AN INVENTORY AND ANALYSIS OF PACIFIC NORTHWEST AGRICULTURAL LAND USE PROJECTIONS

by

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ABSTRACT. This paper is a summary of a larger project that consolidated agricultural land use projection information for the Pacific Northwest, as of January 1979. The characteristics of nine major projection studies are identified and used as a basis for comparing the relative merits of each study with regard to: 1) methodology, 2) assumptions, 3) data base, 4) time frame, 5) geographic coverage, and 6) selected projected futures. In addition, the applicability and limitations of the projection information are summarized.

INTRODUCTION

Resource planners in the Pacific Northwest must take into account the future, as well as the present, when making decisions for the region. Planners lack the means to foresee actual future conditions, so projection studies are commonly used as benchmarks of the future to help guide decision making processes. As a result, future oriented management decisions are to a degree dependent upon the quality of these benchmark studies. This paper is aimed at assessing the quality and relative advantages of the agricultural land use projections currently available to resource planners in the Pacific Northwest.

This paper is a summary of a larger project that consolidated agricultural land use projection information for the Pacific Northwest, as of January 1979. The general characteristics of nine major projection studies are identified and used as a basis for comparing the relative merits of each study with regard to: 1) methodology, 2) assumptions, 3) data base, 4) time frame, 5) geographic coverage and 6) selected projected futures. In addition, the applicability and limitations of the projection information are summarized.

BACKGROUND

The argument has been made that, as a geographer, one should be primarily concerned with the "present" areal variation and interrelationships of phenomena (Hartshorne, 1962). It is the contention of this paper, however, that geography is a study that embraces a continuum of time and space relationships. In addition to an awareness of presently existing phenomena, a geographer must understand the landscapes of the past and potential landscapes in the future. A geographer must be aware of, and have the ability to understand the degree of, the regularity, rate, and direction of change in his environment (Broek, 1966, pg. 76). As stated by the National Academy of Sciences (1965, pg. 9), "For the problems it treats, that of the man-environment system, geography is concerned primarily with space in time." Projections provide a means to analyze spatial relationships, as they conceivably may exist at future points in time.

There are strong ties between the development and utilization of land use and economic projections, and the discipline of geography. One sector of geography where projections can be a valuable asset is land use planning. In particular, long-range regional planning can benefit from properly developed and interpreted projection data. The decision making capabilities of planners can be enhanced by the use of baseline projections in the assessment of future demands for water and related land resources (U.S. Water Resources Council, 1974, pg. 7). Projection

data can also be useful as an indicator of potential economic problem areas, and help to portray the nature and dimensions of future economic conditions (U.S. Water Resources Council, 1974, pg. 7). These types of contributions are beneficial if not essential for comprehensive long-range planning.

Projection methods may also prove to be of value in the updating of basic inventory information. Basic inventories provide only a static observation of the state of a resource, at a particular point in time. It is not feasible to initiate an inventory of a resource at all points in time when up-to-date information is needed. Therefore, it would seem there is a place for the modeling of resource change, in order to attain an estimation through simulation of the current resource state (Buchman, 1978). In other words, known inventory information could be updated, revised and moved through time, via a projection system.

It would seem acceptable to conclude that projections can indeed be of value to geographers, and definitely do contribute to the science of geography. It should also be pointed out that geographers are in an excellent position to contribute to the development of projection systems. Many variables upon which projections are dependent must be identified and quantified through the research and analysis of human and physical environmental factors; for example, land resource availability, water availability, migration trends, national and international trade flows, and so forth. As a result, the development of projections in general, and land use projections in particular, should be considered within the scope of applied geographic research.

With the connection between geography and projections established, the implied meaning of the term "projection", as it is used in this paper, should be examined. Due to the varying levels of effort and complexity found in projection procedures, and the diversity of the actual phenomena that is projected, it is difficult to fully explain the theory or processes involved in the development of projections. A summarization by the U.S. Water Resources Council (1974, pg. 5), however, does help to organize and clarify the matter.

> ". . .projections, are conditional forecasts of the future. Inasmuch as it is not possible to foresee the future, however, projections must be based on an extension of past relationships believed to have future relevance for the measures being projected. The choice of the past relationships to be extended and the methodology for extending them are based on assumptions,. . . The projections represent estimates of economic activity and land use expected to develop during the projection period if all assumed conditions materialize. . . . Thus the projections represent an attempt, imperfect though it may be, to forecast the economic future with the specification of assumptions and methodology introducing maximum objectivity into the process and giving the user a basis for appraising the validity of the projections."

