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Climate Change and Water Transfers

Christine A. Klein, *University of Florida*



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CLIMATE CHANGE AND WATER TRANSFERS

Christine A. Klein*

Jesse Reiblich**

Climate change adaption is all about water. Although some governments have begun to plan for severe water disruptions, many have not. The consequences of inaction, however, may be dire. As a report of the U.N. Environment Programme warns, “countries that adopt a ‘wait and see’ approach potentially risk the lives of their people, their ecosystems and their economies.” In the United States, according to one study, nearly 60% of the states are unprepared to deal with the impending crisis. Responding to this void, we offer what we believe is the first comprehensive, state-by-state survey of water allocation law and its efforts to ensure an adequate water supply in the face of a changing climate. In particular, we focus on one specific allocation mechanism—“water transfer”—because it is both widely considered and broadly controversial as a climate adaptation strategy. Through this article, we seek to make three unique contributions to the literature. First, we parse the opaque usage of the phrase “water transfer” and construct a typology of its three most prominent meanings. Second, we have conducted an empirical review of water transfer statutes, and present our raw data in table form, grouped by state and by transfer type. Finally, we have categorized state transfer statutes along a continuum, from measures that restrict transfers, to those that mitigate transfer impacts, to those that compensate for impacts in a currency other than water. Overall, we offer to legislators a “toolkit” of options, arrayed along a logical continuum.

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* Chesterfield Smith Professor of Law and Director, LL.M. Program in Environmental & Land Use Law, University of Florida Levin College of Law. We would like to thank Becky Convery, Jay Fields, and Alexis Segal for their many helpful comments on this paper. We would also like to thank the Florida Climate Institute for generous funding without which this research would not have been possible.

** LL.M. Candidate, Class of 2013, University of Florida Levin College of Law, Environmental & Land Use Law; J.D. University of Florida Levin College of Law, 2011.

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I. INTRODUCTION

Climate change adaption is all about water. As a report of the United Nations Environment Programme asserted, the availability and quality of water will be the “main pressures” that climate change imposes on society and the environment.¹ The warnings are dire. The U.N. sounded an apocalyptic call to action: “While predicting the exact consequences of climate change in specific geographies is not yet possible, countries that adopt a ‘wait and see’ approach potentially risk the lives of their people, their ecosystems and their economies.” Likewise, another study admonished governments that “ignoring climate change is not an option.”

We are already feeling water-related consequences of climate change.² The Environmental Protection Agency catalogues a host of alterations to the hydrological cycle, including impacts to the amount, timing, form, and intensity of precipitation.³ Some states will be drier, including Colorado, whose winter snowpack could diminish by almost seventy percent by 2070.⁴ Other areas will be wetter or deluged by concentrated storms. Already, the most intense squalls have concentrated their fury

¹ United Nations Environment Programme, *Climate Change Adaptation and Water Resources Management in Africa*.

² See *infra* Part II.A.

³ U.S. Environmental Protection Agency, *Climate Change and Water*, <http://water.epa.gov/scitech/climatechange/index.cfm> (last updated Dec. 11, 2012).

⁴ Natural Resources Defense Council, *Ready or Not: How Water-Ready is Your State?* (press release), <http://www.nrdc.org/water/readiness/press-materials.asp> (2012); Ben Chou et al., *Ready or Not: An Evaluation of State Climate and Water Preparedness Planning*, NRDC Document April 2012 D:12-03-D, available at <http://www.nrdc.org/water/readiness/files/Water-Readiness-full-report.pdf>.

over the past half-century, increasing their rainfall by up to twenty percent during a single storm.⁵

Despite this impending crisis, many states are failing to prepare adequately. The Natural Resources Defense Council surveyed the overall efforts of all fifty states, and found them wanting. Challenging officials to follow the lead of the most active states, the NRDC concluded in 2012 that “29 states or nearly 60% of the states in the United States are inadequately prepared to deal with the threats from climate change related to water.”⁶

Responding to this call to action, we offer what we believe is the first comprehensive, state-by-state survey of water allocation law and its efforts to ensure an adequate water supply in the face of a changing climate.⁷ In particular, we focus on one specific allocation mechanism—“water transfer”—because it is both widely considered and broadly controversial as a climate adaptation strategy.⁸ Although “water transfer” does not have one consistent meaning, it refers generally to the severance of water from its natural basin or aquifer, and its subsequent broad-scale transport through pipes or ditches for use in a distant watershed, county, or perhaps even state.⁹ While many laud transfers as an efficient market mechanism that delivers water to its highest and best use, others bemoan transfers as the commodification of an essential resource, often without regard to the negative externalities that result.¹⁰

Through this article, we seek to make three unique contributions to the literature. First, we parse the opaque usage of the phrase “water transfer” and construct a

⁵ EPA, *supra* note 3, at 1 (describing the increase in rainfall during the most intense 1% of storms over the past 50 years).

⁶ NRDC, *supra* note 4, at *1.

⁷ Although some have conducted surveys of water transfers, they tend to focus on the western states or to predate the fairly recent concern for making water law resilient in the face of climate change.

⁸ See *infra* Parts II.B and IV.B.

⁹ See *infra* Part II.C.

¹⁰ See *infra* Part IV.B.

typology of its three most prominent meanings.¹¹ Second, we have conducted an empirical review of water transfer statutes, and present our raw data in table form, grouped by state and by transfer type.¹² Finally, we have categorized state transfer statutes along a continuum, from measures that *restrict* transfers (as through prohibitions or recall measures), to those that *mitigate* transfer impacts (as by imposing prerequisites or conditions), to those that *compensate* for impacts in a currency other than water (as by providing monetary payments to the source basin or constructing storage facilities therein).¹³

We take no stance on the relative merits of water transfers in general or regulatory mechanisms in particular. Instead, we offer to legislators a “toolkit” of options, arrayed along a logical continuum. Part IV undertakes a review of the literature, summarizing the benefits and limitations of transfers as a guide to states considering the adoption of new transfer regulation statutes.

II. THE CONTEXT: AN UNCERTAIN HYDROLOGIC FUTURE

A. *The Problem: The Impacts of Climate Change on Water Resources*

Perhaps the most troubling aspect of climate change’s effect on water resources is the uncertainty of those effects. Various models predict the possible effects of climate change on water resources. These models do not always predict the same effects.¹⁴

¹¹ See *infra* Part II.C.

¹² See *infra* Part III and Appendix 1.

¹³ See *infra* Part III and Appendix 2.

¹⁴ U.N. Env’t Programme and World Meteorological Org., Intergovernmental Panel on Climate Change [IPCC], *Climate Change and Water: IPCC Technical Paper VI*, 3 (Bates, B.C., Z.W. Kundzewicz, S. Wu & J.P. Palutikof eds., 2008), available at <http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf> Report/AR4WG1_Print_SPM.pdf (contribution of Working Group II). “Outside [precipitation increases in the high latitudes and parts of the tropics, and decreases in some subtropical and lower mid-latitude regions], the sign and magnitude of projected [precipitation] changes varies between models, leading to substantial uncertainty in precipitation projections. Thus projections of future precipitation changes are more robust for some regions than for others. Projections become less consistent between models as spatial scales decrease.” *Id.*

Furthermore, the models designed to predict the effects of climate change on water resources are less certain than the models designed to predict changes in global temperatures.¹⁵ Despite these uncertainties, the predicted changes in temperatures alone provide us with some sense of the coming effects on our water resources.¹⁶ Likewise, further insight can be gleaned by coupling the more predictable temperature change information with hypothetical changes in precipitation.¹⁷ Additionally, the uncertainty of these models reflects the general uncertainty that we should embrace regarding climate change generally. We cannot be sure that the coming climactic changes will be like any we have experienced in the past.

Because climate change models are not the fortune-telling oracles we might like them to be, it is worth considering some of the observed changes to water resources during the last century. In North America the following changes occurred over most of the continent: the duration and extent of snow cover decreased; annual precipitation increased; mountain snow water equivalent decreased; the frequency of heavy precipitation events increased; and the water temperature of lakes increased.¹⁸ Annual precipitation decreased in the central Rockies, the southwestern United States, the Canadian prairies, and the eastern Arctic.¹⁹ Furthermore, salinization of coastal surface waters occurred in Florida and Louisiana, periods of drought increased in the western

¹⁵ Robert W. Adler, *Climate Change and the Hegemony of State Water Law*, 29 STAN. ENVTL. L.J. 1, 11 (2010).

¹⁶ *Id.* (Adler explains that, “basic physics suggests that adding more energy to the atmosphere will alter the movement of atmospheric moisture and therefore affect precipitation. There is significant agreement among a large number of models that those changes will be significant, but more uncertainty about the exact nature, timing, location, and magnitude of those changes.”).

¹⁷ Kathleen A. Miller, *Climate Change and Water in the West: Complexities, Uncertainties and Strategies for Adaptation*, 27 J. LAND RESOURCES & ENVTL. L. 87, 92 (2007). Miller gives the following example: “An early study of the possible impacts of climate change on the flow of the Colorado River used [the impacts of projected temperature changes coupled with a range of hypothetical precipitation changes] to conclude that annual inflows into Lake Powell would decline by about 21 percent if precipitation over the Upper Colorado Basin remained unchanged while temperatures increased by 4C°. To keep annual runoff unchanged with such a temperature change, the study found that basin precipitation would need to increase by almost 20 percent—considerably more than the projected increase for global average annual precipitation for a global temperature increase of that magnitude.” *Id.*

¹⁸ Bates, et al., *supra* note at 102, table 5.7.

¹⁹ *Id.*

United States and in southern Canada, the proportion of precipitation falling as snow decreased in western Canada and prairies and in the western United States, and earlier peak streamflows due to earlier snowmelts occurred in the western United States, New England, and in Canada.²⁰ Runoff and streamflow decreased in the Colorado and in the Columbia River basins.²¹

Looking forward in time, the probable impacts of climate change on water resources are many and varied.²² They include saltwater intrusion into freshwater sources, increased drought in dry areas, increased flooding in wet areas, increased flooding in areas made drier due to climate change, lower lake water levels, reduced groundwater recharge, reduced stream flows, and reduced annual snowpack. These effects are all interconnected through the hydrologic cycle. For example, reduced precipitation causes more water to evaporate from the soil. Lower soil moisture causes the soil to bake and harden in the sun. This hardened soil then acts much like a concrete surface: it exacerbates flooding to other areas because the soil is now able to absorb less moisture than it previously could.

Sea level rise is another threat to water resources that can result from climate change. One study predicts a sea level rise in south Florida of 32 to 40 inches by 2100.²³ Other studies estimate an even larger rise by that year.²⁴ The 2012 hurricane that struck the mid-Atlantic and northeastern United States in 2012, known as “Superstorm Sandy,” demonstrated the vulnerability of cities to flooding and natural disasters.²⁵ It

²⁰ *Id.*

²¹ *Id.*

²² See generally Bates, et al., *supra* note 18.

²³ GARY T. MITCHUM, FLORIDA CLIMATE INSTITUTE, SEA LEVEL CHANGES IN THE SOUTHEASTERN UNITED STATES PAST PRESENT, AND FUTURE i (2011), available at http://www.seclimate.org/pdfpubs/201108mitchum_sealevel.pdf.

²⁴ Bates, et al., *supra* note 18, at 28 (“Model- based projections of global mean sea-level rise between the late 20th century (1980–1999) and the end of this century (2090–2099) are of the order of 0.18 to 0.59 m, based on the spread of AOGCM results and different SRES scenarios, but excluding the uncertainties noted above. In all the SRES marker scenarios except B1, the average rate of sea-level rise during the 21st century is *very likely* to exceed the 1961–2003 average rate (1.8 ± 0.5 mm/yr).”).

also showed that the effects of climate change—such as sea level rise—could come in the form of intermittent severe weather events rather than in a slow gradual process that will appear at some point in the distant future. Troublingly, some studies have shown that even very minimal sea level rise could result in saltwater intrusion into groundwater reservoirs of fresh water.²⁶ The obvious danger of this intrusion is that entire aquifers could go from being freshwater sources of drinking water to requiring desalination in order to drink.

Flooding is expected to increase in currently wet areas and drought is expected to increase in areas that are already arid as a result of climate change.²⁷ Flooding is also expected to increase in areas that are arid but that currently experience seasonal rains.²⁸ Increased drought brings possible water quality deterioration from a range of sources listed by one study, including “sediments, nutrients, dissolved organic carbon, pathogens, pesticides and salt, as well as thermal pollution.”²⁹

²⁵ See Benjamin Strauss & Robert Kopp, *Rising Seas, Vanishing Coastlines*, Opinion, N.Y. TIMES, Nov. 24, 2012, <http://www.nytimes.com/2012/11/25/opinion/sunday/rising-seas-vanishing-coastlines.html> (“In a world with oceans that are five feet higher, our calculations show that New York City would average one flood as high as Hurricane Sandy’s about every 15 years, even without accounting for the stronger storms and bigger surges that are likely to result from warming.”).

²⁶ See, e.g., Bates, et al., *supra* note 18, at 43. “For two small and flat coral islands off the coast of India, the thickness of freshwater lenses was computed to decrease from 25 m to 10 m and from 36 m to 28 m, respectively, for a sea-level rise of only 0.1 m (Bobba et al., 2000).”

²⁷ *Id.* at 3 (“Climate model simulations for the 21st century are consistent in projecting precipitation increases in high latitudes (very *likely*) and parts of the tropics, and decreases in some sub- tropical and lower mid-latitude regions (likely).” *Id.* “Many semi-arid and arid areas (e.g., the Mediterranean Basin, western USA, southern Africa and north- eastern Brazil) are particularly exposed to the impacts of climate change and are projected to suffer a decrease of water resources due to climate change (high *confidence*). [2.3.6]”).

²⁸ *Id.* at 25 (“Precipitation increases...in some of the monsoon regimes, e.g., the south Asian monsoon in summer (June to August) and the Australian monsoon in summer (December to February), are notable...”).

²⁹ *Id.* at 3.

Climate change is also expected to result in lower lake water levels, especially in areas such as the Great Lakes region.³⁰ Lower water levels could require dredging to keep open shipping lanes.³¹ This dredging could, in turn, harm water quality.³² Lower water levels could also worsen water quality by hindering the Lakes' ability to adequately self-regulate the impacts of toxic substances and nutrients such as nitrogen and phosphorous.³³ Lower water levels could also cause wetlands along the Lakes' shores to dry up and to be replaced by forests or dunes.³⁴ This loss of filtering wetlands could further reduce the water quality of the Lakes. Since residents of the Great Lakes region rely on the Lakes for drinking water, water quality degradation caused by climate change could have serious consequences for the region.³⁵

Reduced water availability could lead to reduced groundwater recharge in aquifers. According to a report by the Intergovernmental Panel on Climate Change (IPCC), reduced water availability could result from any of the following: decreased flows in basins fed by shrinking glaciers and longer and more frequent dry seasons; decreased summer precipitation leading to a reduction of stored water in reservoirs fed with seasonal rivers; interannual precipitation variability and seasonal shifts in streamflow; reductions in inland groundwater levels; increase in evapotranspiration as a result of higher air temperatures, lengthening of the growing season and increased irrigation water usage; and salinisation.³⁶ In turn, decreases in groundwater recharge

³⁰ See generally International Joint Commission, *Protection of the Waters of the Great Lakes*, Final Report of the Governments of Canada and the United States. (February 22, 2000), available at <http://www.ijc.org/php/publications/html/finalreport.html>.

³¹ PERVAZE A. SHEIKH & CYNTHIA BROUGHER, CONG. RESEARCH SERV., RL32956, GREAT LAKES WATER WITHDRAWALS: LEGAL AND POLICY ISSUES 7 (2008).

³² *Id.*

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.* at 4 ("The estimated 45 million people in the Basin rely on the Great Lakes for jobs, energy, shipping, drinking water, and recreation, among other things.").

³⁶ Bates, et al., *supra* note 18, at 70.

can exacerbate the effects of sea-level rise.³⁷ For instance, decreased groundwater recharge can cause saline aquifers to intrude upon nearby inland freshwater aquifers.³⁸

Like groundwater availability, surface flows also are expected to decrease in many semi-arid areas due to climate change³⁹ (although streamflows in other areas could increase initially due to reduced or earlier snowpack melting each winter⁴⁰). Decreases in streamflows could lead to an increase in the salinity of rivers and estuaries in these areas.⁴¹ Earlier snowmelts send too much water into reservoirs during spring and too little during summer.⁴²

Climate change is also expected to result in reduced annual snowpack. Glaciers and ice caps are expected to lose mass because these areas of stored freshwater are expected to melt more during summers than they are expected to increase during winter snowfalls.⁴³ These decreases are expected to result in less available fresh water during warm and dry periods than in the past.⁴⁴

³⁷ *Id.* at 43.

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Id.* at 3. “Water supplies stored in glaciers and snow cover are projected to decline in the course of the century, thus reducing water availability during warm and dry periods (through a seasonal shift in streamflow, an increase in the ratio of winter to annual flows, and reductions in low flows) in regions supplied by melt water from major mountain ranges, where more than one-sixth of the world’s population currently live...” *Id.*

⁴¹ *Id.* at 43. (“For example, salinity levels in the headwaters of the Murray-Darling Basin in Australia are expected to increase by 13–19% by 2050.”).

⁴² Felicity Barringer, *Storing Water For a Dry Day Leads to Suits*, N.Y. TIMES, July 27, 2011, http://www.nytimes.com/2011/07/27/science/earth/27waterbank.html?pagewanted=all&_r=0.

⁴³ Bates, et al., *supra* note 18, at 27.

