

## THE "SHIFTING SANDS" OF POTATO PRODUCTION

by

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The modern potato industry in Washington is relatively young compared to a number of other states and several years ago trends within the state were discussed. Data, such as that provided in Figure 1, showing acres and production of Washington potatoes were provided in that discussion. It is fairly common knowledge that the Washington industry has grown quite significantly since potatoes were introduced in the Columbia Basin. Figure 1 shows how harvested acres has increased from less than 40,000 acres to over 120,000 acres between 1960 and 1990. More recently, while the trend has been upward, we have seen some fairly significant shifts from year to year. Of particular interest is the difference between 1980 and 1990 harvested acreage. Although 1980 was influenced by the large crop in 1978 and the resulting extremely low prices, it does offer a point for discussion. The difference between 1980 and 1990 is roughly 40,000 acres and we will return to that figure later in the discussion. The other thing to note about Figure 1 is the growth in production over that period of time. Note how production, relative to harvested acreage, has been increasing. Growth in yields played a key role in that pattern.

### Production and Yield Trends

For purposes of this discussion, the reader should view the paper as an opportunity to take a look at some historic patterns that are occurring within the potato industry and use those trends in addressing the question "How will I adjust to these trends?" Quite often the tendency is to deal with short-term issues and not recognize some of the longer-term trends that are occurring at the same time. Occasionally, it is useful to think of those long-term patterns and give some thought to the implications for the farm business.

The first point that deserves mentioning and recognition is that the potato industry is more than just Washington, more than just Oregon, more than just Idaho. It is important to recognize that the potato industry here is really a Pacific Northwest industry. Certainly some problems are very local in nature. Research in the use of fertilizers, for example, may require specific information for different growing areas. Yet once the potatoes leave the farm gate it is no longer rational to think of the industry as a Washington industry or an Idaho industry or an Oregon industry, it is a Pacific Northwest industry.

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If there is any doubt about the validity of that statement, merely consider the volume of potatoes that are trucked back and forth among the three states. State borders are an artificial boundary established for political purposes and have no role in the dynamics of the market economy beyond local grade standards. I recognize that politics can influence the economic arena by defining the boundaries within which the game is to be played, but in industries that are relatively unfettered with regulations, state boundaries are of minimal importance. As a result, much of this discussion will focus on the Pacific Northwest rather than on individual states.

Potato production has undergone some major long-term trends that are not immediately obvious when looking at ten or twenty or thirty years of data. Figure 2 provides a longer-term trend information on production and acreage. U.S. potato acreage increased throughout the late 1800s until about 1910 when 3.6 million acres were planted to potatoes. Between 1910 and 1980, acreage followed a persistent downward trend reaching a low of 1.15 million acres. Since 1980 acreage has slowly been increasing and by 1990 was back up to 1.36 million acres. During that same time period, potato production followed a continuous, inexorable increase in production suggesting that, particularly since 1910, yields have been trending upward.

In addition to these long-term trends in U.S. potato acreage and production, there have been substantial shifts in acreage by region. Figure 3 shows potato acreage by region. Note how, prior to 1950, the Midwest contained the largest amount of potato acreage. The Northeast contained the second largest volume of acreage and the Southeast was number three. By 1950, substantial changes had occurred with major declines in both the Midwest and the Northeast as well as the other regions with only the West and the Pacific Northwest showing growth in acreage. It is interesting to note that in 1900 and 1925 the Midwest had more acreage planted to potatoes than were planted to potatoes in the U.S. in 1990.

By 1975 the Pacific Northwest had become the most important potato producing region in terms of acreage. By that time every other region had gone through declines in potato acreage. Since 1975 the Midwest has begun to increase acreage somewhat and the West, excluding the Pacific Northwest, has gone through some growth in acreage. But the biggest gain has been in the Pacific Northwest.

Figure 4 looks at potato production using the same regional breakdown. This chart shows that the Pacific Northwest has really become dominant in terms of potato production. Some modest gain in production has occurred in the Southeast and the rest of the West and Midwest. The Northeast has continued to decline and the south has essentially seen little change. By 1990 the Pacific Northwest alone was producing over 200 million hundredweight of potatoes, more than double any other region in the U.S. The shift in acreage and production to the Northwest is dramatic.

It probably substantiates what most of us already knew subconsciously. The importance of that shift should not be downplayed. It shows the strength of the industry in this region and based on that strength one would expect this to be a pattern to be continued at least into the near future.

