



Fall 1997

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Recommended Citation

Ronald A. Kaiser & Michael McFarland, *A Bibliographic Pathfinder on Water Marketing*, 37 Nat. Resources J. 881 (1997).

Available at: <https://digitalrepository.unm.edu/nrj/vol37/iss4/5>

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A Bibliographic Pathfinder on Water Marketing

Western water management is in a state of transition. Robust economic, industrial and tourism development, urban population growth and changing attitudes about environmental water needs have created additional demands for water. There is simply not enough water available to satisfy this new thirst. The normal flows of most western rivers are fully allocated and groundwater resources in many areas are limited and unable supply water for these new needs. Based on increasing demand and limited supply, western water management is evolving from a supply development paradigm to one of demand management. Under a demand management plan water is reallocated from existing to new uses.

Water transfers are a common component of the demand management paradigm. Transfers, defined as a voluntary change in ownership, point of diversion, or place or purpose of use, can serve different purposes in water management, but fundamentally they involve the reallocation of existing supplies to new and often higher valued uses. Water marketing is a variation of a transfer.

The growing acceptance of water transfers and water marketing has been mirrored by a growth in the economic, legal and water planning literature. This bibliographic pathfinder is a research guide to books, journal articles, technical reports and conference proceedings that address issues raised by water transfers. As a considerable number of publications are included in the pathfinder, the bibliography is organized into six major issue areas. Each issue area begins with a short introductory statement followed by the bibliographic entries listed alphabetically by first author's last name.

Many publications deal with two or more issues but in general the source is listed in only one section. Although this bibliographic pathfinder seeks to capture the important and relevant economic, legal and planning literature, it is not exhaustive, nor does it reference political, social, or biological science sources.

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This bibliography is a result of research sponsored by the Texas Water Development Board and the Texas Agricultural Experiment Station. The views expressed herein are those of the authors and do not necessarily represent the views of the sponsoring agencies.

We gratefully acknowledge the research assistance of Dr. Jim Mertes, Professor, Michigan State University.

I. REALLOCATIONS AND TRANSFERS

Although long authorized under the prior appropriation doctrine, transfers are one of the most debated topics in western water law today. At least seven benefits have been attributed to water transfers. In addition to providing a new source of water supply to growing cities, transfers are justified as (1) a tool to manage drought, (2) a means to provide water for environmental and recreational needs, (3) a way to promote efficient water use, (4) a way to encourage conservation, (5) an alternative to new reservoir construction and (6) a means to promote political and social harmony. The following literature generally documents transfer benefits and offers specific exemplars of those benefits.

1. Transfer Benefits

Owen Anderson & Pauline Simmons, *Reallocation, in WATERS AND WATER RIGHTS* 234–428 (Robert Beck ed., 1991).

John H. Davidson, *Emerging Issues in Western Water Transfers*, 13 J. AGRIC. TAX'N & L. 73 (1991).

Leo Eisel, *The Role of Engineering in the Age of Water Reallocation, in A.L.I.-A.B.A. COURSE OF STUDY: WESTERN WATER LAW IN THE AGE OF REALLOCATION* 175 (March 1991) (Cosponsored by the University of Arizona College of Law).

Ernest Flack, *Meeting Future Water Requirements Through Reallocation*, 59 J. AM. WATER WORKS ASS'N 1340 (1967).

GENERAL ACCOUNTING OFFICE, *WATER TRANSFERS: MORE EFFICIENT WATER USE POSSIBLE, IF PROBLEMS ARE ADDRESSED* (1994).

GEORGE GOULD, *RECENT DEVELOPMENTS IN THE TRANSFER OF WATER RIGHTS* (1990) (A.B.A. Annual Water Law Conference).

L. HARTMAN & D. SEASTONE, *WATER TRANSFERS, ECONOMIC EFFICIENCY, AND ALTERNATIVE INSTITUTIONS* (1971).

HIGGINSON-BARNETT CONSULTANTS, *WATER RIGHTS AND THEIR TRANSFER IN THE WESTERN UNITED STATES, REPORT TO THE CONSERVATION FOUNDATION* (1984).

