PEPPERDINE UNIVERSITY

Pepperdine Law Review

Volume 41 | Issue 3 Article 1

3-15-2014

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Climate change adaptation 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, fifty-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 encourage transfers. Overall, we offer to legislators a "toolkit" of options, arrayed along a logical continuum.

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* LL.M., University of Florida Levin College of Law, 2013; J.D. University of Florida Levin College of Law, 2011. We would like to thank Becky Convery, Jay Fields, and Alexis Segal for their 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.

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I. INTRODUCTION

Climate change adaption is all about water. As a report of the United Nations (U.N.) 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

1. Gareth James Lloyd, UNEP-DHI, *UN CC-DARE DRAFT Policy Brief: Climate Change Adaptation and Water Resources Management in Africa* 1 (2009), *available at* http://www.unepdhi.org/~/media/Microsite_UNEPDHI/Publications/documents/unep_DHI/CCA%2

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."[2] Likewise, another study admonished governments that "ignoring global warming is not an option."[3]

We are already feeling water-related consequences of climate change.[4] The Environmental Protection Agency catalogues a host of alterations to the hydrological cycle, including impacts "to the amount, timing, form, and intensity of precipitation."[5] Some states will be drier, including Colorado, whose April snowpack could diminish by almost seventy percent by 2070.[6] Other areas will be wetter or deluged by concentrated storms.[7] Already, the most intense squalls have focused their fury over the past half-century, increasing their rainfall by up to twenty percent during a single storm.[8]

Despite this impending crisis, many states are failing to prepare adequately.[9] The Natural Resources Defense Council (NRDC) surveyed the overall efforts of all fifty states, and found them wanting.[10] Challenging officials to follow the lead of the most active states, the NRDC concluded in 2012, "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."[11]

0and%20WRM%20Policy%20Brief%20Draft%20031209%20(2).ashx.

2. *Id*. at 2.

3. Abigail Tucker, *Rising Seas Endanger Wetland Wildlife: For Scientists in a Remote Corner of Coastal North Carolina, Ignoring Global Warming Is Not an Option*, SMITHSONIAN MAG. (Aug. 1, 2010), http://www.smithsonianmag.com/40th-anniversary/rising-seas-endanger-wetland-wildlife-734892/?all.

4. *See infra* Part II.A.

5. *Climate Change and Water*, EPA, http://water.epa.gov/scitech/climatechange/index.cfm (last updated Jan. 7, 2014).

6. *Ready or Not: How Water-Ready Is Your State?*, NRDC (Apr. 5, 2012), http:www.nrdc.org/water/readiness/press-materials.asp; Ben Chou, *Ready or Not: An Evaluation of State Climate and Water Preparedness Planning*, NRDC 45 (April 2012), *available at* http://www.nrdc.org/water/readiness/files/Water-Readiness-full-report.pdf.

7. *See Ready or Not: How Water-Ready Is Your State?*, *supra* note 6.

8. *Climate Impacts on Water Resources*, EPA, http://www.epa.gov/climatechange/impacts-adaptation/water.html (last updated Sept. 9, 2013) (describing the increase in rainfall "during the most intense 1% of storms" "over the past 50 years" (citations omitted)).

9. *See Ready or Not: How Water-Ready Is Your State?*, *supra* note 6.

10. *See id*.

11. *Ready or Not: How Water-Ready Is Your State?*, *supra* note 6.

Responding to this call to action, we offer what we believe is the first comprehensive, fifty-state survey of water allocation law and its efforts to ensure an adequate water supply in the face of a changing climate.[12] 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.[13] 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.[14] 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.[15]

Through this Article, we seek to make three unique contributions to the literature. First, we parse the opaque use of the phrase "water transfer" and construct a typology of its three most prominent meanings.[16] Second, we have conducted an empirical review of water transfer statutes in all fifty states, and present our raw data in table form, grouped by state and by transfer type.[17] Finally, we categorize state transfer statutes along a continuum (graphically illustrated in Appendix 1), from measures that *restrict* transfers (through prohibitions or recall measures), to those that *mitigate* transfer impacts (by imposing prerequisites or conditions), to those that *encourage* transfers (by allowing them to go forward, provided that the receiving basin provides sufficient compensation to the basin of origin).[18]

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 for states considering the adoption of new transfer

12. 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.

13. *See infra* Parts II.B and IV.B.

14. *See infra* Part II.C.

15. *See infra* Part IV.B.

16. *See infra* Part II.C.

17. *See infra* Part III and Appendix 1.

18. *See infra* Part III and Appendix 2.

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 influence on water resources is the uncertainty of those effects. Various models predict the possible effects of climate change on water resources.[19] These models do not always predict the same effects.[20] 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.[21] Despite these uncertainties, the predicted changes in temperatures alone provide some sense of the coming effects on water resources.[22] Likewise, further insight can be gleaned by coupling the more predictable temperature change information with hypothetical changes in precipitation.[23]

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19. *See* Intergovernmental Panel on Climate Change [IPCC], *Climate Change and Water: IPCC Technical Paper VI*, at 47–48, (Bryson C. Bates et al. eds., 2008) [hereinafter *IPCC Technical Paper*], *available at* http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf.

20. *Id*. at 3 ("[P]recipitation increases in the high latitudes . . . and parts of the tropics, and decreases in some subtropical and lower mid-latitude regions. Outside these areas, 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.").

21. Robert W. Adler, *Climate Change and the Hegemony of State Water Law*, 29 STAN. ENVTL. L.J. 1, 10 (2010).

22. *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.").

