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STRUCTURING VOLUNTARY DRY YEAR TRANSFERS

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Water supply variability is a challenge throughout the western United States and worldwide. Numerous western cities have recently made efforts to acquire agricultural water to enhance supply reliability. Elsewhere in Australia, Chile, Spain, and parts of Africa there has been an ongoing concern between rural and urban interests trying to firm up supplies and get through drought. In dry years, voluntary, temporary water transfers are an essential tool in "firming" supplies for those sectors which value reliability most highly. The temporary nature of such transfers make them effective in managing drought-induced supply variability. However, because they are a temporary "borrowing" of water from an established user, they are not suitable to provide long term supplies for population growth. There are several tools available to structure dry year transfers, including water banks and dry year option contracts.

Water Banks

Water banks are typically created during drought to facilitate water transfers. Dozens of regional water banks exist throughout the U.S. that perform a range of functions. Water banks can assist with water transfers by facilitating negotiations and transactions between willing buyers and sellers. Often, a water bank will negotiate contracts with agricultural districts to lease water. Banks can also coordinate with private sector water brokers.

It is important for a water bank not to displace private interests which are involved in water business in the region. In most parts of the West, there are now professional water brokers who help facilitate transactions. Publicly authorized water banks can coordinate with private sector water brokers and represent the public interest (such as water quality, local economic effects and fish and wildlife habitat) in water transactions and negotiations. The private sector can play a crucial role even when a public entity coordinates temporary transfers for dry year reliability.

When a drought is over and wet conditions return, water banks typically continue to operate, taking on coordination functions. Water banks can store water for future use, which requires adequate storage. In Arizona, for example, many years of groundwater overdraft have created vast underground storage space. Similar underground storage is possible in parts of New Mexico. Flexibility in reservoir use and river system operations is also important in the operation of a water bank.

As is the case with other forms of water transfers, water bank transactions can cause third party impacts on the environment and/or communities in the source area.

Another important function for water banks is to screen out "paper water," that is, legal access to water that may not provide actual wet water for the desired purpose at the desired time. Paper water, for instance, can be created when irrigation districts receive "credit" for reducing their diversions, but actual consumptive use in the district is not reduced. In this case, wet water is not generated for other purposes. Banked water needs to be water that is physically available for use, particularly during dry periods.

In the Truckee-Carson Basin in western Nevada, for example, water was needed for dry year endangered fish recovery programs and to buffer drought impacts in the urban areas of that part of Nevada. There was a large quantity of agricultural water that had not been consumptively used for many years, which meant that water was paper, not wet water. As a result, it became the task of the organization that arranged temporary transfers to coordinate with the State Engineer's office to identify which agricultural water entitlements had recently been consumptively used. This was necessary so that water acquisitions actually would firm dry year supply by ensuring that wet water was being acquired.

As is the case with other forms of water transfers, water bank transactions can cause third party impacts on the environment and/or communities in the source area. Water banks can account for third party impacts by negotiating with potential third parties or their representatives, and arranging appropriate compensation.

The following are examples of active water banks in the western US:

Idaho Water Bank: Dry Year Fallowing

The Idaho Water Bank along the Snake River is the oldest water bank in the western United States. Conflict in the region stems from groundwater-surface water issues and endangered fish concerns. In 2001 in anticipation of electricity supply shortages stemming from drought and price shocks in California's energy market, Idaho Power Company (IPC) initiated an "irrigation electricity buyout" program. IPC solicited bids from large irrigators to voluntarily reduce their 2001 energy consumption. IPC hoped to evade shortage by reducing energy (and water) use among irrigators.

Low crop prices and threatening drought prompted greater program participation than was expected. Within two weeks of the program's initiation, 400 farmers had contracted to forego use of 500 million kWh of electricity used for pumping groundwater to irrigate almost 150,000 acres of cropland. Bids at or below 15 cents per kWh were accepted, with IPC ultimately paying 15 cents per kWh, or approximately $485 per acre, to all participating irrigators. This is equivalent to approximately ten times the annual rate for a piece of average quality farm land, which explains why the arrangements were finalized so quickly (Hamilton and Taylor).

Klamath Water Bank

The waters of the Klamath Basin support irrigated agriculture, the municipal and industrial sectors, hydroelectric power, fishing, recreation, and environmental uses. However, in seasons when stream diversions coincide with dry conditions, the remaining streamflow is inadequate to support endangered fish populations, and the result has been bitter water conflicts. In 2003, the Bureau of Reclamation created the Klamath Water Bank as an overall response to the conflicts and to address a NOAA-Fisheries Biological

Opinion establishing specific flow requirements to meet the needs of endangered fish species.