⁴⁴ *Id.* at 3. Sections 2.1.2, 2.3.2, and 2.3.6 explain that this reduction in available freshwater will result from “a seasonal shift in streamflow, an increase in the ratio of winter to annual flows, and reductions in low flows.” *Id.*

B. *The Response: Water Transfers*

Proposed responses to climate change will undoubtedly call for increased uses of water transfers. A recent major study on the impact of climate change on the Colorado River Basin concluded that projected future demands for water in the basin exceed projected future supply.⁴⁵ The study identified a range of options for addressing this demand imbalance, including water banks⁴⁶ and water transfers.⁴⁷

Legal scholars have argued for an increased use of water transfers as a direct response to climate change. One type of water transfer that is especially popular is water markets. These scholars argue that water markets are our best response to climate change for a variety of reasons. For instance, they argue that water markets are preferable to traditional centralized planning and administration, because water markets promote flexibility require less bureaucratic red tape.⁴⁸ Likewise, proponents of

⁴⁵ Reclamation: Managing Water in the West, Colorado River Basin Water Supply and Demand Study, U.S. Department of the Interior Bureau of Reclamation. Available at http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/StudyReport_FINAL_Dec2012.pdf

⁴⁶ *Id.* at SR-82. “In the Study, a conceptual Upper Basin water bank was explored where the benefit was twofold: 1) the bank provided increased flexibility in the Upper Basin to mitigate risk of potential future Lee Ferry deficits and 2) the water generated through conservation for the bank enhanced ecological and recreational resources as it was routed to a conceptual storage facility. Although there are significant legal, policy, and institutional challenges associated with potential banking options, the potential benefits associated with this option suggest that additional exploration and analysis of this concept may be warranted.” *Id.*

⁴⁷ *Id.* “In terms of reducing demands and as conservation options, water transfers were also demonstrated through the Study portfolios as being an important tool for resolving imbalances in the near and long-term. Voluntary water transfers can have many potential benefits and in particular promote flexibility in adapting to uncertain future conditions. Many of the Basin States have been utilizing voluntary water transfers within their respective states to meet water management challenges and will continue to look to transfers as an important solution. Although negative impacts can be associated with certain types of water transfers, such as permanent dry-up of agricultural land, innovative strategies can be employed to avoid these impacts and are being explored by many states.” *Id.*

⁴⁸ Jonathan H. Adler, *Water Marketing as an Adaptive Response to the Threat of Climate Change*, 31 HAMLINE L. REV. 729, 732 (2008). See also Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 TEXAS L. REV. (2005).

water markets argue that these “free markets” offer the best way to adequately value water resources.⁴⁹ They also argue that the flexibility of water markets make them particularly well suited to deal with climate change.⁵⁰ Furthermore, they assert that using water markets would reduce the uncertainty that comes with planning for climate change.⁵¹

Other scholars have recommended adopting the reasonable use doctrine as a way to safeguard against the possible effects of climate change on water resources.⁵² For instance, these scholars argue that the reasonable use doctrine can be used to compel more efficient uses of California’s surface and groundwater.⁵³ According to these scholars, adopting the reasonable use doctrine could lead to the creation of water banks—both public and private—and increased pumping of groundwater in order to quench the growing thirst of the state as the whole.⁵⁴

The United States has not been alone in embracing water transfers as a possible response to climate change. For instance, commentators have pointed to Australia as an example of a government that used water transfers to successfully combat water

⁴⁹ See, e.g., Andrew P. Morriss, *Real People, Real Resources, and Real Choices: The Case for Market Valuation of Water*, 38 TEX. TECH. L. REV. 973 (2006).

⁵⁰ Jonathan H. Adler, *Water Marketing*, *supra* note 48, at 739 (“The demands of current and projected water management challenges can best be met through a greater reliance on water markets for water management”). See also *id.* at 749 (“Traditional planning tools are poorly equipped to address climatic effects on water supplies.”).

⁵¹ *Id.* at 749. “Water markets can both reduce uncertainty for water users and provide security against the harms that uncertainty can produce.” *Id.*

⁵² Brian E. Gray, *Global Climate Change: Water Supply Risks and Water Management Opportunities*, 14 HASTINGS W.-N.W. J. ENVTL L. & POL’Y 1453, 1459 (2008). Professor Gray’s recommendations are specific to California, but the reasonable use doctrine seems like it could be employed in other states in a similar way. *Id.*

⁵³ *Id.* at 1460-61. Gray’s argument is that by requiring all landowners, and the groundwater under these landowners, to be beholden to the reasonable use doctrine, landowners would have to make efficient use of their water and may be compelled “to permit the portion of the aquifer beneath their lands to be included in water banking and conjunctive use projects.” *Id.*

⁵⁴ *Id.* at 1460.

scarcity due to climate change.⁵⁵ In the wake of water scarcity problems, Australia instituted legal reforms in the 1990s that promoted water markets.⁵⁶ Proponents of following Australia's path argue that U.S. law could be adapted in the same way Australian law was in order to implement water markets as a possible solution to its water shortages due to climate change.⁵⁷ For example, they call for minimizing legal barriers in the western U.S. "to allow water transfers to occur more frequently."⁵⁸ Proponents of following Australia's example argue that the rest of the United States can look to California's Emergency Drought Water Bank of 1991 for creating institutions to facilitate temporary transfers of water rights.⁵⁹

Multinational reports have also endorsed water transfers as a possible response to climate-induced uncertainty. For example, the International Panel on Climate Change (IPCC) has identified water transfers as possible adaptation options for increased water demand. The IPCC has identified using water markets as a demand-side solution to reallocate water to highly valued uses.⁶⁰ The IPCC has also identified water transfers as a supply-side adaptation option in response to climate change.⁶¹

⁵⁵ Priyanka Sundareshan, *Using the Transfer of Water Rights as a Climate Change Adaptation Strategy: Comparing the United States and Australia*, 27 ARIZ. J. INT'L & COMP. L. 911 (2010).

⁵⁶ *Id.* at 936.

⁵⁷ *Id.* at 944.

⁵⁸ *Id.*

⁵⁹ *Id.* at 943.

⁶⁰ Bates, et al., *supra* note 18, at 49. Table 3.4. "summarises some supply-side and demand-side adaptation options, designed to ensure supplies during average and drought conditions. Supply-side options generally involve increases in storage capacity or abstraction from water courses and therefore may have adverse environmental consequences. Demand-side options may lack practical effectiveness because they rely on the cumulative actions of individuals." *Id.* at 48. The "water market" the IPCC mentions seems akin to a market where water rights are transferrable and limited to a certain sustainable number of water rights, such as the kind of market used in carbon emission trading schemes, but the report is not entirely clear.

⁶¹ *Id.* The "water transfers" the IPCC endorses as a tool to insure water supplies seem to be physical water transfers, such as an interbasin transfers, but the report is not entirely clear.

The Natural Resources Defense Council has prepared a report on state preparedness for climate-induced changes to state water supplies.⁶² The report acknowledges the link between water transfers and climate change and suggests that even with increased uses of water transfers, many states will not be able to meet future water demand.⁶³ The report also acknowledges that some states have stronger current regulatory frameworks in place for dealing with proposed water transfers in the face of climate change than others.⁶⁴

C. *The Typology: A Closer Look at Water Transfers*

Although many agree that “water transfers” may be employed by states in response to climate change, there is no clear agreement as to the precise meaning of that phrase. For instance, “water transfers” seem to include both physical transfers of water from one place to another as well as transfers of water rights from one party to another. The following subsections sketch out a “typology” of the water transfer mechanism and discuss its three primary meanings.

1. Simple substitution transfers

This article uses the phrase “simple substitution transfer” to describe the situation in which one water rights owner steps into the shoes of another, generally in conjunction with the sale or gift of real estate. As a result, the water rights of the first owner may pass unchanged to the new owner.⁶⁵ In this context “transfer” refers to the

⁶² Chou et al., *supra* note 4, at D:12-03-D.

⁶³ *Id.* at 46. The report explains that, in Colorado, for example, “Despite additional available water supplies in the future from planned agricultural water transfers, water reuse, expanded use of existing supplies, and new in-basin and transbasin projects, the report notes that total supplies will not be enough to offset greater water demand in 2050.”

⁶⁴ *Id.* at 138-39. Massachusetts, for example, “historically has had a strong regulatory framework for water resources management. In the mid-1980s, the state adopted the Interbasin Transfer Act and the Water Management Act. The Interbasin Transfer Act requires that all proposed water and wastewater transfers between the state’s basins be submitted for approval.” *Id.*

⁶⁵ DOUGLAS L. GRANT & GREGORY S. WEBER, CASES AND MATERIALS ON WATER LAW 106 n.6, 203 n.1 (8th ed., 2010).

passage of *legal rights* (water rights) from one party to another as an adjunct to the real estate transaction.⁶⁶ In many cases, the new owner will continue to exercise the water rights in the same manner as the previous owner, without change to such critical factors as the volume of use, the type of use, the time of use, the place of use, and the pattern by which excess water returns to its source.⁶⁷ As a result of such continuity, other users will not suffer any consequences, rendering simple substitutions generally noncontroversial.⁶⁸ The word “transfer” is usually employed to describe this type of transaction.⁶⁹

In common law riparian jurisdictions, absent other agreement, new owners acquire whatever water rights their predecessors enjoyed.⁷⁰ As a Tennessee court explained, “riparian rights were an appurtenance to the property” and the conveyance of upland by the owner of both the upland and the adjacent water “transfers the riparian rights absent an express provision to the contrary.”⁷¹ Likewise, prior appropriation jurisdictions generally presume that water rights pass with the land, unless the conveyance states otherwise.⁷²

2. Geographic transfers

Geographic water transfers occur when humans engineer the movement of water across the physical landscape from its natural source to its place of use. In order to qualify as a “transfer,” generally, the water must cross a boundary the law regards as

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ DAVID H. GETCHES, *WATER LAW IN A NUTSHELL* 62 (4th ed. 2009)

⁷¹ *The Pointe, LLC v. Lake Management Ass’n, Inc.*, 50 S.W.3d 471, 477 (Tenn. Ct. App. 2000).

⁷² GETCHES, *NUTSHELL*, *supra* note 70, at 167.

significant. In some cases, significance may be measured by distance traveled.⁷³ In other transfers, humans pump water across geographic boundaries, such as those marking surface watersheds,⁷⁴ mountain ranges,⁷⁵ and groundwater basins.⁷⁶ In yet other situations, water crosses legal and political lines, including property boundaries,⁷⁷ county lines,⁷⁸ and state borders.⁷⁹ Notably, when considered in this context, these geographic transfers involve the transport of water itself, and do not implicate legal “water rights” recognized under state law. Jurists and commentators refer to this type of transfer through terms including “water transfer,”⁸⁰ “interbasin transfer,”⁸¹

⁷³ See, e.g., Kansas Statutes Annotated §§ 82-a-726(a), 82(a)-1501(a)(1), 82(a)-1502 (defining transfer as the diversion of a specified minimum amount of water a distance more than 35 miles from the point of diversion).

⁷⁴ See, e.g., *Stratton v. Mt. Hermon Boys’ School*, 103 N.E. 87 (Mass. 1913) (imposing liability for material injury to riparians caused by diversion of water for use outside the source watershed).

⁷⁵ See, e.g., *City of Thornton v. Bijou Irrigation Co.*, 926 P.2d 1 (Colo. 1996) (finding the difficulty and expense of engineered transbasin diversion relevant in determining whether diversion was completed with due diligence).

⁷⁶ See, e.g., *Jensen v. Department of Ecology*, 685 P.2d 1068 (Wash. 1984) (treating separately imported groundwater stored in aquifer from groundwater naturally occurring in same basin).

⁷⁷ See *Mt. Hermon Boys’ School*, *supra* note (considering riparian landowner’s diversion from stream for use on a separate non-riparian tract that it owned).

⁷⁸ See, e.g., Fla. Rev. Stat. § 373.223(2) (prescribing statutory criteria for evaluation of proposed inter-county transfers).

⁷⁹ See, e.g., *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982) (holding invalid under the dormant commerce clause a portion of Nebraska’s statute restricting the withdrawal of groundwater from Nebraska well for use in adjoining state).

⁸⁰ See, e.g., Johanna Hamburger, *Improving Efficiency and Overcoming Obstacles to Water Transfers in Utah*, 15 U. DENV. WATER L. REV. 69 (2011).

⁸¹ See, e.g., Stephen E. Draper, *Sharing Water Through Interbasin Transfer and Basin of Origin Protection in Georgia: Issues for Evaluation in Comprehensive State Water Planning for Georgia’s Surface Water Rivers and Groundwater Aquifers*, 21 GA. ST. U. L. REV. 339 (2004).

“transbasin diversion,”⁸² “transmountain diversion,”⁸³ “engineered” transfers,⁸⁴ and “water export.”⁸⁵

Common law riparianism, practiced primarily in the eastern states, frowns upon such geographic water transfers. Under the so-called “watershed rule,” riparian landowners may not divert water from adjacent watercourses for use on property outside the drainage basin.⁸⁶ Likewise, under the “non-riparian use” restriction of many jurisdictions, landowners may not divert water from a neighboring stream for use on a different tract of land, even if both parcels lie in the same watershed.⁸⁷ In their strictest applications, these rules serve as *per se* bans, even if no one is injured by the subject water transfers.⁸⁸ These rules, at least in theory, can be particularly problematic for cities, which are generally forbidden from diverting surface water for non-riparian or out-of-basin use.⁸⁹ These restrictions are supported by the mentality that riparian lands

⁸² See, e.g., *City and County of Denver v. Fulton Irrigating Ditch Co.*, 506 P.2d 144 (Colo. 1972) (holding that water imported by means of transbasin diversion not subject to appropriation).

⁸³ Gregory J. Hobbs, Jr., *Reviving the Public Ownership, Antispeculation, and Beneficial Use Moorings of Prior Appropriation Water Law*, 84 COLO. L. REV. 97,112 (2013) (discussing “transmountain diversion and storage projects” constructed by Colorado cities).

⁸⁴ Ronald A. Kaiser & Michael McFarland, *A Bibliographic Pathfinder on Water Marketing*, 37 NATURAL RESOURCES J. 881, 899 (1997) (discussing the “cryptically termed” “engineering approach” for providing water to areas of limited supply).

⁸⁵ See, e.g., Christine A. Klein, *The Dormant Commerce Clause and Water Export: Toward a New Analytical Paradigm*, 35 HARV. ENVTL. L. REV. 131 (2011).

⁸⁶ See *Mt. Hermon Boys’ School*, *supra* note 74.

⁸⁷ Joseph W. Dellapenna, *The Evolution of Riparianism in the United States*, 95 MARQ. L. REV. 53 (2011).

⁸⁸ But see *Pyle v. Gilbert*, 265 S.E.2d 584 (Ga. 1980) (permitting non-riparian use in absence of injury to other riparians); *Lingo v. City of Jacksonville*, 522 S.W.2d 403 (Ark. 1975) (permitting non-riparian use in the absence of injury to other riparians); *Stratton v. Mt. Hermon Boys’ School*, 103 N.E. 87 (Mass. 1913) (permitting out-of-watershed use in absence of injury to other riparians).

⁸⁹ *Lord v. Meadville Water Co.*, 19 A. 1007 (Pa. 1890) (forbidding diversion of water from natural channel to supply a town); *Braidburn Realty Corp. v. City of East Orange*, 153 A. 714 (N.J.Err. App. 1931) (forbidding use, distribution, or sale of water for non-riparian use, but only if injury demonstrated). But see *North Carolina v. Hudson*, 731 F. Supp. 1261 (E.D.N.C. 1990) (permitting transbasin diversion for

and adjacent waters form an inseparable unit and, therefore, that water should not be severed from the land.⁹⁰ Notable exceptions occur in the context of municipal water supply, allowing interbasin transfers to supply water for cities including New York City,⁹¹ Virginia Beach,⁹² and Atlanta.⁹³

The riparian distaste for physical transfers also influences groundwater doctrines, in both eastern and western states. Like surface riparianism, these groundwater rules associate water use with land ownership. In particular, both the “reasonable use”⁹⁴ and “correlative rights”⁹⁵ doctrines limit the use of water to the tract of land from beneath which it was withdrawn. As a result, these two rules join surface riparianism in discouraging the geographic transport of water.⁹⁶ Only the minority “English rule” (or rule of capture) imposes no restrictions on the place of use, even

municipal use); *City of Enid v. Crow*, 316 P.2d 834 (Okla. 1957) (refusing to enjoin sale of water to city for non-riparian use, but requiring city to pay damages for any injury suffered).

⁹⁰ GETCHES, *supra* note, 70, at 53-54 (“The philosophical premise of the [watershed] rule is that watercourses and lakes exist primarily to benefit the lands through which they flow, rather than to benefit riparian landowners”).

⁹¹ *Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York*, 451 F.3d 77, 79-80 (2d Cir. 2006) (describing water delivery system for New York City), *cert. denied*, 549 U.S. 1252 (2007).

⁹² *State of North Carolina v. Hudson*, 731 F. Supp. 1261 (E.D.N.C. 1990), *aff’d*, 940 F.2d 58 (4th Cir. 1991). *See generally*, JOSEPH L. SAX ET AL., *LEGAL CONTROL OF WATER RESOURCES* 88-89 (4th ed. 2006) (noting that “riparian rights play a scant role” in deciding contemporary municipal supply disputes, which instead are guided by “a potpourri of environmental and administrative law issues that have little in common with the ‘water law’ issues of the case”).

