oregon's plum production.)

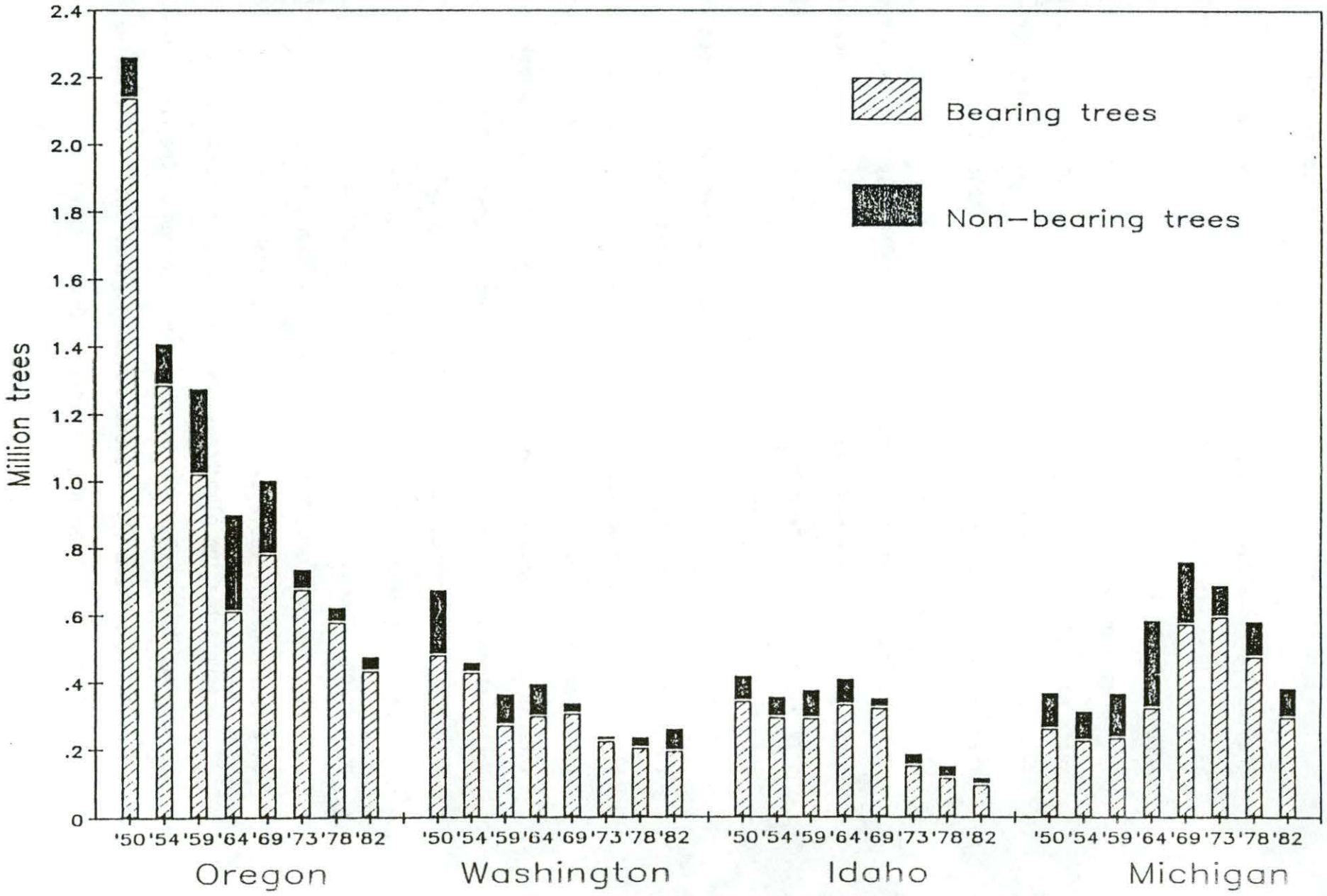
Washington plum production has shown a relatively flat long-term trend, although considerable fluctuations have occurred in annual production. Crop size during the most recent three years of 1981-1983 has been down considerably from a large crop in 1980 (Appendix Table 4).

Although the production trend for the three Pacific Northwestern states together has been relatively stable to up slightly in recent years, substantial fluctuations in production from year to year can occur. For example, the total Northwest plum production fluctuated from 48,000 tons in 1979 to 66,000 tons in 1980 (Appendix Table 6). However, annual crop fluctuations in the Northwestern states have been, in recent years, considerably smaller and less frequent than occurred during the 1960s and early 1970s.

Data on bearing and nonbearing trees can indicate future trends in plum production. Since Oregon and Washington do not have detailed fruit tree censuses, the most recent available data are from the U.S. Census of Agriculture (see Appendix Table 9). The latest available census data are for 1982.

Oregon's bearing plum trees have shown a significant long-term downward trend. Particularly noteworthy decreases occurred during the early 1950s and early 1960s (Figure 9). Recent census figures show a continuing downward trend in Oregon's bearing plum trees. Oregon's bearing trees in 1982 were

Figure 9. Plum Tree Numbers by States



Source: U.S. Census of Agriculture, Bureau of the Census, U.S. Department of Commerce.

previous levels within this period. Since the mid-1970s, Idaho's plum production has been stable. (For further detail on Idaho's plum production, see Appendix Table 5.)

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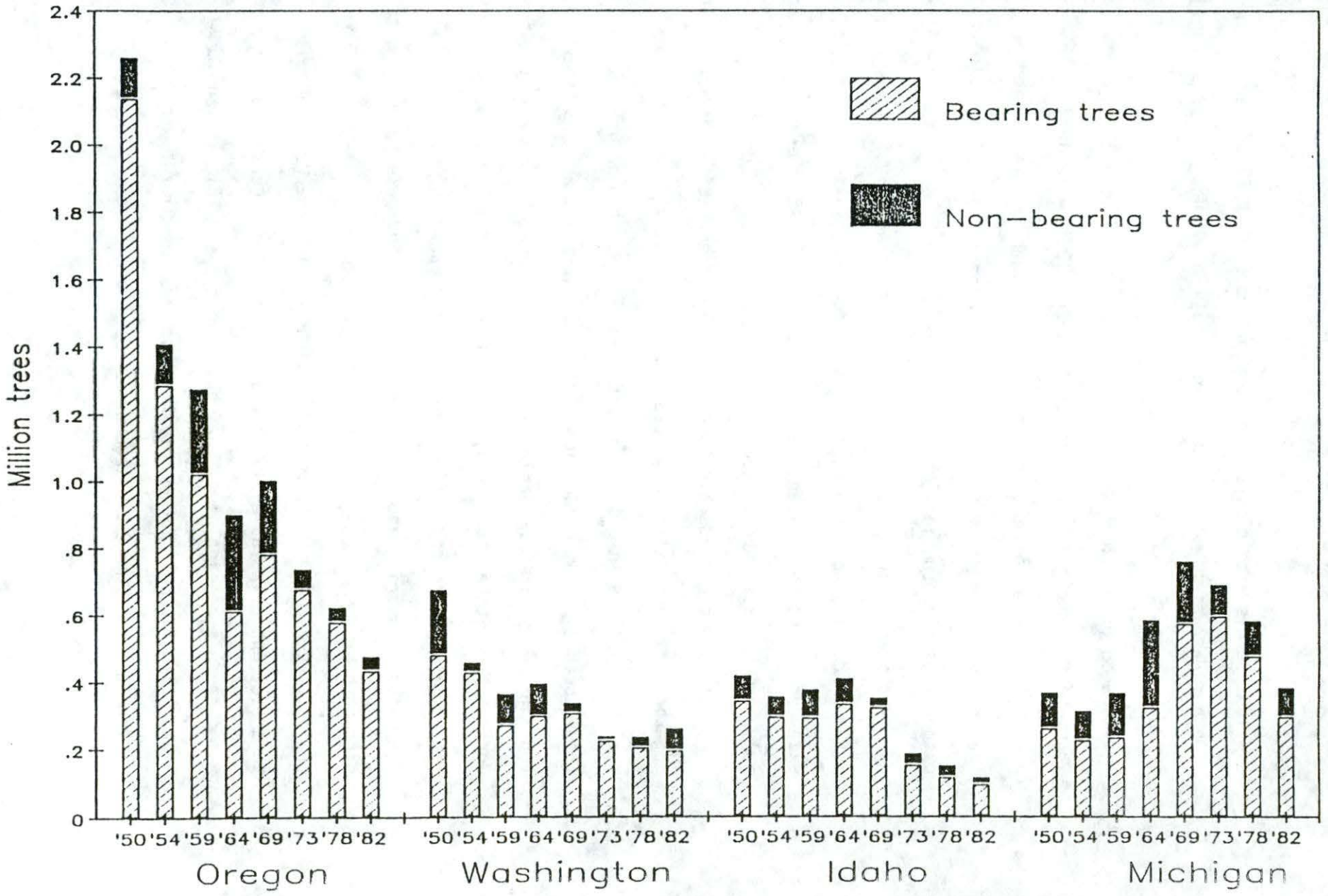


Source: U.S. Census of Agriculture, Bureau of the Census, U.S. Department of Commerce.

only 56% of those existing in 1969. Production in Oregon has, however, remained relatively high because of concentration of remaining acreage in more productive orchards.

Nonbearing plum trees in Oregon, as shown by the most recent census for 1982, were at an unusually low level (Appendix Table 9). Also economic returns to growers in that state have not been favorable in some recent years as the demand for canning plums has declined. For these reasons, Oregon industry observers predict that a number of growers there may decide to remove significant plum acreages because of low returns for plums. A decline in Oregon plum production is thus expected, although this will be tempered somewhat by growth in the dried prune market.

Bearing plum tree numbers in Washington have trended downward according to census data (Appendix Table 9), although the latest 1982 census shows almost as many bearing trees as in the previous census. Washington's nonbearing trees increased considerably between 1978 and 1982. Nonbearing trees now comprise 34% of the bearing trees. This suggests some increase in future plum production is likely. Washington industry observers indicate that growers are decreasing their acreage of Italian prune-type plums and new plantings are mainly varieties similar to California types of plums.

Idaho bearing plum trees decreased considerably during the 1970s, with the 1982 Census of Agriculture showing only about 30% as many bearing trees as in 1969 (Figure 9). The more detailed 1980 Idaho fruit tree census showed Italian prune-type varieties down 20% from 1978, while California-type plum varieties were down by a smaller 9%.

By 1980, Idaho's nonbearing trees of Italian prune-type varieties were near zero (less than 1%). Growers are reportedly quite discouraged with returns from fresh sales of these varieties. It is expected that Idaho

growers will further decrease their acreage of prune-type varieties substantially during the next few years.

In contrast to trends for prune-type varieties, Idaho growers have planted significant acreages of California-type varieties of plums. The 1980 tree census shows that nonbearing trees of this type of plum are equal to 21% of the state's existing bearing acreage. New plantings of these plums are continuing. Therefore, it is expected that Idaho's production of this type of fresh market plum will expand in the future, while the Italian-type varieties will likely decline in future production.

Considering the three Pacific Northwest states together, tree number data show that a continued decline in bearing and total plum trees occurred during the 1970s and early 1980s. The last three Censuses of Agriculture indicated that nonbearing tree numbers have been relatively stable at a relatively low level. This suggests stable to gradual declines in future bearing tree numbers. Unfavorable economic returns could, however, cause growers to remove substantial plum acreages.

Industry sources in Northwestern states report that grower returns in recent years have been unfavorable, especially for canning plums and in some years from fresh market. If plum acreage is taken out, this could result in a more pronounced decline in future Northwestern plum production. It is reported that most reductions in Northwest plum acreage will be of the Italian type, both in the Willamette Valley because of poor markets for canning plums, and in Washington and Idaho because of poor returns for fresh Italian plums.

Trends in Plum Production and Acreage in Other States

In addition to purple or prune-type plums from the Pacific Northwestern states, plum production in California is increasingly important in the expanding U.S. market for fresh plums. This is especially so as both Michigan and the Northwestern states try to maintain or increase a significant share of the expanding overall fresh plum market of which California has a large share. New York plums also compete in fresh markets for the eastern U.S. Thus, trends in plum production and acreage in these states are important for the future supply and market situation for Michigan plums.

California

Plum production in California has experienced a strong upward trend since the early 1970s (Figure 10). Average California production during the recent years of 1979-1983 was 55% greater than the average produced during 1970-1973.[1/] The expansion in California plum production occurred both because of increasing acreage and an upward trend in average yields per acre.