Potato yields, on the other hand, show some extremely interesting patterns. Figure 5 shows yields by region. Yields declined late in the 1800s. Part of this may have been weather as these are specific years and certainly crops are influenced by weather and that may be a factor in the lower yields in 1900, 1925, and 1875. It is also possible that because of the large amount of acreage planted to potatoes during the early 1900s, some marginal land may have been planted to potatoes which brought yields down.

But there is another even more interesting pattern here to yields as we move into the more recent years. Note, while yields generally increased every time period between 1900 and 1990, the way the curves move suggest some possible problems in the future. While yields are continuing to increase, the increases over each time period appear to be smaller.

Figure 6 shows that pattern even more dramatically. This figure shows the change in yields over each 25-year period. For example, the first set of points which are on the left vertical axis represent the difference between yields in 1875 and 1900. As seen on the earlier graph, yields were lower in 1900 than in 1875, therefore, they intersect the vertical axis at points below the zero line. The difference between 1900 and 1925, represented by the next set of points (with the exception of the point for the South) are above the zero line indicating that yields increased between 1900 and 1925. Similarly, we have an increase in yields between 1925 and 1950, 1950 and 1975, and another increase in yields between 1975 and 1990. What is interesting about this is that if you track particular lines note how, for example, the Northeast yields increased somewhat between 1900 and 1925 and increased dramatically between 1925 and 1950. The increase in yield between those two years was over 100 hundredweight per acre. By the 1950 to 1975 time period, the increase in yields had dropped down to roughly 20 hundredweight and increased somewhat for the period 1975 to 1990.

Turning to the Northwest, yields increased at an increasing rate, i.e., the difference in the points were successively higher in the graph as they go from the second set of points 1900 to 1925. One way to describe this is that yields were increasing at an increasing rate between 1900 and 1975 in the Pacific Northwest. What is disconcerting is that the yield gains from 1975 to 1990 have been smaller. In other words, the increase in yields between 1975 and 1990 were quite small and I recognize that we're looking at a 15-year period, but the pattern for all regions is downward and suggests that yield improvements are becoming more difficult to achieve.

Figure 7 shows the changes in average yields for each 5-year period so each point in Figure 7 represents the difference in 5-year averages for each of the three Northwest states. Averages were calculated, for example, for the time period 1923 to 1927, 1928 to 1932, and then the average for 1925 was subtracted from the average for 1930 and that then determined the level of the point of this particular point.

Figure 7 shows how, first of all, Idaho has not had major gains in yields between any two 5-year averages. At the same time, they have always been able to at least maintain yields. Only during one time period did yields remain constant reflecting a zero point on the chart.

Oregon showed fairly significant gains prior to 1950, started to lose some of those gains and then continued to improve yields since 1950 with a really major increase between 1970 and 1975. As far as can be determined, this improvement was due to the increase in acreage in potato production in the Southern Columbia Basin around the Boardman and Hermiston areas. Since that time their gain in yields has been more typical of the other two states.

Washington has seen continued growth in yields as well. However, note that since 1960 the improvement in yields in Washington have slowly but steadily been declining until the 5-year average yield for 1990 was less than the average yield for 1985.

In essence, these charts on yields indicate that improvements in yields have been harder and harder to achieve and raises a question as to whether we may be at a point where further improvements are going to be very difficult to achieve. There are certainly a variety of reasons why this may be occurring - fertilization rates, timing of fertilization, and varieties all may come into play. One of the factors that may be relevant here is the volume of acreage planted to early potatoes. Figure 8 shows potato yields in the Columbia Basin project as reported by the U.S. Bureau of Reclamation for early potatoes and late potatoes. The late potatoes show a nearly steady increase in yields, particularly since 1975. Early potato yields, on the other hand, have been much more erratic and have been declining in recent years. The major unknown here is the amount of acreage planted to early potatoes in Washington. The greater the amount of early acreage, the greater the impact on state yields.

#### Some Potato Farm Characteristics

Agriculture, in general, has suffered through a long period of declining numbers of producers and the potato industry is no different. Figure 9 shows the number of farms producing potatoes in each of the last five agricultural census years. The taller bar in this figure represents U.S. potato growers and the shorter black bar represents growers in the Pacific Northwest. In 1969 there were 55,455 potato growers in the U.S. By 1987 that number had declined to 14,782, a decline of 73%. Pacific Northwest, during that same time period, dropped from 4,601 potato growers in 1969 to 2,766 potato growers in 1987 which is a decline of only 40%. So, as an industry, the number of individual growers in the U.S. has declined dramatically while in the Northwest the numbers have been declining more slowly.