23. 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.

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. Over most of the continent in North America, both annual precipitation and the frequency of heavy precipitation events increased.[24] Exceptions included increased periods of drought in the western United States (as annual precipitation decreased in the central Rockies and the southwestern United States, and annual runoff and streamflow decreased in the Colorado and in the Columbia River basins)[25] and in southern Canada (as annual precipitation decreased in the Canadian prairies).[26] North American snowfall patterns also changed: the duration and extent of snow cover decreased; mountain snow water equivalent decreased; the proportion of precipitation falling as snow decreased in western and prairie Canada, and in the western United States; and earlier snowmelts led to earlier peak streamflows in the western United States, New England, and Canada.[27] Other observed changes in North America included increased lake water temperatures, and the salinization of coastal surface waters occurred in Florida and Louisiana.[28]

Looking forward in time, the predicted impacts of climate change on water resources are many and varied.[29] It is expected to exacerbate already extant trends. For example, 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[30] (but flooding is also expected to increase in areas that are arid, but currently experience seasonal rains).[31]

Id. (footnote omitted).

24. *IPCC Technical Paper*, *supra* note 19, at 15–16, 102 tbl.5.7.

25. *Id*. at 102 tbl.5.7.

26. *Id*.

27. *Id*.

28. *Id*.

29. *See* Adler, *supra* note 21.

30. *IPCC Technical Paper*, *supra* note 19, 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*). . . . 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*)).

31. *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.").

Climate change is also expected to result in reduced annual snowpack.[32] This reduction will probably be most apparent in glaciers and ice caps because the yearly melting of these frozen freshwater features is expected to outpace the increases historically caused by winter snowfalls.[33] These decreases are expected to result in less available fresh water during warm and dry periods.[34]

Scientists also predict reduced groundwater recharge of aquifers—caused by a variety of possible factors, including "decreased flows in basins fed by shrinking glaciers," "longer and more frequent dry seasons," "decreased summer precipitation (leading to a reduction of stored water in reservoirs fed with seasonal rivers)," variability of annual precipitation and seasonal streamflow; and increased evapotranspiration ("as a result of higher air temperatures, lengthening of the growing season and increased irrigation water usage").[35]

Like groundwater availability, surface flows also are expected to decrease in many semi-arid areas due to climate change (although streamflows in other areas could increase initially due to reduced or earlier snowpack melting each winter).[36] Decreases in streamflows could lead to an increase in the salinity of rivers and estuaries in these areas.[37] Changes in the timing of snowmelts affect reservoir levels too—earlier snowmelts send too much water into reservoirs during spring and not enough during summer.[38]

Sea level rise is another threat to water resources as a result of climate

32. *Id*. at 27–28.

33. *See id*.

34. *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*.

35. *Id*. at 70.

36. *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.").

37. *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." (citation omitted)).

38. Felicity Barringer, *Storing Water for a Dry Day Leads to Suits*, N.Y. TIMES, July 27, 2011, at A1, *available at* http://www.nytimes.com/2011/07/27/science/earth/27waterbank.html?pagewanted=all&_r=0.

change.[39] One study predicts a sea level rise in south Florida of thirty-two to forty inches by the year 2100.[40] Other studies estimate an even larger rise by that year.[41] The hurricane that struck the mid-Atlantic and northeastern United States in 2012, known as "Superstorm Sandy,"[42] demonstrated the vulnerability of cities to flooding and natural disasters.[43] It 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.[44] Troublingly, some studies have shown that even very minimal sea level rise could cause saltwater intrusion into groundwater reservoirs of fresh water.[45] This intrusion could turn freshwater aquifers salty—a change that would necessitate expensive desalination treatments to yield potable waters.[46]

The effects of climate change can be magnified by so-called "feedback loops."[47] For example, reduced precipitation causes more water to evaporate

39. Gary T. Mitchum, Fla. Climate Inst., Sea Level Changes in the Southeastern United States: *Past, Present, and Future* i (2011), *available at* http://www.seclimate.org/pdfpubs/201108mitchum_sealevel.pdf.

40. *Id*.

41. *IPCC Technical Paper*, *supra* note 19, 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).").

42. Tina Susman, *Superstorm Sandy Continues to Plague Jersey Shore, Poll Finds*, L.A.TIMES (Sept. 25, 2013), http://www.latimes.com/nation/nationnow/la-na-nn-superstorm-sandy-jersey-20130925,0,1616632.story.

43. *See* Benjamin Strauss & Robert Kopp, *Rising Seas, Vanishing Coastlines*, N.Y. TIMES, Nov. 25, 2012, at SR6, *available at* 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.").

44. *See* Seth Borenstein, *Climate Change Tied to Some Wild Weather in 2012: NOAA*, WEATHER CHANNEL (Sept. 5, 2013), http://www.weather.com/news/science/environment/climate-change-linked-some-wild-weather-2012-study-finds-20130905; *see also* Spencer Weart, *Discovery of Global Warming: Impacts of Climate Change*, AM. INST. OF PHYSICS (Feb. 2013), http://www.aip.org/history/climate/impacts.htm#impacts.

45. *See IPCC Technical Paper*, *supra* note 19 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." (citation omitted)).

46. *Id*.