Nonbearing acreage of California plums has shown a distinct upward trend since the late 1960s (Figure 11). New plantings were especially large during 1979-1981 and have remained relatively high. As a result of the substantial new plantings, bearing acreage of California plums has grown steadily since 1970. The state's bearing acreage rose from 21,000 acres in 1970 to 34,000 acres in 1984 -- an increase of 60% during this 14-year period.[2/] The continuing large nonbearing acreages in recent years indicate that California's bearing acreage and production will increase still further in future years.

[1/] Data on California plum production are shown in Appendix Table 11.

[2/] Acreage data for California plums are summarized in Appendix Table 12.

Figure 10. California Plum Production

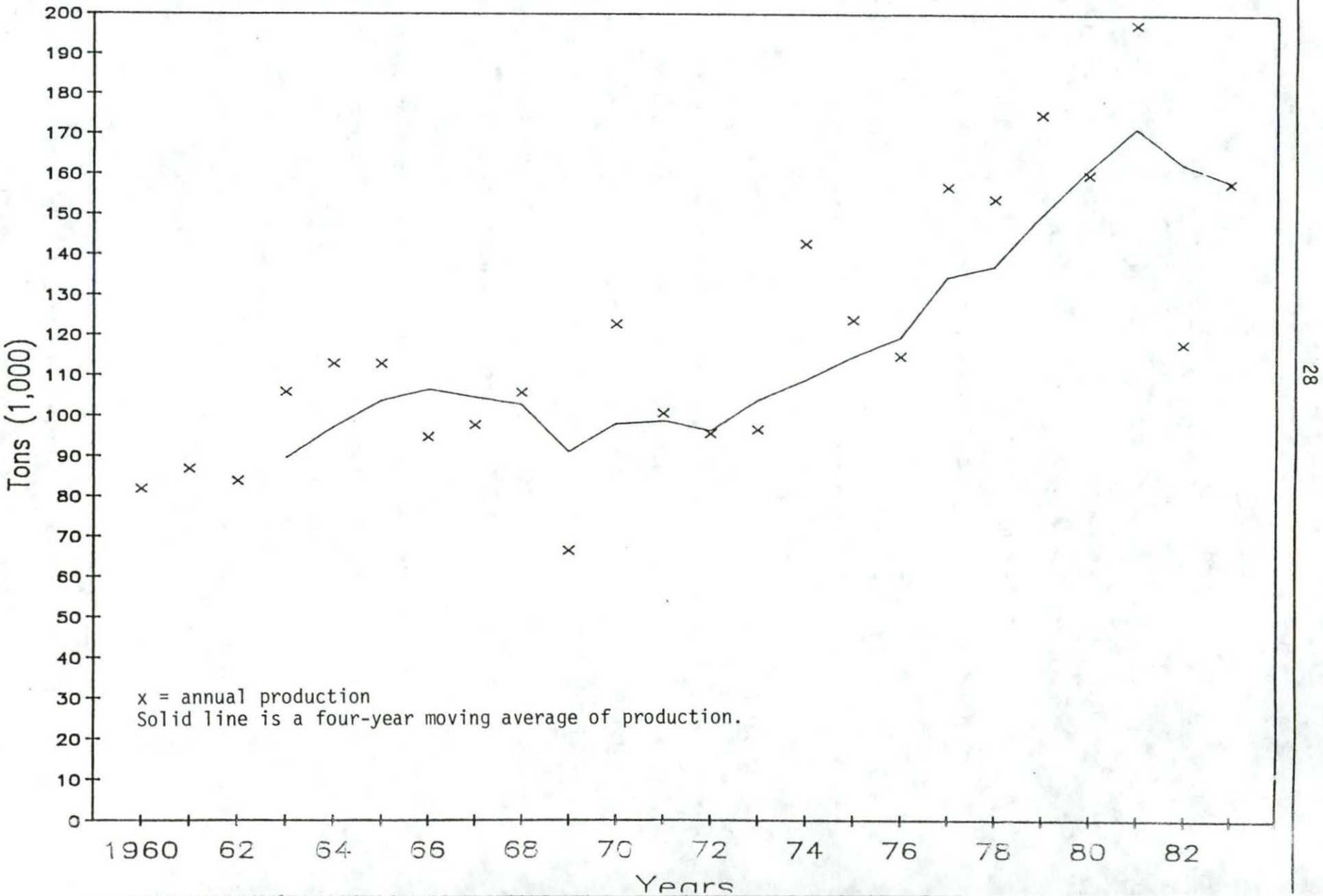
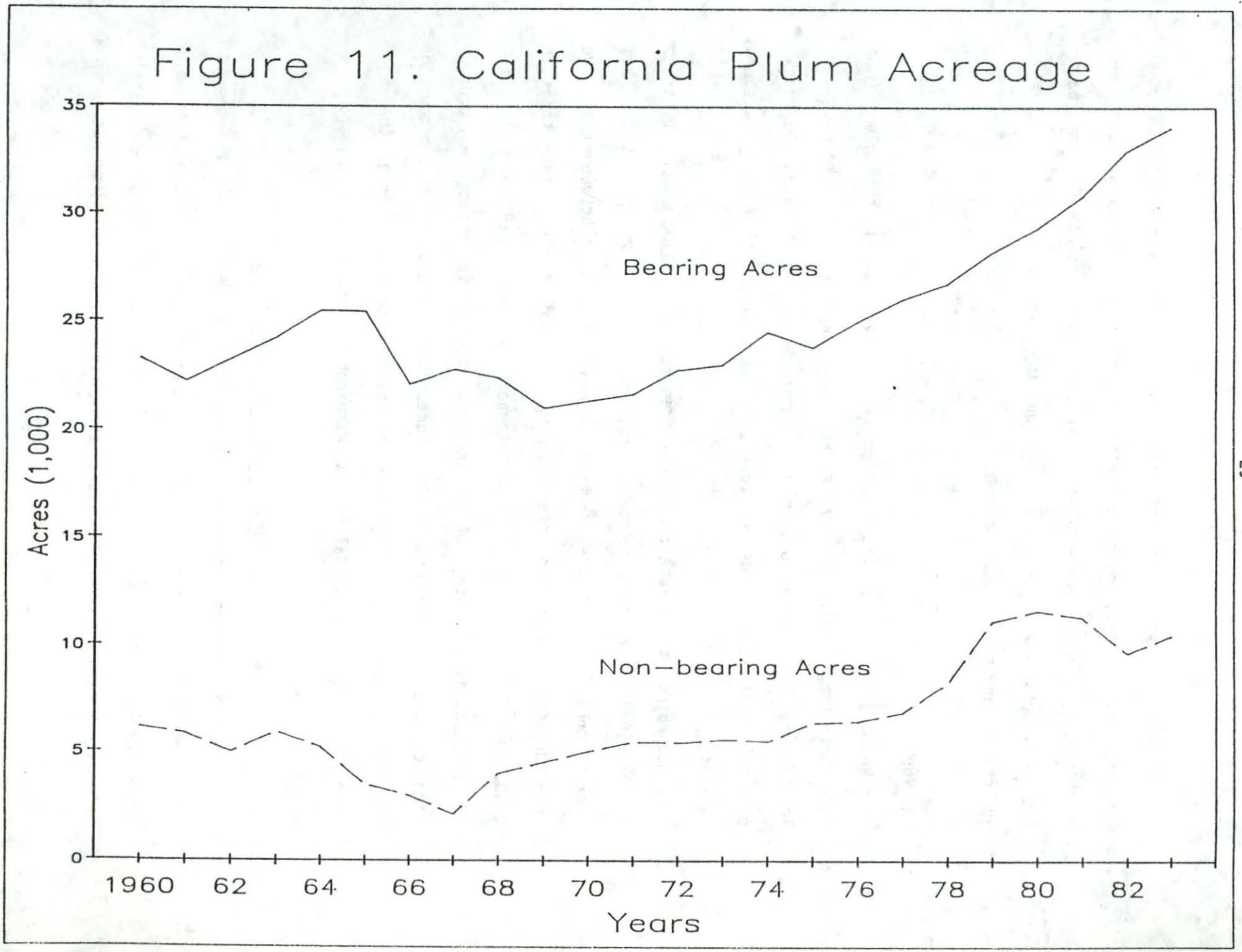


Figure 11. California Plum Acreage



While supplies of California plums have increased considerably, demand for this fruit has also grown substantially. Demand increases have been aided by increasing consumer preferences for fresh fruits, a relatively long season for California plums, generally high quality, and a substantial generic advertising and promotional program.

New York

While New York's plum production is relatively small, some plums from that state compete with Michigan plums. Since New York is, like Michigan, located near many eastern U.S. plum-consuming population centers, the transportation cost aspect aids New York's competitive position versus western regions.

According to the latest New York tree census in 1980, total plum trees and bearing tree numbers decreased from the levels existing in 1975. New York's nonbearing plum tree numbers, however, increased between those two tree censuses. Nonbearing trees were equal to 55% of the bearing trees in 1980, and there were one-third more nonbearing trees in 1980 than in 1975. The substantial percentage of nonbearing trees suggests rising plum production potential from New York in the future. Nevertheless, New York production will likely remain relatively minor in relation to production in the major plum-producing states of California, Washington, Oregon, and Michigan.

Major Market Uses for Purple Plums

Fresh sales have been the most important market for plums from both Michigan and the Northwestern states. In recent years, about 50% of the plum crop from each region has been sold fresh (Table 6). While fresh market sales have trended upward in recent years, the canning market for plums has shown a

Table 6. Utilization of Plums and Prunes by Regions, 1980-1983

	Percent of State's Total Sales			
	Northwestern States a/	Michigan	California	
			Plums	Prunes
	Percent			
Fresh	49	51	98	--
Canning	13	45		--
Drying	36	0		100
Freezing	2	4		--

a/ Includes Oregon, Washington, and Idaho.

Source: Computed from data reported in Noncitrus Fruits and Nuts, Statistical Reporting Service, USDA (various issues).

distinct declining trend. The drying market has experienced a large increasing trend in recent years. Although drying is especially important for Oregon, the expansion of this market is significant for Michigan as the dried market affects competing supplies available in national markets for purple plums. The frozen utilization of plums has been fairly minor in both Michigan and the Northwestern states.

While markets for canning plums have declined in both Northwestern states and Michigan, canning remains an important market outlet for Michigan accounting for an average of 45% of the Michigan crop in recent years. Oregon is the other major state in the canning market. Washington and Idaho contribute only minor quantities to the overall canning market. The decline in the canning plum market poses major adjustment challenges for the plum industry -- especially for Michigan and Oregon.

The Fresh Market

The fresh market for plums has been growing and is expected to continue to expand in the future. There has been an upward trend in the sale of fresh plums, both from Michigan and the Northwestern states in recent years (Figure 12). The growth in fresh sales of plums has occurred despite the fact that overall production of plums has been steady in the two regions together and declining in Michigan.