The Pacific Northwest actually represents now a greater proportion of the potato growers. In percentage terms, the Pacific Northwest has gone from 8% of growers to 18% over that 18-year period again suggesting a shift in the potato industry to the Northwest as was seen in the acreage and production figures.

Figure 10 shows the number of growers for each of the Northwest states over that same time period. Idaho has dropped from 3,049 growers in 1969 to 1,792 growers in 1987 which is a 41% drop. Oregon also declined 41% from 827 to 488 growers. Washington declined from 725 growers to 486 growers in 1987 which is a 33% decline. So, while the number of growers has declined in the Northwest following the trend across the country, the declines have been much less dramatic than for the U.S. as a whole.

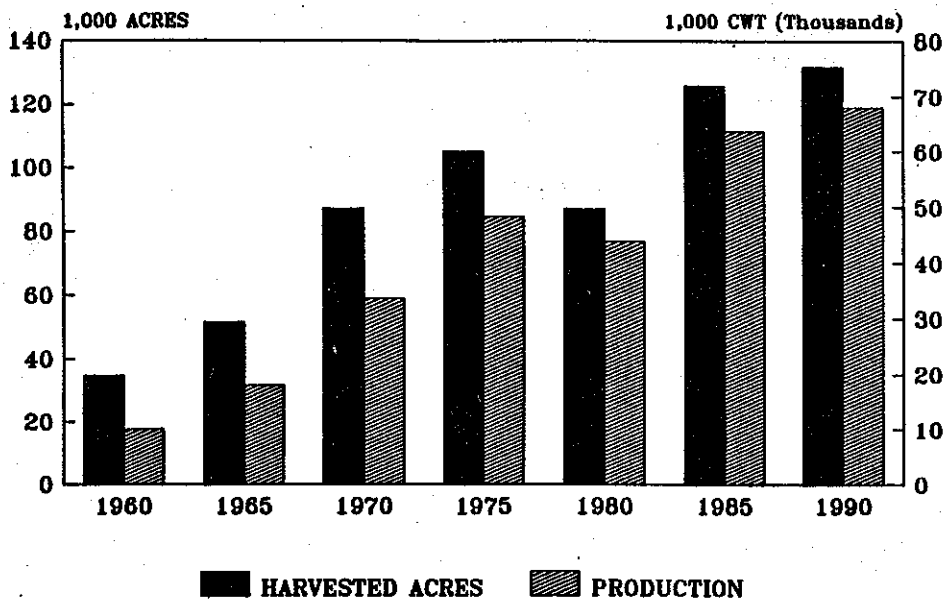
Figure 11 shows potato acres per grower again using data from the various censuses of agriculture. Each bar represents acreage per grower for each of the indicated areas. The shortest bar for all five years is for the U.S. In 1969 the average acreage per potato grower in the U.S. was 22 acres. By 1987 it had increased to 88 acres. Idaho increased from 90 acres to 197 acres over that same period. Oregon grew from 56 acres in 1969 to 120 acres. Washington increased from 87 acres to 227 acres between 1969 and 1987. In the current environment there is nothing to suggest that this trend will not continue.

### Summary

In summary, we have shown that total potato production is increasing. That could be seen both by the figure on total U.S. production as well as Washington production. Given the trends in acreage and production, growth is likely to be in the Pacific Northwest although the Midwest and the rest of the West may also gain acreage and there is room for expansion of acreage in the Northwest, but not for unlimited growth. This is important to recognize. Discussions with Dr. Robert Thornton suggests that roughly 150,000 acres is available for potato production on a sustainable basis. The expansion of the East High project would add approximately another 20,000 acres to that so that the acreage potential in Washington is 150,000 to 170,000 acres depending upon the development of the East High project. Looking at the growth in acreage that occurred between 1980 and 1990 suggests that we may reach our maximum potential within the next 10 to 15 years. Beyond that time period then either additional gains in yields will be necessary or production shift to other areas of the country.