47. *Id*.

from the soil.[48] Lower soil moisture causes the soil to bake and harden in the sun.[49] 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.[50]

Feedback loops may also operate in areas such as the Great Lakes region, where climate change is predicted to result in lower lake water levels.[51] Lower lake water levels in the Great Lakes could require dredging to keep shipping lanes open.[52] This dredging could, in turn, harm the Lakes' water quality.[53] Lower water levels could also worsen water quality by hindering the Lakes' ability to adequately self-regulate and dilute the impacts of toxic substances and nutrients, such as nitrogen and phosphorous.[54] Lower water levels could also cause wetlands along the Lakes' shores to dry up and to be replaced by forests or dunes.[55] This loss of filtering wetlands could further reduce the water quality of the Lakes.[56] Because 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.[57]

B. The Response: Water Transfers

Some water managers and commentators have considered the use of "water transfers" as a response to climate-induced disruptions of water supplies. In a 2008 technical paper, the Intergovernmental Panel on Climate Change (IPCC) identified transfers as a potential adaptation tool to improve

48. *Id*. at 38, 87.

49. *See* Alexandra Bot & Jose Benites, U.N. Food & Agric. Org., The Importance of Soil Organic Matter: Key to Drought Resistant-Soil and Sustained Food Production 39 (2005), *available at* http://www.fao.org/docrep/009/a0100e/a0100e.pdf.

50. *Id*.

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

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

53. *Id*.

54. *Id*. at 7–8.

55. *Id*. at 8.

56. *Id*.

57. *Id*. at 4–5 ("The estimated 45 million people in the Basin rely on the Great Lakes for jobs, energy, shipping, drinking water, and recreation, among other things.").

both demand-side[58] and supply-side[59] management. Likewise, the Federal Bureau of Reclamation identified at least two types of transfers that might facilitate adaptation to climate change in the Colorado River basin:[60] "water transfers"[61] and "water banks."[62] Scholars, too, have evaluated the potential usefulness of transfers. Proponents argue that transfer tools such as "water markets" promote flexibility,[63] respond to uncertainty,[64] and lead to

58. *IPCC Technical Paper*, *supra* note 19 at 48, 49 tbl. 3.4 (summarizing "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."). The "water market" the IPCC mentions seems akin to a market where water rights are transferrable and limited to a certain sustainable number or water rights—such as the kind of market used in carbon emission trading schemes—but the report is not entirely clear. *See id*. at 48.

59. *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. *See id*.

60. *Reclamation: Managing Water in the West, Colorado River Basin Water Supply and Demand Study*, U.S. DEP'T OF THE INTERIOR BUREAU OF RECLAMATION 82 (2012), *available at* http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/Study%20Report/StudyReport_FINAL_Dec2012.pdf.

61. *Id*.

> In terms of reducing demands and as conservation options, water transfers were . . . demonstrated . . . 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.

62. *Id*.

> 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.

63. Jonathan H. Adler, *Water Marketing As an Adaptive Response to the Threat of Climate Change*, 31 HAMLINE L. REV. 729, 732 (2008). Adler argues, "The demands of current and projected water management challenges can best be met through a greater reliance on water markets for water management." *Id*. at 739, 749 ("Traditional planning tools are poorly equipped to address climatic effects on water supplies."); *see also* Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 TEX. L. REV. 1873 (2005); Andrew P. Morriss, *Real People, Real Resources, and*

improved valuation of water resources.[65] Additionally, the Natural Resources Defense Council has prepared a report on state preparedness for climate-induced changes to state water supplies, *Ready or Not: How Water-Ready Is Your State?*, which highlights "water markets," "transbasin transfers," and "interbasin transfers" as partial solutions to the challenge of climate change.[66]

The United States has not been alone in its exploration of water transfers as a possible response to climate change.[67] In the wake of water scarcity problems, Australia instituted legal reforms in the 1990s that included, among other things, the development of water markets.[68] Some recommend that the United States follow Australia's path and minimize state legal barriers to transfers.[69]

C. The Typology: A Closer Look at Water Transfers

Although many discuss the use of "water transfers" by states as a response to climate change and water shortage, they do not use the terminology consistently. The following subsections sketch out a "typology" of the water transfer mechanism and discuss its three primary meanings.

Real Choices: The Case for Market Valuation of Water, 38 TEX. TECH L. REV. 973 (2006).

64. Adler, *supra* note 63, at 749 ("Water markets can both reduce uncertainty for water users and provide security against the harms that uncertainty can produce.").

65. *See* Morriss, *supra* note 63.

66. Chou, *supra* note 6, at 46. The report cites to the example of Colorado, where "[d]espite 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, . . . total supplies will not be enough to offset greater water demand in 2050." *Id*. at 46. The report cites with approval to the example of Massachusetts, which "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*. at 138–39.

67. *See, e.g.*, Priyanka Sundareshan, Note, *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).

68. *Id*. at 935–36.

69. *Id*. Sundareshan also cites with approval the example of California's Emergency Drought Water Bank of 1991, which facilitated the temporary transfer of water rights. *Id* at 943–44.