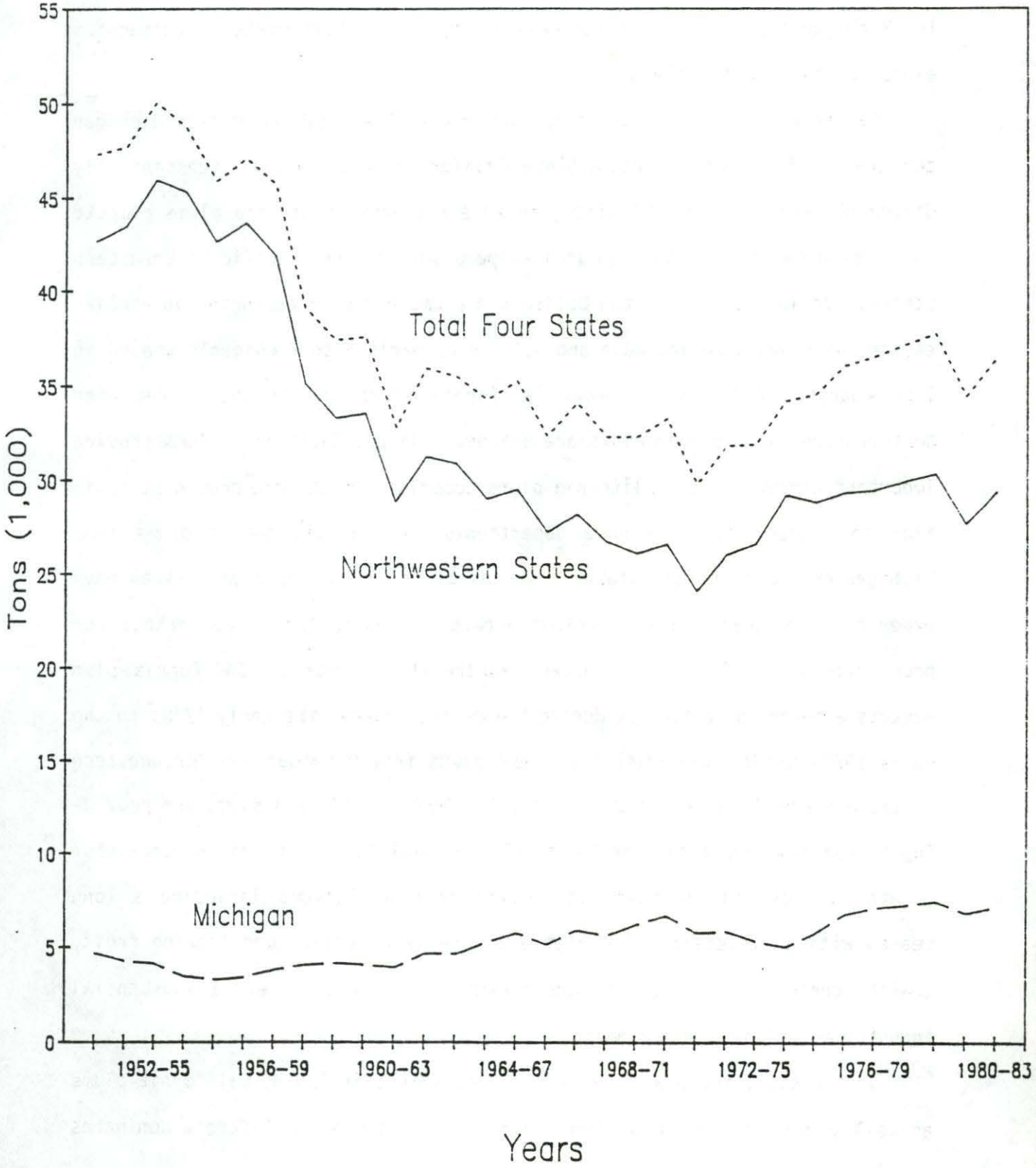
The growth of fresh market sales of plums is related to noteworthy increases in U.S. consumer demand for fresh fruits and vegetables in general during recent years. Consumers are expressing strong preferences for foods which they perceive to be natural, nutritious, non-fattening, and with no sugar added. Fresh produce, including fresh plums, offers characteristics which fit these consumer preferences.

Recognizing the growth in consumer demand for fresh produce, grocery retailers are giving much greater emphasis to the produce section of their stores through more produce merchandising, expanded display space, offering a much wider variety of fresh items, and by emphasizing fresh produce in their stores' advertising. This emphasis on fresh produce by retailers has further strengthened the growing demand for fresh fruits.

The growth in consumer demand for fresh fruits, strengthened by retailers' strong positive response, has provided a strong growth base for expanding fresh plum sales. This has aided the sale of fresh plums from both the Pacific Northwestern states and Michigan. Sales of California fresh plums have also grown substantially in response to the increasing demand.

In fresh plum markets, purple plums produced in Washington, Idaho, Oregon, and Michigan compete most directly with each other since these plums have similar characteristics and overlapping seasons. Apparently many

Figure 12. Plum Sales for Fresh Use



Note: Graph shows four-year moving averages for fresh sales.

consumers cannot readily tell the difference between an Italian plum produced in the Northwestern states or a Michigan Stanley plum. Therefore, consumers and some retailers view these plums as closely interchangeable. Preferences for Michigan fresh plums are increasing compared to Northwestern Italians as expressed by some retailers.

California plums compete increasingly with the fresh plums from Michigan and the Northwestern states. Since California plums are of substantially different varieties than Michigan, in some respects California plums compete in a less direct manner than do prune-type plums from the Pacific Northwestern states. While the bulk of the California plums are shipped during an earlier season which peaks during June and July in comparison to Michigan's season in late August and September, many California plums are on the market when Northwestern and Michigan plums are shipped. Hence, California plums provide important competition. California plums comprise a much more prominent position in grocery store produce departments than do prune-type plums from Michigan and Northwestern states. In addition, California plum markets have experienced a substantially greater growth in demand than have markets for prune-type plums from Michigan and Northwestern states. California plum markets expanded by about 50% during the decade between the early 1970s to the early 1980s while the market for fresh plums from Michigan and Northwestern states expanded by a lesser amount of 15%. Thus, California plums are providing increasing competition in the fresh plum market. California's successful growth in fresh market sales is related to many factors including a long season with a succession of varieties, generally large, good looking fruit, quality control programs, a strong marketing orientation, and a substantial industry advertising and promotion program.

If the total fresh plum market is considered, including California plums as well as purple plums from Michigan and the Northwest, California dominates

the fresh plum market with 82% of the total. By comparison, the Northwestern states contribute 14%, and Michigan has had about 4% of the total U.S. fresh plum sales volume during recent years.

For some purposes, it is useful to consider the total fresh plum market, including California plums. This is especially relevant with the increasing consumer demand for fresh produce, including plums, and because California plum production has shown a definite growth trend. On the other hand, because of the similar type of plum and the close substitutability between Northwest and Michigan plums, for many issues in purple plum marketing it is appropriate to consider primarily plums from Michigan and the Northwestern states.

Overall, fresh sales of purple plums have shown a gradual increasing trend since the early 1970s. Before this upward trend began, fresh sales from Northwestern states of Washington, Idaho, and Oregon had declined rapidly during the 1950s and more gradually during the 1960s (Figure 12). The regrowth of fresh sales from Northwestern states, along with the gradual expansion trend for fresh sales from Michigan, is related mainly to changing consumer preferences for fresh fruit and away from canned fruits.

Future demand for fresh plums from Michigan will be influenced by both (a) the overall growth of the fresh plum market, and (b) Michigan's competitive position for a share of that market. Both factors seem to be favorable for a continued growing demand for fresh Michigan plums. Most Michigan plum shippers and packers express optimism about the future fresh market for Michigan plums. Shippers are generally especially optimistic about the future fresh market for plums grown in southwestern Michigan because of the large size plums which are commonly grown in that part of the state.

Michigan's competitive position for fresh market plums is strong and seems to be improving over time in comparison to the Northwestern states of

Washington, Idaho, and Oregon. This is aided by Michigan's transportation cost advantages. In addition, Michigan plums are reportedly viewed generally as high quality by the grocery trade in comparison to the plums from the Northwestern states. The use of new materials for controlling brown rot, hydro-cooling, and cold storage has enabled Michigan to have a much better control of brown rot in recent years than previously. This has been a significant aid in improving Michigan's competitive position for fresh market plums. Because of competitive advantages regarding quality, Michigan plums generally receive a premium price on a delivered basis compared to Northwest plums. In addition, Michigan has the freight cost advantage compared to the Northwest, which is increasingly important as costs of trucking have risen considerably compared to the early 1970s. Michigan's transportation cost advantage to many eastern U.S. cities has in recent years been about $2.00-2.50 per bushel. The freight cost advantage is also expected to continue to improve Michigan's position further in the future.

Michigan's promotion and demand expansion program is a positive step which can help improve the market for Michigan fresh plums. Although small and relatively new, this program can help Michigan capture an important share of the overall expanding fresh plum market.

Returns to growers in the Northwestern states for fresh plums reportedly have not been favorable in many cases during recent years. Many growers are reported to be discouraged with plums there. It is reported that a number of Northwestern growers have been removing prune-plum orchards, especially older blocks, and replacing them primarily with apples or California-type plum varieties.

Despite the number of favorable factors indicating continued growth for fresh market sales of Michigan plums, there are some factors which pose

challenges and could limit the future growth for Michigan fresh plums. California fresh plum supplies have increased substantially and are expected to continue to rise. California plums are receiving substantial demand-expansion efforts and prominent treatment by grocery retailers. Plums from California will likely pose increasingly important competition in the future for Michigan. On the other hand, the strong demand expansion for plums which is generated by California might provide additional opportunities for Michigan fresh plums.

Michigan's performance in regard to fruit size and maturity of the plums as well as overall marketing efforts will be important factors in regard to the future growth of the state's fresh sales. Effective brown rot control is another key factor, although there are several new, effective materials which can aid the Michigan industry in this regard. The relatively short season of Michigan plums is a limiting factor for overall fresh sales, especially with Michigan's emphasis on one variety. Some feel that the fact that plums are heavily consumed by ethnic consumers in certain markets is also a factor limiting future market growth for fresh Michigan plums.

The challenging factors outlined above are areas which deserve industry attention in order to maximize potential future growth for Michigan within the general increasing fresh plum market. Some possible actions aimed at overcoming these challenges are being studied.

Processing Markets

While canning has historically been the main processing market for purple plums from the Northwestern states and Michigan, in recent years drying has grown and has become more important than canning in the Northwestern states. Drying has used an average of 36% of the plums from the Northwestern

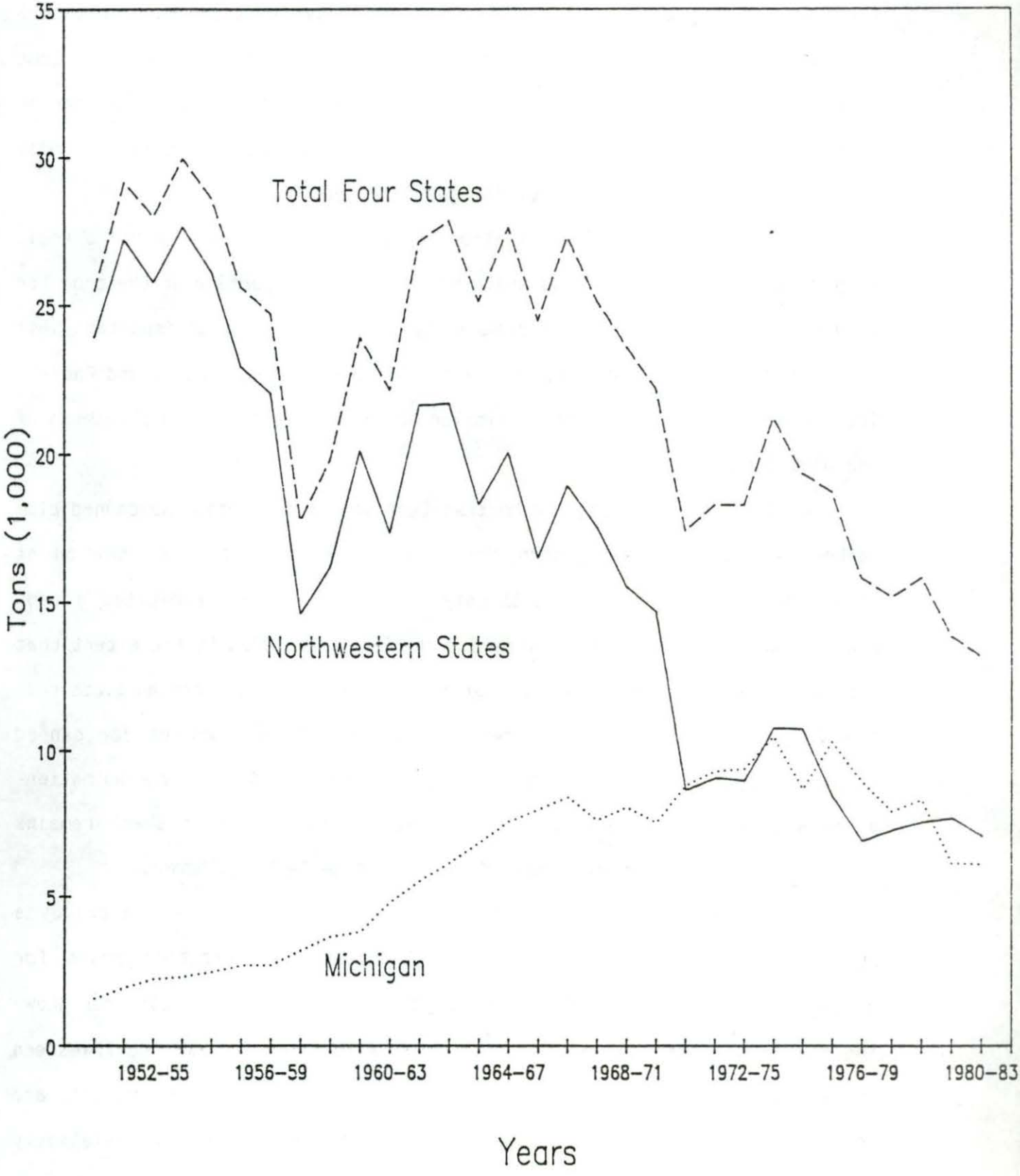
state region, while canning markets have fallen to 13% (Table 6). In Michigan, canning remains the main processed market with 45% of the state's crop utilized in this manner.