⁹³ Barbara Cosens, *The Eternal Quest for Water: Historical Overview and Current Examination of Interbasin Transfers of Water*, PROCEEDINGS OF THE ROCKY MOUNTAIN MINERAL LAW FIFTY-FIFTH ANNUAL INSTITUTE, at 10-11 (2009) (discussing dispute over Atlanta’s water supply).

⁹⁴ GETCHES, NUTSHELL, *supra* note 70, at 276-77 (discussing the reasonable use groundwater doctrine’s preference for uses on overlying land).

⁹⁵ *Id.* at 276-77 (explaining correlative rights doctrine and its recognition of the right to make reasonable use of water on overlying land).

⁹⁶ *See supra* notes and accompanying text.

though it requires the ownership of overlying land as a prerequisite to the withdrawal of the underlying groundwater.⁹⁷

In contrast to riparian-influenced surface and groundwater rules, the western prior appropriation doctrine embraces the right to move scarce water resources long distances to the places where they are needed most. Indeed, in the seminal case of *Irwin v. Phillips*,⁹⁸ in the wake of the nineteenth-century California gold rush the California Supreme Court lauded the ability to transfer water as one of the critical features of its law. The Court described the right to move water long distances as supported by “a universal sense of necessity and propriety,” and declared its firm desire to protect miners who had “taken the waters from their natural beds, and by costly artificial works . . . conducted them for miles over mountains and ravines, to supply the necessities of gold diggers, . . . without which the most important interests of the mineral region would remain without development.”⁹⁹

3. Transfer of water rights

A third transfer possibility involves the conveyance of water rights in a transaction distinct from the sale of land. Often, this results in a change in the *place* where established water rights will be used. Other changes may occur simultaneously, including changes in the type of use (most commonly from agricultural use to municipal and industrial use), the time of use (e.g., from the growing season to year-round use), and the point of diversion.¹⁰⁰ Importantly, in this context “transfer” refers to the passage of *legal rights* (water rights) from one party to another, either appurtenant to a land transaction or as a severable right to use water independent of the ownership of

⁹⁷ GETCHES, NUTSHELL, *supra* note 70, at 268-69 (explaining “English” or “absolute ownership” rule).

⁹⁸ 5 Cal. 140 (Cal. 1855).

⁹⁹ 5 Cal. at ??

¹⁰⁰ *High Plains A&M, LLC v. Southeastern Colorado Water Conservancy Dist.*, 120 P.3d 710 (Colo. 2005); *Strickler v. Colorado Springs*, 26 P. 316 (Colo. 1981).

any particular tract of land.¹⁰¹ This process has been described by phrases such as “sale of water rights,”¹⁰² “change of use,”¹⁰³ and “water markets.”¹⁰⁴

In riparian jurisdictions, both existing uses and changes in the use of water rights (whether or not the owner changes) are judged under the “reasonable use” test. Riparian uses are acceptable if they are reasonable in purpose and amount, and if they do not cause “unreasonable harm” to other water users.¹⁰⁵ Failure to continue an existing use does not usually result in its abandonment or forfeiture,¹⁰⁶ nor does the initiation of a new use face an insurmountable obstacle.¹⁰⁷ As a result of this inherent flexibility, discussions of eastern water markets are rare.¹⁰⁸ Rather than *purchase* water rights, riparian landowners simply initiate their own water rights (at no cost) at any

¹⁰¹ GRANT & WEBER, *supra* note, at 204 n.3.

¹⁰² *Id.*

¹⁰³ GETCHES, NUTSHELL, *supra* note 65, at 173-89.

¹⁰⁴ *Id.* at 203-20; SAX ET AL., WATER RESOURCES 264-67 (4th ed.).

¹⁰⁵ GETCHES, NUTSHELL, *supra* note 70, at 48-53.

¹⁰⁶ *Id.* at 86-87.

¹⁰⁷ For a particularly strong application of this principle, see *Franco-American Charolaise, Ltd. V. Oklahoma Water Resources Bd.*, 855 P.2d 568 (Okla. 1990) (holding that state legislature may not, without compensation, restrict initiation of new riparian uses because “[t]he last riparian use asserted has as much priority as the first”); see generally GETCHES, NUTSHELL, *supra* note, at 89-92 (listing *Franco-American Charolaise* as an exception to the general pattern allowing modern statutes in hybrid riparian/prior appropriation jurisdictions to recognize “riparian rights to extend only to the amount of water applied to a beneficial purpose within a designated time after the law is changed and . . . barring subsequent exercise of unused riparian rights”).

¹⁰⁸ But see Christine A. Klein, *Water Transfers: The Case Against Transbasin Diversions in the Eastern States*, 25 UCLA J. ENV'T'L L. & POL'Y 249 (2007); James L. Huffman, *Water Marketing in Western Prior Appropriation States: A Model for the East*, 21 GA. ST. U. L. REV. 429 (2004) (suggesting that eastern water markets will result in better use and protection of scarce water resources);

time. Nonriparians, in contrast, generally purchase their own tract of riparian *land*, however small,¹⁰⁹ rather than purchase naked water rights severed from the land.¹¹⁰

In contrast, appropriative jurisdictions have given increased attention to change of water rights, particularly as competition for water increases.¹¹¹ Westerners can still attempt to initiate their own new water rights rather than purchase existing water rights. However, the holders of new “junior” water rights must wait patiently in line until all “senior” water rights have been satisfied.¹¹² In some jurisdictions, the average annual water supply has already been stretched so thin that new appropriators will hold only “junior” water rights that do not reliably yield water every year.¹¹³ These types of transfers go by a variety of names, including water markets,¹¹⁴ dry-year (contingent) options,¹¹⁵ spot market transfers;¹¹⁶ and water banks.¹¹⁷

¹⁰⁹ In some cases, however, courts balk at the idea that the acquisition of a narrow strip of riparian land is sufficient to support the landowner’s desired uses. *See Gordonsville v. Zinn*, 106 S.E. 508 (Va. 1921) (considering defendant’s narrow strip of land, measuring 25 feet in width).

¹¹⁰ Although in theory one may purchase riparian water rights independent of land, in practice the purchaser generally acquires nothing more than the seller’s promise not to complain of the purchaser’s water use. Other riparian landowners drawing from the same water source retain their right to complain. *GETCHES, NUTSHELL, supra* note, at 65-67 (“Although grants [of riparian rights] are valid as between the parties, a majority of states hold that grants of riparian rights separate from the grant of any portion of riparian land held by the grantor are invalid as to other riparians.”).

¹¹¹ *GRANT & WEBER, supra* note 65, at 203 n.2.

¹¹² Christine A. Klein, *Water Bankruptcy*, 97 MINN. L. REV. 560, 569-72 (2012).

¹¹³ *Id.*

¹¹⁴ *See Jedidiah Brewer et al., Transferring Water in the American West: 1997-2005*, 40 U. MICH. J. L. REFORM 1021, 1025-31 (discussing western water law and water markets) (2007).

¹¹⁵ Ray Huffaker, Norman K. Whittlesey & Phillip R. Wandschneider, *Institutional Feasibility of Contingent Water Marketing to Increase Migratory Flows for Salmon on the Upper Snake River*, 33 NAT. RESOURCES J. 671 (1993) (examining potential institutional and legal obstacles to imposition of contingent option water market).

¹¹⁶ David W. Yoskowitz, *Spot Markets for Water Along the Texas Rio Grande: Opportunities for Water Management*, 39 NAT. RESOURCES J. 345 (1999).

¹¹⁷ Kevin M. O’Brien & Robert R. Gunning, *Water Marketing in California Revisited: The Legacy of the 1987-92 Drought*, 25 PAC. L.J. 1053, 1056 (1994) (tracing the development of water marketing in California and

III. STATUTORY REVIEW

Building on the transfer typology considered in the previous section, we have conducted a comprehensive, empirical review of each state's law on water transfers. Appendix 1 presents in table form the results of that study, and organizes the raw data by state and by transfer type. Appendix 2 offers a conceptual matrix to bring order to the data. To do so, we have categorized state transfer statutes along a continuum, from measures that *restrict* transfers (as through prohibitions or recall measures), to those that *mitigate* transfer impacts (as by imposing prerequisites or conditions), to those that *compensate* for impacts (as by providing monetary payments to the source basin or constructing storage facilities therein) and allow transfers to go forward. This part highlights in narrative form some of the most important findings of Appendix 1.

A. *Restricting Transfers*

Statutes that restrict water transfers tend to favor water use in the source basin. At their most restrictive, these laws prohibit transfers altogether.¹¹⁸ Such prohibitions may ban transfers that exceed specified distances,¹¹⁹ or that cross identified hydrologic

discussing major unresolved issues); Richard W. Wahl, *Market Transfers of Water in California*, 1 West-N.W. 49, 68 (1994) (discussing California water bank and potential evolution into privately negotiated transactions); Kaiser & McFarland, *supra* note 84, at 881, 893-94.

¹¹⁸ Under common law riparianism, many eastern states forbade the use of water outside of the watershed from which it was drawn. *See, e.g.,* City of Canton v. Shock, 66 Ohio St. 19 (1902). Some eastern statutes continued this prohibition in modified form. *See, e.g.,* Ala. Code § 115 (authorizing local laws to prohibit new transfers from the Tennessee River basin); Ind. Code § 14-25-1-11(b)(2) (restricting diversions out of the Great Lakes basin); La. Rev. Stat. Ann. §§ 14:224 and 33:1236.9 (prohibiting export of surface or groundwater from specified parishes, with exemption for bottled water); 22 Me. Rev. Stat. Ann. § 2660-A(1) (forbidding most intra-municipal transfers for commercial purposes in containers greater than 10 gallons); Ohio Rev. Code Ann. § 1522.01(4.8) (generally prohibiting transfers out of the Great Lakes basin. Some western statutes also prohibit or limit interbasin transfers. *See*, Mark Squillace, *The Water Marketing Solution*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10800, 10801 (2012) (explaining that "at least one state [Wyoming] initially prohibited transfers entirely") and Wyo. Stat. § 41-3-101. *See also* Ariz. Rev. Stat. § 45-544 (prohibiting most interbasin transfers outside active management areas); Mont. Code Ann. § 85-2-301 (prohibiting transfers out of specified watersheds).

¹¹⁹ *See, e.g.,* Kan.Stat. Ann. § 82a-1501 (Kansas statute defining transfer as "the diversion and transportation of water in a quantity of 2,000 acre feet or more per year for beneficial use at a point of use outside a 35-mile radius from the point of diversion of such water.").

or political boundaries.¹²⁰ Some statutes ban exports of water to other states, although legislators must take care to avoid running afoul of the dormant commerce clause.¹²¹ Likewise, statutes may prohibit transfers that impact sensitive basins, or that affect protected water uses.¹²² For example, Alaska generally prohibits transfers out of hydrologic units,¹²³ and Kansas imposes additional requirements for transfers over thirty-five miles.¹²⁴ Common law, too, may impose transfer restrictions, most importantly through riparianism's so-called "watershed rule."¹²⁵

Falling short of a complete ban, other laws allow transfers to occur, but reserve the right to call back the water if needed by the source region. For instance, statutes may permit a source region to "reserve"¹²⁶ water in place or to "recall"¹²⁷ water in times of

¹²⁰ See, e.g., 22 MRS § 2660-A(1) (Maine statute forbidding most intra-municipality water transfers for commercial purposes in containers greater than ten gallons in size); Okla. Stat. tit. 60, § 1B (generally prohibiting out of state exports without legislative consent) and Tarrant Regional Water Dist. v. Herrmann, *cert. granted*, 133 S.Ct. 831 (2013).

¹²¹ See *Sporhase v. Nebraska*, 458 U.S. 941 (1982). See also, Klein, *The Dormant Commerce Clause*, *supra* note 85, at 131.

¹²² Alabama Local Laws prohibit additional transfers of water from the Tennessee River basin to any other river basin, subject to exceptions. 2005 Ala. Acts 176; 2006 Ala. Acts 115, 341, 373, 593, 603, 606.

¹²³ Alaska Stat. § 46.15.035. This general prohibition may be overcome under certain conditions where surplus water exists in a given hydrologic unit. *Id.*

¹²⁴ Kan. Stat. Ann. § 82a-1501(a)(1). Transfers under thirty-five miles in distance are not considered transfers under Kansas law. *Id.*

¹²⁵ See, e.g., *Stratton v. Mount Hermon Boys' School*, 103 N.E. 887 (Mass. 1913).

¹²⁶ The general idea of reservations is to protect at least a portion of the source region's water from transfers. See, e.g., FLA. STAT. § 373.223(4) which provides that "The governing board or the department, by regulation, may reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety. Such reservations shall be subject to periodic review and revision in the light of changed conditions. However, all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest." *Id.*

¹²⁷ Some states may allow use of water by others, but reserve a "right of recapture." See, e.g., Cal. Water Code § 10505, which states that, "No priority under this part shall be released nor assignment made of any application that will, in the judgment of the board, deprive the county in which the water covered by

need. Further, some states negotiate interstate compacts to reserve each state's share of transboundary resources.¹²⁸ Thus, water may flow downstream to neighboring states (analogous to an interstate transfer), subject to the slower-developing state's right to recall its share of compact waters at some point in the future.¹²⁹

B. *Mitigating Transfer Impacts*

Some statutes require a party that wishes to transfer water to mitigate its impacts. These requirements can take the form of prerequisites or conditions on transfers, such as the requirement of threshold conservation efforts by the would-be importer¹³⁰ or diversion from local uses before permitting transfers.¹³¹ Some states have "area-of-protection" protective factors which must be evaluated before a transfer can be approved.¹³² Other states have "local sources first" statutes that require water to be used

the application originates of any such water necessary for the development of the county." *Id.* See also Cal. Water Code § 11460: "In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived by the department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein." *Id.* See also 82 Okla. Statutes § 105.12(4). Other states issue water use permits for limited terms, after which state officials can reconsider the allocation. This might also be considered a type of recall of water use. See, e.g., Fla. Stat. § 373.236(1) & (3); Utah Code Ann. § 73-3-5.5 (authorizing issuance of limited period water rights)

¹²⁸ See, e.g., the Colorado River interstate compact, designed to avoid race to develop, and to reserve pool of water for use of slower-growing states. See Klein, *Water Bankruptcy*, *supra* note 112, at 560, 609-610.

¹²⁹ *Id.*

¹³⁰ See, e.g., California Water Code §1725 (requiring that a change in water use "not unreasonably affect fish, wildlife, or other instream beneficial uses.").

¹³¹ See *supra* note and accompanying text.

¹³² See, e.g., V.T.C.A., Water Code § 11.085. "(1) The commission may grant, in whole or in part, an application for an interbasin transfer only to the extent that: (1) the detriments to the basin of origin during the proposed transfer period are less than the benefits to the receiving basin during the proposed transfer period; and (2) the applicant for the interbasin transfer has prepared a drought contingency plan and has developed

for local sources before it can be transferred to other regions.¹³³ For example, Florida's "local sources first" policy overtly discourages transfers across political or hydrological boundaries, and encourages "the use of water from sources nearest the area of use or application whenever practicable."¹³⁴

A state might impose conditions in the form of additional terms and other limitations to minimize the impacts of water transfers. For example, most western states require applicants for changes of water rights to prove "no injury" to other water rights holders before water officials will approve the change application.¹³⁵ Other states use a public interest review to determine whether or not to approve a change application.¹³⁶ Washington requires reciprocity in order to allow out-of-state water transfers.¹³⁷ Texas requires that a party applying for a new or amended water permit include a conservation plan and commit to avoid waste.¹³⁸

and implemented a water conservation plan that will result in the highest practicable levels of water conservation and efficiency achievable within the jurisdiction of the applicant.

¹³³ See *supra* notes & accompanying text (Fla. Stat. 373 Sections 373.016(4)(a) and (b), and 373.223(3)(a) – (g), Florida Statutes, are the primary local sources first statutes.).

¹³⁴ *Id.*

¹³⁵ See, e.g., N.M.S.A. § 72-8-5. "It shall be unlawful for any person, company or corporation to divert the waters of any public stream in New Mexico for use for reservoirs or other purposes in a valley other than that of any such stream, to the impairment of valid and subsisting prior appropriations of such waters.

¹³⁶ Douglas L. Grant, *Public Interest Review of Water Right Allocation and Transfer in the West: Recognition of Public Values*, 19 ARIZ. ST. L.J. 681, 684-85 (1987).

¹³⁷ R.C.W. § 90.03.300 ("the department may in its discretion, decline to issue a permit where the point of diversion described in the application is within the state of Washington but the place of beneficial use in some other state or nation, unless under the laws of such state or nation water may be lawfully diverted within such state or nation for beneficial use in the state of Washington.").

¹³⁸ V.T.C.A., Water Code § 11.1271(a) ("The commission shall require from an applicant for a new or amended water right the formulation and submission of a water conservation plan and the adoption of reasonable water conservation measures, as defined by Subdivision (8)(B), Section 11.002, of this code.").

C. *Compensating for Transfer Impacts*

The compensation end of the spectrum tends to favor the receiving basin and usually features statutes that allow water transfers to go forward, so long as some sort of compensation is exchanged for them. Some compensatory mechanisms are designed to enhance the “security” of the source basin’s supply. For example, Colorado requires some importers to finance the construction of reservoirs in the area of origin to provide “compensatory storage.”¹³⁹ Compensation may also be financial in nature, requiring the importer to pay a tax or damages to the basin-of-origin. For example, Colorado recognizes “transition mitigation payments” as a valid form of compensation.¹⁴⁰ Similarly, in Arizona, transfers of groundwater within a sub-basin are subject to payment of damages if they fall within active management areas.¹⁴¹ Likewise, in Alaska, water transfers outside of hydrologic units require payment of “conservation fees.”¹⁴² In Wyoming, water transfers require payment of just compensation.¹⁴³ New Mexico

¹³⁹ For example, the Green Mountain Reservoir was part of the “compensatory storage” provided to offset the harmful impacts of a massive transfer of Colorado River water across the Rocky Mountains from west to east. See generally, Colorado Division of Water Resources, *General Administration Guidelines for Reservoirs*, Oct. 2011, 38-39 available at http://water.state.co.us/DWRIPub/Documents/Res_Admin_Guidelines_Oct2011.pdf.