1. Simple Substitution Transfers

This Article offers the phrase "simple substitution transfer" as a clear description of 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.[70] As a result, the water rights of the first owner pass unchanged to the new owner.[71] In this context "transfer" refers to the passage of *water rights* from one party to another (as opposed to the movement of raw water from one place to another). Importantly, the "simple substitution" label will be used only when the transfer occurs as an adjunct to the real estate transaction, or in those cases where 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 or is otherwise relinquished).[72] If the new owner seeks to modify usage of the water right, then those subsequent changes will be referred to as a "change of water right."[73] As a result of such continuity, other users will not suffer any consequences, adverse or otherwise, rendering simple substitutions generally noncontroversial.[74]

In common law riparian jurisdictions, water rights are "appurtenant" to the land and new owners acquire whatever water rights their predecessors enjoyed.[75] 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."[76] Likewise, prior appropriation jurisdictions generally presume, as a matter of real estate and contract law, that water rights pass with the land, unless the conveyance states otherwise.[77]

Drawing on these understandings, Appendix 1 categorizes water rights under state "simple substitution" law as either "appurtenant" (may not be

70. *Cf.* 33 C.J.S. *Executions* § 471 (2013).

71. *See* DOUGLAS L. GRANT & GREGORY S. WEBER, CASES AND MATERIALS ON WATER LAW 106–07, 203 (8th ed. 2010).

72. *Id.*

73. *See infra* Part C.3.

74. *See infra* Part C.3.

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

76. Pointe, LLC v. Lake Mgmt. Ass'n, 50 S.W.3d 471, 474, 477 (Tenn. Ct. App. 2000).

77. GETCHES, *supra* note 75, at 167.

transferred apart from the land, or presumed to transfer with the land) or "severable" (no requirement or presumption of appurtenance).

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.[78] In contrast to the transfer of legal water rights under simple substitution transfers, "geographic transfers" involve the movement of bulk water that previously has not been reduced to legally cognizable water rights.[79] To qualify as a geographic transfer, generally, the water must cross a boundary the law regards as significant.[80] In some cases, significance may be measured by distance traveled.[81] In other transfers, humans pump water across geographic boundaries—such as those marking surface watersheds,[82] mountain ranges,[83] and groundwater basins.[84] In yet other situations, water crosses legal and political lines—including property boundaries,[85] county lines,[86] and state borders.[87] Jurists and commentators refer to this type of

78. Chris Reagan, Comment, *The Water Transfers Rule: How an EPA Rule Threatens to Undermine the Clean Water Act*, 83 U. COLO. L. REV. 307, 307 (2011).

79. *See infra* notes 80–93 and accompanying text.

80. *See, e.g.*, KAN. STAT. ANN. § 82a-726 (West, Westlaw through 2013 Sess.) (addressing transporting water across state line).

81. *See, e.g.*, *id.* §§ 82-a-726(a), 82a-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).

82. *See, e.g.*, Stratton v. Mt. Hermon Boys' Sch., 103 N.E. 87, 89 (Mass. 1913) (imposing liability for material injury to riparians caused by diversion of water for use outside the source watershed).

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

84. *See, e.g.*, Jensen v. Dep't of Ecology, 685 P.2d 1068 (Wash. 1984) (treating separately imported groundwater stored in aquifer from groundwater naturally occurring in same basin).

85. *See Stratton*, 103 N.E. at 87 (considering riparian landowner's diversion from stream for use on a separate non-riparian tract that it owned).

86. *See, e.g.*, FLA. STAT. ANN. § 373.223(2) (West, Westlaw through 2013 Sess.) (prescribing statutory criteria for evaluation of proposed inter-county transfers).

87. *See, e.g.*, Tarrant Reg'l Water Dist. v. Herrmann, 133 S. Ct. 2120, 2137 (2013) (holding valid under the dormant commerce clause and under the Red River Compact Oklahoma's restrictive water export statute); Sporhase v. Nebraska *ex rel.* Douglas, 458 U.S. 941, 960 (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).

transfer through terms including "water transfer,"[88] "interbasin transfer,"[89] "transbasin diversion,"[90] "transmountain diversion,"[91] "engineered" transfer,[92] and "water export."[93]

Common law riparianism (practiced primarily in the eastern states) frowns upon such geographic water transfers.[94] Under the so-called "watershed rule," riparian landowners may not divert water from adjacent watercourses for use on property outside the drainage basin.[95] Likewise, under the "non-riparian use" restriction, 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.[96] In their strictest applications, these rules serve as per se bans, even if the water transfer would injure no one.[97] These rules, at least in theory, can be problematic for cities, which often rely on water sources outside their territory or outside the watershed.[98] Such

88. *See, e.g.*, GETCHES, *supra* note 75, at 167–89; Johanna Hamburger, *Improving Efficiency and Overcoming Obstacles to Water Transfers in Utah*, 15 U. DENV. WATER L. REV. 69 (2011).

89. *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).

90. *See, e.g.*, Nebraska v. Wyoming, 325 U.S. 589 (1945) (discussing circumstances in which transbasin diversions between states would be enjoined—including where the diversion substantially interfered with existing uses).

91. *See, e.g.*, City and Cnty. of Denver v. Fulton Irrigating Ditch Co., 506 P.2d 144 (Colo. 1972) (holding that water imported by means of transmountain diversion was not subject to appropriation); Gregory J. Hobbs, Jr., *Reviving the Public Ownership, Antispeculation, and Beneficial Use Moorings of Prior Appropriation Water Law,* 84 U. COLO. L. REV. 97, 112 (2013) (discussing "transmountain diversion and storage projects" constructed by Colorado cities).

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

93. *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).

94. *See infra* notes 95–103 and accompanying text.

95. *See* Stratton v. Mt. Hermon Boys' Sch., 103 N.E. 87, 89 (Mass. 1913).