Markets for canning plums have decreased in both the Northwestern states and in Michigan (Figure 13). The national market for canned purple plums has experienced a pronounced declining trend for a number of years. This decrease is related, in part, to lessening consumer demand for the all canned fruits. In addition, canned plums are an item of weak consumer preference within the canned fruit category, despite being one of the least expensive canned fruits.

Reasons for the decline in consumer demand for canned fruits include: (1) increasing preferences for fresh, "unprocessed" forms; (2) an aversion by some consumers to the sugar syrup in canned fruits; and (3) smaller family sizes, the related emphasis on smaller can size, and hence less fruit involved with each consumer purchase. Probably the most important phenomena affecting consumer demand for canned fruits, including plums, is the switch in preferences to fresh fruits and vegetables which are perceived by increasing numbers of consumers as being especially "natural," "healthful," with no sugar added, and "good for your diet."

Decreasing consumer demand for canned fruits is strengthened by the response of grocery retailers to reduce shelf space for canned fruits, to curtail the variety of canned items carried, to reduce the merchandising efforts for this category, and to reduce the frequency of retailer promotions for canned fruits as featured items in retailer newspaper advertising. These responses by grocery retailers are taken because they view canned fruits as a declining category which warrants less retailer emphasis both since this category is less important to retailer profits and is less important to their consumer customers. While these responses are quite logical and understandable from the retailers' perspective, the result is to further decrease demand for canned fruits, including purple plums.

Figure 13. Plum Sales for Canning



Note: Graph shows four-year moving averages of sales for canning.

In addition to the response of the grocery trade, a number of marketing firms with strong brands for canned fruits have become discouraged with the poor performance and declining demand trend for this food category. Some have, therefore, reduced their advertising and marketing efforts for canned fruits or have discontinued the canned fruit business altogether. These reactions add further to the declining demand syndrome.

The overall result is a situation of considerable challenge for a fruit crop industry like purple plums which has sold a major portion of the crop for canning. This type of serious problem is confronting several important West Coast canned fruit industries, including California cling peaches and Pacific Coast pears. Their situation is similar to the declining demand phenomena of the plum industry.

Until the early 1970s, the Northwestern states dominated the canned plum market, with Oregon having been the primary canning state. Production of canned purple plums in the Northwestern states, however, exhibited a pronounced downward long-term trend during the 1960s and 1970s to the extent that Michigan produced an average about equal to or somewhat more canned plums than the Northwestern states. In recent years, the national market for canned plums and the market for each region have declined with the decreasing national demand trend (Figure 13). Thus, while Michigan's market share remains relatively high, the overall demand decline is quite troublesome.

Michigan's share of the canned purple plum market has been aided by a number of factors. These include: (1) lower transportation costs for Michigan to eastern population centers; (2) comparatively low costs for growing Michigan plums; (3) a dissatisfaction with plums by many Northwestern states' processors due to low profits associated with this canned product; and (4) in the 1960s and early 1970s, expanding plum production from relatively

young orchards in Michigan. The relatively low costs of growing plums in Michigan are aided by (1) a variety (the Stanley) with high average yields per acre and (2) widespread mechanical harvesting.

Transportation cost advantages will continue to aid Michigan's competitive position relative to delivered costs to eastern population centers. On the other hand, Oregon's position has improved somewhat because of their advantages for pitted plums which have taken a share of the canned plum market, particularly for the institutional segment. The Oregon Italian plum is more readily adaptable to pitting with current technology than is the Michigan Stanley variety with its elongated pit and other characteristics.

Overall, Michigan's competitive position for canned plums seems favorable in comparison to the Northwestern states. It is, however, a favorable competitive position in a market segment which is declining.

Markets for dried prunes have been expanding in recent years because of growing consumer demand. Dried fruits, including prunes, apparently fit many consumers' preferences for "natural" foods with no sugar added. Unfortunately, for Michigan, in view of this growth market, Michigan's climate and plum characteristics have historically precluded Michigan from participating in the drying market. In the future, perhaps Michigan can develop techniques to produce a satisfactory dried prune and thus take advantage of this growing market segment. At least the expanding dried market will likely take greater supplies of Oregon prunes which might otherwise compete with Michigan for markets for canned plums.

Summary

Plums have been an important supplemental crop for the Michigan fruit industry. The state's plum production expanded substantially during the

1960s, then plateaued during most of the 1970s, and has shown a downward swing during recent years. Bearing plum acreage is decreasing in Michigan. A number of Michigan growers have removed plum orchards and few have replanted this crop. Michigan's future plum production will likely continue to decline somewhat for the next few years.

Michigan plums have experienced weak markets during some recent years. This is primarily related to the fact that demand for canning plums has decreased significantly because of a decline in consumer demand. Consumer demand for all canned fruits has decreased and consumers have shown an especially weak preference for canned plums. This poses a particularly difficult challenge for the Michigan plum industry, since historically approximately two-thirds of the crop was sold for canning.

While demand has been decreasing for canning plums, fresh market demand has been increasing. As a result, the share of the Michigan crop which is sold fresh has increased so that in recent years approximately half of the Michigan plum crop is sold for fresh market. Michigan fresh plum sales have benefitted from an expanding national market for fresh plums as consumer preferences are switching to fresh produce which is viewed as natural, healthful, and low in calories. The growing national market for fresh plums has also taken larger quantities of fresh plums from California and fresh sales of Pacific Northwestern prune-plums which compete with Michigan Stanley plums in this growth market.

Michigan's competitive position in the growing fresh market is favorable in comparison to plums from the Pacific Northwestern states. Michigan plums usually receive a delivered price premium compared to plums from the Northwestern states. In addition, Michigan has a significant transportation cost advantage to eastern U.S. markets. Michigan has also improved its

competitive position in fresh market in recent years by improvements in brown rot control with new preventive materials, more extensive hydro-cooling, and by closer attention to harvesting at best maturity. Although there are also some limiting factors, Michigan appears to be in a favorable position to continue to expand fresh market sales of plums as a part of the growing U.S. market for this fresh fruit.

Production of plums in Pacific Northwestern states has not shown a distinct upward or downward trend. Indications are that in future years production of prune-plums in these states will likely be steady, but could experience a gradual decline.

Because of the increasing demand for fresh plums, declining supplies of plums in Michigan, and steady production in the Pacific Northwestern states would suggest a favorable supply-demand balance for the expanding fresh plum market. California plums are, however, experiencing a significant increasing trend in supplies. Although California plums are marketed primarily in a different season than those from Michigan and the Northwestern states, California's much larger production provides a very important supply factor in the fresh plum market. California plums will provide increasing competition in the fresh plum market and will fill a substantial proportion of the demand growth for that market. Michigan plums can also likely capture a portion of the growing national demand for fresh plums, particularly since Michigan is much closer to eastern U.S. markets and has primarily a different shipping season than does the predominant production from California.

In addition to expanding sales of fresh plums, Michigan will probably, in the future, be able to continue to sell a significant, although decreasing, quantity of canned purple plums. Michigan's favorable competitive position for canned purple plums led to an increased share of the canned U.S. market

for Michigan since the 1960s and early 1970s. During recent years, however, a more important factor is the marked decrease in overall demand for canned purple plums. Thus, even though Michigan's competitive position remains favorable, it is in a distinctly decreasing market which is expected to continue to decline in the future.

Exploration of new markets or markets which have traditionally been relatively minor for Michigan plums is appropriate in view of the declining market for canned purple plums. Markets for dried prunes and markets for many fruit juices have been expanding in recent years. These may provide significant markets for Michigan plums in the future, although there are obstacles which must be overcome in order to develop these as a significant market for Michigan plums. New markets for plums in other uses such as frozen pitted plums and possible other new uses are being explored. If sufficient new markets for plums can be developed, Michigan fruit growers would likely plant more plum acreage because of the on-farm advantages of growing plums.

In the future, Michigan plums will likely continue to be sold in increasing amounts for fresh market. A significant quantity will also continue to be sold for baby food. Canned markets will continue to take a significant portion of the Michigan plum crop, although probably a decreasing amount as demand for this market is expected to continue to decline. Hopefully, new markets for some plum products can be developed, although development of new markets involves considerable challenges and risks.

APPENDIX

TABLES

Appendix Table 1. Production of Plums by States

Crop Year	Michigan	Oregon	Washington	Idaho	Northwest States[a]	Total Four States	Michigan's Market Share[b]
	tons						-- percent --
1950	6,500	22,300	13,600	10,000	45,900	52,400	12.4
1951	4,600	59,800	12,700	22,600	95,100	99,700	4.6
1952	7,500	45,100	17,100	24,800	87,000	94,500	7.9
1953	6,700	48,400	22,100	20,900	91,400	98,100	6.8
1954	6,300	42,500	15,100	12,700	70,300	76,600	8.2
1955	5,200	52,600	25,000	22,200	99,800	105,000	5.0
1956	4,900	59,000	17,500	25,500	102,000	106,900	4.6
1957	7,300	34,000	16,000	22,000	72,000	79,300	9.2
1958	7,800	19,700	13,500	19,100	52,300	60,100	13.0
1959	6,800	44,000	22,500	22,600	89,100	95,900	7.1
1960	8,000	4,000	10,100	10,600	24,700	32,700	24.5
1961	9,000	27,400	19,100	20,500	67,000	76,000	11.8
1962	8,000	46,000	21,400	16,700	84,100	92,100	8.7
1963	10,500	6,300	16,100	19,000	41,400	51,900	20.0
1964	14,500	23,000	23,300	23,500	69,800	84,300	17.2
1965	11,500	28,000	13,700	21,000	62,700	74,200	15.5
1966	14,000	25,000	17,200	11,000	53,200	67,200	20.8
1967	16,000	30,500	12,700	16,500	59,700	75,700	21.1
1968	14,000	11,000	11,000	9,000	31,000	45,000	31.1
1969	17,500	32,000	29,000	25,500	86,500	104,000	16.8
1970	10,000	20,300	9,700	7,150	37,150	47,150	21.2
1971	25,000	27,900	16,500	19,000	63,400	88,400	28.3
1972	14,000	8,400	12,500	7,500	28,400	42,400	33.0
1973	18,000	32,000	14,700	8,600	55,300	73,300	24.5
1974	12,000	28,000	21,100	6,100	55,200	67,200	17.9
1975	21,000	30,000	20,200	4,000	54,200	75,200	27.9
1976	16,000	31,000	23,000	7,000	61,000	77,000	20.8
1977	14,000	28,000	12,000	7,000	47,000	61,000	23.0
1978	24,000	17,000	21,300	7,500	45,800	69,800	34.3
1979	14,000	26,000	14,700	7,500	48,200	62,200	22.5
1980	12,500	35,000	23,100	8,000	66,100	78,600	15.9
1981	16,000	38,000	14,600	7,500	60,100	76,100	21.0
1982	11,000	37,000	11,500	7,000	55,500	66,500	15.0
1983	13,000	28,000	14,700	6,500	49,200	62,200	20.9

(continued)

Appendix Table 1. (Con't.)