PROBLEM

Projection study information, as stated previously, is of value to planners, resource managers, and decision makers in general. Problems exist for potential users of projection data, however, due in part to the limited distribution, availability, and consequently awareness of available projection information sources. Projections of future acreages of agricultural land for all or portions of the Pacific Northwest region are contained in a number of major published studies, and other technical reports and research memoranda. To date there is no published work that consolidates this information. This paper is designed to remedy the situation.

RESEARCH OBJECTIVES

The specific objectives of this paper are to:

1) inventory and provide references for the major sources of agricultural land use projections in the Pacific Northwest;

2) present a limited description which reflects the scope and coverage of individual projection sources; and

3) develop a comparative analysis of the projection studies, specifically in regards to methodology, assumptions, data base, time frame, geographic coverage, and selected projected futures.

Through the identification and comparative analysis of agricultural land use studies found in this paper, a base is developed for the more specific investigations needed by projection users. This paper provides an individual with a basic understanding of the current availability and scope of Pacific Northwest agricultural land use projection sources.

METHODOLOGY

The inventory process consisted of the identification and selection for analysis of potential projection study sources. This was accomplished by the preparation of a list of individuals and public agencies, at local, state, regional, and federal levels, likely to use or generate agricultural land use projections. Those agencies and individuals identified were contacted and asked to provide references to the presently available projection studies. A review of current literature was also conducted for the purpose of identifying studies containing projection data. All studies were evaluated for content and nine were chosen for in-depth analysis. Projection data was considered for in-depth analysis only in those cases where actual acreages of a particular category of agricultural land use were projected into the future, preferably to the year 2000 or beyond.

OVERVIEW

Nine major studies have been identified which contain significant agricultural land use projection data for the Pacific Northwest. They are as follows:

1) U.S. Water Resources Council, 1972 OBERS Projections: Regional Activity in the U.S., Series C, 1972; Series E, 1974; and Series E', 1975.

2) Bonneville Power Administration, Pacific NW Econonic Base Study For Power Markets, Vol. 1-2, 1970.

3) Bonneville Power Administration, Agriculture and Food Processing, Projections of Production, Employment and Energy Consumption to 1990, Pacific Northwest, U.S. Department of the Interior, July 10, 1974.

4) Pacific NW River Basins Commission, Columbia-North Pacific Region Comprehensive Framework Study of Water and Related Lands, Vol. I-XVI, Main Report, September 1972.

5) Pacific NW River Basins Commission, Water-Today and Tomorrow: A Pacific Northwest Regional Program for Water and Related Resources, Commission Field Level Review Draft, December 20, 1978.

6) U.S. Army Corps of Engineers, Walla Walla District, Irrigation Depletions/Instream Flow Study, December 1976.

7) Idaho Water Resources Board, State of Idaho, The State Water Plan - Part Two, December 1976.

8) Oregon State Water Resources Board, Oregon's Long Range Requirements For Water, June 1969.

9) Washington State Department of Ecology, Washington's Water Resources: Recommendations to the Legislature, January 1977.

A brief synopsis of each of these nine studies is included in the appendix of this paper. In-depth descriptions can be found in Jackson and McKinley (1979).

The nine studies reviewed are quite diverse in their overall nature, however, there are common themes or aspects which tend to tie them together.

The purpose of the majority of these studies is to calculate future water requirements for the region, for individual states, or for river basins. As an important component of water usage, various categories of agricultural land use were inventoried and projections were made to assist in the long-range planning for agricultural water demand (Jackson and McKinley, 1979, pg. 68). Thus, the development of agricultural land use projections has not been the primary objective or focus of the majority of the studies reviewed.

The studies which contain agricultural land use projections have been developed by a variety of agencies, commissions, and assorted other entities. There is no single source which dominates the development of projections. This is a favorable situation that enables users to cross check and evaluate differing projection results or findings.

There has been a consistent flow of projection information with time. The publication dates, of the nine studies reviewed in this paper, ranged from 1969 to 1978, with no more than two studies published in any one year. A continuation of this pattern into the future will help to maintain the constant availability of up-to-date projection information.