96. Joseph W. Dellapenna, *The Evolution of Riparianism in the United States,* 95 MARQ. L. REV. 53, 57–58 (2011).

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

98. *See* Braidburn Realty Corp. v. City of E. Orange, 153 A. 714 (N.J. 1931) (forbidding use, distribution, or sale of water for non-riparian use, but only if injury demonstrated); Lord v. Meadville Water Co., 19 A. 1007, 1008 (Pa. 1890) (forbidding diversion of water from natural channel to supply a town).

restrictions are supported by the mentality that riparian lands and adjacent waters form an inseparable unit and therefore, that water should not be severed from the land.[99] Despite such obstacles, municipalities—including New York City,[100] Virginia Beach,[101] and Atlanta[102]—have made use of distant waters, either through condemnation or through various other legal mechanisms.[103]

The riparian distaste for physical transfers also influences groundwater doctrines in both eastern and western states.[104] Like surface riparianism, these groundwater rules associate water use with land ownership.[105] In particular, both the "reasonable use"[106] and "correlative rights"[107] doctrines limit the use of groundwater 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.[108] Only the minority "English rule" (or rule of capture) imposes no restrictions on the place of use, even though it requires the ownership of overlying land as a prerequisite to the withdrawal of groundwater.[109]

In contrast to riparian influenced surface and groundwater rules, the

99. GETCHES, *supra* note 75, 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.").

100. 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).

101. North Carolina v. Hudson, 731 F. Supp. 1261, 1273 (E.D.N.C. 1990).

102. Barbara Cosens, *The Eternal Quest for Water: Historical Overview and Current Examination of Interbasin Transfers of Water*, 55 ROCKY MTN. MIN. L. INST. 17-1, 10–11 (2009) (discussing dispute over Atlanta's water supply).

103. *See, e.g.*, *Hudson*, 731 F. Supp. 1261 (permitting transbasin diversion for 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). *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").

104. *See infra* Appendix 1.

105. *See* GETCHES, *supra* note 75, at 276–77.

106. *Id*. (discussing the reasonable use groundwater doctrine's "prefer[ence] for uses on overlying land").

107. *Id*. at 269–71, 276–77 (explaining the correlative rights doctrine and its recognition of the right to make reasonable use of water on overlying land).

108. *See supra* notes 95–103 and accompanying text.

109. GETCHES, *supra* note 75, at 268–69 (explaining "English" or "absolute ownership" rule).

western prior appropriation doctrine embraces the right to move scarce water resources long distances to the places where they are needed most.[110] Indeed, in the seminal case of *Irwin v. Phillips*, 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.[111] 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."[112]

3. Change of Water Rights

A third transfer possibility, the "change of water rights," affects the manner in which water rights are exercised. In jurisdictions that permit such alterations, a water rights holder seeks permission to change such factors as the place of use, 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), the point of diversion, and/or the location and timing of return flows.[113]

In some instances—particularly where the place of use will be changed—there will also be a change of the ownership of the water right. In this case, for example, a farmer might sell or lease an agricultural water right to a city for use within a distant municipality. Unlike simple substitution transfers, the first rights holder severs the water right and transfers it apart from any particular tract of land.[114] This process has been described by phrases such as "sale of water rights,"[115] "water market,"[116] "dry-year option

110. *See, e.g.*, *In re* Hood River, 227 P. 1065, 1092 (Or. 1924).

111. 5 Cal. 140, 146–47 (1855).

112. *Id.* at 146.

113. High Plains A&M, LLC v. Se. Colo. Water Conservancy Dist., 120 P.3d 710, 714 (Colo. 2005); Strickler v. City of Colo. Springs, 26 P. 313, 316 (Colo. 1981).

114. GRANT & WEBER, *supra* note 71, at 204–05.

115. *Id.*

116. *Id.* at 200–19; SAX ET AL., *supra* note 103, at 264–67; *see* Jedidiah Brewer et al., *Transferring Water in the American West: 1987–2005*, 40 U. Mich. J.L. Reform 1021, 1025–31

(contingent),"[117] "spot market" transfer,[118] and "water bank."[119]

Riparian jurisdictions measure both existing uses and changes in the use of water rights under the "reasonable use" test.[120] Riparian uses are acceptable if they are reasonable in purpose and amount, and if they do not cause "unreasonable harm" to other water users.[121] Failure to continue an existing use does not usually result in its abandonment or forfeiture,[122] nor does the initiation of a new use face an insurmountable obstacle.[123] As a result of this inherent flexibility, eastern water markets—involving a change from one owner to another—are rare.[124] Riparian landowners can instead initiate new water rights (at no cost) at any time, and therefore, the purchase of existing water rights would seldom be an attractive option. Nonriparians, in contrast, can acquire new water rights by purchasing a tract of riparian land, however small,[125] and likewise have not pushed for the development of

(2007) (discussing western water law and water markets).

117. *See* Ray Huffaker et al., *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).

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

119. *See* Kevin M. O'Brien & Robert R. Gunning, *Water Marketing in California Revisited: The Legacy of the 1987-92 Drought*, 25 PAC. L.J. 1053 (1994) (tracing the development of water marketing in California and discussing major unresolved issues); Richard W. Wahl, *Market Transfers of Water in California,* 1 W.-NW. 49, 68 (1994) (discussing California water bank and potential evolution into privately negotiated transactions); *see also* Kaiser & McFarland, *supra* note 92, at 893–94.

120. *See, e.g.*, A. Dan Tarlock, Law of Water Rights and Resources § 3:69 (2013 ed.).

121. GETCHES, *supra* note 75, at 48–53.

122. *Id*. at 70.