Four-Year Average	Michigan	Oregon	Washington	Idaho	Northwest States a/	Total Four States	Michigan's Market Share b/
1950-53	6,325	43,900	16,375	19,575	79,850	86,175	7.3
1954-57	5,925	47,025	18,400	20,600	86,025	91,950	6.4
1958-61	7,900	23,775	16,300	18,200	58,275	66,175	11.9
1962-65	11,125	25,825	18,625	20,050	64,500	75,625	14.7
1966-69	15,375	24,625	17,475	15,500	57,600	72,975	21.1
1970-73	16,750	21,400	13,625	10,562	45,587	62,337	26.9
1974-77	15,750	29,250	19,175	6,025	54,450	70,200	22.4
1980-83	13,125	34,500	15,975	7,250	57,725	70,850	18.5

a/ Oregon, Idaho and Washington
b/ Michigan production as a percent of four state total plum production.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 2. Michigan Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a]	Fresh	Canned[b]	Frozen	Fresh	Canned	Frozen
	tons					percent		
1950	6,500	6,500	5,220	1,280	b/	80.3	19.7	---
1951	4,600	4,600	3,310	1,290	b/	72.0	28.0	---
1952	7,500	7,125	5,295	1,830	b/	74.3	25.7	---
1953	6,700	6,700	4,840	1,860	b/	72.2	27.8	---
1954	6,300	6,300	3,515	2,785	b/	55.8	44.2	---
1955	5,200	5,200	2,820	2,380	b/	54.2	45.8	---
1956	4,900	4,900	2,650	2,250	b/	54.1	45.9	---
1957	7,300	6,650	4,150	2,500	b/	62.4	37.6	---
1958	7,800	7,800	4,170	3,630	b/	53.5	46.5	---
1959	6,800	6,800	4,340	2,310	150	63.8	34.0	2.2
1960	8,000	8,000	3,660	4,220	120	45.7	52.7	1.5
1961	9,000	9,000	4,500	4,350	150	50.0	48.3	1.7
1962	8,000	8,000	3,730	4,270	---	46.6	53.4	---
1963	10,500	10,500	3,800	6,340	360	36.2	60.4	3.4
1964	14,500	14,500	6,750	7,135	615	46.6	49.2	4.2
1965	11,500	11,500	4,300	6,835	365	37.4	59.4	3.2
1966	14,000	14,000	6,200	7,050	750	44.3	50.4	5.4
1967	16,000	16,000	5,800	9,250	950	36.2	57.8	5.9
1968	14,000	14,000	4,200	8,825	975	30.0	63.0	7.0
1969	17,500	16,500	7,400	8,480	620	44.8	51.4	3.8
1970	10,000	10,000	5,000	3,850	1,150	50.0	38.5	11.5
1971	25,000	20,000	8,200	11,100	700	41.0	55.5	3.5
1972	14,000	14,000	6,100	6,600	1,300	43.6	47.1	9.3
1973	18,000	18,000	3,650	13,700	650	20.3	76.1	3.6
1974	12,000	12,000	c/	5,700	c/	c/	47.5	c/
1975	21,000	20,000	6,000	11,500	2,500	30.0	57.5	12.5
1976	16,000	16,000	5,000	11,000	b/	28.3	69.2	
1977	14,000	14,000	6,600	6,400	1,000	47.1	45.7	7.2
1978	24,000	24,000	9,400	12,300	2,300	39.2	51.2	9.6
1979	14,000	14,000	7,400	6,000	600	52.9	42.8	4.3
1980	12,500	12,500	5,600	6,900	b/	44.8	55.2	---
1981	16,000	16,000	7,400	8,000	600	46.3	50.0	3.7
1982	11,000	11,000	6,700	3,700	600	60.9	33.6	5.5
1983	13,000	13,000	6,800	5,700	500	52.3	43.8	3.8

(continued)

Appendix Table 2. (Con't.)

Four-Year Average	Total Production	Total Utilization [a]	Fresh	Canned	Frozen	Fresh	Canned	Frozen
	tons					percent		
1950-53	6,325	6,231	4,666	1,565	[b]	74.9	25.1	--
1954-57	5,925	5,762	3,284	2,479	[b]	57.0	43.0	--
1958-61	7,900	7,900	4,167	3,627	105	52.8	45.9	1.3
1962-65	11,125	11,125	4,645	6,145	335	41.8	55.2	3.0
1966-69	15,375	15,125	5,900	8,401	824	39.0	55.5	5.4
1970-73	16,750	15,500	5,737	8,813	950	37.0	56.9	6.1
1974-77	15,750	15,500	5,650	8,650		35.1	55.0	--
1980-83	13,125	13,125	6,625	6,075	566[d]	51.1	45.7	4.3

[a] Difference between total production and total utilization is economic abandonment.
[b] Some amounts of frozen or otherwise processed included with canned.
[c] Not published by Statistical Reporting Service to avoid disclosure of individual operations.
[d] Includes years for which data are available.

Source: Non-Citrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 3. Oregon Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a]	Fresh	Canned[b]	Frozen	Dried[c]	Fresh	Canned	Frozen	Dried
	tons						percent			
1950	22,300	22,300	6,350	11,000	2,500	2,450	28.5	49.3	11.2	11.0
1951	59,800	57,200	12,800	28,550	2,650	13,200	22.4	49.9	4.6	23.1
1952	45,100	43,500	17,200	18,000	800	7,500	39.5	41.4	1.8	17.2
1953	48,400	44,200	18,500	14,500	2,600	8,600	41.9	32.8	5.9	19.5
1954	42,500	42,500	6,900	23,000	2,400	9,900	16.2	54.8	5.6	23.3
1955	52,600	51,900	19,400	17,050	1,050	14,400	37.4	32.9	2.0	27.7
1956	59,000	59,000	9,500	28,050	1,550	19,900	16.1	47.5	2.6	33.7
1957	34,000	29,000	6,000	12,400	700	9,900	20.7	42.8	2.4	34.1
1958	19,700	19,700	3,500	12,700	200	3,300	17.8	64.5	1.0	16.8
1959	44,000	44,000	7,300	18,700	500	17,500	16.6	42.5	1.1	39.8
1960	4,000	4,000	1,650	1,500	150	700	41.2	37.5	3.7	17.5
1961	27,400	27,400	4,380	12,620	650	9,750	16.0	46.1	2.4	35.6
1962	46,000	46,000	7,000	22,300	1,000	15,700	15.2	48.5	2.2	34.1
1963	6,300	6,300	5,500	265	80	455	87.3	4.2	1.3	7.2
1964	23,000	23,000	9,150	8,100	275	5,475	39.8	35.2	1.2	23.8
1965	28,000	28,000	6,700	14,600	1,000	5,700	23.9	52.1	3.6	20.4
1966	25,000	25,000	2,900	14,400	600	7,100	11.6	57.6	2.4	28.4
1967	30,500	30,500	7,350	14,300	1,450	7,400	24.1	46.9	4.8	24.3
1968	11,000	11,000	9,900	800		300	90.0	7.3		2.7
1969	32,000	32,000	3,000	19,300	2,300	7,400	9.4	60.3	7.2	23.1
1970	20,300	20,300	7,100	9,250	b/	3,950	35.0	45.5	b/	19.5
1971	27,900	16,700	3,600	6,650	950	5,500	21.6	39.8	5.7	32.9
1972	8,400	8,400	5,700	500	200	2,000	67.9	6.0	2.4	23.8
1973	32,000	25,800	6,500	7,000	1,250	11,050	25.2	27.1	4.9	42.8
1974	28,000	28,000	8,000	11,100	b/	8,900	28.6	39.6		31.8
1975	30,000	27,500	9,000	7,500	b/	11,000	32.7	27.3		40.0
1976	31,000	29,000	10,500	8,300	b/	10,200	36.2	28.6		35.2
1977	28,000	25,000	7,500	6,700	b/	10,800	30.0	26.8		43.2
1978	17,000	17,000	d/	d/	d/	d/				
1979	26,000	26,000	d/	d/	d/	d/				
1980	35,000	35,000	d/	d/	d/	d/				
1981	38,000	36,000	d/	d/	d/	d/				
1982	37,000	31,000	d/	d/	d/	d/				
1983	28,000	23,000	d/	d/	d/	d/				

(continued)

Appendix Table 3 (Con't.)

Four-year Average	Total Production	Total Utilization[a]	Fresh	Canned[b]	Frozen	Dried[c]	Fresh	Canned	Frozen	Dried
	tons						percent			
1950-53	43,900	41,800	13,712	18,012	2,137	7,938	32.8	43.1	5.1	19.0
1954-57	47,025	45,600	10,450	20,200	1,425	13,525	22.9	44.3	3.1	29.7
1958-61	23,775	23,775	4,207	11,380	375	7,813	17.7	47.9	1.6	32.9
1962-65	25,825	25,825	7,087	11,316	589	6,832	27.4	43.8	2.3	26.5
1966-69	24,625	24,625	5,787	12,200	1,087	5,550	23.5	49.5	4.4	22.5
1970-73	22,150	17,800	5,725	5,950	600	5,625	32.0	32.9	3.4	31.6
1974-77	29,250	27,375	8,750	8,400	b/	10,225	31.9	30.7	-	37.3
1980-83	34,500	31,250								

a/ Difference between total production and total utilization is economic abandonment.
b/ Some quantities frozen, or otherwise processed are included with canned or dried to avoid disclosure of individual operations.
c/ Fresh weight basis.
d/ Not reported by USDA.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 4. Washington Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a/]	Fresh	Canned[b/]	Fresh	Canned
	tons				percent	
1950	13,600	13,600	10,400	3,200	76.5	23.5
1951	12,700	12,700	9,240	3,460	72.8	27.2
1952	17,100	17,100	11,410	5,690	66.7	33.3
1953	22,100	19,950	14,520	5,430	72.8	27.2
1954	15,100	15,100	10,600	4,500	70.2	29.8
1955	25,000	23,800	14,900	8,900	62.6	37.4
1956	17,500	17,500	12,600	4,900	72.0	28.0
1957	16,000	16,000	12,740	3,260	79.6	20.4
1958	13,500	13,500	11,250	2,250	83.3	16.7
1959	22,500	21,300	15,400	5,900	72.3	27.7
1960	10,100	9,875	8,170	1,705	82.7	17.3
1961	19,100	18,100	12,200	5,900	67.4	32.6
1962	21,400	19,600	13,800	5,800	70.4	29.6
1963	16,100	15,160	8,400	6,760	55.4	44.6
1964	23,300	21,400	14,200	7,200	66.4	33.6
1965	13,700	12,700	9,100	3,600	71.7	28.3
1966	17,200	16,400	13,840	2,560	84.4	15.6
1967	12,700	11,300	8,300	3,000	73.5	26.5
1968	11,000	9,800	7,100	2,700	72.4	27.6
1969	29,000	27,200	18,200	9,000	66.9	33.1
1970	9,700	9,400	7,700	1,700	81.9	18.1
1971	16,500	15,500	10,960	4,540	70.7	29.3
1972	12,500	12,400	10,310	2,090	83.1	16.9
1973	14,700	14,700	11,600	3,100	78.9	21.1
1974	21,100	21,100	16,150	4,950	76.5	23.5
1975	20,600	20,600	16,050	4,550	77.9	22.1
1976	23,000	23,000	17,150	5,850	74.6	25.4
1977	12,000	12,000	9,600	2,400	80.0	20.0
1978	21,300	21,300	15,300	6,000	71.8	28.2
1979	14,700	14,700	12,100	2,600	82.3	17.7
1980	23,100	23,100	18,000	5,100	77.9	22.1
1981	14,600	14,600	11,200	3,400	76.7	23.3
1982	11,500	11,500	10,050	1,450	87.4	12.6
1983	14,700	14,700	12,100	2,600	82.3	17.7

(continued)

Appendix Table 4 (Con't.)

Four-year Average	Total Production	Total Utilization[a/]	Fresh	Canned[b/]	Fresh	Canned
	tons				percent	
1950-53	16,375	15,837	11,392	4,445	71.9	28.1
1954-57	18,400	18,100	12,710	5,390	70.2	29.8
1958-61	16,300	15,694	11,755	3,939	74.9	25.1
1962-65	18,625	17,215	11,375	5,840	66.1	33.9
1966-69	17,475	16,175	11,860	4,315	73.3	26.7
1970-73	13,350	13,000	10,142	2,857	78.0	22.0
1974-77	19,175	19,175	14,737	4,437	76.9	23.2
1980-83	15,975	15,975	12,837	3,137	80.4	19.6

a/ Difference between total production and total utilization is economic abandonment.
b/ Small amounts of frozen, dried, or otherwise processed included with canned in some years; after 1973 is all processed.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 5. Idaho Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a/]	Fresh	Canned	Fresh	Canned
	tons				percent	
1950	10,000	10,000	9,600	400	96.0	4.0
1951	22,600	22,600	20,700	1,900	91.6	8.4
1952	24,800	23,500	21,700	1,800	92.3	7.7
1953	20,900	20,100	18,300	1,800	91.0	9.0
1954	12,700	12,700	12,700	b/	100.0	--
1955	22,200	20,400	18,200	2,200	89.2	10.8
1956	25,500	25,500	25,500	b/	100.0	--
1957	22,000	22,000	22,000	b/	100.0	--
1958	19,100	19,100	19,100	b/	100.0	--
1959	22,600	22,600	22,600	b/	100.0	--
1960	10,600	10,600	10,600	b/	100.0	--
1961	20,500	20,500	17,000	3,500	82.9	17.1
1962	16,700	16,700	14,130	2,570	84.6	15.4
1963	19,000	19,000	12,285	6,490	65.8	34.2
1964	23,500	11,788	6,501	5,133	56.5	43.5
1965	21,000	20,374	16,241	4,133	79.7	20.3
1966	11,000	10,780	10,780	b/	100.0	--
1967	16,500	16,172	12,893	3,279	79.7	20.3
1968	9,000	6,480	3,810	2,670	58.8	41.2
1969	25,500	18,500	14,680	3,820	79.4	20.6
1970	7,150	7,140	6,740	410	94.3	5.7
1971	19,000	12,800	11,520	1,280	90.0	10.0
1972	7,500	77,080	6,930	150	97.9	2.1
1973	8,600	8,050	7,600	450	94.4	5.6
1974	6,100	6,100	c/	c/		
1975	4,000	3,500	3,500	--	100.0	--
1976	7,000	5,500	5,500	--	100.0	--
1977	7,000	7,000	7,000	--	100.0	--
1978	7,500	6,900	c/	c/		
1979	7,500	7,500	c/	c/		
1980	8,000	8,000	c/	c/		
1981	7,500	7,500	c/	c/		
1982	7,000	7,000	c/	c/		
1983	6,500	6,500	c/	c/		

(continued)

Appendix Table 5 (Con't)

Four-Year Average	Total Production	Total Utilization[a/]	Fresh	Canned	Fresh	Canned
	tons				percent	
1950-53	19,575	19,050	17,575	1,475	92.3	7.7
1954-57	20,600	20,150	19,475	550	96.7	2.7
1958-61	18,200	18,200	17,325	875	95.2	4.8
1962-65	20,050	16,965	12,384	4,581	73.0	27.0
1966-69	15,500	12,983	10,541	2,442	81.2	18.8
1970-73	10,562	8,770	8,197	572	93.5	6.5
1974-77	6,025	5,525	5,333[d/]	--		
1980-83	7,250	7,250				

a/ Difference between production and total utilization is economic abandonment.
b/ Some quantities, canned, frozen, or otherwise processed are included with fresh sales to avoid disclosure of individual operations.
c/ Not reported by USDA.
d/ Includes years for which data are available.