PROJECTION STUDY COMPARISONS AND EVALUATIONS

A comparative analysis and evaluation of the individual projection studies in regards to methodology assumptions, data base, time frame, geographic coverage, and projected futures follows:

Methodology

There are minor methodological variations in the nine projection studies of concern in this paper. The studies are based on a combination of potential market demands and land and water supplies, which were then modified to reflect local or regional historical trends (Jackson and McKinley, 1979). The similarities in methodological procedures are due in part to the fact that five of the projection studies are essentially based upon previously published projections, in particular the 1972 OBERS Projections (see Appendix), which were then adjusted or revised to meet the needs of the new studies. However, those studies which generated agricultural land use projections utilizing original methodologies also tend to exhibit similarities. In both the 1972 OBERS Projections and the Economic Base Study for Power Markets historical trends were used as a basis for the distribution of U.S. production requirements to the Pacific Northwest and individual states. The projection of future crop yields, and a limited check on resource availability were also components of each study.

The Columbia-North Pacific Comprehensive Framework Study and Oregon's Long-Range Requirements for Water utilized in part the assumptions and

methodologies of the preliminary 1972 OBERS Projections. However, original procedures were also employed in these studies. The Columbia-North Pacific Regional Comprehensive Framework Study relied somewhat on the Pacific Northwest Economic Base Study for Power Markets projection information. The Oregon study also relied in part on other projection sources, primarily the C-NP Comprehensive Framework Study and the Pacific Northwest Economic Base Study for Power Markets. The methodology of the Oregon study is limited to the projection of irrigated acreages as the major consideration in agricultural land use. In contrast, the other three studies,which utilize original methodologies, consider broad categories of land use in addition to irrigated acreage.

Users of agricultural land use projections must decide what methodological procedures are the most appropriate for their particular needs. Agricultural land use projections can be derived by a number of systematic methodologies, however, for the nine projection studies in this paper the methodological variations are slight and not of major concern.

Assumption

Assumptions are essential to the development of projections. They provide guidance in choosing the appropriate past relationships which, if extended, will best represent the future, and provide a basis for choosing the best methodology for extending these relationships (U.S. Water Council, 1972). The specification of assumptions and methodology introduces objectivity into the projection process and enables users to appraise the validity of the projections (U.S. Water Council, 1972).

Assumptions were observed to vary in the nine projection studies reviewed. Population growth rate appears to be the key assumption in the majority of the studies, although other variables such as expected changes in yield, export of agricultural commodities, consumer taste, etc., are not to be overlooked.

Problems arise when projection studies fail to specify guiding assumptions simultaneously with projection information. This practice tends to encourage the misinterpretation of the data by users who do not fully understand the projection process. There is a tendency for projected conditions to be looked upon as fact, rather than mere possibilities dependent upon the realization of all assumptions.

A complete presentation of guiding assumptions was not found in all of the studies reviewed. However, in those particular studies lacking the documentation of assumptions, agricultural land use projections were not of primary concern and perhaps did not justify a complete discussion of methodological procedures and assumptions. Nevertheless, it would seem advisable that statements outlining the limitations of projected data and referencing where a complete discussion of the projection assumptions can be found, should accompany the presentation of any published projection data.

Date Base

The fact that there are sources of agricultural land use projections which did not generate original base data is illustrated in Table 1. Since the publication of the first series in the 1972 OBERS Projections, there has been a trend towards the utilizations of OBERS as well as state derived projection data. The 1972 OBERS Projections seem to have one key

TABLE 1

Primary Sources of Projection Data

	State Derived Data			1972 OBERS Data			Preliminary OBERS	Adjusted	Generated
	Oregon	Idaho	Washington	C	E	E'	1968 Projections	In House	In House
1972 OBERS, WRC Series C 1972									X
1972 OBERS, WRC Series E 1974									X
1972 OBERS, WRC Series E' 1975									X
Pacific NW Economic Base Study for Power Markets/ BPA/1970									X
Agriculture & Food Processing/BPA/1974									X
C-NP Comprehensive Framework Study, PNRBC/1972							X		X
Water-Today and Tomorrow, PNRBC 1978	X	X	X	X		X			
Irrigation Depletions/Instream Flow Study, C.O.E./1976	X	X	X	X					
Idaho State Water Plan, Idaho Water Resource Bd./1976		X		X	X	X		X	
Ore. Long Range Req. for Water, Ore. Water Resources Bd./1969	X								X
Wash. Water Resources Wash. D.O.E./1977			X	X	X	X		X	

advantage over all other studies reviewed. They utilize a historical data base which covers the nation and incorporates uniform economic measures, data sources, and methods of estimation. The OBERS Projections rest on a data base which is consistent from area to area and over time, and can be assembled in varying geographic configurations (U.S. Water Council, 1972). The other projection studies lack this extensive and flexible data base.