¹⁴⁰ Colo. Rev. Stat. § 37-92-305 4.5(b)(I)(A). “A transition mitigation payment shall equal the amount of the reduction in property tax revenues for property that is subject to taxation by an entity listed in section 37-92-302(3.5) that is attributable to a significant water development activity. Such payment shall be made on an annual basis in accordance with the repayment schedule established by the court unless the applicant and the taxing entities mutually agree on an alternate payment schedule.” *Id.*

¹⁴¹ Ariz. Rev. Stat. § 45-543 B. “Groundwater that is withdrawn by a city, town or private water company within its service area may be transported pursuant to a delivery contract authorized by § 45-492, subsection C between sub-basins of an active management area and shall be subject to payment of damages unless the groundwater is withdrawn pursuant to a type 1 non-irrigation grandfathered right.” *Id.*

¹⁴² Alaska Stat. § 46.15.035 (a)(3). “(a) Water may not be removed from the hydrologic unit from which it was appropriated to another hydrologic unit, inside or outside the state, without being returned to the hydrologic unit from which it was appropriated nor may water be appropriated for removal from the hydrologic unit from which the appropriation is sought to another hydrologic unit, inside or outside the state, without the water being returned to the hydrologic unit from which it is to be appropriated, unless the commissioner...(3) assesses a water conservation fee under (b) of this section.” *Id.*

imposes punitive fines or jail time for diversions that impair water existing water rights.¹⁴⁴ Nevada requires a fee for transferring water out of county or out of state.¹⁴⁵

Some jurisdictions explicitly countenance the practice of water marketing, where willing buyers and sellers negotiate for the sale or lease of water rights. In these states, the negotiated sales price is presumed adequate to compensate for any negative impacts caused by the transfer. Water markets enhance flexibility with a variety of market mechanisms such as temporary transfers,¹⁴⁶ water banks,¹⁴⁷ “interruptible supplies,”¹⁴⁸ and dry-year options.¹⁴⁹ New Mexico features a water leasing program.¹⁵⁰

¹⁴³ Wyo. Stat. § 41-3-104. “Where it can be shown to the board of control under the provisions hereof [§§ 41-3-101 through 41-3-103], that a preferred use is to be made, the procedure for a change of such use shall embrace a public notice, an inspection and hearing if necessary by and before the proper division superintendent, a report of such superintendent to the board of control, and an order by said board. If the change of use is approved, just compensation shall be paid and under the direction of the board, proper instruments shall be drawn and recorded.” *Id.*

¹⁴⁴ N.M.S.A. § 72-8-5. “It shall be unlawful for any person, company or corporation to divert the waters of any public stream in New Mexico for use for reservoirs or other purposes in a valley other than that of any such stream, to the impairment of valid and subsisting prior appropriations of such waters. Any violator of this section, shall upon conviction be punished by a fine of not less than one hundred dollars (\$100) nor more than five hundred dollars (\$500) or imprisonment in the county jail for not less than one month nor more than three months, or both, in the discretion of the court.” *Id.*

¹⁴⁵ N.R.S. § 533.438 (providing that “if an appropriation of groundwater pursuant to a permit to appropriate groundwater results in the transfer to and beneficial use of water in a county in this State other than the county in which the water is appropriated or in another state, the county of origin may impose a fee of \$10 per acre-foot per year on the transfer.”).

¹⁴⁶ See, e.g., California Water Code §§ 1728. Temporary transfers are “any change of point of diversion, place of use, or purpose of use involving a transfer or exchange of water or water rights for a period of one year or less.” *Id.*

¹⁴⁷ See, e.g., California Water Code §§; See also, N.M.S.A. 1978, § 72-1-2.3. “The interstate stream commission may recognize a water bank established by an irrigation district, a conservancy district, an artesian conservancy district, a community ditch, an acequia or a water users association in the lower Pecos river basin below Sumner lake for purposes of compliance with the Pecos River Compact.” *Id.*

¹⁴⁸ See, e.g., California Water Code §§

¹⁴⁹ See, e.g., California Water Code §§

¹⁵⁰ N.M.S.A. § 72-6-(1-7).

IV. LITERATURE REVIEW

The literature suggests several approaches for responding to climate change. We first address the broad theoretical literature and frameworks for responding to climate change in section A. Then, section B discusses the specific literature on water transfers and climate change.

A. *Thinking Globally, Thinking Locally*

The literature identifies several approaches to how environmental law can adapt to climate change generally and how water law can adapt specifically. Section A will discuss theoretical approaches to climate change in general and how these approaches have been, or may be, applied to water policy. Proponents of these approaches seek to make the law more flexible and nimble in light of future projected uncertainties in the aftermath of climate change. This first subsection considers resilience and adaptive management as a response to climate change. The second subsection then examines the tension between local and federal water resource management and policymaking in the wake of climate change, and these two approaches' detractors and supporters.

1. Resilience and Adaptive Management

Climate change seems to call for a more flexible and forward-looking approach than traditional command and control lawmaking and policymaking. For instance, scholars have called for a water policy that is adequately able to respond to a breakdown of existing water resource systems' resilience due to possible irreversible climate change stressors on these systems.¹⁵¹ According to its formulator, resilience is "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks."¹⁵² Ecological resilience, in contrast with engineering resilience, requires

¹⁵¹ See Adler, *Water Marketing*, *supra* note 48, at 738 (arguing that the threat of climate change "requires the creation of institutional arrangements that can foster greater resilience and adaptability in water management.").

¹⁵² C.S. Holling, Resilience and Stability of Ecological Systems, 4 Ann. Rev. Ecology & Systematics, 1973, at 1, 17-19.

system adaptations and adjustments in response to stressors. This ability to adapt and adjust in the face of changes in a system is the essence of ecological resilience. When this ability of a system to “bounce back” is lost, a system has lost its resilience.

Proponents of resilience point out that for resilience to be an adequate response to climate change, both society and nature must adapt to climate change.¹⁵³ This connectedness has been called “social-ecological resilience.”¹⁵⁴ In order to achieve this type of resilience, supporters recommend that “society should aim at strengthening the ability to deal with uncertainties and surprises, rather than attempting to control nature, maintain once and for all a given social or ecological situation, or counter any change.”¹⁵⁵ For example, one advocate has explained the attractiveness of ecological resilience strategy as its ability to accommodate “the possibility of fluctuating within a basin of attraction to equilibrium, with the goal of avoiding ‘flips’ from one structural state to another.”¹⁵⁶ But climate change seems to challenge the very idea of what is “normal” and “natural” and makes us ask ourselves what we should do if the systems we currently work within simply perish. Some point out that resilience-based environmental policy assumes a baseline equilibrium that we may never achieve again.¹⁵⁷ Instead, the baseline has shifted and might never move back to the range it inhabited before.

¹⁵³ Andrea M. Keesen & Helena F.M.W. van Rijswijk, *Adaptation to Climate Change in European Water Law and Policy*, 8 UTRECHT L. REV. 38, 39 (2012). “Since the human influence on the resilience of ecosystems can hardly be overestimated, the concept of social-ecological resilience has been developed. Social-ecological resilience is the capacity of linked social and ecological systems to absorb as well as to adapt to change. In other words, both society and nature have to adapt to climate change.” *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.* (citing C. Folke et al., ‘Regime shifts, resilience, and biodiversity in ecosystem management’, 2004 *Annual Review of Ecology, Evolution, & Systematics* 35, pp. 557-581; C. Folke et al., ‘Adaptive governance of social-ecological systems’, 2005 *Annual Review of Environment and Resources* 30, pp. 441-473).

¹⁵⁶ J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—with Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1377 (2011).

¹⁵⁷ See Robert W. Adler, *Climate Change*, *supra* note at 9 (pointing out that “[t]he longstanding scientific underpinnings of water resources planning reflect an assumption of relative stability known as ‘stationarity,’” but that “[r]ecent changes in global hydrologic conditions resulting from human-induced climate change...have caused some scientists to ‘assert that stationarity is dead and should no longer serve as a central, default assumption in water-resource risk assessment and planning.’”).

In contrast, the main weakness of relying on a resilience-based model of water transfer policy in response to climate change is that climate change could push the system so far that the system's basic structural identity is fundamentally changed—that the system literally “flips.” In such a case, resilience would no longer be useful because the system would not be correctly described as resilient anymore. Instead, the system would be more adequately described as fluctuating, or evolving, but not resilient. Accordingly, others have argued that climate change necessitates a move to an environmental framework that allows for paradigmatic shifts outside the range of a system's resilience. Furthermore, the IPCC suggests that, “Climate change challenges the traditional assumption that past hydrological experience provides a good guide to future conditions.”¹⁵⁸

In the face of such mounting uncertainty about resilience, some scholars argue that water law and policy should instead turn to a different, but related, strategy—adaptive management.¹⁵⁹ The adaptive management and resilience frameworks are linked by a similar history.¹⁶⁰ In fact, some observers have called adaptive management “a tool for implementing resilience theory.”¹⁶¹ Resilience, in turn, embodies the understanding of ecosystems' non-static nature within which adaptive management

¹⁵⁸ Bates, et al., *supra* note 18, at 4.

¹⁵⁹ Kevin E. Regan, *Balancing Public Water Supply and Adverse Environmental Impacts Under Florida Water Law: From Water Wars Towards Adaptive Management*, 19 J. LAND USE & ENVTL. L. 123 (2003) (arguing that, among other attractive qualities, “[f]urther incorporation of an adaptive management approach into Florida's water management system may encourage such cooperation and help reach a more effective balance between certainty, flexibility, and fairness under Florida water law.”).

¹⁶⁰ Mary Jane Angelo, *Stumbling Toward Success: A Story of Adaptive Management and Ecological Resilience*, 87 Neb. L. Rev. 950, 953 (2009). “The adaptive management concept originated from the works of C.S. Holling and Carl Walters in 1978 and 1986, respectively, but can be traced back to Charles Lindblom's article *The Science of “Muddling Through”* published in 1959. Holling incorporated the concept of resilience into policy design as an alternative to environmental assessment, which he found to be a “reactive approach” that “will inhibit laudable economic enterprises as well as violate critical environmental constraints.” *Id.*

¹⁶¹ Thomas T. Ankersen & Kevin E. Regan, *Shifting Baselines and Backsliding Benchmarks: The Need for the National Environmental Legacy Act to Address the Ecologies of Restoration, Resilience, and Reconciliation*, in *BEYOND ENVIRONMENTAL LAW: POLICY PROPOSALS FOR A BETTER ENVIRONMENTAL FUTURE*, 67 (Alyson C. Flournoy & David M. Driesen eds., 2010).

attempts to work. Some point to adaptive management's flexibility as its greatest asset.¹⁶² Adaptive management is especially useful in long-term projects and projects in which conditions are likely to change. Some major federal projects have implemented adaptive management. For example, the U.S. Bureau of Reclamation has used adaptive management to allay environmental fears about some of its dam projects.¹⁶³ The U.S. Army Corps of Engineers has also relied on adaptive management in its Everglades Restoration project.¹⁶⁴

On the other hand, some criticize adaptive management as being *too* adaptive, with flexibility beyond that which lawmakers can tolerate in a legal system that relies on predictability and clearly authorized actions. Water users might also find it difficult to endorse a policy that allows for adaptive solutions to problems because of resilience's inherent unpredictability, at least in the long term.

In sum, resilience and adaptive management highlight the underlying tension inherent in the concept of water transfers. Although these approaches seek to promote flexible responses to changing conditions, that flexibility comes at a high price: ceding a significant amount of control to ecosystem managers and water users, respectively.

2. Localism and Federalism Compared

A second tension over how we should respond to climate change's effects on water resources is the debate over whether we should employ a local or federal response. For example, some states have attempted to outlaw the export of water.¹⁶⁵

¹⁶² Regan, *Balancing Public Water Supply*, *supra* note 159 at 179. "While such a comprehensive approach may not be necessary in all permitting or water management decisions, it can be especially useful in complex disputes involving adverse environmental impacts and strong public need. Through cooperation, adaptive management attempts to understand the potential trade-offs among stakeholder interests and tries to generate innovative approaches and 'win-win' situations." *Id.*

¹⁶³ *Glen Canyon Dam Adaptive Management Program*, U.S. Department of the Interior Bureau of Reclamation (Nov. 30, 2012) available at <http://www.usbr.gov/uc/rm/amp/background.html>.

¹⁶⁴ The Journey to Restore America's Everglades, Adaptive Management, http://www.evergladesplan.org/pm/program_docs/adaptive_mgmt.aspx (last visited Feb. 26, 2013). See also Thomas T. Ankersen & Richard Hamann, *Ecosystem Management and the Everglades: A Legal and Institutional Analysis*, 11 J. LAND USE & ENVTL. L. 473, 493 (1996).

¹⁶⁵ *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982).

“Localism” is the belief that local or state governments should handle water policy decisions. Generally, localism tends to result in political decisions to use water where it is over transferring it to other areas.¹⁶⁶ Florida water law, for example, features a “local sources first” statute.¹⁶⁷ Pragmatically, localism seems to ostensibly support the notion that populations should move to places where water is instead of moving water to where people are.¹⁶⁸ One advantage of localism is that state and local governments are generally better able than a centralized government to identify and enact policies for their states and localities. This advantage is particularly obvious when it comes to the effects of climate change on water resources. Scholars point out that, “[a]daptation for Florida, where sea level rise is the primary threat, will not be what it is for Nevada, where even less water is the likely scenario.”¹⁶⁹ Another advantage of localism is that it might help to avoid the adverse environmental impacts traditionally associated with water transfers.¹⁷⁰ Water transfers out of a basin of origin result in a 100 percent consumptive use of that water resource.¹⁷¹ By limiting out-of-basin-of-origin transfers, localism policies can serve to protect those basins of origins and the environment.

¹⁶⁶ Klein, *Water Transfers*, *supra* note 108, at 249, 260-61 (recounting the revolt which followed an advisory report to the Florida governor to study the practicability of distributing water in Florida from water-rich areas to water-poor areas).

¹⁶⁷ FLA. STAT. § 373.016(4)(a) (2012). “Because water constitutes a public resource benefiting the entire state, it is the policy of the Legislature that the waters in the state be managed on a state and regional basis. Consistent with this directive, the Legislature recognizes the need to allocate water throughout the state so as to meet all reasonable-beneficial uses. However, the Legislature acknowledges that such allocations have in the past adversely affected the water resources of certain areas in this state. To protect such water resources and to meet the current and future needs of those areas with abundant water, the Legislature directs the department and the water management districts to encourage the use of water from sources nearest the area of use or application whenever practicable.” *See also*, FLA. STAT. §§ 373.223(3)(a) – (g) (2012).

¹⁶⁸ *See generally* Klein, *Water Transfers*, *supra* note 108.

¹⁶⁹ J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 427 (2010).

¹⁷⁰ Squillace, *The Water Marketing Solution*, *supra* note 118, at 10800, 10807 (limiting water transfers to the basin of origin).

¹⁷¹ Klein, *Water Transfers*, *supra* note 108, at 253.

One potential downside of localism is that empowering local water boards may lead to reactive policies wrought out of fear rather than out of good management practices. One example of this sort of wrongheaded regulation is the case of the Texas High Plains region.¹⁷² While other Texas appropriators introduced regulation in response to the Ogallala's decline due to saltwater intrusion or increased costs, the Texas High Plains region organized underwater conservation districts out of fear of outside regulation—by Texas or by the Texas Water Commission.¹⁷³ Likewise, some might say that localism tends to benefit those blessed with an abundance of water resources to the detriment of other areas. This is particularly salient when two similar areas have similar water supplies but one of these areas experiences accelerated growth for a reason unrelated to water availability. Localism could cause the price of water in the area to increase in the area with accelerated growth but not in the area with less growth, despite the fact that the area with accelerated growth would be able to cheaply purchase water from the other area if it were not for the localism policies of that area which prohibit such transfers.

As an alternative to localism, some embrace a federal response to the effects of climate change on water resources. Some have pointed to the role that federal law can play in water allocation, especially in the West.¹⁷⁴ Others have pointed out that while the federal government has traditionally deferred to state water law schemes, there are no existent constitutional or legal barriers to the federal government taking on an enhanced role in water policy and lawmaking.¹⁷⁵ Further, a federal system of water law policy would avoid the “race to the bottom” that tends to result from leaving

¹⁷² Christopher R. Brown & Blake Farrar, *A Hole in the Bucket: Aspermont's Impact on Groundwater Districts and What it Says about Texas Groundwater Policy*, 39 TEX. ENVTL. L.J. 1 (2008).

¹⁷³ *Id.* at 8-9 (pointing out that “many appropriators of Ogallala groundwater in the Texas High Plains region organized underground water conservation districts, not primarily because they realized that they and Ogallala appropriators in other states were mining the aquifer, but because they feared outside regulation. On one side, these appropriators feared the type of stringent groundwater regulations that Arizona had enacted; on the other side, they feared encroachment from the erstwhile Texas Water Commission.”).

¹⁷⁴ David H. Getches, *The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?*, 20 STAN. ENVTL. L.J. 3, 8 (2001).