Source: Noncitrus Fruits and Nuts. Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 6. Northwest State Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a]	Fresh	Canned	Frozen & Other	Dried[c]	Fresh	Canned	Frozen & Other	Dried
	tons						percent			
1950	45,900	45,900	26,350	14,600	2,500	2,450	57.4	31.8	5.4	5.3
1951	95,100	92,500	42,740	33,910	2,650	13,200	46.2	36.7	2.9	14.3
1952	87,000	84,100	50,310	25,490	800	7,500	59.8	30.3	1.0	8.9
1953	91,400	84,250	51,320	21,730	2,600	8,600	60.9	25.8	3.1	10.2
1954	70,300	70,300	29,700	27,800	2,400	9,900	42.2	39.5	3.4	14.1
1955	99,800	96,100	52,500	28,150	1,050	14,400	54.6	29.3	1.1	15.0
1956	102,000	102,000	47,600	32,950	1,550	19,900	46.7	32.3	1.5	19.5
1957	72,000	67,000	40,740	15,660	700	9,900	60.8	23.4	1.0	14.8
1958	52,300	52,300	33,850	14,950	200	3,300	64.7	28.6	0.4	6.3
1959	89,100	87,900	45,300	24,600	500	17,500	51.5	28.0	0.7	19.9
1960	24,700	24,475	20,420	3,205	150	700	83.4	13.1	0.6	2.9
1961	67,000	66,000	33,580	22,020	650	9,750	50.9	33.4	1.0	14.8
1962	84,100	82,300	34,930	30,670	1,000	15,700	42.4	37.3	1.2	19.1
1963	41,400	40,460	26,410	13,515	80	455	65.3	33.4	0.2	1.1
1964	69,800	56,188	30,005	20,433	275	5,475	53.4	36.4	0.5	9.7
1965	62,700	61,074	32,041	22,333	1,000	5,700	52.5	36.6	1.7	9.3
1966	53,200	52,180	27,520	16,960	600	7,100	52.7	32.5	1.1	13.6
1967	59,700	57,972	28,543	20,579	1,450	7,400	49.2	35.5	2.5	12.8
1968	31,000	27,280	20,810	6,170	--	300	76.3	22.6	--	1.1
1969	86,500	77,700	35,880	32,120	2,300	7,400	46.2	41.3	3.0	9.5
1970	37,150	36,850	21,540	11,360	--	3,950	58.5	30.8	--	10.7
1971	63,400	45,000	26,080	12,470	950	5,500	58.0	27.7	2.1	12.2
1972	28,400	27,880	22,940	2,740	200	2,000	82.3	9.8	0.7	7.2
1973	55,300	48,550	25,700	8,030	1,300	13,520	53.0	16.6	2.6	27.8
1974	55,200	55,200	b/	12,965	b/	12,035	--	23.5	--	21.8
1975	54,600	51,600	28,550	12,000	50	11,000	55.3	23.3	0.1	21.3
1976	61,000	57,500	33,150	b/	b/	12,850	57.7	--	--	22.3
1977	47,000	44,000	24,100	7,800	300	11,800	54.8	17.7	0.7	26.8
1978	45,800	45,200	31,550	3,800	800	9,050	69.8	8.4	1.8	20.0
1979	48,200	48,200	29,100	5,900	1,300	11,900	60.4	12.2	2.7	24.7
1980	66,100	66,100	35,000	11,600	2,200	17,300	53.0	17.5	3.3	26.2
1981	60,100	57,600	25,700	8,900	900	22,100	44.6	15.5	1.6	38.4
1982	55,500	49,500	20,750	4,350	700	23,700	47.9	8.8	1.4	47.9
1983	49,200	44,200	24,200	3,430	600	15,970	54.8	7.8	1.3	36.1

(continued)

Appendix Table 6. (Con't)

Four-Year Average	Total Production	Total Utilization[a/]	Fresh	Canned	Frozen & Other	Dried[c/]	Fresh	Canned	Frozen & Other	Dried
	tons						percent			
1950-53	79,850	76,687	42,680	23,932	2,137	7,938	55,7	31.2	2.8	10.4
1954-57	86,025	83,850	42,635	26,140	1,425	13,525	50.8	31.2	1.7	16.1
1958-61	58,275	57,669	33,287	16,194	375	7,813	57.7	28.1	0.7	13.5
1962-65	64,500	60,005	30,846	21,738	589	6,832	51.4	36.2	1.0	11.4
1966-69	57,600	53,783	28,188	18,957	1,087[d/]	5,550	52.4	35.2	2.1	10.3
1970-73	46,062	39,570	24,065[d/]	8,650[d/]	816[d/]	6,242	60.8	21.8	2.0	15.7
1974-77	54,450	52,075	28,600[d/]	10,921[d/]	175[d/]	11,921	54.9	21.0	0.3	22.9
1980-83	57,725	54,350	26,412	7,070	1,100	19,768	50.1	12.4	1.9	37.1

a/ Difference between total production and total utilization is economic abandonment.
b/ Not reported.
c/ Fresh weight basis.
d/ Includes years for which data is available.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 7. Four State Plum Production and Utilization

Crop Year	Total Production	Total Utilization[a/]	Fresh	Canned	Frozen & Other	Dried	Fresh	Canned	Frozen & Other	Dried
	tons						percent			
1950	52,400	52,400	31,570	15,880	2,500	2,450	60.2	30.3	4.8	4.7
1951	99,700	97,100	46,050	35,200	2,650	13,200	47.4	36.3	2.7	13.6
1952	94,500	91,225	55,605	27,320	800	7,500	61.0	29.9	0.9	8.2
1953	98,100	90,950	56,160	23,590	2,600	8,600	61.7	25.9	2.9	9.5
1954	76,600	76,600	33,215	30,585	2,400	9,900	43.4	39.9	3.1	12.9
1955	105,000	101,300	55,320	30,530	1,050	14,400	54.6	30.1	1.0	14.2
1956	106,900	106,900	50,250	35,200	1,550	19,900	47.0	32.9	1.4	18.6
1957	79,300	73,650	44,890	18,160	700	9,900	61.0	24.7	1.0	13.4
1958	60,100	60,100	38,020	18,580	200	3,300	63.3	30.9	0.3	5.5
1959	95,900	94,700	49,640	26,910	650	17,500	52.4	28.4	0.7	18.5
1960	32,700	32,475	24,080	7,425	270	700	74.1	22.9	0.8	2.2
1961	76,000	75,000	38,080	26,370	800	9,750	50.8	35.2	1.1	13.0
1962	92,100	90,300	38,660	34,390	1,000	15,700	42.8	38.7	1.1	17.4
1963	51,900	50,960	30,210	19,855	440	455	59.3	39.0	0.9	0.9
1964	84,300	70,688	36,755	27,568	890	5,475	52.0	39.0	1.3	7.7
1965	74,200	72,574	36,341	29,165	1,365	5,700	50.1	40.2	1.9	7.9
1966	67,200	66,180	33,720	24,010	1,350	7,100	51.0	36.3	2.0	10.7
1967	75,700	73,972	34,343	29,829	2,400	7,400	46.4	40.3	3.2	10.0
1968	45,000	41,280	25,010	14,995	975	300	60.6	36.3	2.4	0.7
1969	104,000	94,200	43,280	40,600	2,920	7,400	45.9	43.1	3.1	7.9
1970	47,150	46,850	26,540	15,210	1,150	3,950	56.6	32.5	2.5	8.4
1971	88,400	65,000	34,280	23,570	1,650	5,500	52.7	36.3	2.5	8.5
1972	42,500	41,880	29,040	7,460	3,380	2,000	69.3	17.9	8.0	4.8
1973	73,300	66,550	29,350	21,730	1,950	13,520	44.1	32.7	2.9	20.3
1974	67,200	67,200	34,350	18,665	2,150	12,035	51.1	27.8	3.2	17.9
1975	75,600	71,600	34,550	23,500	2,550	11,000	48.3	32.8	3.6	15.4
1976	77,000	73,500	38,150	20,900	1,600	12,850	51.9	28.4	2.2	17.5
1977	61,000	58,000	30,700	14,200	1,300	11,800	52.9	24.5	2.2	20.3
1978	69,800	69,200	40,950	16,100	3,100	9,050	59.2	23.3	4.5	13.1
1979	62,200	62,200	36,500	11,900	1,900	11,900	58.7	19.1	3.1	19.1
1980	78,600	78,600	40,600	18,500	2,200	17,300	51.7	23.5	2.7	22.0
1981	76,100	73,600	33,100	16,900	1,500	22,100	45.0	23.0	2.0	30.0
1982	66,500	60,500	27,450	8,050	1,300	23,700	45.4	13.3	2.2	39.2
1983	62,200	57,200	31,000	9,130	1,100	15,970	54.2	16.0	1.9	27.9

(continued)

Appendix Table 7 (Con't)

Four-year Average	Total Production	Total Utilization[a/]	Fresh	Canned	Frozen & Other	Dried	Fresh	Canned	Frozen & Other	Dried
	tons						percent			
1950-53	86,175	82,919	47,346	25,497	2,137	7,938	57.1	30.7	2.6	9.6
1954-57	91,950	89,612	45,919	28,619	1,425	13,525	51.2	31.9	1.6	15.1
1958-61	66,175	65,569	37,455	19,821	480	7,813	57.1	30.2	0.7	11.9
1962-65	75,625	71,130	35,491	27,883	924	6,832	49.9	39.2	1.3	9.6
1966-69	72,975	68,908	34,088	27,358	1,911	5,550	49.5	39.7	2.8	8.1
1970-73	62,837	55,070	29,802	16,992	2,032	6,242	54.1	30.8	3.6	11.3
1974-77	70,200	67,575	34,437	19,316	1,900	11,921	51.0	28.6	2.8	17.6
1980-83	70,850	67,475	33,038	13,145	1,525	19,768	49.0	19.0	2.3	29.8

a/ Difference between total production and total utilization is economic abandonment.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 8. Plum and Prune Market Share by State

State or Region	Percent of Four-State Total Market Sales						
	Fresh		Canning		Drying	Freezing & Other	
	1970-75	1980-83	1970-75	1980-83	1970-75 only	1970-75	1980-83
Michigan	18	20	44	46	0	54	36
Oregon	21	b/	37	b/	100	46	b/
Washington	38	39	b/	b/	0	0	b/
Idaho	23	b/	2	b/	0	0	b/
Northwest States[a/]	82	80	56	54	100	46	64

a/ Includes Oregon, Washington, and Idaho.
b/ Not reported by USDA.
Source: Computed from data reported in Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 9. Plum and Prune Tree Numbers by States

State	1950 Census	1954 Census	1959 Census	1964 Census	1969 Census	1974 Census	1978 Census	1982 Census
	1,000 trees							
Bearing Trees								
Michigan	265	229	237	349	579	601	481	298
Idaho	349	299	296	339	329	156	119	98
Washington	487	435	276	303	312	228	208	198
Oregon	2,142	1,290	1,026	617	787	682	584	439
Northwest Total	2,978	2,024	1,598	1,259	1,428	1,066	911	735
4-State Total	3,243	2,253	1,835	1,608	2,007	1,667	1,392	1,033
Nonbearing Trees								
Michigan	109	90	136	295	187	95	107	89
Idaho	77	63	87	78	29	35	36	21
Washington	195	30	95	99	31	14	32	67
Oregon	158	123	255	289	221	61	45	43
Northwest Total	430	216	437	466	281	110	113	131
4-State Total	539	306	573	761	468	205	220	220
Total Trees								
Michigan	374	319	373	643	766	696	587	387
Idaho	426	362	383	417	358	191	155	119
Washington	682	465	381	402	343	242	241	265
Oregon	2,300	1,413	1,281	906	1,008	743	629	482
Northwest Total	3,408	2,240	2,035	1,725	1,709	1,176	1,025	866
4-State Total	3,782	2,554	2,408	2,368	2,475	1,872	1,612	1,253
Nonbearing Trees as a Percent of Bearing Trees	percent							
Michigan	41	39	58	85	32	16	22	30
Idaho	22	21	29	23	9	22	30	21
Washington	40	7	34	33	10	6	15	34
Oregon	7	10	25	47	28	9	7	10
Northwest Total	14	11	27	37	20	10	12	18
4-State Total	17	14	31	47	23	12	15	25

Source: U. S. Census of Agriculture, Bureau of the Census, U. S. Department of Commerce.

