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Structuring Dry Year Land Fallowing to Improve Supply Reliability

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STRUCTURING DRY YEAR LAND FALLOWING TO IMPROVE SUPPLY RELIABILITY

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Water supply reliability is a major concern for water users in regions subject to prolonged drought. In much of the western US, agricultural districts hold the most senior and reliable water rights. Access to this water during drought is of great interest to those with less reliable water portfolios. Temporary water transfers conditioned on drought conditions have been used in a number of locations worldwide to firm less reliable supplies. This presentation summarizes the most innovative features of these programs and proposes a structure for regional dry year fallowing programs in the western U.S. Specific concerns addressed include compensation for agricultural water users, third party impacts, equity issues among agricultural interests, effects of drought on water prices and cost effectiveness in achieving more reliable supplies. The presentation is based on research conducted over the last two years in collaboration with public agencies, water users and NGOs.

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Water Shortage Sharing Agreements: the Role of Climate Indicators

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Water supply variability is a challenge throughout the western United States. The economic, environmental, and social costs associated with variable supply are diverse and can be far reaching. Particularly in dry years, water shortage sharing agreements are a viable mechanism to enhance supply reliability. These agreements typically involve a drought-triggered temporary transfer of water out of agriculture for municipal or environmental restoration use

Western water rights are governed by prior appropriation, or a "first-in-time, first-in-right" system. As such, many irrigators across the West hold senior water rights while municipalities or newer uses such as the environment or recreation have a junior priority status. This implies that in the event of shortage, irrigators with senior water rights will receive their full allocation, while junior rights holders may be shorted. When there is a shortage, this is often an inefficient allocation of water because the value of the water used to irrigate low-value crops is lower than the value to a municipal water district, for instance. Temporary shortage sharing agreements can facilitate the reallocation of water out of low-value agriculture to higher-value uses during drought. However, the ownership of the water rights remains with the original user, and under normal hydrologic conditions, farming in the area continues.

Political opposition, third party impacts, and transaction costs of dry-year transfers are often less than with permanent transfers. Permanent water transfers often arouse local controversy and can face fierce political opposition, owing mostly to the negative third-party impacts of permanent transfers in the area or origin and concerns that water transfers will fundamentally change the rural way of life. The temporary nature of dry-year transfers can go a long way in addressing theses legitimate concerns. Irrigators who participate in shortage sharing agreements do not forfeit their water rights; in years with normal hydrologic conditions, irrigated farming in the area continues, so the negative economic impacts of agriculture-related industries are reduced. Additionally, shortage sharing agreements can be designed to provide incentives to irrigators to spend or invest their compensation payments locally in agriculture or agriculturally linked businesses. Finally, without the intense local opposition that is often associated with permanent transfers, the transaction costs of negotiating, gaining approval for, and carrying out a dry-year transfer may be significantly less.

Because temporary dry-year transfers are generally more expensive on a per acre-foot per year basis than the outright purchase of water rights, there must be a significant improvement in dry year supply reliability to justify the higher costs. This requires carefully structuring dry-year transfers arrangements so that supply reliability benefits are

maximized. It is also important that the agreement be based on reliable "wet water" sources rather than "paper water."

Shortage sharing arrangements can take advantage of climate prediction to make the water transfers more efficient and cost effective. For example, if a municipal water provider knows with a comfortable degree of certainty that due to dry hydrologic conditions they will need to augment their water supply by a certain quantity to meet municipal demand, they can negotiate a temporary transfer out of agriculture prior to actually needing the water. This reduces the risk of supply variability faced by the municipal provider. It can also make the transfer more cost effective because if the irrigator knows in advance of the planting season that he will fallow his land for the season, he can avoid incurring early-season variable costs of production.

This presentation covers the structure, advantages, and disadvantages of temporary dry-year transfers in more detail. It also covers the results of statistical analysis of water lease transactions to test whether past drought conditions have influenced the price of leased water. The dataset analyzed includes 660 lease transactions from Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Washington, and Wyoming that occurred between 1987 and 2005.

The statistical analysis uses a two-stage-least-squares instrumental variable approach to estimate price of leased water as a function of demand side variables (such as the new use of the water), the Standard Precipitation Index (SPI), the Multivariate ENSO Index (MEI), a time trend, and other variables expected to influence the price of water leases.

Significant findings include a statistically significant relationship between the price of leased water and the drought index, the SPI. As hydrologic conditions become dryer, which is reflected in the SPI, results show that the price per acre-foot of leased water likewise increases. That is, the rising scarcity value of water during drought is reflected in its lease price in western water markets.