¹⁷⁵ See generally Robert W. Adler, *Climate Change*, *supra* note 157.

policymaking in the hands of the states.¹⁷⁶ This “race to the bottom” has perhaps been most distinct in the environmental law arena. Other advantages of a federal water policy would be predictability, centralized decision making, and a way to resolve intrastate water disputes.¹⁷⁷ Similarly, a federal water policy would hypothetically be better able to make decisions based on hydrological boundaries of watersheds and basins, rather than based on arbitrary states and county lines.¹⁷⁸ This advantage will be particularly felt by in those states that have watersheds that extend across political boundaries.

A possible middle ground between localism and federalism is concurrent jurisdiction of state and local governments and the federal government.¹⁷⁹ This overlap of state and federal powers has been labeled “dynamic federalism” and it has been successful in other areas of environmental law.¹⁸⁰ This middle ground would allow states to determine their own water policies as long as they meet a federally mandated minimum. Such a scheme is attractive because it allows each state to consider its own

¹⁷⁶ Justice Louis Brandeis famously referred to the practice by states of removing safeguards and limits on size and powers of corporations to lure corporations to charter there as a race “one not of diligence but of laxity.” *Louis K. Liggett Co. v. Lee*, 288 U.S. 517, 558-559, 53 S.Ct. 481, 494 (1933).

¹⁷⁷ Robin Kundis Craig, *Climate Change, Regulatory Fragmentation, and Water Triage*, 79 U. COLO. L. REV. 825, 884-85 (2008) (pointing out the attraction of this option because “One need only look at the decades-long battle over the Colorado River, or the growing conflict between Georgia and Florida over the Apalachicola-Chattahoochee-Flint River Basin, or even one of the earliest water conflicts between New York and New Jersey over the Delaware River, to lose all sense of optimism about cooperative watershed-level management in times of water shortage.”).

¹⁷⁸ Florida, for instance, hypothetically divides its water management districts based on watersheds, but these watersheds extend north into Georgia, for instance. *See* FLA. STAT. § 373.503 (2012).

¹⁷⁹ Adler, *Climate Change*, *supra* note 157, at 37-38 (proposing that “Congress could design a program of nationwide (as opposed to national) water efficiency standards using the ‘cooperative federalism’ models exemplified in statutes such as the CWA and the Clean Air Act (CAA). Similar to the water quality standards program in the CWA, such a program might authorize states to develop their own efficiency standards tailored to their own climates, uses, and other conditions, subject to minimum federal requirements and oversight, and the prospect of federal regulations if states fail to adopt adequate standards.”).

¹⁸⁰ Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 176 (2006).

interests and would allow states facing imminent threats from climate change to act more quickly than would the federal government. This scheme's primary drawback is the "race to the bottom" referenced above. Lower standards in states not facing imminent threats from climate change would have the added negative effect on those states of perhaps speeding up those states' demise by not adopting policies to combat climate change.¹⁸¹

B. *Evaluating Water Transfers*

Advocates of water transfers generally argue that allowing water transfers will lead to increased efficiency of water allocation and conservation and perhaps a reduction in overall water use.¹⁸² These supporters argue that the ability to transfer ownership of water rights creates an incentive for efficient water use.¹⁸³ Some opponents of water transfers point out that transfers tend to run counter to public policy because water is a public good that should not be privatized for the benefit of some.¹⁸⁴ Even proponents of water transfers admit that though water rights may seem like property rights, and thus alienable, they are actually just usufructuary rights—rights to use the water.¹⁸⁵ The argument for embracing water markets is essentially that we should leave our coming water shortage woes in the able hands of the free market.¹⁸⁶

¹⁸¹ *But see* Massachusetts v. Environmental Protection Agency, 549 U.S. 497 (2007) (finding that the U.S. EPA has the power to regulate greenhouse gases).

¹⁸² Glennon, *Water Scarcity*, *supra* note 48 at 1883 (pointing out that "[i]f the price of water rose, people would carefully examine how they use water, for what purposes, and in what quantity.").

¹⁸³ *Id.* at 1887.

¹⁸⁴ *See, e.g.,* In re Water Use Permit Applications, 94 Hawai'i 97, 9 P.3d 409 (Hawai'i 2000) (explaining that under the Hawaiian Public Trust Doctrine, a water user's correlative water rights do "not describe an unqualified right of *ownership*, but a limited, situational right of *use* contingent at all times on numerous variables."). *But see* Glennon, *supra* note 48, at 1883 (who argues that users do not pay for using the water as the water resource currently exists, but instead only pay for the service of providing this resource to the user, and accordingly, water markets should be used to fix this market inefficiency).

¹⁸⁵ Brewer, et al., *supra* note 114, at 1026 ("An important characteristic of water rights in most western states is that they are not absolute ownership rights but instead usufructuary rights—rights to use the resource.").

¹⁸⁶ Huffman, *supra* note 108, at 432 ("The invisible hand of the marketplace is demonstrably far more efficient in the allocation of scarce resources, in the sense of maximizing net social welfare, than the

Defenders of water markets point out, for example, that purchasing water rights from third parties can combat the impacts of droughts.¹⁸⁷ Water market apologists point to other potential benefits of markets. They claim that water markets permit the required reallocations of water resources in the wake of new development.¹⁸⁸ Other scholars have suggested that water markets might be useful for environmental purposes, such as preserving instream flows to protect wildlife habitats.¹⁸⁹ Some market proponents argue that a market-based “middle ground” is an attractive means to certain environmentalist ends.¹⁹⁰

invisible hand of politics.”). *See also* Glennon, *supra* note 48, at 1884 (asserting that “It would be far better to encourage voluntary transfers between willing sellers and buyers. Let them decide what the water is worth to each of them. Water markets would facilitate the movement of water from low-value activities to higher-value ones, thus resulting in a more efficient deployment of the resource.”); Adler, *Water Marketing*, *supra* note 48, at 732 (predicting that “[m]arket-based pricing of water provides additional benefits, including the creation of incentives for increased efficiency and conservation.”) Adler goes on to assert that “[i]n short, there is a particularly good match between the primary virtues of water markets and the demands placed on water institutions by the prospect of climate change.” *Id.* *See also* Glennon, *supra* at 1888 (arguing that “Water markets may even encourage water conservation.”).

¹⁸⁷ Adler, *supra* note 48, at 750.

¹⁸⁸ Glennon, *supra* note 48, at 1887.

¹⁸⁹ *See generally* Janet C. Neuman & Cheyenne Chapman, *Wading Into the Water Market: The First Five Years of the Oregon Water Trust*, 14 J. ENVTL. L. & LITIG. 135 (1999) (explaining that the motivation behind establishing the Oregon Water Trust was “to apply the experience of private land trusts in the water arena and to test ‘market environmentalism.’ The Trust intended to purchase consumptive water rights and convert them to instream water rights under Oregon law for enhancement of fish habitat and other instream uses.”).

¹⁹⁰ James Huffman, *Environmental Perspectives: Moving Toward a Market-Oriented Middle Ground*, 28 HARV. J.L. & PUB. POL’Y 61 (2004). (embracing a middle approach between the “hardcore free-market position” and the “orthodox environmentalist position” as an attractive decentralized approach to allocating scarce environmental resources). Huffman applies this market approach to water rights in James Huffman, *Water Marketing in Western Prior Appropriation States: A Model for the East*, 21 GA. ST. U. L. REV. 429 (2004). “Even some environmental groups have recognized that they might accomplish their objectives better through water markets than through regulation. Interest groups of all stripes can invest heavily in lobbying for and enforcement of regulation without any certainty of initial or sustained success. The acquisition of property rights can provide better security and, at least in some cases, can deliver results at less cost. Philosophical principles will prevent some environmentalists from embracing or even tolerating markets, but others have and will see water markets as a pragmatic and cost-effective way to achieve their objectives.” *Id.* at 447.

Others make the case that the U.S. should take a cue from other countries by changing our legal system to promote water markets. They point out that until recently Australian law restricted water transfers similarly to current United States law.¹⁹¹ Accordingly, these scholars argue that the United States should change its water laws in similar ways to promote water markets.¹⁹² Despite the negative economic and environmental effects that water markets could have, water market enthusiasts point to unidentified “laws and regulations” that can correct for these externalities.¹⁹³ However, skeptics of water markets have pointed out that legislative changes alone were not enough to deal with Australia’s water scarcity.¹⁹⁴

1. Satisfying demand

Although the literature often evaluates the geographic dimension of water transfers in tandem with legal changes to established water rights, some studies have focused on the physical aspect of the transfer itself. In this context, the provision of

¹⁹¹ Sundareshan, *supra* note at 936-37 (“In 2004, the Council of Australian Governments (COAG) reached a National Water Initiative Agreement and established a National Water Commission (NWC). Key elements of the National Water Initiative (NWI) Agreement include defining water entitlements to promote security of entitlements along with a statutory basis for environmental benefits and ecosystem outcomes; facilitating the operation of water markets and trading of water rights while recognizing environmental needs and third-party impacts; ensuring proper pricing of water to encourage the sustainable use of water resources, pay for infrastructure, and promote pricing transparency; and to provide healthy and reliable water supplies.”).

¹⁹² *Id.* at 944.

¹⁹³ *Id.* (“While water marketing has the potential to negatively impact the environment and local economies, laws and regulations can correct for these externalities and create trading institutions that minimize negative impacts.”) Sundareshan’s claim seems unlikely in the current political climate. See 2012 National Environmental Scorecard Second Session of the 112th Congress, League of Conservation Voters, available at http://scorecard.lcv.org/sites/scorecard.lcv.org/files/LCV_Scorecard_2012.pdf (calling the 112th Congress the “most anti-environmental House in our nation’s history.”)

¹⁹⁴ See Public Interest Energy Research Program, *Climate Vulnerability and Adaptation Study for California: Legal Analysis of Barriers to Adaptation for California’s Water Sector* 25-31, 53 (CEC-500-2012-019m July 2012) (white paper prepared for the California Energy Commission by the University of California, Berkeley). (“Australia’s experience was that water markets alone did not adequately respond to extreme water scarcity”).

urban supply is one important area of focus. Powerful social and political forces call for the intrastate transfer of water from areas of relative abundance to areas of scarcity, and from areas of relatively low population to major urban centers.¹⁹⁵ California's transmountain diversions are the stuff of legend.¹⁹⁶ Also well known are Colorado's diversions across the Rocky Mountains, from its "western slope" to its eastern urban corridor that includes Colorado Springs, Denver, Fort Collins, and other front range cities.¹⁹⁷ In the east, New York City pipes in water from several other watersheds, including transfers up and over the Catskill Mountains.¹⁹⁸ Without transfers such as these, the literature notes, it would be difficult to supply some of the nation's major metropolitan centers with an adequate water supply.¹⁹⁹ Some see this type of intrastate sharing as a matter of basic fairness and practicality.²⁰⁰ Notably, when considering geography alone—apart from the nature of state water law—the literature makes little distinction between east and west.

Apart from the pragmatic appeal of physical transfers, some have noted their limitations. Geographic transfers focus on supply-side management, to the neglect of demand-side management.²⁰¹ Overreliance on transfers can become an exercise in futility, in which a city never feels that it has secured "enough" water.²⁰² Transfers can be magnets for undesirable settlement patterns, potentially encouraging urban

¹⁹⁵ James W. Boyd, *Canada's Position Regarding an Emerging International Fresh Water Market with Respect to the North American Free Trade Agreement*, 5 NAFTA L. & Bus. Rev. Am. 325, 352 (1999) (discussing inequitable distribution of fresh water throughout the earth and potential for sale of Canadian water resources to the United States).

¹⁹⁶ Klein, *Water Transfers*, *supra* note 1008, at 264-67 (describing efforts of Los Angeles to acquire more water).

¹⁹⁷ *Id.* at 267.

¹⁹⁸ SAX ET AL., *supra* note 104, at 80-88.

¹⁹⁹ *Id.* at 79-80.

²⁰⁰ *Id.*

²⁰¹ Klein, *Water Transfers*, *supra* note 108, at 263.

²⁰² *Id.* at 264-65.

sprawl.²⁰³ In addition, transfers can sever water from its basin of origin, ensuring that unconsumed water (as in agricultural return flows) will not find its way back to its source. This can have serious environmental impacts in the source region.²⁰⁴ In addition, because water is heavy, the energy that it takes to move it long distances can have negative environmental consequences both in terms of energy consumption and in terms of the emission of greenhouse gases that contribute to global warming.²⁰⁵

2. Reallocating water for new uses

Moving beyond the geographic focus, water transfers—at their core—are a mechanism for the reallocation of water rights from one purpose to another. In the western states (and in groundwater basins following priority allocation), most of the oldest and most reliable water rights are locked into traditional uses such as mining, ranching, and farming. Agricultural irrigation, alone, uses a hefty eighty percent of western water supplies.²⁰⁶ In some cases, these uses have not kept pace with society's values and needs. For example, most of the oldest western priorities were established well before society thought about saving some water for environmental, recreational, and aesthetic uses.²⁰⁷ In other cases, agricultural industries may have been established in relatively inhospitable regions that are no longer viable, or irrigation methods may be wasteful or outdated.²⁰⁸ The literature hails the reallocation of water rights through sale or donation for its ability to add much-needed flexibility to a system of rights that extends back more than 150 years.²⁰⁹

²⁰³ A. Dan Tarlock & Sarah Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 WEST-NORTHWEST 163 (1999) (arguing that physical transfers promote urban sprawl and affect growth patterns?). See also Adler, *supra* note, at.

²⁰⁴ Klein, *Water Transfers*, *supra* note 108, at 273.

²⁰⁵ Cite.

²⁰⁶ Brewer et al., *supra* note 114, at 1022 (asserting that “farmers continue to use roughly eighty percent of each state’s water, even though other users might find a significantly more profitable use for it”).

²⁰⁷ A. Dan Tarlock, *The Recognition of Instream Flow Rights: ‘New’ Public Western Water Rights*, 25 ROCKY MOUNTAIN MINERAL L. INSTITUTE 24, at 24 (1979).

²⁰⁸ Brewer et al, *supra* note 114, at 1021-23.

²⁰⁹ See *Irwin v. Phillips*, 5 Cal. 140 (1855) (recognizing as valid water right diversion dating back before 1855); Kaiser, *supra* note, at 881 (asserting that “water marketing is consistent with the current belief that

In theory, perhaps this same reallocation benefit could apply to eastern regions that have supplanted common law riparianism with comprehensive permit systems. However, the benefits are significantly reduced because regulated riparianism, by its nature, does not offer appropriation-style perpetual permits, but only renewable rights that administrators reevaluate periodically.²¹⁰ In common law riparian jurisdictions, these potential benefits could be realized only in jurisdictions that have abandoned the traditional rules limiting the place of use to the original watershed and/or tract of land.²¹¹

3. Freeing up water for environmental, recreational, and aesthetic purposes

In addition to satisfying demand and reallocating water rights, transfers have been cited with approval for their ability to reallocate water to a specific type of new purpose—nonconsumptive uses. Because traditional appropriation law required a physical diversion from source to place of application, it often refused to recognize instream and other *in situ* uses.²¹² Many, if not most, western jurisdictions modified their laws to permit the issuance of new water rights for instream flow, recreational, and aesthetic purposes.²¹³ In many fully allocated basins, however, the reforms came too late for the new uses to obtain priorities senior enough to provide meaningful environmental protection.²¹⁴ To remedy this problem, states including Oregon, Colorado, and others began to allow the holders of appropriative water rights to sell or

markets are an effective way to allocate scarce resources to meet the tripartite goals of efficiency, equity and conflict minimization.”

²¹⁰ See, e.g., Fla. Stat. 373.223(1)&(3) (authorizing the issuance of renewable “consumptive use permits” for periods generally extending for 20-50 years).

²¹¹ See *supra* notes and accompanying text.

²¹² See generally, GETCHES, NUTSHELL, *supra* note 70, at 121-24 (appropriations for instream use “initially encountered the fundamental requirements of the appropriation doctrine that water be diverted and put to a beneficial use”).

²¹³ *Id.*

²¹⁴ SAX ET AL., *supra* note 104, at 265 (discussing purchase of existing water rights for new instream flow purposes).

donate some or all of the right to maintain stream and lake levels.²¹⁵ In this way, new uses could obtain more senior, secure, and reliable priorities.

Apart from maintaining water *in situ*, the ability to transfer water rights might protect the environment by reducing the need for the initiation of new water rights, which would draw yet more water from streams and aquifers.²¹⁶ This conservation benefit may be of special importance in coastal communities, where excessive withdrawals from freshwater sources may create a void filled by seawater.²¹⁷ As a consequence of such saltwater intrusion, freshwater sources may become contaminated and unusable.²¹⁸

As with other potential transfer benefits, this reform may offer less promise in riparian jurisdictions. A few commentators have explored the possibility of transferring riparian water rights to new environmental purposes, but have identified numerous limitations.²¹⁹

4. Getting the incentives right

The previous subsections considered three aspects of *what* water transfers can potentially accomplish—satisfy demands, reallocate existing water rights, and protect the environment. The next three subsections canvass the literature on *how well* water

²¹⁵ Michael F. Browning, *Instream Flow Water Rights in the Western States and Provinces*, 56 ROCKY MOUNTAIN MINERAL LAW INSTITUTE 1 (2010); David R.E. Aladjem, *Innovation Within a Regulatory Framework: The Protection of Instream Beneficial Uses of Water in California, 1978 to 2003*, 36 MCGEORGE L. REV. 305 (2005); Jason S. Wells, *Leasing Water Rights for Instream Flow Protection: The Opportunities and Impediments to Improved Public Interest Involvement in Colorado's Instream Flow Protection Regime*, 7 DENV. WATER L. REV. 309 (2004);

²¹⁶ SAX ET AL., *supra* note 104, at 265 (“Many environmentalists see additional benefits to water markets. By freeing up water for the West’s growing urban regions, markets reduce the need to divert more water from already depleted rivers or construct new storage projects with environmental side effects.”).

