Agricultural Land Use Projections for the Pacific Northwest: A Summary and Review

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AGRICULTURAL LAND USE PROJECTIONS FOR THE PACIFIC NORTHWEST:
A SUMMARY AND REVIEW

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Agricultural Land Use Projections for the Pacific Northwest: A Summary and Review

The purpose of this Extension special report is to provide a summary and review of recent studies of agricultural land use projections for the states of Oregon, Washington, and Idaho. The intent is to provide a useful reference to these studies, and to facilitate their use by individuals and agencies dealing with land resource issues.

The results of a recent survey ¹ indicate that a number of state and federal resource agencies in the Pacific Northwest utilize agricultural land use information in the pursuit of agency objectives. It was indicated that forecasts of agricultural land may play an important role in assessing cross impacts of future resource use. Related issues of resource allocation may include energy demand, rural and urban development, economic development, conservation, and land use and environmental quality. Other important information opportunities related to land resource considerations may be contained in these studies as well.

Projections of future acreages of agricultural land for all or portions of the Pacific Northwest are contained in at least nine different published studies and a number of other technical reports and research memoranda. The purpose of the majority of these reports is to calculate future water requirements for the Pacific Northwest region for individual states, or for river basins. As an important component of water use various categories of agricultural lands have been inventoried, and projections of future use made to assist in the long range planning for agricultural water demand.

A descriptive review of individual projection studies is presented which identifies:

1) sponsoring agency and date of completion
2) level of effort and objectives
3) data base for projections
4) projection time frame, geographic information unit, and agricultural land use definitions
5) projection methodology and assumptions
6) projected agricultural land use acreages.

For comparative purposes, a summary review of the methodological concerns of some of the studies is presented. This discussion focuses on the following features:

1) methodology
2) data base origin
3) time frame
4) projected data -- concerning irrigated area, agricultural land conversions, and major categories of land use.

This report is designed to provide agencies and individuals with a basic understanding of the scope and current availability of studies dealing with projections of Pacific Northwest agricultural land use. More detailed information may be secured by a specific and thorough examination of the individual publications referenced here.

The format of this report provides for a summary of each study followed by a brief comparative discussion of the studies as a whole. The agricultural land use projection tables are not presented here. They appear in the publications cited. However, the authors have copies of the tables and if you want a copy, write:

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SUMMARY OF PROJECTION STUDIES

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


SUMMARY DESCRIPTIONS

Nine major studies have been identified that provide significant agricultural land use projection data for the Pacific Northwest. A brief synopsis of each study follows. In-depth descriptions can be found in Jackson and McKinley (1979).

Study 1


- 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, Rangeland of Cropland Resulting from Competing Land Uses, Irrigated Lands, and Non-Irrigated Cropland.


- 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


- 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 are 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.


- 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


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


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

Study 4


- 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 are presented at individual state level, and the C-NP Region and its subregions.


Study 5


- 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.


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

**Study 6**


- **Geographic Coverage.** The Columbia River Basin, its subregions, and sub-areas in Washington, Idaho, Montana, Wyoming, Nevada, Utah, and Oregon.

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


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

**Study 7**


- **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**


- **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.


Study 9


Land Use Categories. Irrigated Land.


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 were then adjusted in-house by the Department of Ecology.
A comparative analysis and evaluation of the individual projection studies in regard 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 that 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.

Assumptions

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

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 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.

Data Base

There are sources of agricultural land use projections that did not generate original base data. Since the publication of the first series in the 1972 OBERS Projections, there has been a trend toward the utilization of OBERS as well as state-derived projection data. The 1972 OBERS Projections seem to have one key 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 that 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 that 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 state 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 vary considerably from study to study. 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 that receives coverage by a number of projection studies. Two BPA studies do not provide data beyond 1990. All other studies make projections to at least the year 2020. None of 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. 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 that 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. It should be noted that the level of detail that is actually presented in the published study does not necessarily reflect the greatest detail that is available from that projection development effort. Occasionally, additional more specific data are available upon request to the author. It is the user's responsibility to decide what coverage and scale of detail is required to satisfy particular informational needs, and to then investigate its availability.

Projected Futures

There is considerable variation among the nine studies in regard to the specific categories of projected land use. 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 that alter the comparability of the projected data. Any user of projection data must be cautious of being misled 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 that 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. Irrigation acreages are projected to the year 2020. 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 that 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 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 are lacking among the projection studies concerning agricultural land conversions. OBERS (C, E and E') is the major study reviewed that does estimate cropland reduction resulting from competing land uses, and additions to total cropland resulting from resource development activities. More data are 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 that 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 Regional 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 are presented by state, but only for land in farms. This breakdown does not consider a large part of the Forest and Range acreage that is not in commercial farms.

Where data for broad categories of land use are comparable, there appear 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 Regional Comprehensive Framework Study, and Water-Today and Tomorrow). 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 about that reached in 1980. The BPA study does not make projections beyond 1985.

2) Rangeland: The three studies project a gradual increase 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.

SUMMARY

Once an individual has identified all of the potential sources of some particular projection information, it may be tempting 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 the range of values.
by eliminating those projections that 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 Tommorrow and Irrigation Depletions/Instream 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 that attempt to pinpoint 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 that are not formally structured or based upon mathematical 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 that 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 become 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.