The Klamath Water Bank is charged with creating voluntary reductions in water diversions in order to ensure flows for fish recovery. Since 2003, the bank has met its flow requirement through soliciting bids from farmers for temporary land fallowing and for replacing surface water irrigation with groundwater irrigation. In 2003, irrigators were offered $187.50 an acre, which generated approximately 14,400 acres of fallowed land that year. The water conserved by land fallowing actually exceeded the flow required by the biological opinion, so the following year the bank switched to a bid solicitation process in which farmers where asked to submit bids per acre. In 2004, approximately 4,400 acres of land were fallowed, and the average cost per acre-foot was $65.

In 2005, the flow requirement was 100,000 acre-feet, and lands irrigated with surface water in both 2003 and 2004 were eligible to submit a bid for the 2005 fallowing program. This time, the bid price per acre-foot of water was calculated based on consumptive use according to farm-specific crop and soil type. This value was then used to select the least expensive bids. As an additional criterion, large contiguous acreages were favored for fallowing, as this helps the district manage its water deliveries. A total of 258 applications for land fallowing were submitted in 2005, representing 43,400 acres. The average bid price per acre was $159.80, and 159 bids were selected for inclusion in the banking program (Bureau of Reclamation Mid-Pacific Region).

California Drought Water Bank

There are about a dozen water banks currently operating in California, each with different authorizations, regions of the state, and reasons for existence. One example is the California Emergency Drought Water Bank which was established in 1991 as an adaptation mechanism following five years of drought in the state. The California Department of Water Resources (DWR) negotiated voluntary contracts to purchase water for $125 per acre-foot from farmers who chose to fallow their land or substitute groundwater for surface water irrigation. DWR negotiated 351 supply contracts in less than five months, making available over 820,000 acre-feet of water to meet the critical needs of the state.

The $125 offer price was around six to seven times the net return to water for an acre-foot of consumptive use for crops grown in the areas the bank was targeting. DWR was obliged to accept all of the water offered to them because of the way the program was written, and as a result DWR obtained more water than the end users were willing to pay for and the state had to bear the unreimbursed costs. In the next few years, the bank remained operational but wetter conditions and more restrictive participation led to lower trading activity and a lower offer price. Irrigators vary their response based on offer price, so it is essential to set a price designed to obtain the desired quantity (Clifford, Landry, and Larsen-Hayden).

Irrigation Suspension in Texas

The Edwards Aquifer in the San Antonio area of Texas supports agricultural, municipal and industrial water use in the greater San Antonio region, and also supports a diverse biological environment (including five threatened or endangered species). The springs in this area of Texas are very closely tied to groundwater pumping and groundwater levels around San Antonio. The area came under very intense pressure after a federal court ruling involving the need to maintain spring flows for native fish species in the region and ponds that relied on the springs. In the 1990s, drought-induced water shortages prompted an irrigation suspension program aimed at meeting municipal and environmental needs.

Dry-year option contracts are something that has been experimented with in arid regions worldwide, but they have become increasingly sophisticated in the western U.S. in the last ten years.

The City of San Antonio solicited offers for irrigation suspension because they were the urban area most at risk of cutbacks and imposed water rationing. Farmers submitted a bid price per acre of land fallowed. Bids were evaluated based on a farm's crop types, irrigation system, commitment to dry land farming, and the bid price per acre. Lower valued crops were favored by both the City and the irrigators because the compensation to irrigators would be less for lower value crops and also because farmers wanted to fallow their marginal, least profitable lands.

Twenty-thousand acre-feet were quickly obtained through land fallowing. Ten-thousand acre-feet were auctioned off to municipal users to cover the costs of acquiring the water. The remainder was dedicated to meeting endangered species needs (Keplinger and McCarl).

Dry Year Options Contract

Dry-year option contracts are something that has been experimented with in arid regions worldwide, but they have become increasingly sophisticated in the western U.S. in the last ten years. Dry-year options are contractual agreements that provide for voluntary and temporary drought-triggered water transfers. They are a mechanism for maintaining the agricultural base while serving municipal, environmental, and industrial needs throughout a drought because the ownership of the water right does not change. Water is temporarily transferred out of senior agricultural water uses to municipal or environmental restoration uses, but the water right remains with the district that holds the long-term water contract to use the water under a public project or with the original agricultural holder or that right.

Typically, buyers pay an up-front fee which secures the option to transfer irrigation water to a new use if specified dry-year conditions are met. Then, if the option is exercised, buyers pay on a per acre-foot basis to exercise the option. For example, dry-year options contracts between the Metropolitan Water District of Southern California (MWD) and several Sacramento Valley irrigators were negotiated at $10/acre-foot for the water district to secure the option. Then, growers were paid $90/acre-foot to exercise the option. In this instance, participating irrigators in the Sacramento Valley switched to less water intensive crop production in order to provide water for transfer. In 2003 almost 100,000 acre-feet of water were transferred via dry year options contracts in the Sacramento Valley (Metropolitan Water District of Southern California).