Appendix Table 10. Trends in Michigan Plum Tree Numbers by Area

Northwest Michigan (Area 1)[a/]

Crop Year	Total Trees	Non Bearing Trees [f/]	Bearing Trees [f/]	Percent Bearing Trees [b/]	Area's Share of State's Total Trees [c/]	Farms With Plums	Average Plum Acreage per Farm [d/]
				percent			acres
1950	24,079	8,947	15,132	63	6	786	.3
1954	39,750	18,462	21,288	54	12	493	.8
1959	78,263	32,225	46,038	59	21	556	1.4
1964	168,759	91,832	76,927	46	26	581	2.9
1969	197,362	51,822	145,540	74	26	345	5.7
1974	159,267	21,985	102,318	88	22	260	6.1
1978	183,920	54,535	129,385	70	31	223	8.2
1982	115,375	25,285	90,090	78	30	150	7.7

West Central Michigan (Area 2)[e/]

Crop Year	Total Trees	Non Bearing Trees [f/]	Bearing Trees [f/]	Percent Bearing Trees [b/]	Area's Share of State's Total Trees [c/]	Farms With Plums	Average Plum Acreage per Farm [d/]
				percent			acres
1950	39,227	10,298	28,929	74	11	483	.8
1954	47,970	16,342	31,648	66	15	298	1.6
1959	71,716	31,628	40,088	56	19	287	2.5
1964	119,621	49,007	70,614	59	19	270	4.4
1969	126,692	28,488	98,204	78	17	193	6.6
1974	140,369	16,225	115,246	88	20	164	8.6
1978	105,023	15,147	89,866	86	18	137	7.7
1982	87,603	23,925	63,678	73	23	91	9.6

Central Michigan (Area 3)

Crop Year	Trees Trees	Non Bearing Trees [f/]	Bearing Trees [f/]	Percent Bearing Trees [b/]	Area's Share of State's Total Trees [c/]	Farms with Plums	Average Plum Acreage per Farm [d/]
				percent			acres
1950	28,438	8,357	20,081	71	8	908	.3
1954	29,045	8,898	20,147	70	9	325	.9
1959	42,310	18,830	23,980	57	11	280	1.5
1964	92,702	48,041	44,661	48	14	301	3.1
1969	107,628	22,238	85,390	79	14	158	6.8
1974	95,220	16,199	68,890	81	14	138	6.9
1978	86,751	10,008	58,666	85	15	117	7.4
1982	34,524	5,507	29,017	84	9	49	7.0

(continued)

Appendix Table 10 (con't)

Southwest Michigan (Area 4)

Crop Year	Total Trees	Non Bearing Trees f/	Bearing Trees f/	Percent b/ Bearing Trees	Area's Share c/ of State's Total Trees	Farms with Plums	Average Plum d/ Acreage per Farm
				------ percent ------			---- acres ---
1950	211,248	61,166	150,082	71	57	2,165	1.0
1954	163,191	35,601	127,653	78	51	1,297	1.3
1959	152,540	47,967	104,573	69	41	1,003	1.5
1964	236,177	95,932	140,245	59	37	950	2.5
1969	320,426	83,158	237,268	74	42	568	5.6
1974	288,813	30,032	243,256	89	41	470	6.1
1978	196,664	22,989	173,675	88	33	395	5.0
1982	138,643	29,151	109,492	79	36	245	5.7

Michigan

Crop Year	Total Trees	Non Bearing Trees	Bearing Trees	Percent b/ Bearing Trees	Farms with Plums	Average Plum d/ Acreage per Farm
				--percent--		----acres----
1950	374,067	109,091	264,976	71	18,240	0.7
1954	319,551	90,060	229,491	72	5,858	1.2
1959	373,783	136,458	237,325	64	4,079	1.6
1964	643,246	294,646	348,600	54	3,163	2.9
1969	766,361	187,122	579,239	75	1,313	6.0
1974	696,544	95,230	601,314	86	1,114	6.3
1978	587,183	106,668	480,515	82	1,093	5.4
1982	387,558	89,441	298,117	77	749	5.2

a/ See Figure 1 for the four Michigan area locations.
b/ Bearing trees as a percent of total trees.
c/ Area's percent of Michigan trees of all ages.
d/ Assuming 100 trees per acre.
e/ Newaygo County is included in the West Central Area
f/ For certain years, the sum of bearing and non-bearing trees is less than the total trees because some county data on bearing and non-bearing trees is not reported by the census to avoid disclosure of individual farm operations.

Source: U.S. Census of Agriculture, Bureau of Census, U.S. Department of Commerce.

Appendix Table 11. California Plum Production and Utilization

Crop Year	Plum Production	Utilization	
		Fresh	Processed
	tons		
1950	77,000	73,400	1,600
1951	97,000	91,300	2,700
1952	53,000	50,900	2,100
1953	84,000	75,300	1,700
1954	71,000	64,500	2,500
1955	86,000	80,800	3,200
1956	100,000	92,100	3,900
1957	81,000	75,400	2,600
1958	61,000	57,000	4,000
1959	93,000	85,600	4,400
1960	82,000	77,000	3,000
1961	87,000	80,100	4,900
1962	84,000	74,900	7,100
1963	106,000	95,200	5,800
1964	113,000	105,200	4,800
1965	113,000	102,600	5,400
1966	95,000	82,400	3,600
1967	98,000	90,400	4,600
1968	106,000	100,700	5,300
1969	67,000	63,600	2,400
1970	123,000	119,300	3,700
1971	101,000	98,200	2,800
1972	96,000	93,300	2,700
1973	97,000	93,800	2,900
1974	143,000	140,000	3,000
1975	124,000	121,400	2,600
1976	115,000	111,900	3,100
1977	157,000	156,000	1,000
1978	154,000	151,000	3,000
1979	175,000	a/	a/
1980	160,000	157,400	2,600
1981	197,500	194,300	3,200
1982	118,000	116,600	1,400
1983	158,000	155,700	2,300
1950-53	77,750	74,750	2,025
1954-57	84,500	81,250	3,050
1958-61	80,750	79,000	4,075
1962-65	104,000	100,500	5,755
1966-69	91,500	88,500	4,225
1970-73	104,250	104,250	3,100
1974-77	134,750	132,330	2,425
1980-83	158,375	156,000	2,375

a/ Not published by USDA.

Source: Noncitrus Fruits and Nuts, Statistical Reporting Service, U.S. Department of Agriculture (various issues).

Appendix Table 12. California Plum Acreage

Year	Bearing Acres	Non-Bearing Acres	Total Acres	Non-Bearing as a Percent of Bearing Acres
1960	23,270	6,140	29,410	26
1961	22,210	5,840	28,050	26
1962	23,240	4,960	28,200	21
1963	24,230	5,930	30,160	24
1964	25,480	5,190	30,670	20
1965	25,420	3,480	28,900	14
1966	22,090	2,960	25,050	13
1967	22,780	2,100	24,880	9
1968	22,380	3,970	26,350	18
1969	21,000	4,500	25,500	21
1970	21,340	5,000	26,340	23
1971	21,660	5,450	27,110	25
1972	22,780	5,420	28,200	24
1973	23,030	5,600	28,630	24
1974	24,520	5,470	29,990	22
1975	23,810	6,380	30,190	27
1976	25,020	6,450	31,470	26
1977	26,060	6,860	32,920	26
1978	26,800	8,250	35,050	31
1979	28,240	11,140	39,380	39
1980	29,360	11,640	41,000	40
1981	30,850	11,320	42,170	37
1982	32,990	9,660	42,650	29
1983	34,070	10,500	44,570	31
1984	34,150			

Source: California Fruit and Nut Acreage, California Crop and Livestock Reporting Service (various issues).

Appendix Table 13. California Prune Acreage

Year	Bearing Acres	Non-bearing Acres	Total Acres	Non-Bearing as a Percent of Bearing Acres
1970	96,250	14,000	110,250	14
1971	88,210	13,230	101,440	15
1972	86,020	10,010	96,030	12
1973	81,210	8,730	89,940	11
1974	79,660	7,840	87,500	10
1975	77,970	8,300	86,270	11
1976	74,080	8,340	82,420	11
1977	74,880	8,270	83,150	11
1978	74,960	8,470	83,430	11
1979	73,640	9,460	83,100	13
1980	69,360	12,910	82,270	19
1981	65,020	12,650	77,670	19
1982	66,180	12,500	78,680	19
1983	67,290	11,930	79,220	18
1984	66,500			

Source: California Fruit and Nut Acreage, California crop and Livestock Reporting Service (various issues).

Appendix Table 14. U. S. Canned Purple Plum Pack by Regions

Crop Year	Northwest States	Michigan	Other States[a]	U. S. Total	Percentage of U.S. Total Pack		
					Northwest States	Michigan	Other States
	1,000 cases, 24 No. 2½ equivalents				percent		
1960	220	120	34	374	59	32	9
1961	1,440	158	39	1,637	88	10	2
1962	1,835	154	71	2,060	89	8	3
1963	828	255	87	1,170	71	22	7
1964	1,178	277	42	1,497	79	19	2
1965	1,336	321	72	1,729	77	19	4
1966	1,027	415	46	1,488	69	28	3
1967	1,337	471	50	1,858	72	25	3
1968	255	425	51	731	35	58	7
1969	1,708	412	89	2,209	77	19	4
1970	527	222	39	788	67	28	5
1971	593	567[b]	39[b]	1,199	50	47	3
1972	34	324[b]	36[b]	394	9	82	9
1973	504	735	23	1,261	41	57	2
1974	791	363	12	1,166	68	31	1
1975	709	689	49	1,447	49	48	3
1976	598	444	--	1,042	57	43	--
1977	441	376	--	817	54	46	--
1978	222	701	--	923	24	76	--
1979	333	378	--	711	47	53	--
1980	656	410	--	1,066	62	38	--
1981	554	386	--	940	59	41	--
1982	260	118	--	378	69	31	--
1983	179	264	--	443	40	60	--
1960-62	1,165	144	48	1,357	86	11	3
1962-65	1,294	252	68	1,614	80	16	4
1966-69	1,081	431	59	1,571	69	27	4
1970-73	414	462	34	910	45	51	4
1974-77	635	468	--	1,118	56	41	--
1980-83	412	295	--	707	58	42	--

a/ New York and Indiana; combined with Michigan beginning in 1976.
b/ Calculated estimates based upon partial data from industry sources.
Source: National Food Processors Association.