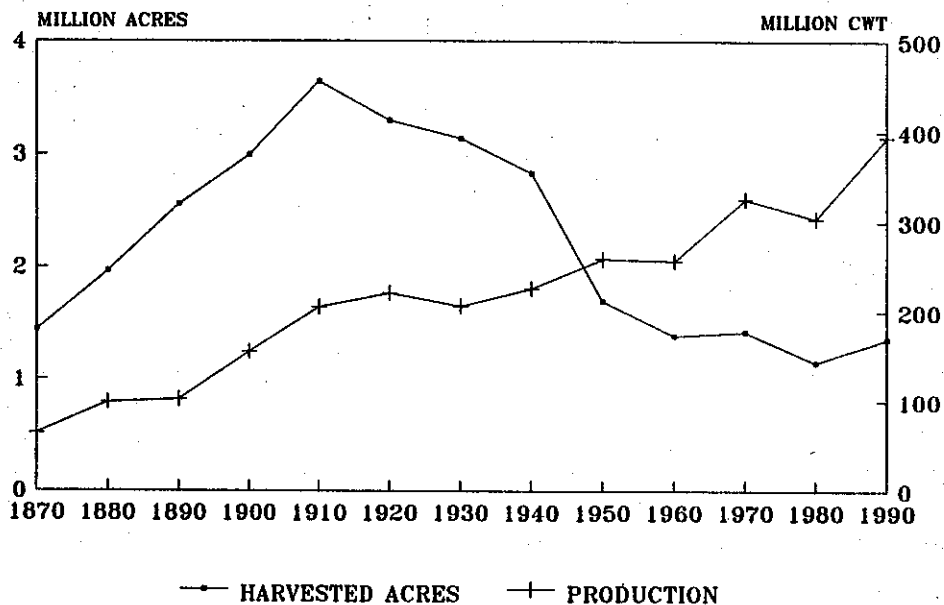
We also saw that grower numbers are declining as is the pattern in agriculture generally and that the average acre per grower is increasing. Many forces are combining to create these trends within agriculture. The implication for the industry in this area suggests that further increases in acreage will be limited in the not-too-far distant future and if the working relationship between the processor and producer stabilizes one could envision a scenario where the processors turned increasingly to larger producers to meet the bulk of their needs in an effort to minimize the number of negotiations required at contract signing time. So, while the industry may continue to be in a growth phase for the next ten years, we may well see the potato industry stabilizing in acreage and becoming a mature nongrowth industry within the next decade or so.

Figure 1. Acres and Production - Washington Potatoes.



USDA, ERS, POTATO FACTS, various issues

Figure 2. U.S. Potato Acreage and Production.



USDA, ERS, STATISTICAL BUL. NO. 122 & 824  
 USDA, ERS, POTATO FACTS

Figure 3. Acreage by Region.

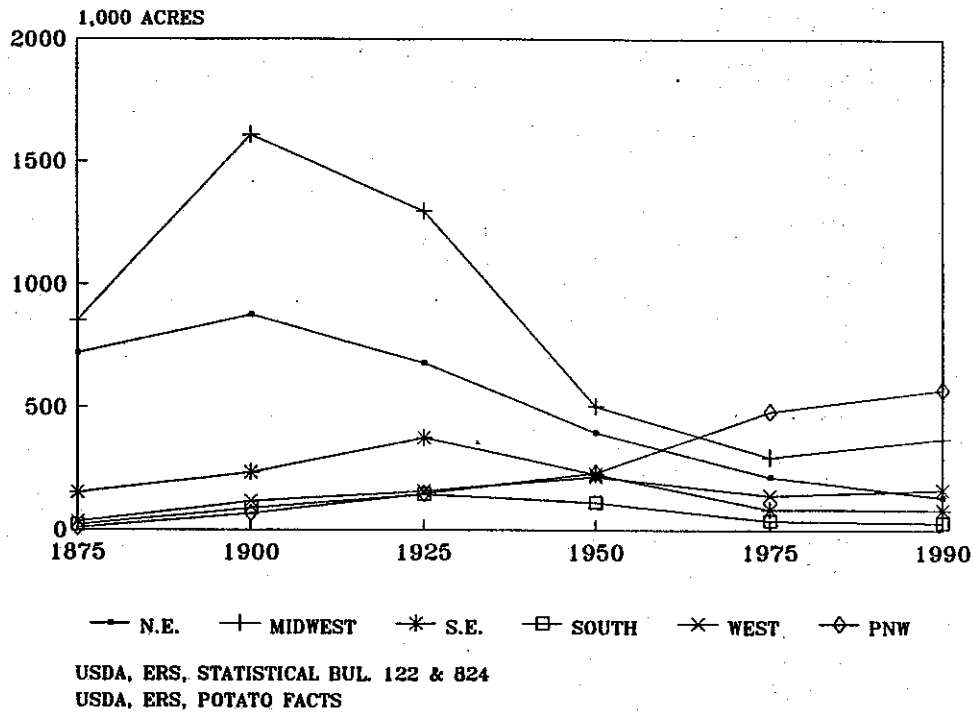


Figure 4. Potato Production by Region.