WELLS HUTCHINS, TRANSFER OF WATER RIGHTS, SELECTED PROBLEMS IN THE LAW OF WATER RIGHTS IN THE WEST 385 (1942).

Jay Lund & Morris Israel, *Water Transfers in Water Resource Systems*, 121 J. WATER RESOURCES PLAN. & MGMT. 193 (1995).

LAWRENCE MACDONNELL, WATER TRANSFER PROCESS AS A MANAGEMENT OPTION FOR MEETING CHANGING WATER DEMANDS (1990) (University of Colorado School Of Law Natural Resources Law Center).

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MARC REISNER & SARAH BATES, OVERTAPPED OASIS: REFORM OR REVOLUTION FOR WESTERN WATER (1990).

MARC REISNER, CADILLAC DESERT (1986).

JOSEPH SAX ET AL., LEGAL CONTROL OF WATER RESOURCES 212-44 (1991).

Simms & Davis, *Water Transfers Across State System* 31 ROCKY MTN. MIN. L. INST. 22-1 (1985).

DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES 5-1 to 5-104 (1997).

Gary Weatherford & Steven Shupe, *Reallocating Water In The West*, 78 J. AM. WATER WORKS ASS'N 63 (1986).

2. Transfer Methods

Ironically, current water transfers change past allocation practices and at the same time continue past practices. Transfers may be permanent or temporary and occur along a continuum from an outright sale of a permanent water right to the lease of water. Transfer transactions are limited only by the imagination and ingenuity of the parties and include; (1)

dry-year option [contingent] contracts on right to use water, (2) spot market transfers, (3) sale of reclaimed, conserved or surplus water, (4) subordination agreements, (5) water banks, (6) water ranching, (7) institutional transfers, (8) exchanges, and (9) wheeling of stored water. Most of these are described in the literature that follows.

W.P. Balleau, *Water Appropriation and Transfer in a General Hydrologic System*, 28 NAT. RESOURCES J. 269 (1988).

David B. Bush, *Dealing for Water in the West: Water Rights as Commodities*, 80 J. AM. WATER WORKS ASS'N 30 (1988).

ELIZABETH CHECCHIO, WATER FARMING: THE PROMISE AND PROBLEMS OF WATER TRANSFERS IN ARIZONA (1988) (University of Arizona Water Resources Research Center, Issue Paper #4).

Bonnie Colby et al., *Transferring Water Rights in the Western States: A Comparison of Policies and Procedures*, in RESEARCH REPORT SERIES (1989) (University of Colorado School of Law, Natural Resources Law Center).

Brian Gray, *Temporary Transfers of Water: A Case Study of California*, in A.L.I.-A.B.A. COURSE OF STUDY: WESTERN WATER LAW IN THE AGE OF REALLOCATION 103 (March 1991) (Cosponsored by the University of Arizona College of Law).

Morris Israel & Jay Lund, *Recent California Water Transfers: Implications for Water Management*, 35 NAT. RESOURCES J. 1 (1995).

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Mark Tader, *Reallocating Western Water: Beneficial Use, Property and Politics*, 1986 U. ILL. L. REV. 277 (1986).

Dan Tarlock, *New Water Transfer Restrictions: The West Returns to Riparianism*, 27 WATER RESOURCES RES. 987 (1991).

Dan Tarlock, *From Reclamation To Reallocation of Western Water*, 46 J. SOIL & WATER CONSERVATION 122 (1991).

Sergio Viscoli, *The Resource Conservation Group Proposal to Lease Colorado River Water*, 31 NAT. RESOURCES J. 887 (1991).

Gary Weatherford, *Water Transfers and Exchanges: Using the Market to Improve Water Use - A Legal and Institutional View*, in WESTERN WATER: EXPANDING USES/FINITE SUPPLIES (1986) (University of Colorado School of Law, Natural Resource Law Center, Seventh Annual Summer Program).