If one wishes to coordinate Pacific Northwest projection data with that of the entire nation, the 1972 OBERS Projections is obviously the study most suited to perform this function. The 1972 OBERS Projections is the only study of those reviewed, which includes data for the nation as a whole. However, if one is primarily interested in a particular subdivision of the Pacific Northwest, those projection studies developed by states agencies or regional commissions are perhaps more responsive to and provide a better reflection of specific local conditions and trends.

Time Frame

The time frame and projection intervals of available agricultural land use projections varies considerably from study to study. As can be seen in Table 2, the temporal coverage and intervals are not consistent and do not provide for a complete data set for all areas of the Pacific Northwest. This becomes a significant problem when one is attempting to compare projected data from various sources for a specific point in time. The year 2020 is a coincident point in time which receives coverage by a number of projection studies. Table 2 illustrates the limited time frame of the two B.P.A. studies, which do not provide data beyond 1990. All other studies make projections to at least the year 2020. None of

TABLE 2

Time Frame and Interval of Projection Data

	1960	1965	1970	1975	1980	1985	1990	1995	2000	2010	2020
1972 OBERS, WRC Series C 1972					X				X		X
1972 OBERS, WRC Series E 1974					X	X			X		X
1972 OBERS, WRC Series E' 1975					X	X			X		X
Pacific NW Economic Base Study for Power Markets/ BPA/1970		X	X	X	X	X					
Agriculture and Food Processing,BPA/1974					X		X				
C-NP Comprehensive Framework Study, PNRBC/1972					X				X		X
Water-Today and Tomorrow, PNRBC/1978					X				X		X
Irrigation Depletions/ Instream Flow Study, C.O.E./1976 [1/]											X
Idaho State Water Plan, [1/] Idaho Water Resource Board 1976											X
Oregon Long Range Req. for Water, [1/] Ore. Water Resources Board/1969											X
Washington's Water Resources [1/] Wash. D.O.E./1977					X				X		X

1/Considers Irrigated Land Only

the studies reviewed attempts to project agricultural land use beyond the year 2020, although there are attempts to project the ultimate level of irrigation development, which would presumably take place some time after the year 2020.

Geographic Coverage

There are some major variances in geographic coverage among the agricultural land use projection studies reviewed. As can be seen in Table 3, there is adequate coverage for each of the Pacific Northwest states, but each state is not completely covered in all studies. For example, each Pacific Northwest state has developed a study concerned only with individual political areas, and the Irrigation Depletions/ Instream Flow Study only covers that part of each state which is included in the Columbia River basin. When making direct comparisons of the data found in various projection studies, one must check to see that the specific geographic coverage of each is equal and thus comparable.

In addition to the actual geographic coverage of the projection studies, the scale or level of detail available within that coverage is important. Table 3 presents the general level of detail which is available in each projection study. It should be noted that the level of detail which is actually presented in a published study does not necessarily reflect the greatest detail which is available from that projection development effort. Occasionally additional more specific data is available upon request to the author. It is the user's responsibility to decide what coverage and scale of detail is required to satisfy his particular informational needs, and to then investigate its availability.

TABLE 3

PROJECTION COVERAGE AND LEVEL OF DETAIL

	GEOGRAPHIC COVERAGE			LEVEL OF DETAIL
	IDAHO	OREGON	WASHINGTON	
1972 OBERS, WRC Series C 1972	X	X	X	State Totals
1972 OBERS, WRC Series E 1974	X	X	X	State Totals
1972 OBERS, WRC Series E' 1975	X	X	X	State Totals
Pacific NW Economic Base Study for Power Markets/ BPA/1970	X	X	X	State Totals
Agriculture & Food Processing/BPA/1974	X	X	X	State Totals
C-NP Comprehensive Framework Study, PNRBC/1972	X (Excluding Bear Basin)	X (Excluding Klamath Basin)	X	State & Regional Totals, 12 Subregions, Subareas
Water-Today and Tomorrow, PNRBC 1978	X (Excluding Bear Basin)	X (Excluding Klamath Basin)	X	State Totals, Plus Subregions And Subareas For Idaho
Irrigation Depletions/Instream Flow Study, C.O.E./1976	X (Columbia Basin Only)	X (Columbia Basin Only)	X (Columbia Basin Only)	River Reaches, And 9 Subregions
Idaho State Water Plan, Idaho Water Resource Bd./1976	X			State Totals, And 3 Major Basins With Subareas
Ore. Long Range Req. for Water, Ore. Water Resources Bd./1969		X		State Totals, And 18 River Basins
Wash. Water Resources Wash. D.O.E./1977			X	State Totals