123. *Id*. at 58–61, 89–70. For a particularly strong application of this principle, *see Franco-American Charolaise, Ltd. v. Oklahoma Water Resources Board*, 855 P.2d 568, 572 (Okla. 1990), which held 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, *supra*, at 89–92 (listing *Franco-American Charolaise* as an exception to the general pattern of modern statutes in hybrid riparian/prior appropriation jurisdictions that 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.").

124. *See* Christine A. Klein, *Water Transfers: The Case Against Transbasin Diversions in the Eastern States*, 25 UCLA J. ENVTL. L. & POL'Y 249 (2006–2007). *But see* 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);

125. *See* GETCHES, *supra* note 75, at 62–68. In some cases, however, courts balk at the idea that

eastern water markets.[126]

In contrast, appropriative jurisdictions have given increased attention to changes of water rights and to water markets—particularly as competition for water increases.[127] Although westerners can avoid the cost of purchasing existing water rights by initiating new appropriations, in many jurisdictions the average annual water supply has already been stretched so thin that new water rights are unreliable.[128] Under the prior appropriation doctrine's principle, "first in time, first in right,"[129] the holders of such "junior" water rights must wait patiently in line until all "senior" water rights have been satisfied in full.[130]

III. STATUTORY REVIEW

Building on the transfer typology considered in the previous part, we have conducted a comprehensive, empirical review of each state's law on water transfers. Appendix 1 offers a conceptual matrix to bring order to the data. Appendix 2 presents in table form the results of that study, and organizes the raw data by state and by transfer type. To do so, we have categorized state transfer statutes along a continuum, from measures that *restrict* transfers (through prohibitions or recall measures), to those that *mitigate* transfer impacts (by imposing prerequisites or conditions), to those that *encourage* transfers (by allowing them to go forward, provided that the receiving basin provides sufficient compensation to the basin of origin). This Part explains in narrative form some of the most important findings of the appendices.

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the acquisition of a narrow strip of riparian land is sufficient to support the landowner's desired uses. *Accord* Gordonsville v. Zinn, 106 S.E. 508, 514 (Va. 1921) (considering defendant's narrow strip of land, measuring twenty-five feet in width).

126. *See* GETCHES, *supra* note 75, at 62–68. 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. *See id*. Other riparian landowners drawing from the same water source retain their right to complain. *See id*. ("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." (citations omitted)).

127. GRANT & WEBER, *supra* note 71, at 203.

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

129. *Id*. at 563 (citations omitted) (internal quotation marks omitted).

130. *Id*. at 569.

A. Restricting Transfers

Statutes that restrict water transfers favor water use in the source basin.[131] At their most restrictive, these laws prohibit transfers altogether.[132] Such prohibitions include a ban on transfers that exceed specified distances,[133] or that cross hydrological[134] or political boundaries.[135] Some statutes ban exports of water to other states, although legislators must take care to avoid running afoul of the Dormant Commerce Clause.[136] Some states prohibit transfers that impact sensitive basins or that affect protected water uses.[137] Common law, too, may impose transfer restrictions—most

131. *See infra* notes 132–40.

132. 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, 63 N.E. 600, 603 (Ohio 1902) (holding that water "cannot be lawfully diverted or transported" from its original source). Some eastern statutes continued this prohibition in modified form. *See, e.g.*, ALA. CODE § 45-36-251 (Westlaw through 2013 Sess.) (authorizing local laws to prohibit new transfers from the Tennessee River basin); IND. CODE ANN. § 14-25-1-11(b)(2) (West, Westlaw through 2013 Sess.) (restricting diversions out of the Great Lakes basin); LA. REV. STAT. ANN. §§ 14:224, 33:1236.9 (Westlaw through 2013 Sess.) (prohibiting export of surface or groundwater from specified parishes, with exemption for bottled water); ME. REV. ST. tit. 22, § 2660–A(1) (Westlaw through 2013 Sess.) (forbidding most intra-municipal transfers for commercial purposes in containers greater than ten gallons); OHIO REV. CODE ANN. § 1522.01(4.8) (LexisNexis, LEXIS through 2013 File 47) (generally prohibiting transfers out of the Great Lakes basin). Some western statutes also prohibit or limit interbasin transfers. Mark Squillace, *The Water Marketing Solution*, 42 ENVTL. L. REP. NEWS & ANALYSIS 10800, 10801 n.14 (2012) (explaining that "[a]t least one state, Wyoming, initially prohibited transfers entirely"); *see* WYO. STAT. ANN. §41-3-101 (LEXIS through 2013 Sess.); *see also* ARIZ. REV. STAT. ANN. § 45-544 (Westlaw through First Sess. of the Fifty-first Legis.) (prohibiting most interbasin transfers outside active management areas); MONT. CODE ANN. § 85-2-301 (West, Westlaw through 2013 Sess.) (prohibiting transfers out of specified watersheds).

133. *See, e.g.*, KAN. STAT. ANN. § 82a-1501(a)(1) (West, Westlaw through 2013 Sess.) (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.").

134. *See, e.g.*, ALASKA STAT. § 46.15.035 (LEXIS through 2013 Sess.) (generally prohibiting transfers out of hydrologic units, subject to certain conditions of surplus).