Successful dry year options programs usually require a sound working relationship between water districts and their member irrigators. The issue of splitting the proceeds from dry year leases between the district, who does have certain management obligations and extra in management concerns, and the growers, who are ceasing to irrigate and therefore forgo income from crop production, is a challenging negotiation that has to take place. Often, a water entity, such as a water bank, will negotiate the contract terms with water districts, and the districts then negotiate payment for land fallowing with individual irrigators.

In the 1980s in Utah, for example, an electric power generating facility needed 45,000 acre-feet of water to operate its plant. The power facility was located in a rural, agricultural region of Utah, and the local communities were concerned about the plant being built in their area. When the power company began seeking water rights, the communities involved set up an arrangement in which all members of the irrigation companies were invited to participate in making water available. The power company negotiated with the local irrigation districts and ultimately purchased a package of 45,000 acre-feet of water that was composed of water rights of relatively small quantities from many different irrigators (Saliba and Bush).

Major impediments to the development of active land fallowing programs are unfamiliarity with the process (by both irrigators and water districts), lack of program momentum, and rivalry among growers to receive payments. One approach to addressing these obstacles is to offer an early response bonus to farmers who embrace the program in its early stages. For example, if every irrigator in a specific district were given an option right to sell 10% of their water in a given year, negotiations and trades to sell and acquire options could then also occur between farmers. That is, if one farmer wanted to lease out more than 10% of his water, he could buy an option from a farmer who did not wish to lease out his water. This means that even those farmers who did not choose to sell their water would still be involved in, become familiar with, and benefit from the program. It also avoids a divide and conquer approach, which has been the case in many of the early years of water transactions between cities and agriculture. This is a public, open process involving publicly authorized entities on both ends of the transaction, that is, the water bank or water authority and the district. Each district member receives some form of benefit, and the revenues from the acquisition program are spread very broadly.

The cost of paying for dry-year options should be evaluated and weighed against the additional reliability the options will provide to municipal supply, fish recovery programs, and so on. Dry-year options are much more expensive (often four times more expensive) on a per acre-foot basis than outright water purchases. The desire to avoid the third party impacts associated with permanent fallowing and to maintain a reliable agricultural sector are the chief impetus for considering these drought-triggered transactions.

Third Party Impacts

Third party impacts can generate significant controversy and opposition to water transfers, ultimately preventing some transfers altogether and making others more costly. Community opposition stems from concerns that local businesses and workers will suffer due to reduced spending by farmers as agricultural land is fallowed. Third party impacts can be quantified using standard regional economic models, which are relatively transparent and can accommodate differing assumptions about changes in farmer expenditures when land is fallowed. There are viable options for addressing community impacts, thereby lessening opposition to temporary water transfers out of agriculture.

There can be a rebuttable presumption using these local economic impact models to estimate the magnitude of the impacts. These local impacts, everywhere they have been documented, have been a small fraction of the drought costs that are being averted through these temporary transfers. Compensation for third party impacts does not "break the bank" in terms of dry year transactions. It is something to be put in place and made part of the dry year reliability program structure. State and federal agencies have the power to encourage investment in the area through other types of non-water-related programs, such as small business loans. It is important to consider bringing some of these other policies into use when considering dry year firming and supply reliability for a region.

The key to addressing third party impacts is cost. Parties or communities who object to transfers out of agriculture can generate very high costs for the participants in a supply reliability agreement. One way to address third party impacts is adequate payments to farmers. In voluntary fallowing agreements, farmers generally receive two to three times what they would have earned irrigating crops, including having federal program payments that would have gone with crop production. Options programs can be designed to provide incentives to irrigators to spend or invest their fallowing payments locally in agriculture or agriculturally linked businesses.

In general, dry-year options are more expensive on a per acre-foot per year basis than the outright purchase of water rights. The higher cost of options contracts must therefore be justified by a significant improvement in dry year supply reliability. This means dry year options programs must be carefully structured to maximize supply reliability benefits and must be based on reliable "wet water" sources rather than "paper water."

Firming water supplies is not simple or inexpensive, but pre-planning is more effective and less costly than reactive, crisis management response to drought-related shortages.

In sum, effective voluntary dry year lease programs require careful structuring, but if well planned, can decrease the pressure for permanent water transfers out of agriculture. Typically, senior consumptive users such as irrigators and Native American tribes have the most reliable water in a region that could firm supplies for other users by temporary land fallowing. The third party impacts generated by temporary transfers are less than permanent purchases, but it is still important that direct local economic impacts be systematically quantified and compensated.

Firming water supplies is not simple or inexpensive, but pre-planning is more effective and less costly than reactive, crisis management response to drought-related shortages. Water in the West creates an "inextricable web of mutuality" between rural and urban users at the tribal, municipal, state, and federal levels. Tackling supply reliability necessitates integrated participation and acceptance of reliability enhancement strategies from all parties involved.

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