Projected Futures

There is considerable variation among the nine studies in regards to the specific categories of land use which are projected. This situation makes the comparison of data between studies difficult. At times an identical land use category may be utilized in two studies, however, the category may not be defined similarly in both cases. There may be subtle differences which alter the comparability of the projected data. Any user of projection data must be cautious of being mislead by category labels. A thorough analysis of land use definitions is a definite prerequisite to the utilization of any projection information.

For the purposes of this paper the projected futures for three categories of land use, as found in the nine projection studies, will be analyzed and compared where possible. Although this will represent only a limited sample of the available projected futures, it will provide a good example of actual projected acreages, and will illustrate the varying availability of projection information for specific land use categories.

Irrigated Area. In general, there is no consistency in the specific agricultural land use categories utilized by each of the projection studies. The category of "irrigated area," however, is one exception. It receives coverage in all but the 1974 BPA study. This high degree of coverage is perhaps to be expected, due to the fact that most of the studies are water oriented.

"Irrigated Area" appears to be the agricultural land use which is of primary concern in the Pacific Northwest. This is probably due to

the far-reaching impacts of irrigation development on factors of local and regional power needs, depletion of stream flows and ground water, and crop yields and levels of production. The range of projected irrigation acreages is illustrated in Table 4, for the year 2020. Upon comparison of the various projections of irrigated area, several observations are possible. Among all irrigated area projections, the C-NP Comprehensive Framework Study projects the highest level of irrigation development for each of the Pacific Northwest states with a total of 12.149 million acres. The various sources of individual state derived data also project relatively higher acreages for a three state total of approximately 10 million acres. Comparing regional totals of the three OBERS levels of projected irrigation development, Series E is lowest (9,035,000 acres), Series E' slightly higher (9,121,000 acres), and Series C substantially higher (9,963,000 acres). A wide range of projected irrigated acreages for each state is apparent when all sources of projections are considered together. However, if the C-NP Comprehensive Framework Study values which are significantly greater than the others are excluded, the range in projected irrigated acreage for the region is greatly reduced. For informational needs concerning projected irrigation development, one would be advised to avoid total reliance upon the C-NP Comprehensive Framework Study projected levels. They appear to be aberrant values, considerably higher than any of those found among other reviewed studies.

Excluding the C-NP Comprehensive Framework Study projections and the rough estimate made for Idaho, in the absence of available state data for the Irrigation Depletions/Instream Flow Study, the ranges of

TABLE 4

Irrigated Area 2020
(In Thousand Acres)

	Idaho (Exc. Bear Basin)	Oregon (Exc. Klamath Basin)	Washington	Total
1972 OBERS, WRC Series C[1] 1972	5016.0	2223.0	2724.0	9963
1972 OBERS, WRC Series E[1] 1974	4421.0	2077.0	2537.0	9035
1972 OBERS, WRC Series E'[1] 1975	4431.0	2123.0	2567.0	9121
Pacific NW Economic Base Study for Power Markets/ BPA/1970	Does not make projections to 2020			
Agriculture and Food Processing,BPA/1974	Does not make projections to 2020 or for Total Irrigated Area			
C-NP Comprehensive Framework Study, PNRBC/1972	5037.0	3139.0	3973.0	12149
Water-Today and Tomorrow, PNRBC/1978	Low (E') = 4431.0 High (state) = 4570.0[2]	Low (E') = 2123.0 High (state) = 2525.0	Low (E) = 2537.0 High (state) = 2941.0	Low = 9091 High = 10036
Irrigation Depletions/ Instream Flow Study, C.O.E./1976[4]	OBERS (C) = 5016.0 State Derived = 5413.0[3]	OBERS (C) = 2223.0 State Derived = 2525.0	OBERS (C) = 2724.0 State Derived = 2941.0	9963 10879
Idaho State Water Plan, Idaho Water Resource Board 1976	4570.0[2]			
Oregon Long Range Req. for Water, Ore. Water Resources Board/1969		2425.7		
Washington's Water Resources Wash. D.O.E./1977			Low = 2503 High = 2615	

[1] OBERS projections of Irrigated Cropland Harvested were converted to reflect Total Irrigated Area. Source: Irrigation Technical Memorandum, B.O.R., May 1976, Revised July 1976.