3. Agricultural Transfers

Historically, farmers have made extensive use of transfers to obtain water for irrigation. There are numerous examples of water transactions between farmers, mutual irrigation companies and governmental water districts throughout the western states. Mutual irrigation companies are typically nonprofit associations whose customers (ranchers, farmers and irrigators) are also their shareholders, while water districts are governmental entities with elected boards not unlike other local governments. According to Barton Thompson (see *infra* Institutional Considerations) institutions supply, on average, water for about half of the irrigated acreage in the western states.

The new pattern of agricultural transfers involves shifting water from agricultural to urban, industrial and environmental uses. According to Solley (*infra* this section) agriculture utilizes about 80 percent of western water withdrawn for use and is a prime source for reallocation to urban uses. This trend has important implications for agriculture and economic development in many western states.

Raymond Lloyd Anderson, *The Irrigation Water Rental Market: A Case Study*, 13 AGRIC. ECON. RES. 54 (1961).

California Water Transfers: Gainers And Losers In Two California Counties, THE AGRICULTURAL ISSUES CENTER & THE WATER RESOURCES CENTER CONF. PROC. (1993) (Davis, California).

Gardner Delworth et al., *Transfer Restrictions and Misallocations of Irrigation Water*, 50 AM. J. AGRIC. ECON. 556 (1968).

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George Gould, *Conversion of Agricultural Water Rights to Industrial Use*, 27 ROCKY MTN. MIN. L. INST. 1791 (1981).

Jack Houston & Norman Whittlesey, *Modeling Agricultural Water Markets for Hydropower Production in the Pacific Northwest*, 11 W. J. AGRIC. ECON. 221 (1986).

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Stephen Smith, *The Rural-Urban Transfer of Water in California*, 1 NAT. RESOURCES J. 64 (1961).

Rodney Smith, *Water Transfers, Irrigation Districts and the Compensation Problem*, 8 J. POL'Y ANALYSIS & MGMT. 446 (1989).

Rodney Smith & R. Vaughan, *Irrigation Districts: Obstacles to Water Marketing*, AM. WATER WORKS ASS'N J. 10 (March 1988).

SOLLEY, WAYNE ET AL., U.S. DEP'T OF INTERIOR GEOLOGICAL SURVEY DIV., *ESTIMATED USE OF WATER IN THE UNITED STATES IN 1990* (1994).

Walker, Wynn & Gaylord Skogerbee, *An Implicit Approach to Pricing Agricultural Water Transfers to Urban Uses*, 11 WATER RES. BULL. 751 (1975).

Wong, Benedict & Wayland Eheart, *Market Simulations for Irrigation Water Rights: A Hypothetical Case Study*, 19 WATER RESOURCES RES. 1127 (1983).

4. Federal Water Transfers

The federal government, operating principally through the Bureau of Reclamation (Bureau) and the Army Corps of Engineers (Corps), stores and distributes large quantities of water and has the potential to shape the future of western water transfers. While federal laws recognize the states' primacy in the allocation [reallocation] of water rights the complex relationships between federal water agencies, the state water agencies, state-established water and irrigation districts, mutual irrigation districts and individual water users represents a barrier to water transfers. Basically, if a water user with a contractual right to receive Bureau or Corps water seeks to transfer that water or right to another, the transfer would be subject to federal, state and local review. While the law may tilt in favor of state law governing transfers, federal project managers retain substantial discretion in determining whether to approve transfers under their physical control. The literature speaks to the need for institutional clarification favoring water transfers.

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Richard Collins, *Voluntary Conveyance of the Right to Receive a Water Supply from the United States Bureau of Reclamation*, 13 ECOLOGY L.Q. 773 (1987).

John M. Dunn, *Marketing of Surplus Water from Federal Reservoirs*, 13 LAND & WATER L. REV. 835 (1978).

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Joseph Sax, *Selling Reclamation Water Rights: A Case Study in Federal Subsidy Policy*, 64 MICH. L. REV. 13 (1965).

Dan Tarlock, *From Reclamation to Reallocation of Western Water*, 46 J. SOIL & WATER CONSERVATION 122 (1991).