²¹⁷ *Id.* at 88 (discussing saltwater intrusion).

²¹⁸ *Id.*

²¹⁹ See generally, Klein, *Water Transfers*, *supra* note 108.

transfers achieve those purposes, with a focus on creating incentives, promoting efficient reallocation, and achieving equity.

In the context of water *markets*, the opportunity to sell unneeded water for a profit can create significant incentive to use less, particularly in the context of reducing waste from irrigated agriculture.²²⁰ This dynamic has received particular attention in the context of maintaining minimum stream flows and lake levels to protect the natural environment.²²¹ These incentives can backfire, however. Some have argued that the possibility of selling excess water can lead to hoarding and speculation, rather than conservation.²²² As with the benefits of reallocating senior water rights, however, the conservation incentive of markets may have less force in eastern riparian jurisdictions.²²³

5. Reallocating water rights efficiently

The evaluation of the efficiency of water markets reflects the broader debate about whether free market transactions (“carrots”) or command-and-control regulation (“sticks”) produce superior results.²²⁴ Some commentators argue that water can be reallocated more efficiently and nimbly through the market than through regulation or through the amendment of existing state water laws.²²⁵ In this context, the literature

²²⁰ SAX ET AL., *supra* note 104, at 183-90 (discussing California statute purporting to authorize sale of conserved water), and contrasting it with Arizona’s and Colorado’s most restrictive views on the right to use conserved water.

²²¹ *Id.*

²²² See, e.g., Robert Benjamin Naeser, *Playing With Borrowed Water: Conflicts Over Instream Flows on the Upper Arkansas River*, 35 NAT. RESOURCES J. 93 (1995).

²²³ See, e.g., Bradford Bowman, *Instream Flow Regulation: Plugging the Holes in Maine’s Water Law*, 54 ME. L. REV. 287 (2002). But see Thomas Hicks, *An Interpretation of the Internal Revenue Code and Treasury Regulations Supporting the Tax Deductibility of the Voluntary Charitable Contribution in Perpetuity of a Partial Interest in an Appropriate or Riparian Water Right Transferred Instream for Conservation Purposes (With an Emphasis on California Water Law)*, 17 HASTINGS W. –N.W. J. ENVTL. L. & POL’Y 93 (2011).

²²⁴ See generally, Dana A. Rasmussen, *Enforcement in the U.S. Environmental Protection Agency: Balancing the Carrots and the Sticks*, 22 ENVTL. L. 333 (1992).

²²⁵ SAX ET AL., *supra* note 104, at 264-67.

cites often to California's experimental use of markets as a response to drought.²²⁶ Transfer proponents recall the perceived benefits of markets in general, and anticipate that the same virtues will attach to water markets in particular. This optimism is tempered, however, by studies revealing that the actual prevalence of water markets falls short of theoretical expectations,²²⁷ and by articles citing necessary legal reforms before "robust" water markets can emerge.²²⁸

Others doubt whether true markets for water can exist—even in appropriative jurisdictions—because water is a fugitive resource, the transfer of which produces significant externalities.²²⁹ In a similar vein, commentators note that water markets are subject to regulatory oversight.²³⁰ As a result, the transaction costs imposed by marketing middlemen may render water markets less, rather than more, efficient than regulation.²³¹ As noted in some literature, state water doctrines such as beneficial use, the prohibition of waste, abandonment and forfeiture, and the public trust doctrine can already do the work of freeing up excess water for new uses.²³² Based on such critiques, at least one scholar has discouraged the development of water markets in the eastern states.²³³

²²⁶ *Id.* (discussing California water bank implemented in 1991 during drought and noting that it saved about \$100 for the state's economy), *citing* Richard Howitt et al., A Retrospective on California's 1991 Emergency Drought Water Bank (Cal. Dep't of Water Resources, March 1992).

²²⁷ Brewer et al., *supra* note 114, at 1021 (2007).

²²⁸ *Id.*

²²⁹ Joseph W. Dellapenna, *The Importance of Getting Name Right: The Myth of Markets for Water*, 25 Wm. & Mary Env't'l L. & Pol'y Rev. 317 (2000)

²³⁰ *Id.*

²³¹ See generally, Robert Abrams, *Water Allocation by Comprehensive Permit Systems in the Eastern United States: Considering a Move Away from Orthodoxy*, 9 Va. Env't'l L.J. 255, 261-65 (1990) (discussing potential advantages and disadvantages of regulatory oversight of water allocation).

²³² Klein, *Water Transfers*, *supra* note 108.

²³³ *Id.*

6. Achieving equity

The geographic transfer of water from one area to another can have significant impacts on the basin-of-origin, including the potential to limit future growth and to create future water shortages.²³⁴ In the case of the transfer or sale of existing water rights, agricultural water rights may be sold to cities, and then changed from irrigation to municipal and industrial use.²³⁵ As a result, an agricultural lifestyle may evaporate along with the region's water.²³⁶ The literature describes additional third-party impacts that may occur.²³⁷ Beyond these potential social externalities, the literature raises several equitable concerns of a philosophical nature. Some question whether it is fair (or desirable) for the states to give away the right to use water for free to the first appropriator, but after the appropriation has hardened into a "water right," to allow for its subsequent sale.²³⁸ Less difficult to evaluate, perhaps, is what one court described as

²³⁴ See generally, Stephen E. Draper, *Sharing Water Through Interbasin Transfer and Basin of Origin Protection in Georgia: Issues for Evaluation in Comprehensive State Water Planning for Georgia's Surface Water Rivers and Groundwater Aquifers*, 21 GA. ST. U. L. REV. 339 (2004).

²³⁵ See, e.g., Robert Benjamin Naeser, *The Cost of Noncompliance: The Economic Value of Water in the Middle Arkansas River Valley*, 38 NAT. RES. J. 445 (1998); Myrl L. Duncan, *High Noon on the Ogallala Aquifer: Agriculture Does Not Live by Farmland Preservation Alone*, 27 WASHBURN L.J. 16 (1987). See also Kaiser, *supra* note, at 905-06 (describing adverse agricultural impacts as including "reductions in farm income, dislocation of farm workers, decreases in property tax revenues, a shrinking local tax base and decline in local services," negative impacts which "may or may not be offset by similar gains in the urban area" that receives the water).

²³⁶ *Id.*

²³⁷ Kaiser, *supra* note, at 905-06 (explaining that "water transfer can cause a variety of adverse economic, social and environmental impacts on the public and third parties" and "[e]xisting laws, procedures and institutions may not fully protect the public from these impacts"). See also SAX ET AL., *supra* note 104, at 289, excerpting NATIONAL ACADEMY OF SCIENCES, *WATER TRANSFERS IN THE WEST: EFFICIENCY, EQUITY, AND THE ENVIRONMENT* 45-54 (1992); GRANT & WEBER, *supra* note 65, at 217 n.7 (considering economic and social effects of water rights transfers).

²³⁸ Although some observers may be unbothered by this dichotomy, others would address it by restricting or prohibiting the right to sell water. See, e.g., Others suggest the opposite remedy: perhaps a charge or tax should be attached to the initial appropriation of water, as well as to the subsequent sale of water rights. See, e.g.,

the “heirloom attitude” —the source region’s resentful malaise that it has been deprived of something that rightfully “belongs” to it.²³⁹

The existence of such externalities is not generally questioned. Instead, analysts weigh the significance of third-party impacts, and ponder what measures might be implemented to adequately address them. The next part of this article provides a broad, state-by-state survey of mitigating and compensatory mechanisms that the states have adopted.

V.CONCLUSION

Uncertainty is a basic truth we must come to terms with when considering the effects of climate change on water resources. This uncertainty will require innovative responses from policymakers. Undoubtedly, some will call for increased water transfers, and these water transfers will come in many forms. By understanding the current legal landscape of water transfers, policymakers can make more informed choices about which policies to enact. Water transfers appear attractive on first blush, but other strategies might be more appropriate and longer lasting depending on the region. In addition to considering the policy tools currently available in each state, policymakers should keep an eye toward several factors that can inform smart water resource policymaking. First, the source of water potentially subject to transfers should be considered. Second, the simple fact that water is a limited resource should be squarely in the minds of policymakers making decisions about water resources.

²³⁹ *Associated Enterprises, Inc. v. Toltec Watershed*, 656 P.2d 1144, 1147 (Wyo. 1983).

VI. APPENDIX 1 — SURVEY OF THE LAW

TRANSFER TYPOLOGY BY STATE

ALABAMA			
Ala. Code (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Riparian rights are appurtenant to riparian lands	
	Geographic transfer	<u>Interbasin</u> : Local laws may prohibit new transfers of water from the Tennessee River basin (with certain exceptions allowing transfers from Morgan county to Cullman and Blount counties)	§§ 115, 176, 341, 373, 593, 603, 606
	Rights transfer	--	
Use Regulation	Surface	Riparian water rights; certificates of use may be restricted upon the designation of any area as a "capacity stress area" where the aggregate existing /reasonably foreseeable uses will exceed water availability	§ 9-10B-22
	Groundwater	<u>On-tract</u> : Must be used on overlying tract if non-riparian use will injure adjacent landowners, Adams v. Lang, 553 So. 2d 89 (Ala. 1989); nominal damages may be required for non-riparian use, Ulbricht v. Eufaula Water Co., 86 Ala. 587, 6 So. 78 (1889)	
ALASKA			
Alaska Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Water rights are generally appurtenant to land, but severable under specified conditions	§ 46.15.160
	Geographic transfer	<u>Interbasin</u> : Water exports outside hydrologic unit generally prohibited; however, the state is authorized to participate in potential water export markets	§ 46.15.035, .160(b)
	Rights transfer	Sale, lease, or transfer requires commissioner's approval; water appropriated in the name of Alaska may be sold as "excess water"	§ 46.15.037
Use Regulation	Surface	Prior appropriation	§§ 46.15.010-.270; .16.010-.100
	Groundwater	--	
Other		<u>Instream flows</u> : Water rights may be reserved to maintain sufficient instream flows, including by private appropriators	§ 46.15.145

ARIZONA

Ariz. Rev. Stat. (2012)

Transfer Regulation	Simple substitution	<u>Severable</u> : Non-irrigation water rights may be severed from appurtenant land (subject to specified conditions)	§45-172
	Geographic transfer	<u>Sub-basins</u> : Groundwater may be transferred within same sub-basin; if sub-basins fall within active management areas (AMAs), may be subject to payment of damages	§ 45-541 to -544
		<u>Interbasin</u> : Most interbasin transfers outside AMAs prohibited (subject to certain grandfathered exceptions)	§ 45-544
		<u>Interstate</u> : Interstate transfers require notice, director's approval for reasonable/ beneficial use, and satisfaction of additional requirements	§ 45-292, -293
	Rights transfer	Changes to domestic, municipal, or irrigation rights require director's approval (subject to specified exceptions); changes to new hydroelectric or other power generation uses (> 25,000 hp) require legislative approval	§ 45-156(B)
Use Regulation	Surface	Prior appropriation	
	Groundwater	Permit required	

ARKANSAS

Ark. Code (2012)

Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Intra- and interbasin</u> : Commission may authorize "reasonable" intra- and interbasin transfers to nonriparians of "excess surface water"; nonriparians may be required to pay for deliveries along route of transportation	§ 15-22-304(A), (D)
		<u>Interstate</u> : Exports must be approved by General Assembly and consistent with interstate compact (subject to conditions, and subject to exemption for water bottling)	§ 15-22-303
	Rights transfer	--	
Use Regulation	Surface	Riparian, but regulated by commission during shortage	
	Groundwater	--	

CALIFORNIA

Cal. Water Code (2012)

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Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Interbasin</u> : Restricted by consideration of source watershed factors <u>Interstate</u> :	§ 108 § 1230
	Rights transfer	<u>Encouraged</u> : Generally encouraged (provided transfer is efficient and needed); department must establish program to facilitate voluntary transfers of existing diversions (including transfer of conserved water); permitting purchase of exported water May sell or lease voluntarily forgone water; may change point of diversion, place of use, or purpose of use (subject to board permission, board fees, provision of notice, and no injury to other users, fish, or wildlife); temporary changes permitted	§§ 109, 475, 480, 1217 §§ 382, 386, 1701, 1703, 1725, 1728
Use Regulation	Surface	Prior appropriation, with recognition of grandfathered riparian rights	
	Groundwater	<u>Percolating groundwater</u> : Subject to "only sporadic state regulation of any sort," Robert E. Beck, Waters and Water Rights (California)	
Other		<u>Environmental protection</u> : Users may petition to change permit or right to new use of preserving/enhancing wetlands habitat, fish & wildlife resources	§ 1701

COLORADO

Colo. Rev. Stat. (2012)

Transfer Regulation	Simple substitution	<u>Severable</u> : Water rights generally not included in the sale of land, unless so specified by contract, Merrick v. Fort Lyon Canal Co., 621 P.2d 952 (Colo. 1981)	
	Geographic transfer	<u>Interstate</u> : Export prohibited without approval	§ 37-81-101
	Rights transfer	<u>No injury</u> : Change decrees must limit the amount of changed water to historic consumptive use (which may be less than historic diversions and amounts authorized by original decree), subject to demonstration of need and satisfaction of specified conditions, Pagosa v. Trout Unlimited, 219 P.3d 774 (Colo. 2009), Thornton v. Bijou Irrigation Dist., 926 P.2d 1 (Colo. 1996); court may impose "transition mitigation payment" <u>Temporary</u> : "Interruptible water supplies" provide for temporary sales or transfers <u>Climate change</u> : Change may be conditioned on "a limitation on the use of the water that is subject to the change, taking into consideration the historical use and the flexibility required by annual climatic differences" <u>Irrigation rights</u> : Change of existing irrigation rights may require	§ 37-92-305(3), (3.5) § 37-92-309 § 37-92-305(3.5) § 37-92-302(3.5)

		notice to county of origin, if change constitutes a “significant water development activity” <u>Instream flows</u> : Water rights may be sold or donated for instream flow purposes	
Use Regulation	Surface	<u>Appropriation</u>	
	Groundwater	<u>Tributary groundwater</u> : Allocated under prior appropriation doctrine <u>Nontributary groundwater</u> : Right to withdraw based on ownership of overlying land and maintenance of 100 year aquifer life, Park County Sportsmen’s Ranch LLP v. Bargas, 986 P.2d 262 (Colo. 1999)	§ 37-90-137(2) § 37-90-103(10.5)
Other		<u>Instream flows</u> : Only specified governmental entities may appropriate new instream flow water rights	§ 37-92-103
CONNECTICUT Conn. Gen. Stat. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Regulated riparian</u> : Riparian, with administrative permits; diversions permitted only if necessary, compatible with long-range planning and proper management, and after notice (subject to specified application requirements and specified exemptions)	§ 22a-366, -369, -370, -377
	Groundwater	<u>Regulated riparian</u> : Permit required	§ 22a-367(2), 22a-368(a)
DELAWARE Del. Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	Riparian; natural flow doctrine, with specified exceptions for stream alterations by municipalities; Delaney v. Boston, 2 Del. (2 Harr.) 489 (Del. Super. 1839); Murphey v. Wilmington, 5 Del. Ch. 281 (1879)	

	Groundwater	--	
FLORIDA			
Fla. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Severable</u> : Water rights are not appurtenant to any particular parcel of land	
	Geographic transfer	<u>Modified local sources first preference</u> : "Local sources first" policy discourages transfers across political or hydrological boundaries, and encourages "the use of water from sources nearest the area of use or application whenever practicable;" potentially inconsistent declaration provides that water should be managed on a state and regional basis to meet all reasonable-beneficial uses	§ 373.016(4)(a)
		<u>Interbasin</u> : Interdistrict transfers have been adjudged to fall within the spirit of the statute, <i>Osceola Cty. v. St. Johns River Water Mgmt. Dist.</i> , 504 So. 2d 385, 388 (Fla. 1987); must satisfy an enhanced public interest test that considers factors including projected population and future needs of both withdrawal and use areas	§ 373.223(2), .2295(4)
		<u>Inter-county</u> : Intercounty transfers must satisfy an enhanced public interest test that favors local sources first and that considers factors including the proximity of the proposed water source to the area of use; all technically and economically feasible sources that are geographically closer to the area of use; all economically and technically feasible alternatives including desalination, conservation, reuse of nonpotable reclaimed water and stormwater, and aquifer storage and recovery; the potential environmental impact of the transfer; and the ability of the source region to satisfy its own existing and reasonably anticipated future needs	§§ 373.223(3), .1961(1)(e)
	Rights transfer	--	
Use Regulation	Surface	<u>Regulated riparian</u> : Integrated permit system for surface diversions / groundwater withdrawals, subject to exemptions for domestic consumption by individual users; supplants common law riparianism <u>Renewable permits</u> : Permits generally endure for up to 20 years (50 years, for certain governmental entities)	§ 373.019(20), 203, .219, .223(1), .250 § 373.236(1) & (3)
	Groundwater	" "	
GEORGIA			
Ga. Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Interbasin</u> : Surface water transfers across watershed boundaries permitted, subject to approval (but may be prohibited by House Resolution 1022 until completion of state water plan and definition	§ 12-5-31(n)

		of council political boundaries)	
	Rights transfer	<u>Markets:</u> Water markets were proposed, but not implemented, in 2003 <u>Irrigation permits:</u> Modest compensation system operates during drought under "irrigation permit retirement program"	§ 12-5-540 (2000)
Use Regulation	Surface	Permits required for withdrawals / diversions over 100,000 gallons per day	§ 12-5-31(b)(1)
	Groundwater	" "	
Other		Water Stewardship Act of 2010 (?) exempted agricultural uses and power producers from certain regulations and conservation requirements	
HAWAII			
Haw. Rev. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant:</u> Surface rights may not be severed from riparian land but permits may be transferred from landowner to successor if the place, quantity, and purpose of use remain the same, and if commission is notified within 90 days of transfer	§ 59
	Geographic transfer	<u>Interbasin:</u> Prohibited under common law, McBryde Sugar Co. v. Robinson, 504 P.2d 1330 (Haw. 1973); Reppun v. Bd. Of Water Supply, 656 P.2d 57 (Haw. 1982). Statute now allows with permit, if consistent with public interest and with state/county land use policies.	§ 49(c)
	Rights change	Application for change in place or type of use treated as application for new permit	§ 174C-57
Use Regulation	Surface	Riparian	
	Groundwater	Correlative rights	
Other		<u>Instream flows:</u> Permissible	§ 174C-71
IDAHO			
Idaho Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Interstate:</u> Under appropriate conditions where specified public interest factors are satisfied, Idaho recognizes out-of-state transport /use of public waters as not in conflict with the public welfare or water conservation; minimum stream flow is a beneficial use that protects against interstate diversions	§ 42-401, -1501
	Rights transfer	Must cause no injury to existing rights;	§ 540.540