[2] Estimated from data presented in Water-Today and Tomorrow and the Idaho State Water Plan. Utilized base of 3.65 million irrigated acres and a projected increase of 920,000 acres by 2020.

[3] Was based on a constant 20% increase from the 2020 OBERS Series C, rather than state derived.

[4] This study makes projections for the Columbia River Basin only. However, utilizing the same base data found in the B.O.R. Irrigation Technical Memo, coverage was expanded to state level to facilitate comparison.

projected irrigated acreage for the year 2020, for individual states, are as follows:

Idaho - 4,421,000 - 5,016,000

Oregon - 2,077,000 - 2,525,000

Washington - 2,503,000 - 2,941,000

Agricultural Land Conversions. Data is lacking among the projection studies concerning agricultural land conversions. OBERS (C, E and E') is the only major study reviewed which does estimate cropland reduction resulting from competing land uses, and additions to total cropland resulting from resource development activities. More data is clearly needed before any conclusions concerning reliability or the acceptable range of agricultural land conversions data can be made. It would appear there is a need for more detailed data generated at the state and local level to assist in the analysis of specific rates and types of agricultural land conversions. Conversions are a good example of an aspect of agricultural land use which is in need of additional attention in future projection studies.

Major Categories of Land Use. Projections of land use by major land classifications, i.e., Cropland, Forest, Rangeland, Other, are made for the Pacific Northwest in the following studies; 1) 1972 OBERS, 2) Pacific NW Economic Base Study for Power Markets, 3) C-NP Region Comprehensive Framework Study, and 4) Water-Today and Tomorrow. Except for the OBERS projections, the various sources are readily comparable in time frame and land use categories utilized, although there are slight differences in geographic coverage and level of detail available. The

OBERS projections of land use are not presented in a format easily comparable with the other sources. The acreages of Total Cropland, Forest and Woodland, Pasture and Range, and Other Uses, is presented by state, but only for land in farms. This breakdown does not consider a large part of the Forest and Range acreage which is not in commercial farms.

Where data for broad categories of land use are comparable, there appears to be only minor differences among the sources reviewed. General trends in projected major uses of land are illustrated in Table 5, for the three comparable sources, (Pacific Northwest Economic Base Study for Power Markets, C-NP Region Comprehensive Framework Study, and Water-Today and Tommorrow). A summary of these trends by land use categories follows:

1) Cropland: All three studies project an increase in cropland for 1980. The C-NP Comprehensive Framework Study and Water-Today and Tomorrow each predict a drop in acreage from 1980 - 2000. Both studies then project an increase in acreage during the period 2000-2020, to a level above that reached in 1980. The BPA study does not make projections beyond 1985.

2) Rangeland: The three studies project a gradual decrease in Rangeland acreage with time.

3) Forest: The three studies project a gradual decrease in Forest acreage with time.

4) Other Land: An increase in the "Other Land" category is projected by all three studies. However, the Pacific Northwest Economic Base Study for Power Markets projects a considerably lower acreage level for 1980 than do the other studies.

TABLE 5

Major Categories of Land Use
(1000 Acres)

	Cropland			Forest		Rangeland		Other Land	
	1980	2000	2020	1980	2020	1980	2020	1980	2020
Pacific NW Economic Base Study for Power Markets/BPA/1970 Pacific NW Region[3]	21,644	--	--	85,898[1]	--	62,251[2]		3,305	
C-NP Comprehensive Framework Study, PNRBC/1972 Columbia - North Pacific Region[4]	21,552	21,407	21,642	85,416	84,160	57,309	56,461	8,954	10,488
Water-Today and Tomorrow, PNRBC/1978 Columbia-North Pacific Region	21,497	21,392	21,631	85,476	84,209	57,327	56,457	8,990	10,524

[1] Identified in BPA study as Forest and Woodland

[2] Identified in BPA study as Nonforested Grassland

[3] Includes Klamath Basin in Oregon, and Western Montana

[4] Adds small parts of Wyoming, Utah, and Nevada to Pacific Northwest Region.