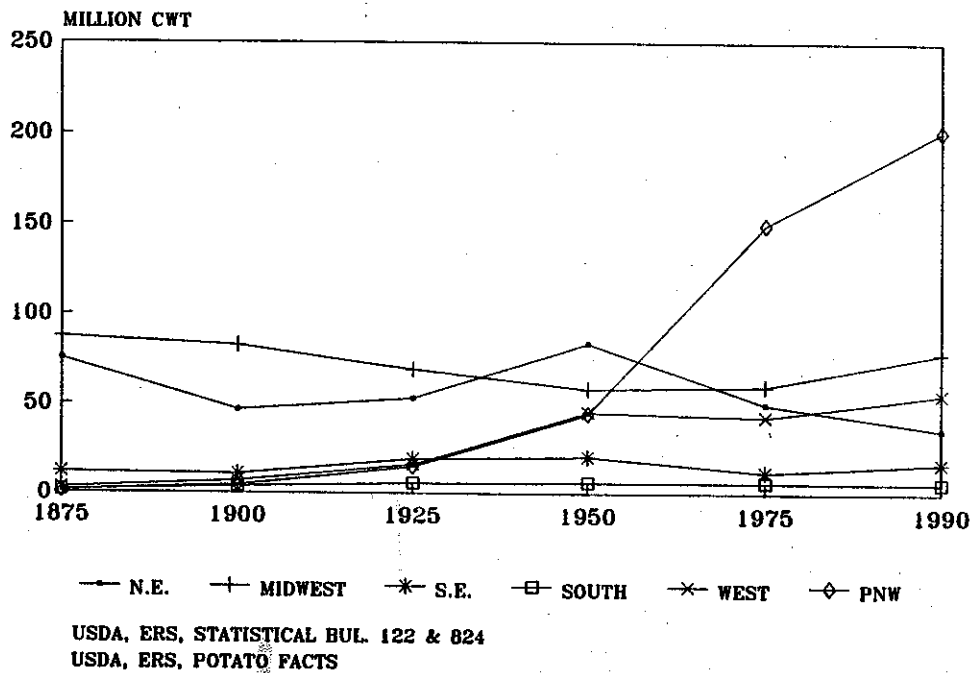


Figure 5. Potato Yields by Region.

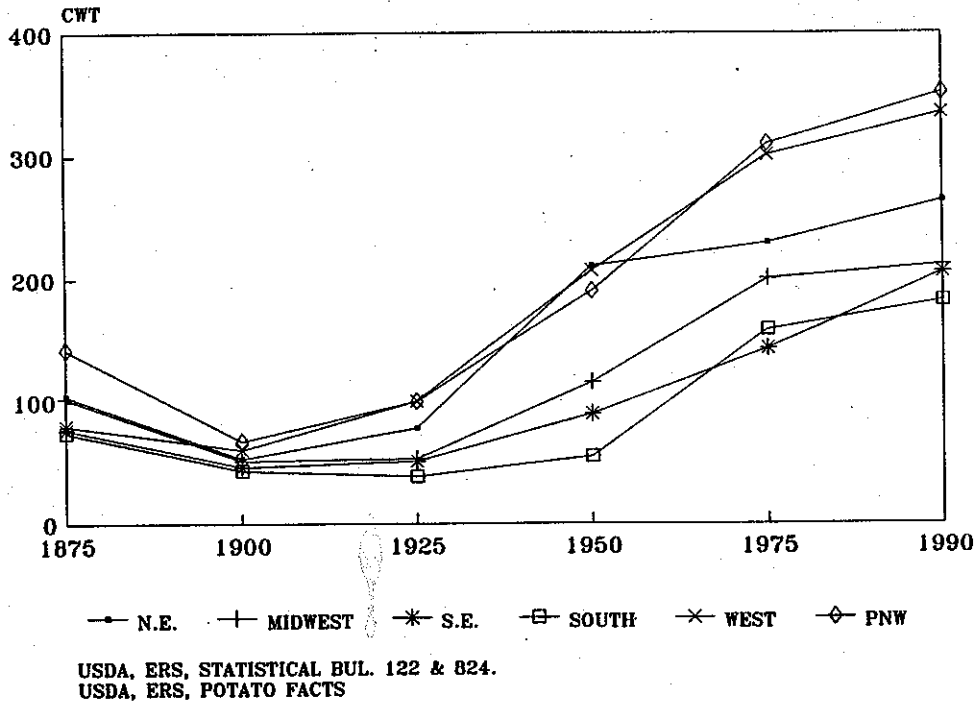


Figure 6. Changes in Yields by Region.