RICHARD WAHL, *MARKETS FOR FEDERAL WATER: SUBSIDIES, PROPERTY RIGHTS AND THE BUREAU OF RECLAMATION* (1989).

Zach Willey & Tom Graff, *Federal Water Policy in the United States – An Agenda for Economic and Environmental Reform*, 13 COLUM. J. ENVTL. L. 325 (1988).

5. Indian Reservation Transfers

In 1908, the United States Supreme Court ruled in *Winters v. United States*, 207 U.S. 564 (1908) that when Indian reservations were established, sufficient water was implicitly reserved to fulfill the purposes of the reservation. Where Indian reserved rights exist, they are incorporated into the state water law hierarchy with the priority date from the date of creation of the reservation. In many instances, Indian tribes hold unquantified reserved rights for water that predate many rights held by non-Indians under the states' appropriation laws. Thus, Indian reserved rights are the most senior and the most valuable, and the leasing of these rights may provide significant economic benefits to the reservation.

The legal authority of tribes to lease (transfer) their *Winters* water off the reservation is murky and unclear. While federal legislation confirming tribal rights to sell or lease water would resolve such questions, federal trust obligations suggest that federal approval would still be required on a case-by-case basis.

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David Getches, *Management and Marketing of Indian Water: From Conflict to Pragmatism*, 58 COLO. L. REV. 515 (1988).

Leaphart, *Sale and Lease of Indian Water Rights*, 33 MONT. L. REV. 226 (1972).

Owen Olpin, *Indian Water Rights Transfers*, in A.L.I.-A.B.A. COURSE OF STUDY: WESTERN WATER LAW IN THE AGE OF REALLOCATION 139 (March 1991) (Cosponsored by the University of Arizona College of Law).

Jack Palma, *Considerations and Conclusions Concerning the Transferability of Indian Water Rights*, 20 NAT. RESOURCES J. 91 (1980).

Judith V. Royster, *A Primer on Indian Water Rights: More Questions than Answers*, 30 TULSA L.J. 82 (1994).

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II. WATER MARKETING

Water marketing has been a topic since at least 1973 when the National Water Commission recommended the removal of existing legal barriers to water transfers. The literature since then has described the role that market transfers can play in meeting the growing industrial, urban and environmental demands.

Water marketing can be described as a framework and process for transferring water. This process is characterized by voluntary negotiations between the parties over the amount, timing and price of water to be exchanged. Advocates of marketing suggest that the process would allocate water to its highest economic use by allowing those who place the highest economic value on it to buy it. They argue that the specific needs of the purchaser and the seller should dictate the type of transfer sought and the forum through which transfer arrangements are made. In this way property rights are respected and water is reallocated through negotiated purchases rather than through regulatory removal or cancellation. Thus, water marketing is consistent with the current belief that markets are an effective way to allocate scarce resources to meet the tripartite goals of efficiency, equity and conflict minimization.

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Terry Anderson & Peter Hill, *Water Marketing – The Next Generation* (Terry Anderson & Peter Hill, eds. 1997).

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Victor Brajer et al., *The Strengths and Weaknesses of Water Markets as They Affect Water Scarcity and Sovereignty in the West*, 29 NAT. RESOURCES J. 489 (1989).

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Norman Dudley, *Water Allocation by Markets, Common Property and Capacity Sharing: Comparisons or Completions?*, 32 NAT. RESOURCES J. 757 (1992).

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James Ellis & Charles DuMars, *The Two-Tiered Market in Western Water*, 57 NEB. L. REV. 333 (1978).

FRESHWATER FOUNDATION, *WATER VALUES AND MARKETS: EMERGING MANAGEMENT TOOLS* (1986).

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CHARLES MEYERS & RICHARD POSNER, *MARKET TRANSFERS OF WATER RIGHTS: TOWARDS AN IMPROVED MARKET IN WATER RESOURCES* (1971) (National Water Commission Legal Study No 18-25).