SUMMARY

Once an individual has identified all of the potential sources of some particular projection information, he may be tempted to choose one source as the "best." It is recommended here, however, that a user of projection data avoid adopting the findings of one particular projection study as gospel. The collection and analysis of all available projection information, for the purpose of determining an acceptable range of projected futures, would be a more proper approach. An individual may want to narrow that range of values by eliminating those projections which are, for example, clearly unrealistic or out-dated. The projection user is reminded, however, that all projections are not developed to make a best estimate of future conditions. They are at times specifically developed so that the possible impacts of alternative futures may be explored. Water-Today and Tomorrow and the Irrigation Depletions/In-stream Flow Study are good examples of projection studies which have attempted to develop conceivable ranges or high-low alternatives for their projected data. These results are more realistic than those studies which attempt to pin-point a specific optimum value. The establishment of projected ranges also helps to create an appreciation among users for the potential fluctuations of projection data due to slight alterations of assumptions or base data.

When utilizing projection information one should remember that at times the data may have been subject to and altered by the opinion of

local experts and the general public. This factor could have introduced some degree of regional bias or political expectations into the development of the projections. This situation is most likely to occur in those projection studies which are not formally structured or based upon mathmatical models, and do not specifically state their methodologies and assumptions. Users of projection information should be aware that levels of objectivity may vary from study to study.

Correct utilization of projection information depends upon an understanding by the user of the inherent limitations of the data. Most studies which include projection information are careful to point out that projections are not to be looked upon as guidelines or goals to be achieved, but rather as estimations of future conditions which could occur, given the underlying assumptions. In the majority of cases, projections represent a base or framework from which alternative future programs can be compared and evaluated. Potential users should also be aware of the critical need for periodic revision and updating of projection methodologies and assumptions, as additional base data becomes available with time. If care is taken by users to avoid the misinterpretation and inappropriate use of projected data, projections should increase in value as research tools.

CONCLUSIONS

Projections of agricultural land use can be of value to geographers and other individuals who are concerned with the implications of a changing landscape. Projections have been successfully utilized by various public and private interests. However, with wider distribution and improved documentation they could conceivably be of even greater utility. In addition, increased efforts could perhaps be made to inform potential new projection users as to the current availability, reliability, and capabilities of projection information.

This paper has consolidated and organized the agricultural land use projection information which is available as of January 1979 for the Pacific Northwest. As a result of this effort a framework has been developed for future research to build upon and expand.

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APPENDIX

Projection Study Descriptions

PROJECTION STUDY DESCRIPTIONS

Nine major studies have been identified which provide significant agricultural land use projection data for the Pacific Northwest. A brief synopsis of each study follows:

Study 1

U.S. Water Resources Council, 1972 OBERS Projections: Regional Activity in the U.S. Series C, 1972; E, 1974; and E', 1975.

Geographic Coverage. U.S.A., broken down to states, water resource regions and subareas, economic areas, and in Series E, SMSA and non-SMSA areas.

Land Use Categories. Cropland Harvested, (Feed, Food and Other Crops) Cropland Not Harvested, Cropland, Forest and Woodland, Pasture and Range, Additions to Cropland Resulting from Resource Development Activity, Reductions of Cropland Resulting from Competing Land Uses, and Irrigated Cropland, Non-Irrigated Cropland.

Temporal Coverage. Historical data for 1959 and 1964. Projected data for 1980, 1985, 2000, and 2020.

Data Base. Population projections for each series from the Bureau of Census. The projections of agricultural activity are based on a substantial historical state and county level file, possessed by the Economic Research Service.

Study 2

Bonneville Power Administration, Pacific NW Economic Base Study for Power Markets, Vol. 1-2, 1970.

Geographic Coverage. The major part of the Columbia River Drainage

basin within the U.S. All of Idaho, Oregon, Washington, and eleven counties west of the continental divide in Montana are included. The small areas of western Wyoming, northern Nevada and Utah, also draining to the west but where agriculture is of little importance, are excluded. Data is presented at the Pacific Northwest regional and state levels.

Land Use Categories. Cropland (irrigated and non-irrigated), Non-forested Grassland, Forest and Woodland, and Other Land. Sprinkler and non-sprinkler Irrigated Area, Acreage Requirements for Crop Groups.

Temporal Coverage. Historical data for 1959. Projected data for 1965, 1970, 1975, 1980, and 1985.

Data Base. Relied on various published data and historical trends. Population projections were derived from Bureau of Census projections dated 1960 and 1962.

Study 3

Bonneville Power Administration, Agricultural and Food Processing, Projections of Production, Employment and Energy Consumption to 1990, Pacific Northwest. U.S. Department of the Interior, July 10, 1974.

Geographic Coverage. Idaho, Oregon, and Washington. Data presented at state level only.

Land Use Categories. Vegetable Acreage, Potato Acreage, and Sugar Beet Acreage.