135. *See, e.g.*, Tarrant Reg'l Water Dist. v. Herrmann, 656 F. 3d 1222, 1227 (10th Cir. 2011) (A Texas agency alleged that Oklahoma statute governing water transfer violated Dormant Commerce Clause.); ME. REV. ST. tit. 22, § 2660–A(1) (Westlaw through 2013 Sess.) (Maine statute forbidding most intra-municipality water transfers for commercial purposes in containers greater than ten gallons in size); OKLA. STAT. tit. 82, § 1B (Westlaw through 2013 Sess.) (generally prohibiting out of state exports without legislative consent).

136. *See* Sporhase v. Nebraska *ex rel*. Douglas, 458 U.S. 941, 943 (1982); *see also,* Klein, *supra* note 93, at 131–33.

137. *See, e.g.*, 2005 Ala. Acts 359; 2006 Ala. Acts 115, 341, 373, 593, 603, 606 (Alabama Local Laws prohibiting additional transfers of water from the Tennessee River basin to any other river

importantly through riparianism's "watershed rule."[138]

Falling short of a complete ban, other laws permit transfers, 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" water in place[139] or to recapture water in times of need.[140] Further, some states negotiate interstate compacts to reserve each state's share of transboundary resources.[141] Thus, water flows downstream to neighboring states (analogous to an interstate transfer), subject to the upstream state's right to recall its share of compact waters at some point in the future.[142]

B. Mitigating Transfer Impacts

Some statutes require a party that wishes to transfer water to mitigate

basin—subject to exceptions.).

138. *See, e.g.*, Stratton v. Mt. Hermon Boys' Sch., 103 N.E. 87, 89 (Mass. 1913).

139. *See, e.g.*, FLA. STAT. ANN. § 373.223(4) (West, Westlaw through 2013 Sess.) ("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.").

140. Some states may allow use of water by others, but reserve a right of recapture. *See, e.g.*, CAL. WATER CODE § 10505 (West, Westlaw through 2013 Sess.) ("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 the application originates of any such water necessary for the development of the county."); 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."); OKLA. STAT. tit. 82, § 105.12(A)(4) (Westlaw through 2013 Sess.) ("If the application is for the transportation of water for use outside the stream system wherein the water originates, the proposed use must not interfere with existing or proposed beneficial uses within the stream system and the needs of the water users therein."). Other states issue water use permits for limited terms, after which state officials can reconsider the allocation. *See, e.g.*, FLA. STAT. ANN. § 373.236(1), (3) (West, Westlaw through 2013 Sess.); UTAH CODE ANN. § 73–3–5.5 (LexisNexis, LEXIS through 2013 Sess.) (authorizing issuance of limited period water rights). This might also be considered a type of recall of water use.

141. See, for example, the Colorado River Compact, which was designed to avoid a race to develop water resources and to reserve a volume of water for the use of slower growing states. *See* Klein, *supra* note 128, at 609–11.

142. *See id.*

the transfer's 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 importer[143] or diversion from local sources before permitting transfers.[144] Some states have "area-of-protection" factors that must be evaluated before a transfer can be approved.[145]

Other states impose permit conditions 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.[146] Other states use a public interest review to determine whether or not to approve a change application.[147] Washington requires reciprocity in order to allow out-of-state water transfers.[148] Texas requires that a party applying for a new or amended water permit include a conservation plan and commit to avoiding waste.[149]

143. *See, e.g.*, CAL. WATER CODE § 1725 (West, Westlaw through 2013 Sess.) (requiring that a change in water use "not unreasonably affect fish, wildlife, or other instream beneficial uses").

144. FLA. STAT. ANN. §§ 373.016(4)(a), 373.223(3) (West, Westlaw through 2013 Sess.) (encouraging "the use of water from sources nearest the area of use or application whenever practicable").

145. *See, e.g.*, TEX. WATER CODE ANN. § 11.085(l) (West, Westlaw through 2013 Sess.) ("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 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.").

146. *See, e.g.*, N.M. STAT. ANN. § 72-8-5 (West, Westlaw through 2013 Sess.) ("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.").

147. 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).

148. WASH. REV. CODE ANN. § 90.03.300 (West, Westlaw through 2013 legislation) ("[T]he 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.").

149. TEX. WATER CODE ANN. § 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. Encouraging Transfers

Some states encourage transfers by allowing them to go forward, provided that the receiving basin provides compensation to the source area. 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."[150] Compensation can 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.[151] Similarly, in Arizona, transfers of groundwater within a sub-basin are subject to payment of damages if they fall within active management areas.[152] Likewise, in Alaska, water transfers outside of hydrologic units require payment of "conservation fees."[153] In Wyoming, water transfers require payment of just compensation.[154] New Mexico

150. 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, e.g.*, COLO. DIV. OF WATER RES., GENERAL ADMINISTRATION GUIDELINES FOR RESERVOIRS 38–39 (2011), *available at* http://water.state.co.us/DWRIPub/Documents/Res_Admin_Guidelines_Oct2011.pdf.

151. COLO. REV. STAT. § 37-92-305(4.5)(b)(I)(A) (LEXIS through 2013 Sess.) ("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.").

152. ARIZ. REV. STAT. ANN. § 45-543(B) (Westlaw through First Sess. of the Fifty-first Legis.) ("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.").