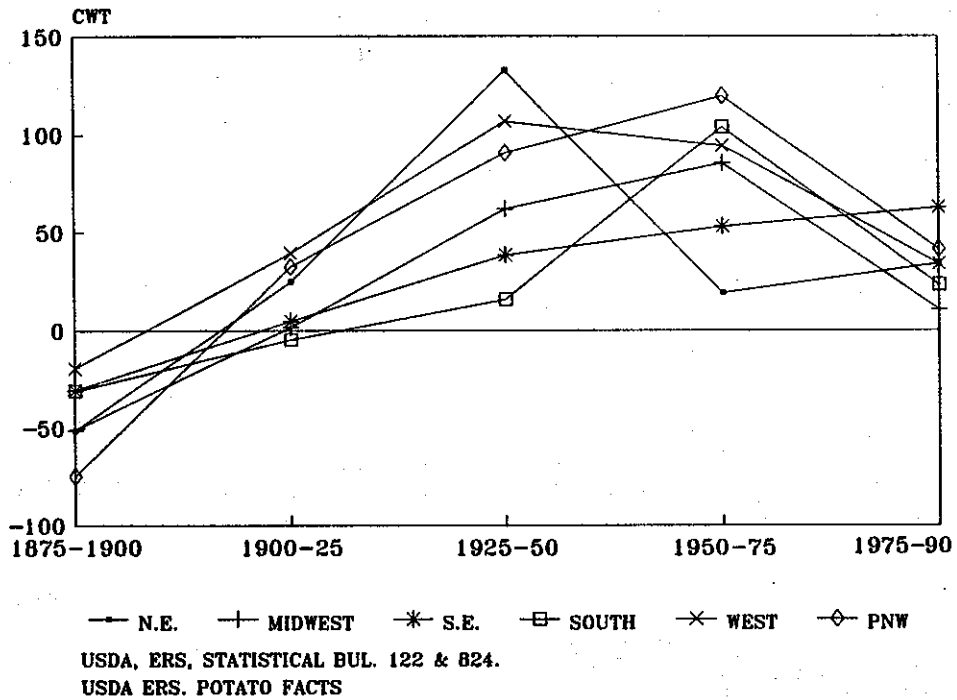




Figure 7. Changes in Average Yields - 5 Year Averages.

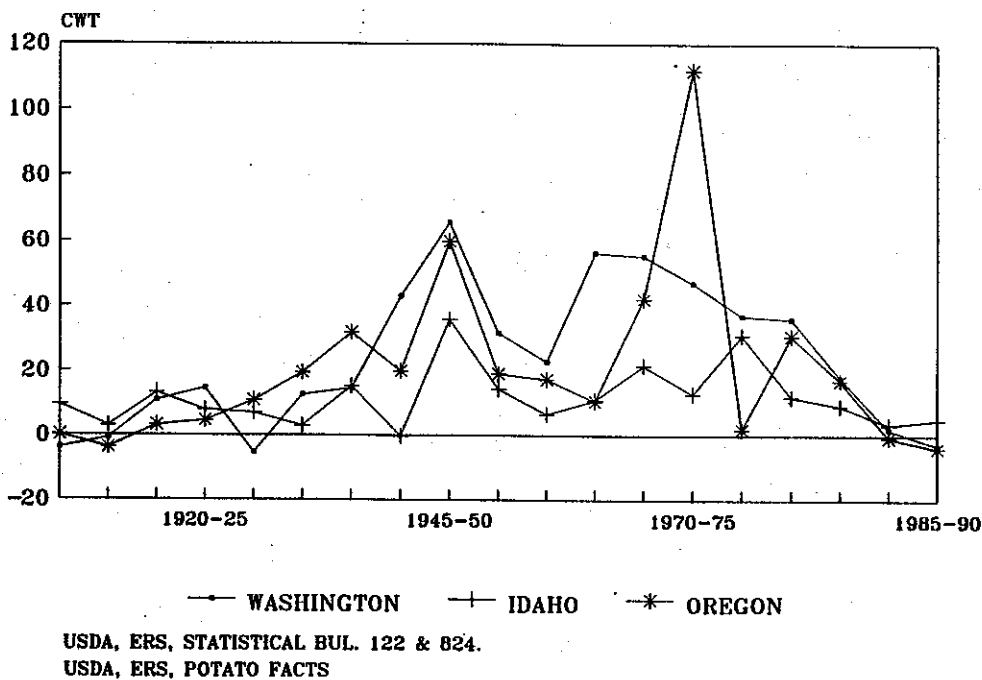


Figure 8. Potato Yields - Columbia Basin Project.