Appendix Table 15. Total U.S. Pack of Canned Purple Plums

Crop Year	Total Pack All Sizes	Total Consumer Pack[a]	Total Institutional Pack[b]	24/2½ Size as % of Total Pack	24/303 as % of Total Pack	6/10 Size as % of Total Pack
	---1,000 cases, 24 No. 2½ equivalents---			----------Percent----------		
1950	1,026	809	271	61.4	0.9	21.2
1951	2,360	1,798	562	56.7	6.8	23.8
1952	1,623	1,176	447	50.9	7.3	27.5
1953	1,399	1,088	311	56.4	3.7	22.2
1954	1,706	1,264	443	55.2	8.7	25.9
1955	1,698	1,253	445	58.2	6.4	26.2
1956	2,330	1,661	669	53.7	9.4	28.7
1957	1,077	802	275	49.8	11.4	25.5
1958	1,271	759	512	43.9	12.6	40.3
1959	1,701	1,040	662	49.6	8.6	38.9
1960	374	208	166	37.7	15.1	44.3
1961	1,637	1,035	604	47.5	12.3	36.9
1962	2,060	1,330	730	51.4	10.7	35.4
1963	1,170	809	363	54.4	12.3	31.0
1964	1,497	1,007	490	50.4	13.9	32.8
1965	1,729	1,321	409	63.1	10.5	23.6
1966	1,488	935	553	49.6	10.5	37.2
1967	1,858	1,213	645	51.8	11.4	34.7
1968	731	516	215	52.7	14.5	29.5
1969	2,209	1,382	827	45.6	14.1	37.4
1970	788	581	207	51.9	15.4	26.3
1971	1,199	699	500	41.0	8.7	41.7
1972	394	219	176	32.0	17.4	44.6
1973	1,261	807	455	40.9	20.9	36.0
1974	1,166	825	341	43.0	25.3	29.0
1975	1,447	816	631	40.4	15.4	43.6
1976	1,041	439	602	26.1	14.9	57.8
1977	817	570	247	42.8	25.0	30.2
1978	923	492	431	31.1	21.3	46.7
1979	711	400	311	30.0	24.9	43.7
1980	1,066	596	470	33.2	22.1	44.1
1981	940	443	497	24.7	22.1	52.9
1982	379	191	188	21.6	28.8	49.6
1983	443	196	247	20.3	23.4	55.7
1950-53	1,950	1,218	384	55.9	4.7	24.0
1954-57	2,231	1,245	460	54.6	9.0	26.9
1958-61	1,485	760	486	46.6	12.2	39.0
1962-65	2,022	1,116	498	54.8	11.9	30.8
1966-69	2,020	1,012	560	49.2	12.6	35.6
1970-73	1,646	576	334	42.3	15.6	36.7
1974-77	1,118	663	455	38.1	20.1	40.2
1980-83	707	357	350	25.0	24.1	50.6

[a] Includes 24/2½, 24/303, misc. 24/8 oz.
[b] 6/10 only

Source: National Food Processors Association.

Appendix Table 16. U. S. Canned Purple Plum Pack by Can Size

Crop Year	Can Size						Total 24 No. 2½ Equivalent
	24/8 oz.	24/303	24/2½	6/10	Misc.[a/]	Total[b/]	
	1,000 actual cases						
1950	76	17	630	236	33	1,019	1,026
1951	260	282	1,339	611	70	2,603	2,360
1952	136	208	826	486	50	1,736	1,623
1953	110	158	789	338	60	1,467	1,399
1954	100	260	941	481	15	1,800	1,706
1955	214	192	988	484	23	1,930	1,698
1956	170	385	1,251	727	5	2,540	2,330
1957	146	215	536	299	4	1,200	1,077
1958	134	280	558	557	3	1,532	1,271
1959	140	256	843	719	17	1,975	1,701
1960	36	99	141	180	1	457	374
1961	162	353	778	656	10	1,959	1,637
1962	150	385	1,059	793	14	2,401	2,060
1963	98	252	636	394	--	1,380	1,170
1964	130	366	755	533	11	1,795	1,497
1965	126	317	1,091	444	19	1,997	1,729
1966	96	275	738	601	19	1,729	1,488
1967	126	372	962	701	3	2,164	1,858
1968	56	186	385	234	11	872	731
1969	180	548	1,008	899	17	2,652	2,209
1970	98	213	409	225	31	976	788
1971	86	321	491	543	--	1,441	1,199
1972	--	120	126	191	24	461	394
1973	91	463	516	494	--	1,564	1,261
1974	99	518	501	371	--	1,489	1,166
1975	38	392	582	686	--	1,697	1,447
1976	44	272	272	654	--	1,242	1,042
1977	55	359	350	268	--	1,032	817
1978	26	346	287	469	--	1,128	923
1979	34	311	213	338	--	896	711
1980	26	414	354	511	--	1,305	1,066
1981	27	358	232	541	--	1,157	940
1982	--	178	82	204	15	479	379
1983	--	184	90	268	6	549	443
1950-53	146	166	896	418	53	1,706	1,602
1954-57	158	263	929	498	12	1,868	1,703
1958-61	118	247	580	528	8	1,481	1,246
1962-65	126	330	885	541	11	1,893	1,614
1966-69	115	345	773	609	13	1,854	1,572
1970-73	69	279	386	363	14	1,111	911
1974-77	59	385	426	495	--	1,365	1,118
1980-83	13	284	190	381	5	873	706

a/ Includes mostly consumer sizes.
Source: National Food Processors Association

Appendix Table 17. U.S. Canned Purple Plums -- Carryover, Pack, Total Supply and Movement

Crop Year	Carryover of June 1	Total U.S. Pack	Total U.S. Supply[a/]	Total U.S. Movement[b/]
	---------- 1,000 Cases, 24 No. 2 1/2 Equivalents ----------			
1950	338	1,026	1,364	1,269
1951	95	2,360	2,455	1,929
1952	526	1,623	2,149	1,716
1953	433	1,399	1,832	1,502
1954	330	1,706	2,036	1,535
1955	501	1,698	2,199	1,674
1956	525	2,330	2,855	2,072
1957	783	1,077	1,860	1,663
1958	197	1,271	1,468	1,208
1959	260	1,701	1,961	1,685
1960	276	374	650	612
1961	38	1,637	1,675	1,293
1962	382	2,060	2,442	1,706
1963	736	1,170	1,906	1,338
1964	568	1,497	2,065	1,503
1965	562	1,729	2,291	1,558
1966	733	1,488	2,221	1,759
1967	462	1,858	2,320	1,802
1968	518	731	1,249	998
1969	251	2,209	2,460	1,543
1970	917	788	1,705	1,255
1971	450	1,199	1,649	1,273
1972	376	394	770	713
1973	57	1,261	1,318	1,100
1974	218	1,166	1,384	1,011
1975	373	1,447	1,820	1,019
1976	800	1,041	1,842	1,249
1977	594	817	1,411	1,000
1978	411	923	1,334	1,056
1979	278	711	989	839
1980	151	1,066	1,217	709
1981	508	940	1,447	820
1982	627	379	1,006	775
1983	231	443	674	579
1950-53	348	1,602	1,950	1,604
1954-57	535	1,703	2,238	1,736
1958-61	193	1,246	1,439	1,200
1962-65	562	1,614	2,176	1,526
1966-69	491	1,572	2,063	1,526
1970-73	450	911	1,361	1,085
1972-75	256	1,067	1,323	961
1974-77	496	1,118	1,614	1,070
1980-83	379	707	1,086	720

[a/] Supply equals pack plus carryover.
[b/] Movement equals beginning of year carryover, plus pack, minus end-of-year carryover.

Source: National Food Processors Association.

Appendix Table 18. U.S. Canned Purple Plum Shipments

Crop Year	June 1 to Nov.1	Nov.1 to Jan.1	Jan.1 to April 1	April 1 to June 1	Total Movement
	----------1,000 cases 24 No. 2 1/2 equivalents----------				
1959	315	728	361	281	1,685
1960	296	143	124	49	612
1961	256	311	264	192	1,293
1962	664	343	416	283	1,706
1963	497	305	303	233	1,338
1964	572	369	310	252	1,503
1965	584	263	447	264	1,558
1966	681	425	461	192	1,759
1967	602	490	440	270	1,802
1968	443	160	261	134	998
1969	603	372	395	203	1,543
1970	558	268	263	166	1,255
1971	441	401	269	162	1,273
1972	348	121	179	65	713
1973	290	374	322	114	1,100
1974	489	212	123	187	1,011
1975	427	143	280	169	1,019
1976	534	245	299	171	1,249
1977	393	197	283	125	1,000
1978	341	334	277	104	1,056
1979	351	198	192	98	839
1980	270	148	185	106	709
1981	243	270	170	136	821
1982	355	139	136	142	775
1983	211	127	152	89	579

Source: National Food Processors Association.

Appendix Table 19. Michigan Canned Purple Plums--
Carryover, Pack, Supply and Movement

Crop Year	Carryover	Pack	Supply[a/]	Movement[b/]
	----------1,000 cases, 24/ No.2 1/2 equivalents----------			
1960	11	120	131	122
1961	9	158	167	143
1962	24	154	178	105
1963	73	255	328	207
1964	121	277	398	291
1965	107	321	428	308
1966	120	415	535	434
1967	101	471	572	469
1968	103	425	528	404
1969	124	412	536	395
1970	141	222	363	293
1971	70	567	637	510
1972[c/]	127	324	451	402
1973	41	734	775	622
1974	153	363	516	367
1975	149[d/]	689	838	416
1976[e/]	422	444	866	598
1977	268	376	644	452
1978	192	701	893	724
1979	169	378	547	473
1980	74	410	484	254
1981	230	386	616	409
1982	207	118	325	242
1983	83	264	347	281
1960-62	15	144	159	123
1962-65	81	252	333	228
1966-69	112	431	626	426
1970-73	97	462	559	457
1974-77	248	468	716	458
1980-83	148	295	443	296

a/ Supply equals pack plus carryover.
b/ Movement equals beginning of year carryover, plus pack, minus end-of-year carryover.
c/ Calculated estimates based upon partial data from industry sources.
d/ Includes "other states."
e/ For 1976 and later years includes "Michigan" and "other states" as reported together by the National Food Processors Association.

Source: National Food Processors Association.

Appendix Table 20. Michigan Canned Purple Plum Pack by Can Size

Crop Year	Can Size								Total 24 No. 2½ Equivalents
	24/303		24/2½		6/10		Misc.[a]	Total	
	cases	% of pack[d]	cases	% of pack[d]	cases	% of pack[d]			
	1,000 actual cases								1,000 cases
1960	8	4	20	17	103	79	1	132	120
1961	1	1	20	13	150	87	-	171	158
1962	9	3	26	17	132	79	6	173	154
1963	17	4	84	33	175	63	3	279	255
1964	47	10	104	38	159	53	-	310	277
1965	14	3	185	58	135	39	5	339	321
1966	25	3	201	48	215	48	3	444	415
1967	35	4	234	50	233	46	3	505	471
1968	56	8	260	61	136	29	7	459	425
1969	31	4	219	53	188	42	8	446	412
1970	9	2	127	57	96	40	1	233	222
1971	74	7	243	43	307	50	2	626	567
1972 [b]	87	15	113	35	172	49	2	374	324
1973	182	14	317	43	340	43	-	839	734
1974	105	17	171	47	143	36	-	419	363
1975	115	10	300	44	352	47	-	767	689
1976 [c]	68	9	108	24	324	67	-	500	443
1977	87	13	190	51	148	36	-	325	376
1978	208	17	254	36	357	47	-	819	701
1979	142	21	148	39	162	39	-	452	378
1980	124	17	169	41	187	42	-	480	410
1981	105	15	113	29	233	55	-	451	386
1982	55	26	44	37	47	36	-	146	118
1983	102	22	63	23	156	54	-	321	264
1960-62	6	3	22	15	128	82	-	158	144
1962-65	22	5	99	36	250	58	-	274	252
1966-69	37	5	228	53	193	41	-	463	431
1970-73	88	10	200	45	229	45	-	518	462
1974-77	94	12	192	41	242	46	-	503	468
1980-83	97	20	97	33	156	47	-	350	295

a/ Includes mostly consumer sizes.
b/ Calculated estimates based upon partial data from industry sources.
c/ For 1976 and later years includes "Michigan and other states" as reported together by the National Food Processors Association.
d/ Percent of the pack in 24/2½ equivalents.

Source: National Food Processors Association.

Appendix Table 21. Northwest Canned Purple Plums -- Carryover, Pack, Supply and Movement

Crop Year	Carryover	Pack	Supply[a/]	Movement[b/]
	1,000 cases, 24 No. 2½ equivalents			
1960	247	220	467	441
1961	26	1,440	1,466	1,112
1962	354	1,835	2,189	1,544
1963	645	828	1,473	1,051
1964	422	1,178	1,600	1,164
1965	436	1,336	1,772	1,196
1966	576	1,027	1,603	1,251
1967	352	1,337	1,689	1,291
1968	398	255	653	544
1969	109	1,708	1,817	1,080
1970	642	527	1,169	819
1971	350	593	943	718
1972	225	34	259	247
1973	12	504	516	468
1974	48	791	839	615
1975	224	709	933	555
1976	378	598	976	650
1977	326	441	767	548
1978	219	222	441	332
1979	109	333	442	365
1980	77	656	733	455
1981	278	554	832	412
1982	420	260	680	532
1983	148	179	327	298
1960-62	209	1,165	1,374	1,032
1962-65	464	1,294	1,759	1,239
1966-69	359	1,082	1,441	1,042
1970-73	307	414	722	563
1974-77	244	635	879	592
1980-83	231	412	643	424

a/ Supply equals pack plus carryover.
b/ Movement equals beginning-of year carryover, plus pack, minus end-of-year carryover.

Source: Northwest Food Processors Association.