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Paula Smith, *Coercion and Groundwater Management: Three Case Studies and a 'Market' Approach*, 16 ENVTL. L. 797 (1986).

Rodney Smith & Roger Vaughan, *Taking Water to Market*, 57 CIV. ENGINEERING 70 (1987).

Frank J. Trelease, *The Changing Water Market for Energy Production*, 5 J. CONTEMP. L. 83 (1978).

Zach Wiley, *Behind Schedule and Over Budget: The Case of Markets, Water and Environment*, 15 HARV. J.L. & PUB. POL'Y 391 (1992).

Richard Young, *Why Are There so Few Transactions Among Water Users?*, 68 AM. J. AGRIC. ECON. 1143 (1986).

2. Western State Marketing Efforts

A growing body of literature documents the potential for water marketing on a state-by-state basis. Most of these articles examine the economic, institutional, legal, and technical factors needed to support marketing in a particular state.

AGRICULTURAL ISSUES CENTER, UNIVERSITY OF NORTHERN CALIFORNIA, *WATER TRANSFERS: GAINERS AND LOSERS IN TWO NORTHERN COUNTIES* (1993) (Davis, California).

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Delworth Gardner, *The Untried Market Approach to Water Allocation*, in *NEW COURSES FOR THE COLORADO RIVER* 155 (Gary Weatherford & F. Lee Brown eds., 1986).

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RONALD KAISER, TEXAS WATER RESOURCES INSTITUTE, LEGAL AND INSTITUTIONAL PARAMETERS FOR WATER MARKETING IN TEXAS (1994) (TR NO. 167).

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Mike Willatt, *Buying and Selling Water Rights in Texas*, 59 TEX. B.J. 628 (1996).

D. Yardas, *Water Transfers and Paper-Rights in the Truckee and Carson River Basins*, in INDIAN WATER RIGHTS AND WATER RESOURCES MANAGEMENT 32–42 (1989) (Proceedings of the American Water Resources Association Symposium, Bethesda, Maryland).

3. Water Banks and Transfers

A water bank is basically a brokerage institution created for the purpose of pooling surplus water rights for rental or sales to other users. Typically, a bank buys water for a fixed price from voluntary sellers and sells it to users at a higher fixed price. The revenue from the difference in prices is used to cover the bank's administrative and technical costs. Under most banking arrangements, the original water rights holders retain their permanent water right and only sell to the bank the right to use the water.

The California Drought Emergency Water Banks of 1991 and 1992 are the most celebrated examples of banking. In both years, the state acted as the banker and fixed the terms and prices of transfers. Formal water banks have also developed in Texas and Idaho, and bank-like activities occur in Kansas, Colorado and Wyoming.

LLOYD DIXON ET AL., CALIFORNIA'S 1991 DROUGHT WATER BANK: ECONOMIC IMPACTS IN THE SELLING REGIONS (1993) (A Report of the Rand Corporation).

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JAY R. LUND ET AL., UNIVERSITY OF CALIFORNIA, *RECENT CALIFORNIA WATER TRANSFERS EMERGING OPTIONS IN WATER MANAGEMENT* (1992) (Department of Civil and Environmental Engineering Report No. 92-1).

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L. MINK, *WATER BANKING IN IDAHO* (1993) (paper presented at Riparian Management: Common Threads and Shared Interests and USDA Forest Service General Technical Report RM-226).

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III. ECONOMIC CONSIDERATIONS IN TRANSFERS

Economic value has been the principal means for establishing resource utility in our society. Values established by market price are used to allocate scarce resources. Western water policy is often criticized for allocating water through nonmarket means without regard to its economic value. As such, water is not used efficiently for its highest economic value. The problem of economic misallocation is further complicated by the federal subsidies for water development projects.

Economic theorists have advocated that water be reallocated by market mechanisms to remedy these inefficiencies. They posit that market mechanisms provide allocation flexibility by allowing those who place a higher economic value on the water to purchase it at its market price. In this way, markets generally generate economically efficient outcomes because they facilitate voluntary trading among users thereby delivering water to those users who put the highest economic value on it.