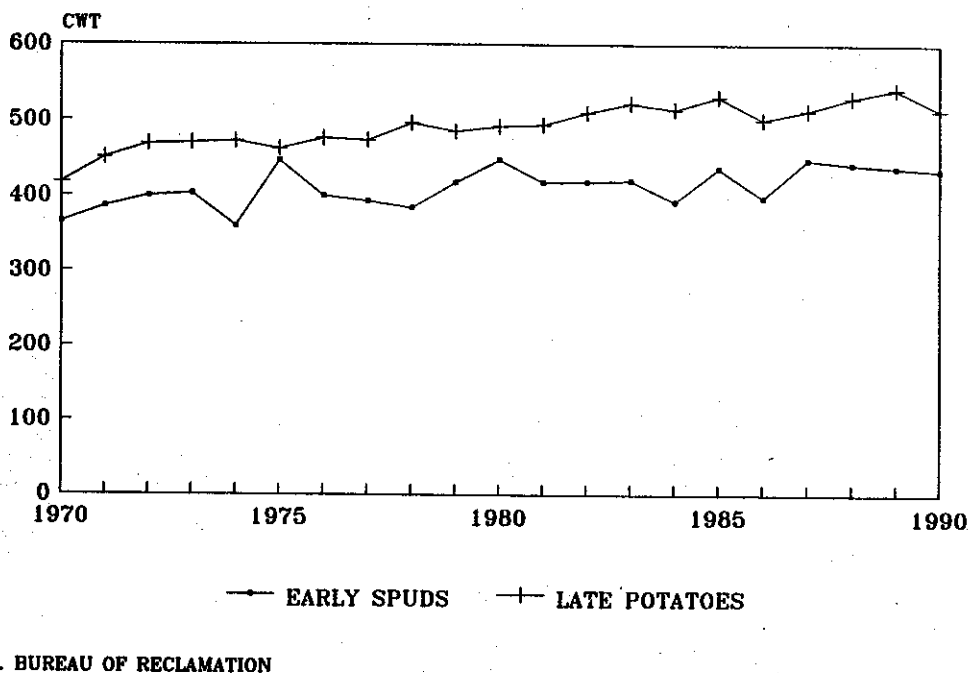
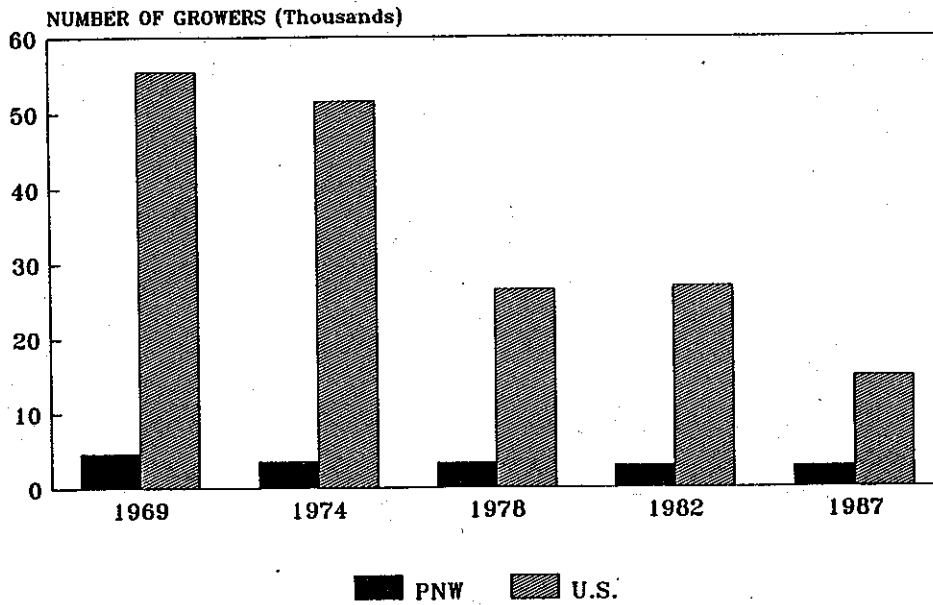
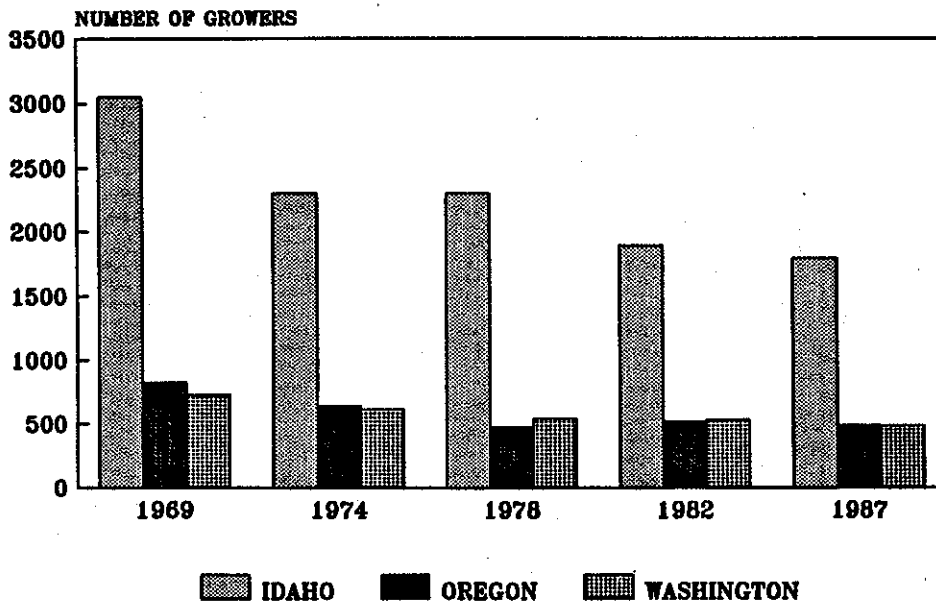