Use Regulation	Surface	Prior appropriation	
	Groundwater		
ILLINOIS			
Ill. Comp. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Riparian rights are appurtenant to land at water's edge, <i>Bouris v. Largent</i> , 94 Ill. App. 2d 251, 256 (1968)	
	Geographic transfer	--	
	Rights transfer	Must cause no injury to existing rights;	§ 540.540
Use Regulation	Surface	Riparian (reasonable use), subject to local authority to "reasonably regulate the use of water and during any period of actual or threatened shortage to establish limits upon or priorities as to the use of water"	70 ILCS § 3715, 3716
	Groundwater	Riparian (requires administrative permit)	Water Use Act of 1983
INDIANA			
Ind. Code (2012)			
Transfer Regulation	Simple substitution	<u>Severable</u> : Riparian rights may be conveyed apart from the land, Indiana Dep't of Natural Resources, <i>The Indiana Water Resource: Availability, Uses, and Needs</i> (1980)	
	Geographic transfer	<u>Interbasin</u> : Water diversions out of the Great Lakes basin subject to the Great Lakes-St. Lawrence River Basin Water Resources Compact and some implementing legislation	§§ 14-25-1-11(b)(2), -15
	Rights transfer	--	
Use Regulation	Surface	<u>Regulated riparian</u> : Some statutory modification of traditional common law principles, <i>Center Twp. Corp. v. City of Mishawaka</i> , 882 N.E.2d 762, 767 (Ind. App. 2008)	§§ 14-25-7-2, -6; 14-25-5; 14-29-1-8
	Groundwater	<u>Percolating groundwater</u> : Follows English rule of capture, <i>Wiggins v. Brazil Coal and Clay Corp.</i> , 452 N.E. 2d 958 (Ind. 1983) <u>Subterranean streams</u> : likely follow same law as surface streams, <i>Gagnon v. French Lick Springs Hotel Co.</i> , 72 N.E. 849, 851 (Ind. 1904). <u>Regulation</u> : Emergency Groundwater Rights Act authorizes some withdrawal restrictions, generally applicable to facilities capable of withdrawing > 100,000 gallons per day <u>Designated areas</u> : Department may restrict use in designated areas where the withdrawal of groundwater exceeds or threatens to exceed natural replenishment	§ 14-25-4 § 14-25-3

Other		Minimum flows and levels; Permitted by statute	§ 14-25-7-14
IOWA			
Iowa Code (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interstate: Interstate transfers are permitted, but such permits have lowest preference	§ 455B.266
	Rights transfer	Must cause no injury to existing rights;	§ 540.540
Use Regulation	Surface	Riparian (requires administrative permit, to be issued if investigation indicates that the proposed diversion, storage, or withdrawal is consistent with beneficial use and conservation)	§ 455B.265
	Groundwater	Administrative permit required	
KANSAS			
Kan. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	Severable: Water rights are appurtenant real property rights, but can be severed from the land in connection with which the right is used; sales not involving changes in place of use, point of diversion, or type of use not regulated as a “transfer”	§§ 701,
	Geographic transfer	Outside 35-mile radius: Permitted under specified conditions, subject to exemption for transfers of less than 2,000 acre feet/ year	§ 82a-1501(a)(1), -1502
		Interstate: Permitted under specified conditions	§ 82a-726(a)
	Rights transfer	Change of use, point of diversion, or type of use permitted under specified conditions	§ 82a-708b(a)
Use Regulation	Surface	Prior appropriation	§ 82a-701 to -738,
		Water market: Municipal and industrial users may be required to purchase water reserved by the water office	§ 82a-1301 to -1320
		Water banking: Water rights holders may place unused water into a bank for future withdrawal or for leasing to others	§ 82a-761 to -773
	Groundwater	Prior appropriation	§ 82a-701 to -738
		Multi-year flex account: Users may place a portion of their water into an account for flexible withdrawal over a 5-year period	§ 82a-736
KENTUCKY			
Ky. Rev. Stat. Ann. (2012)			
Transfer	Simple	Severable: Riparian can transfer right to use water via easement,	

Regulation	substitution	Scott v. Long Valley Farm Kentucky, Inc., 804 S.W. 2d 15 (Ky. App. 1991)	
	Geographic transfer	<u>Interbasin</u> : Permits may be granted for transfer or diversion of water between streams or watersheds, consistent with wise use and public interest	§ 151.200(2)
	Rights transfer	Must cause no injury to existing rights;	§ 540.540
Use Regulation	Surface	Riparian (administrative permit required)	§ 151.150(1)
		<u>Emergency</u> : During drought or emergency, officials may make temporary allocation of water supply among users	§ 151.200(1)
	Groundwater	" "	
LOUISIANA			
La. Rev. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Water rights probably cannot be severed from adjacent riparian land	Louisiana Civil Code, art. 650
	Geographic transfer	<u>Inter-parish</u> : Export of surface or groundwater from specific parishes prohibited, with exemption for bottled water	§§ 14:224, 33:1236.9
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Follows common law riparianism	Louisiana Civil Code, art. 657-658
	Groundwater	<u>Capture</u> : Follows English absolute ownership rule, Adams v. Grigsby, 152 So.2d 619 (La. App.), <i>cert. denied</i> , 153 So.2d 880 (1963)	§ 31:8
MAINE			
Me. Rev. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Intra-municipal</u> : Intra-municipal transfers for commercial purposes forbidden in containers greater than 10 gallons (subject to specified exceptions) <u>By distance</u> : Surface and groundwater transfers beyond specified distance and above specified volumes must be reported (subject to data aggregation and protection of individual withdrawal reports as confidential, non-public records)	22 MRS § 2660-A(1) 38 MRS § 470
	Rights transfer	--	
Use Regulation	Surface	Riparian (natural flow, but moving toward reasonable use), Lockwood Co. v. Lawrence, 77 Me. 297, 316 (1885)	38 MRS § 480-D(4)

	Groundwater	Rule of capture (“absolute dominion” rule), Chase v. Silverstone, 62 Me. 175, 177 (1875)	
MARYLAND			
Md. Env. Code Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Severable</u> : Permits can be transferred with written approval of Department of the Environment	Md. Regs. Code § 26.17.06.06A(10)
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	Riparian (administrative permit required, generally for non-domestic uses of at least 10,000 gallons/day)	§ 5-502(b)
	Groundwater	“ ”	
MASSACHUSETTS			
Mass. Gen. Laws ch. 21G, § x (2012)			
Transfer Regulation	Simple substitution		
	Geographic transfer	<u>Interbasin</u>: Under Interbasin Transfer Act, all “significant” new interbasin transfers (including all new diversions > 1 mgpd) trigger additional authorization requirements, including prior implementation of all practical measures (including metering, detection of leaks, receiving basin conservation, and exploration of all alternatives). For new interbasin transfers, “reasonable” donor basin instream flows must be maintained. <u>Safe yield</u>: Cumulative impact of existing, permitted, and proposed withdrawals generally may not exceed water source’s safe yield. <u>Common law</u>: forbids off-tract or out-of-basin uses, but only if they cause present or future injury to another riparian’s reasonable use. See Stratton v. Mount Hermon Boys’ School, 103 N.E. 87 (Mass. 1913). Specific legislation may authorize municipal and other off-tract uses. See Town of Somerset v. Dighton Water Dist., 200 N.E.2d 237 (Mass. 1964).	§§ 8B-8D § 11
	Rights transfer	--	
Use Regulation	Surface	<u>Regulated riparian</u>: Statute governs large-scale consumptive withdrawals exceeding threshold volume of 100,000 gpd., generally integrating surface and groundwater; different permitting requirements for “existing” and “new” withdrawals <u>Common law reasonable use</u>: resolves issues not covered by statute	§§ 2,4
	Groundwater	“ ”	

MICHIGAN

Mich. Comp. Laws (2012)

Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Interbasin</u> : Transfers of Great Lakes water (including tributary water) for use outside the basin subject to basin-wide decision-making standards and measures to conserve and improve the resource	Great Lakes-St. Lawrence River Basin Water Resources Compact
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u>: Reasonable use riparianism, with some statutory regulation; For inland water, new or increased withdrawals exceeding 2 million gallons per day require a permit, the approval of which considers factors including whether the withdrawal is "likely to cause an adverse resource impact" <u>Great Lakes and tributaries withdrawals</u>: Permits are required for withdrawals exceeding 5 mgpd from the Great Lakes and their tributaries.	§ 324.32723(1) § 324.3723(6); Great Lakes Compact (ratified by Michigan in 2008)
	Groundwater	<u>Riparian</u> : Reasonable use riparianism, United States Aviox Co. v. Travelers Ins. Co., 336 N.W.2d 838 (Mich. 1983). Some statutory modification and regulation.	§§ 324.31701, 324.32723(1 & 5); 600.2941

MINNESOTA

Minn. Stat. (2012)

Transfer Regulation	Simple substitution	<u>Severable</u> : Rudimentary statute about transfer of water use permits to successive owner of real property; under common law, riparian rights can be severed from riparian land ownership, <u>Nelson v. DeLong</u> , 7 N.W.2d 342, 346 (Minn. 1942).	§ 103G.271
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparianism</u>: Reasonable use riparianism applies to surface diversions, <u>Pinney v. Luce</u>, 46 M.W. 552, 563 (MN 1890). <u>Permit</u>: required for cu > 10,000 gpd; priorities listed by use category <u>Reuse</u>: Treatment and reuse for non-consumptive uses "shall be encouraged"	§ 103G.271
	Groundwater	English absolute ownership; <u>Welsh Nat'l Water Dev. Authority v. Burgess</u>, 28 P. 378 (1974) <u>Minnesota Water Appropriation Law</u>: common law now modified	§ 103G.271, 105.405,

		by statute and permits are required for withdrawals > 10,000 gpd or 1 million gallons per year	116D.04
MISSISSIPPI			
Miss. Code Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Water rights are appurtenant to the land where they are used	§ 51-3-15
	Geographic transfer	--	
	Rights transfer	<u>No injury</u> : If rights holder seeks to change water right, the permitted amount may be modified if change would interfere with vested rights or be contrary to the public interest.	§ 51-3-35(1)
Use Regulation	Surface	<u>Pre-1985</u> : Western prior appropriation law applied to surface water <u>Regulated riparianism</u> : Comprehensive permit system for surface and groundwater adopted in 1985	§§ 51-3-3(b) & (e), 51-3-5
	Groundwater	<u>Regulated riparianism</u> : Comprehensive permit system for surface and groundwater adopted in 1985	§§ 51-3-3(b) & (e), 51-3-5
MISSOURI			
Mo. Rev. Stat. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use riparianism, Edmondson v. Edwards, 111 S.W.3d 906 (Mo. App. 2003)	
	Groundwater	<u>Riparian</u> : Reasonable use riparianism applies to both percolating groundwater and underground streams, Higday v. Nickolaus, 469 S.W.2d 859 (Mo. App. 1971)	
MONTANA			
Mont. Code Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Water rights are generally appurtenant to the land, <i>Axtell v. M.S. Consulting</i> , 955 P.2d 1362 (Mont. 1998); <i>Kruer v. Three Creeks Ranch of Wyoming</i> , 194 P. 3d 634 (Mont. 2008).	
	Geographic transfer	<u>Interbasin</u> : Transfers out of specifically named watersheds are prohibited <u>Interstate</u> : Temporary (10 years or less) and intermittent changes of	§ 85-2-301 § 85-2-311, -319, and -803

		use allowed with DNRC approval; statute described petition mechanism where compacts are concerned	
	Rights transfer	<u>Change of water right</u>: Changes permitted if prior appropriator can reasonably exercise right under changed conditions; DNRC must approve changes; changes probably limited to original basin of use <u>Temporary changes</u>: Temporary (10 years or less) and intermittent changes of use allowed with DNRC approval	§ 85-2-401 § 85-2-407
Use Regulation	Surface	<u>Appropriation</u> : Water Use Act of 1973 repealed previous surface appropriation laws (dating back to at least 1885).	§ 85-2-102(20)
	Groundwater	<u>Appropriation</u> : Permitting system initiated in 1961, then largely folded into 1973 Water Use Act	§ 85-2-102(20)
	Miscellaneous	<u>Instream flow water rights</u> : Private persons must “divert, impound, or withdraw,” but various federal agencies may “reserve” water for instream uses.	§ 85-2-316
NEBRASKA			
Neb. Rev. Stat. (2012)			
Transfer Regulation	Simple substitution		
	Geographic transfer	<u>Interbasin</u>: Transfer must satisfy public interest criteria; source stream must be > 100 feet wide; transfer volume must be ≤ 75% regular stream flow; transfer must not jeopardize the continued existence of endangered/threatened species, <i>Central Platte Natural Resources District v. Fremont</i>, 549 N.W.2d 112 (Neb. 1996); <i>Upper Big Blue Natural Resources District v. Fremont</i>, 495 N.W.2d 23 (Neb. 1993); <i>Little Blue Natural Resources District v. Lower Platte North Natural Resources District</i>, 294 N.W.2d 598 (Neb. 1980). <u>Interbasin groundwater transfers</u>: Although American rule requires use on overlying land, statutes permit interbasin transfers for municipal, agricultural, domestic, industrial, and environmental purposes, and for induced groundwater recharge.	§§ 46-2, -116, -206, -235(1), -288, -289 § 46-2233, -638, -677, -691,
	Rights transfer	<u>Water markets</u> : Users may sell volumes up to their consumptive use amounts with approval of DNR, provided new/old uses are in same preferential use class (generally, imposes limit on ability to transfer agricultural rights to new uses)	§§ 46-290 to -294
Use Regulation	Surface		
	Groundwater	Correlative rights (use limited to reasonable/beneficial use on overlying lands, apportioned if shortage), with some surface/groundwater integration for hydrologically connected groundwater (as of 2004)	§ 46-702
	Miscellaneous	<u>Instream flow water rights</u> : Game & Parks Commission (and	§ 46-2-107

		natural resources districts) can appropriate instream flow appropriations for fish and wildlife and recreational uses <u>Conjunctive management</u>: relates to hydrologically connected ground- and surface water; no new uses if basin declared over- or fully-appropriated	§ 46-714
NEVADA			
Nev. Rev. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Severable</u> : Water rights may be conveyed apart from the property on which they are used, Adaven Management, Inc. v. Mt. Falls Acquisition Corp., 191 P.3d 1189 (Nev. 2008)	
	Geographic transfer	<u>Interbasin</u> : Procedures for considering interbasin applications	§ 533.370
	Rights transfer	<u>Authorization</u>: Transfers or assignments of water rights authorized by statute <u>No injury</u>: Proposed changes of water rights must not conflict with existing rights or with protectable interests in existing domestic wells, or threaten to prove detrimental to the public interest	§ 533.383 § 533.370(5)
Use Regulation	Surface	<u>Prior appropriation</u>	§ 533.370(5) and chapter 533
	Groundwater		Chapter 534
NEW HAMPSHIRE			
N.H. Rev. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Severable</u> : Water rights may be severed from the property on which they are used, Concord Mfg. Co. v. Robertson, 25 A. 718 (N.H. 1889)	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use doctrine, Bassett v. Salisbury Mfg. Co., 43 N.H. 569 (1862)	
	Groundwater	<u>Riparian</u>: " " <u>Large withdrawals</u>: Withdrawals ≥ 57,600 gallons / 24 hours are subject to permitting and regulation.	§§ 485-C:4, -C:13, -C:21
NEW JERSEY			
N.J. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	--	