The literature focuses on (1) the technical and legal predicates for market reallocations, (2) efficiency and equity in allocations, (3) investment and risk assessment, (4) benefit/cost valuation and transactional barriers and costs. It includes theoretical and practical articles as well as those that are positive and pessimistic. Positivists suggest that market mechanisms can reallocate water in an economically efficient manner among irrigation, municipal, industrial, environmental and recreational purposes by letting voluntary transfers determine the highest economic use of water. Pessimists point to market failures, third party impacts and water valuation problems.

Raymond Anderson, *Windfall Gains from Transfer of Water Allotments Within the Colorado-Big Thompson Project*, 43 LAND ECON. 265 (1967).

H. Stuart Burness & James Quirk, *Water Law, Water Transfers and Economic Efficiency: The Colorado River*, 23 J.L. & ECON. 111 (1980).

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IV. ENVIRONMENTAL WATER NEEDS

A remarkable new demand for water is for instream and estuary flows that support nonconsumptive environmental and recreational uses. This demand is driven by recreation and tourism which has become a major part of the economy of many western states, rivaling or surpassing agriculture in gross state revenues. Water-based recreational and tourism activities require that a certain amount of water remain in streams and these activities are harmed by consumptive diversions. Marketing and transfer advocates argue that recreational and environmental needs can be satisfied through transfers.

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V. INTERBASIN TRANSFERS

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Because of the possible severe effects on the economy, ecology, culture, lifestyle and potential future growth in the originating basin most

states have established "area-of-origin" protection requirements. These statutory safeguards increase transfer costs and may impose substantial barriers to transfers.

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VI. LEGAL AND INSTITUTIONAL CONSIDERATIONS IN WATER TRANSFERS

A water right acquired under the prior appropriation doctrine is a vested property right entitled to protection against interference from other water users. The ability of an appropriator to transfer the legal priority to use a quantity of water is a valuable property right recognized by all appropriation states. This transfer right is not absolute but is qualified. The transfer may not injure other water rights holders. The "no injury rule" is the only universal restriction on transfers.

1. Legal Considerations

Some states have imposed additional restrictions on transfers. One is the area-of-origin restriction that limits the transfer of water between watershed within the state. Unlike the "no injury rule," interbasin transfer restrictions are intended to safeguard the needs of communities and regions and not just those of other water users. State restrictions designed to discriminate against out-of-state transfers are constitutionally suspect as impermissible burdens on interstate commerce.

A more recent restriction on transfers is the public interest review. While the practice varies from state to state, interest reviews require scrutiny of the transfer to protect public values and to internalize the external cost associated with the transfer. This public interest rubric provides the basis for evaluating third-party impacts associated with transfers.

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2. Institutional Considerations

Public and private water institutions are an integral part of the appropriation doctrine and today control and distribute most of the surface water in the western states. While the prior appropriation doctrine establishes the allocation rules, institutions supply the water. Because of their pivotal development and supply role, institutional arrangements can facilitate or impede transfers. Any analysis of water transfers restrictions must consider these water brokers.

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VII. PUBLIC INTEREST CONSIDERATIONS—THIRD PARTY IMPACTS

Since water supports a wide range of private and public uses, water transfers are not simple transactions between buyers and sellers. Indeed, water transfer can cause a variety of adverse economic, social and environmental impacts on the public and third parties. Existing laws, procedures and institutions may not fully protect the public from these impacts. For example, if agricultural land is taken out of production to transfer water to urban areas negative economic and social impacts can

occur in the rural area. These may include reductions in farm income, dislocation of farm workers, decreases in property tax revenues, a shrinking local tax base and decline in local services. These negative impacts may or may not be offset by similar gains in the urban area.

The literature on third-party impacts is mostly conceptual. Recent studies indicate that most states subject transfers to public interest reviews but the statutes vary considerably regarding specific criteria used and the weight accorded to each criteria. While some protection exists in these reviews serious questions arise as to the scope of protected interests, the extent of protection and how it should be provided.

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