Figure 9. Number of Potato Growers - Census Years.



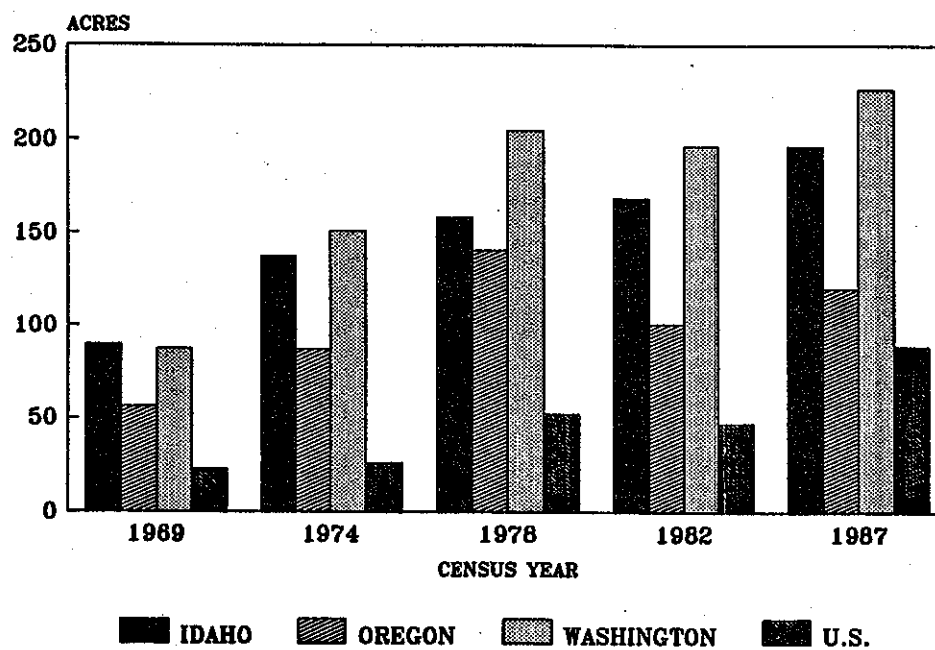
U.S. CENSUS OF AGRICULTURE, VAR. YRS.

Figure 10. Number of Potato Growers - Census Years.



U.S. CENSUS OF AGRICULTURE, VAR. YRS.

Figure 11. Potato Acres Per Grower.



U.S. CENSUS OF AGRICULTURE, VAR. YRS.