Temporal Coverage. Historical data for 1959, 1963, 1965, 1968, and 1970. Projections for 1980 and 1990.

Data Base. Agricultural Statistics, published by the USDA and data provided by the BPA Branch of Power Requirements.

Study 4

Pacific NW River Basins Commission, Columbia-North Pacific Region Comprehensive Framework Study of Water and Related Lands, Vol. I-XVI, Main Report, September 1972.

Geographic Coverage. Columbia-North Pacific Region, which includes all of the Columbia River in the U.S. (including small areas in Nevada and Utah), those basins in Oregon and Washington draining into the Pacific, the Straits of Georgia or Juan de Fuca within Washington, and the part of the Great Basin lying in Oregon. The Klamath basin in Oregon is excluded. Data is presented at individual state level, and the C-NP Region and its subregions.

Land Use Categories. Cropland, Forest, Rangeland, Water Areas, Irrigated Land, and Other.

Temporal Coverage: Historical data for 1966, projected data for 1980, 2000, and 2020.

Data Base. Economic projections developed by the Office of Business Economics, and Economic Research Service in 1968, modified by the Willamette and Puget Sound Type 2 studies. National population projections are from the Bureau of Census Series C published in 1964. Projected agriculture production based on a USDA, ERS, and FS study published in 1967.

Study 5

Pacific NW River Basins Commission, Water-Today and Tomorrow: A Pacific Northwest Regional Program for Water and Related Resources, Commission Field Level Review Draft, December 20, 1978.

Geographic Coverage. Pacific NW Region, which includes all of the Columbia River basin in the U.S. (except for areas in Nevada and Utah),

those basins in Oregon and Washington draining into the Pacific, the Straits of Georgia or Juan de Fuca within Washington, and the part of the Great Basin lying in Oregon. The Klamath basin in Oregon is excluded.

Land Use Categories. Cropland, Forest Land, Rangeland, Irrigated Land Area, and Other.

Temporal Coverage. Historical data for 1970, projected data for 1980, 2000, and 2020 with some exceptions.

Data Base. Land use and production - Adjusted OBERS E' data. Irrigation development - OBERS C, E' and individual state data.

Study 6

U.S. Army Corps of Engineers, Walla Walla District, Irrigation Depletions/Instream Flow Study, December 1976.

Geographic Coverage. The Columbia River Basin, its subregions and subareas in Washington, Idaho, Montana, Wyoming, Nevada, Utah, and Oregon.

Land Use Categories. Projections made for irrigated land only, with a breakdown by crop mix.

Temporal Coverage. Base level 1970 and one projected year 2020.

Data Base. OBERS Series C, 1972, and individual state derived data.

Study 7

Idaho Water Resource Board, State of Idaho, The State Water Plan - Part Two, December 1976.

Geographic Coverage. State of Idaho, with data presented for the total state, and its major drainage regions (Snake, Panhandle, and Bear) and their subareas.

Land Use Categories. Irrigated Land.

Temporal Coverage. Increases in irrigated land are projected for

the period from 1974 to 2020.

Data Base. Projections of irrigated land based on OBERS figures, with adjustments made by in-house discussions of the Idaho Water Resources Board and input from the public sector.

Study 8

Oregon State Water Resources Board, Oregon's Long-Range Requirements for Water, June 1969.

Geographic Coverage. State of Oregon, with data presented for the total state, and its river basins and sub-basins.

Land Use Categories. Irrigated Land and Irrigable Land.

Temporal Coverage. Historical data for 1949, 1954, 1959, and 1964. Projection data for 2020.

Data Base. Irrigable land identified by Oregon State University with the cooperation of the Soil Conservation Service. Historical irrigated land data from the 1964 Census of Agriculture. Population projections from the Bureau of Census 1967. Studies contributing data were the "Columbia-North Pacific Comprehensive Study," "Willamette Basin Comprehensive Study," and the "Pacific NW Economic Base Study for Power Markets."

Study 9

Washington State Department of Ecology, Washington's Water Resources: Recommendations to the Legislature, January 1977.

Geographic Coverage. State of Washington.

Land Use Categories. Irrigated Land.

Temporal Coverage. Historical irrigation development for 1969, and projected for 1980, 2000, and 2020.

Data Base. The U.S. Bureau of Census provided a low population projection (OBERS E) and a high population projection (OBERS C). The USDA (OBERS) provided irrigation development projections. Data was then adjusted in-house by the Department of Ecology.