	Geographic transfer	<u>On-tract</u> : Water may not be sold or used on nonriparian land, <i>McCarter v. Hudson County Water Co.</i> , 65 A. 489 (E. & A. 1906), <i>aff'd</i> , 209 U.S. 349 (1908)	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Generally adheres to natural flow doctrine, <i>Merritt v. Parker</i> , 1 N.J.L. 460 (Sup. Ct. 1795) <u>Regulated riparian</u> : Permit overlay	§ 58:1A-1 <i>et seq.</i>
	Groundwater	<u>Riparian</u> : Correlative rights doctrine, <i>Woodsum v. Pemberton Twp.</i> , 412 A.2d 1064 (Law Div. 1980), <i>aff'd on other grounds</i> , 427 A.2d 615 (App. Div. 1981) <u>Regulated riparian</u> : Permit overlay	§ 58:1A-1 <i>et seq.</i>
NEW MEXICO			
N.M. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : All irrigation water considered appurtenant to land.	§ 72-5-22 and -23
	Geographic transfer	<u>Downstream</u> : Upper valley residents may protect against downstream transfers by impounding and utilizing a reasonable share of the stream	§ 72-5-29
		<u>Interbasin</u> : Unlawful to divert waters to other valleys to the impairment of valid and subsisting prior appropriators of such waters	§ 72-8-5
		<u>Interstate</u> : Permit required for out-of-state transport	§ 72-12B-1
	Rights transfer	<u>No injury</u> : Change must cause no detriment to existing rights, be not contrary to conservation, and not detrimental to the public welfare <u>Leasing</u> : Rights may be leased if certain conditions satisfied	§ 72-5-23, -24 § 72-6-1 through -7
Use Regulation	Surface		§ 5
	Groundwater		
NEW YORK			
N.Y. Environmental Conservation Law (2012)			
Transfer Regulation	Simple substitution		
	Geographic transfer	<u>Interbasin</u> : Permit required; aquifers that are the sole source of drinking water receive special protection	§§ 15-1501, -1505

		<u>Interstate</u> : License required	§ 15-1506
	Rights transfer	--	
Use Regulation	Surface	<u>Regulated riparian</u> : Law defines rights, uses, and protection of water; environmental assessment form must accompany applications for discretionary permits to use water <u>Reasonable use</u> : Common law defines residual rights	§ 15-1503
	Groundwater	--	
NORTH CAROLINA			
N.C. Gen. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Riparian rights cannot be severed from the land on which they are used; Zimmerman v. Robinson, 19 S.E. 102 (N.C. 1894)	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, Dunlap v. Carolina Power & Light Co., 195 S.E. 43 (N.C. 1937) <u>Permit overlay</u> : In "capacity use areas," withdrawals may be limited	§ 143-215.11 <i>et seq.</i>
	Groundwater	<u>Capture</u> : American reasonable use, Rouse v. City of Kinston, 123 S.E. 482 (N.C. 1924) <u>Permit overlay</u> : In "capacity use areas," withdrawals may be limited	§ 143-215.11 <i>et seq.</i>
NORTH DAKOTA			
N.D. Cent. Code (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>On-tract</u> : Water must generally be used on the riparian land, City of Durham v. Eno Cotton Mills, 54 S.E. 453 (1906)	
	Rights transfer	<u>No injury</u> : Permit holder may change point of diversion if State Engineer determines it will not adversely affect other appropriators. <u>Purpose</u> : Permit holder may change right only to superior purpose, as ranked by statute (e.g., irrigation use may change to superior municipal use)	§§ 61-04-06.1, 61-04-15.1

Use Regulation	Surface	Prior <u>appropriation</u> ; Permit required	§ 61-04-02
	Groundwater	--	
OHIO Ohio Rev. Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>On-tract</u> : Rights must be used on riparian land, Cooper v. Hall, 5 Ohio 321 (1832) <u>Interbasin</u> : Interbasin transfers generally unlawful, City of Canton v. Shock, 66 Ohio St. 19 (1902) <u>Specific basins</u> : Water generally cannot be transferred out of the Great Lakes Basin; permit required to transfer > 100,000 gallons per day out of Lake Erie and Ohio River Basins	§ 1522.01(4.8) & (4.9); 1501.32
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, City of Canton v Shock, 66 Ohio St. 19 (1902)	§1521.17
	Groundwater	<u>Restatement</u> : Follows Restatement (Second) of Torts § 858, Cline v. American Aggregates Corp., 474 N.E. 2d 324 (Ohio 1984)	§1521.17
OKLAHOMA Okla. Stat. tit. 60 (2012)			
Transfer Regulation	Simple substitution		
	Geographic transfer	<u>Interstate</u> : Moratorium initially extended until at least 2009 “to provide for the conservation, preservation, protection and optimum development and utilization of surface water and groundwater within Oklahoma.” Law forbids any state entity, official, agent or subdivision from executing contracts “for the sale or exportation of surface water or groundwater outside the state, or sell or export surface water or groundwater outside the state without the consent of the Oklahoma Legislature.” See Tarrant Regional Water Dist. v. Herrmann, <i>cert. granted</i> , 133 S.Ct. 831 (2013).	§ 1B
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Natural flow doctrine, supplemented with right to capture diffuse surface water, reasonable use riparianism, and appropriation	§ 60
	Groundwater	<u>Capture</u> : Reasonable use	

OREGON

Or. Rev. Stat. (2012)

Transfer Regulation	Simple substitution	<u>Appurtenance</u> : Water “rights” are appurtenant to the land and automatically transfer to new owner, unless reserved from the sale, Beisell v. Wood, 185 P.2d 570 (Or. 1947). In contrast, water “permits” do not transfer automatically and require the filing of an “assignment of permit” to bind others.	§ 537.220
	Geographic transfer	<u>Interbasin</u> : Out of basin diversions receive special review of the “significant impacts” they may generate	§§ 537.801 – 537.870
	Rights transfer	<u>No injury</u>: Change of water right must cause no injury to existing rights; unneeded surplus water from original use may not be transferred, Oregon Admin. R. 690-380-6010. <u>Conserved water</u>: Users who improve their efficiency may use or sell a portion of the water thereby “conserved,” subject to a variety of requirements including the prevention of injury to existing water rights; another portion of the savings reverts back to the state <u>Flexibility</u>: Law allows temporary transfers and transfers between surface and groundwater sources <u>Instream water rights</u>: Individuals may change or lease (including “split season” leases during part of the year) existing water rights to instream rights	§ 540.540 § 537.455 - .500 §§ 537.211 and 540.510, .520, .523 & .531 § 537-348
Use Regulation	Surface	<u>Regulated riparian</u> : Comprehensive code required permits for all non-exempt appropriations of surface and groundwater; historical riparian rights also recognized	§§ 536-538
	Groundwater	“ ”	

PENNSYLVANIA

Pa. Cons. Stat. (2012)

Transfer Regulation	Simple substitution	<u>Severable</u> : Water rights can be conveyed apart from riparian lands, Borough of Media v. Edgmont Golf Club, Inc., 288 A.2d 803 (Pa. 1972)	
	Geographic transfer	<u>On-tract</u>: Surface water must be used on riparian land, Lackawanna Mills v. Scranton Gas Co., 150 A. 633 (Pa. 1930). Groundwater must be used on the overlying tract of land, Hatfield Twp. V. Lansdale Municipal Auth., 168 A.2d 333 (Pa. 1961). <u>Interbasin transfers</u>: Riparian rights may not be used outside the watershed if it causes actual injury to other riparian users, Belin v. Dep’t of Env’tl. Resources, 291 A.2d 553 (Pa. 1972)	
	Rights transfer	--	
Use	Surface	<u>Riparian</u> : Riparian water rights attach to riparian land	

Regulation	Groundwater	<u>Underground streams</u>: Riparian water rights extend to underground streams and to artesian basins, Ross Common Water Co. v. Blue Mt. Consol. Water Co., 77 A. 446 (1910) (Pa.), Moeller v. Metzger, 491 A.2d 1356 (Pa. 1985). <u>Percolating groundwater</u>: Riparianism (reasonable use), Burr v. Adam Eidemiller, Inc., 126 A.2d 403 (Pa. 1956)	
RHODE ISLAND			
R.I. Gen. Laws (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Natural flow theory, Tyler v. Wilkinson, 24 F. Cas. 472, (C.C.D.R.I. 1827)	
	Groundwater	--	
SOUTH CAROLINA			
S.C. Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>Interbasin</u> : Permits required, subject to public notice and comment; riparian landowners may recover "all provable damages"	South Carolina Interbasin Transfer of Water Act, §§ 49-21-10 to -80
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, White v. Whitney Mfg. Co., 38 S.E. 456 (S.C. 1901)	
	Groundwater	Common law, with statutory overlay; in declared "capacity use areas," groundwater withdrawals require a permit	§ 49-5-60
SOUTH DAKOTA			
S.D. Codified Laws (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Subject to statutory exceptions, irrigation water may not be transferred apart from the land	§ 46-5-34
	Geographic transfer	--	
	Rights transfer	<u>No injury</u> : Upon approval of application, changes of purpose or	§ 46-5-31

		change of place of diversion, storage, or use may be approved, Jewett v. Redwater Irrigating Ass'n, 220 N.W.2d 834 (S.D. 1974)	
Use Regulation	Surface	<u>Appropriation</u>	§ 46-1-1 to -3
	Groundwater	<u>Appropriation</u> : Permit for groundwater "mining" may not be approved if officials find "it is probably that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source."	§ 46-6-3.1
TENNESSEE			
Tenn. Code Ann.(2012)			
Transfer Regulation	Simple substitution	Law unclear; some cases discuss, but do not decide, issue of severance, Hodges v. Town of Bluff City, 32 F.2d 779 (6 th Cir. 1929)	
	Geographic transfer	<u>Interbasin</u> : Interbasin transfers of water rights acquired through eminent domain or for public water supply system prohibited unless permitted under the Inter-basin Transfer Act	§§ 69-7-201 <i>et seq.</i>
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, Cox v. Howell, 65 S.W. 868 (Tenn. 1901)	
	Groundwater	--	
TEXAS			
Tex. Code Ann. (2012)			
Transfer Regulation	Simple substitution		
	Geographic transfer	<u>Interbasin</u>: Commission rules define "inter-watershed transfer" as a transfer of state water from one main river or coastal basin to another <u>Area of origin balancing</u>: interbasin transfer of surface or groundwater of 3,000 AF or more requires protection of area of origin through a balancing of the interests of the basin of origin against those of the receiving basin (and replaces a more protective "no prejudice" test in effect pre-1997). Consideration includes needs-assessment spanning 50 years, evaluation of alternative available supplies, and economic impact. Approved transfers may be granted "only to the extent that the detriments to the basin of origin during the proposed transfer period are less than the benefits to the receiving basin during the proposed transfer period." The Commission must also consider mitigation and compensation measures to reduce adverse harm in both source and receiving basins, including protection of "instream uses, water quality, aquatic and riparian habitat, and bays and estuaries."	§ 11.085

	Rights transfer	<u>Conservation and conditions:</u> Applicants for amended (and new) permits must include a conservation plan and commit to use reasonable diligence to avoid waste; Commission may add new conditions to original permit when approving transfers <u>Marketing:</u> Marketing is permitted, subject to approval by the Commission; minimal changes may be approved without notice or hearing, Bob Beck, <i>Waters and Water Rights</i>, ch. 14	§ 11.1271
Use Regulation	Surface	<u>Appropriation</u>	§ 11.021
	Groundwater	<u>Capture:</u> Groundwater subject to rule of capture, Edwards Aquifer Auth. V. Day, 369 S.W.3d 814 (Tex. 2012)	
UTAH			
Utah Code Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Severance:</u> Water rights are generally presumed appurtenant to the land on which they are used, but may be severed if reserved by grantor of the land	§ 73-1-10(3)
	Geographic transfer	--	
	Rights transfer	<u>No injury:</u> Appropriators may change purpose, place of use, and point of diversion, provided it does not interfere with other water users <u>Markets:</u> For limited period water rights, state officials (rather than market) control reallocation	§ 73-3-3 § 73-3-5.5
Use Regulation	Surface	<u>Appropriation:</u> Stowell v. Johnson, 26 P. 290, 291 (Utah 1891); permit required <u>Short duration:</u> Water rights may be granted for limited periods of time, rather than in perpetuity	§ 73-1-1 § 73-3-5.5
	Groundwater	<u>Appropriation:</u> Permit required <u>Short duration:</u> Water rights may be granted for limited periods of time, rather than in perpetuity	§ 73-1-1 § 73-3-5.5
VERMONT			
Vt. Stat. Ann. Title 10 (2012)			
Transfer Regulation	Simple substitution	<u>Severable:</u> Water rights may be severed from the land on which they are used	Rood v. Johnson, 26 Vt. 64, 71 (1853)
	Geographic transfer	--	
	Rights transfer	--	
Use	Surface	<u>Riparian:</u> Probably reasonable use doctrine, Johns v. Stevens, 3 Vt.	

Regulation		308, 315-16 (1830)	
	Groundwater	<u>Correlative rights</u> ; based on statute	§ 1410
VIRGINIA			
Va. Code Ann. (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	<u>On-tract</u> : Water must be used only on the riparian tract from which it was diverted, Town of Gordonsville v. Zinn, 106 S.E. 508, 513 (Va. 1921)	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, Virginia Hot Springs Co. v. Hoover, 130 S.E. 408, 410 (Va. 1925) <u>Regulated riparian</u> : Statutory overlay requires permit for certain withdrawals from areas designated as surface water management areas	§§ 62.1-242 <i>et seq.</i>
	Groundwater	<u>Permit system</u> : Under Groundwater Act of 1992, permits required for certain withdrawals in "groundwater management areas" that face threats to their water quality or quantity	§§ 62.1-257, -259
WASHINGTON			
Wash. Rev. Code (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	<u>No injury</u> : Water rights may be changed or expanded to irrigate additional acreage, provided, among other things, existing users will not be injured; <u>Public interest</u> : The public interest may only be considered where the water rights to be changed involve the use of groundwater	§§ 90.03.380, 90.44.100 § 90.44-100
Use Regulation	Surface	<u>Appropriation</u> : Appropriative system, Dep't of Ecology v. Grimes, 852 P.2d 1044 (Wash. 1993) <u>Lingering riparianism</u> : Existing riparian rights protected, <i>In re Martha Lake Water Co.</i> , 277 P. 382 (Wash. 1929); <i>In re Clinton Water Dist.</i> , 218 P.2d 309 (Wash. 1950)	§ 90.03.010
	Groundwater	<u>Appropriation</u> : Permit required	§ 90.44.050, .44.070
WEST VIRGINIA			

W. Va. Code (2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Rights transfer	--	
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, Whorton v. Malone, 549 S.E.2d 57 (W. Va. 2001)	
	Groundwater	<u>Riparian</u> : American reasonable use, Pence v. Carney, 52 S.E. 702, 706 (W. Va. 1905)	
WISCONSIN			
Wis. Stat. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenance</u> : Water rights may transfer as appurtenance to transfer of real property, ABKA, L.P. v. Wisconsin Dep't of Natural Resources, 648 N.W.2d 854 (Wis. 2002)	
	Geographic transfer	--	
	Rights transfer	<u>Generally prohibited</u> : Statute prohibits sale of water rights "by easement or by a similar conveyance . . . except for the right to cross the land in order to have access to the navigable water"	§ 30.133
Use Regulation	Surface	<u>Riparian</u> : Reasonable use, Chain of Lakes v. Moses, 193 N.W.2d 708 (Wis. 1972)	
		<u>Regulated riparian</u> : Permit overlay	§ 30.18
	Groundwater	<u>Capture</u> : American reasonable use, State v. Michels Pipeline Constr., Inc., 217 N.W. 2d 339, 350 (Wis. 1974)	
		<u>Regulated riparian</u> : Permit overlay	§§ 281.34(5)(a), 281.35
WYOMING			
Wyo. Stat. Ann. (2012)			
Transfer Regulation	Simple substitution	<u>Appurtenant</u> : Water rights are appurtenant to the land, Toltec Watershed Improvement Dist. v. Associated Enters., 829 P.2d 819 (Wyo. 1992)	
	Geographic transfer	<u>Interbasin</u> : Interbasin transfers recognized, and one who transfers "imported" water has the unrestricted right to reuse, successively use, and make disposition of the water, Thayer v. Rawlins, 594 P.2d 951, 957 (Wyo. 1979)	
	Rights transfer	<u>No injury</u> : Water transfers initially prohibited, § 41-3-101, but	§ 41-3-104

		subsequent law provided authority for transfers <u>Additional limits:</u> Prior to approving transfers, officials may consider factors including economic loss to source community; availability of other sources for new use	" "
Use Regulation	Surface	<u>Appropriation:</u> Permit required, Wyoming Hereford Ranch v. Hammond Packing Co., 236 P. 764 (Wyo. 1925)	§§ 41-4-512, 41-3-503
	Groundwater	<u>Appropriation:</u> Permits required; additional regulation may apply in "control areas"	§§ 41-3-901 to 41-3-919; 41-3-912(a)

VII.APPENDIX 2—CONCEPTUAL MATRIX



RESTRICT	Prohibitions	Forbid transfers that exceed specified distances; that cross identified hydrologic/political boundaries; that impact sensitive basins; or that affect protected water uses
	Revocability	Allow source region to “reserve” water in place or to “recall” water in times of need; negotiate interstate compacts to reserve each state’s share of transboundary resources
MITIGATE	Prerequisites	Require threshold conservation efforts or diversion from “local sources first” before permitting transfers
	Conditions	Impose terms and conditions to minimize impact of transfer; require proponents of changes of water rights to prove “no injury” to other water rights holders
COMPENSATE	Security	Require receiving basin to finance measures that will enhance security of source basin’s supply; require receiving basin to provide “compensatory storage” for source basin
	Monetary	Require receiving basin to pay damages or tax to basin-of-origin
	Markets	Allow willing buyers and sellers to negotiate price for sale or lease of water rights; enhance flexibility with market mechanisms such as temporary transfers, water banks, “interruptible supplies,” and dry-year options

Favor Source Basin

Favor Receiving Basin