153. ALASKA STAT. § 46.15.035(a) (LEXIS through 2013 Sess.) ("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.").

154. WYO. STAT. ANN. § 41-3-103 (LEXIS through 2013 Sess.) ("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,

imposes punitive fines or jail time for diversions that impair existing water rights.[155] Nevada requires a fee for transferring water out of county or out of state.[156]

Some jurisdictions explicitly countenance the practice of water marketing, where willing buyers and sellers negotiate for the sale or lease of water rights.[157] In these states, the negotiated sales price is presumed adequate to compensate for any negative impacts caused by the transfer.[158] Water markets enhance flexibility with a variety of market mechanisms—such as temporary transfers or leases,[159] water banks,[160] "interruptible supplies,"[161] and dry-year options.[162]

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 Part IV.A. Then, Part IV.B discusses the

just compensation shall be paid and under the direction of the board, proper instruments shall be drawn and recorded.").

155. N.M. STAT. ANN. § 72-8-5 (West, Westlaw through 2013 Sess.) ("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.").

156. NEV. REV. STAT. ANN. § 533.438(1) (West, Westlaw through 2011 Sess.) (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.").

157. *See infra* notes 159–62 and accompanying text.

158. *See infra* notes 159–62 and accompanying text.

159. *See, e.g.*, CAL. WATER CODE § 1728 (West, Westlaw through 2013 Sess.). 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.*

160. *See, e.g.*, *id.* § 1745.04; *see also* N.M. STAT. ANN. § 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.").

161. *See, e.g.*, N.M. STAT. ANN. §§ 72-6-1 to -7) (establishing water leasing program).

162. *See, e.g.*, CAL. WATER CODE § 73504.

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. Part IV.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 subpart considers resilience and adaptive management as a response to climate change. The second subpart 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 calls 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.[163] 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."[164] Ecological resilience—in contrast with engineering resilience—requires system adaptations and adjustments in response to stressors.[165] This ability to adapt and adjust in the face of changes in a system is the essence of ecological resilience.[166] When this ability of a system to "bounce-back" is lost, a system has lost its

163. *See* Adler, *supra* note 63, 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.").

164. Brian Walker et al., *Resilience, Adaptability and Transformability in Social-Ecological Systems*, 9 ECOLOGY & SOC'Y art. 5, 2 (2004), *available at* http://www.ecologyandsociety.org/vol9/iss2/art5/print.pdf.

165. 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, 1375–76 (2011).

166. *See id*. at 1376.

resilience.[167]

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.[168] This connectedness has been called "social-ecological resilience."[169] 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."[170] 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."[171] 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.[172] Instead, the baseline has shifted and might never move back to the range it inhabited before.[173]

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

167. *See* Don Clifton, *Progressing a Sustainable-World: A Socio-Ecological Resilience Perspective*, 3 J. OF SUSTAINABLE DEV. 74, 75–76 (2010), *available at* http://www.ccsenet.org/journal/index.php/jsd/article/view/6766/6390.

168. Andrea M. Keessen & Helena F.M.W. van Rijswick, *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." (footnote omitted)).

169. *Id*.

170. *Id*.

171. Ruhl, *supra* note 165, at 1377.

172. *See* Adler, *supra* note 21, at 8–9 (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.'" (citations omitted)).

173. *See id*. at 9–10.

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.[174] Furthermore, the IPCC suggests that "[c]limate change challenges the traditional assumption that past hydrological experience provides a good guide to future conditions."[175]

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.[176] The adaptive management and resilience frameworks are linked by a similar history.[177] In fact, some observers have called adaptive management "a tool for implementing resilience theory."[178] Resilience, in turn, embodies the understanding of ecosystems' non-static nature within which adaptive management attempts to work.[179] Some point to adaptive management's flexibility as its greatest asset.[180] Adaptive

174. *See, e.g.*, Kevin E. Regan, *Balancing Public Water Supply and Adverse Environmental Impacts Under Florida Law: From Water Wars Towards Adaptive Management*, 19 J. LAND USE & ENVTL. L. 123, 125 (2003) (arguing that water policy requires an adaptive management approach).

175. *IPCC Technical Paper*, *supra* note 19, at 4.

176. *Accord* Regan, *supra* note 174, at 177 (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.").

177. Mary Jane Angelo, *Stumbling Toward Success: A Story of Adaptive Law and Ecological Resilience*, 87 NEB. L. REV. 950, 952–53 (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.'" (footnotes omitted)).

178. 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 53, 67 (Alyson C. Flournoy & David M. Driesen eds., 2010).

179. *See id.* at 66–67.

180. Regan, *supra* note 176, 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." (citation omitted))

management is especially useful in long-term projects and projects in which conditions are likely to change.[181] Some major federal projects have implemented adaptive management. For example, the United States Bureau of Reclamation has used adaptive management to allay environmental fears about some of its dam projects.[182] The United States Army Corps of Engineers has also relied on adaptive management strategies in its Everglades restoration project.[183]

On the other hand, some criticize adaptive management as being *too* adaptive, and therefore too unpredictable.[184] This unpredictability stems from adaptive management's inherent flexibility and adaptability.[185] These traits of adaptive management are perhaps 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.[186] "Localism" is the belief that local or state

181. *See infra* notes 182–83 and accompanying text.

182. *Glen Canyon Dam: Adaptive Management Program*, U.S. DEP'T OF THE INTERIOR, BUREAU OF RECLAMATION, http://www.usbr.gov/uc/rm/amp/background.html (last updated Aug. 27, 2008).

183. *Adaptive Management (AM)*, JOURNEY TO RESTORE AM.'S EVERGLADES, http://www.evergladesplan.org/pm/program_docs/adaptive_mgmt.aspx (last visited Jan. 16, 2014); *see also* Thomas T. Ankersen & Richard Hamann, *Ecosystem Management and the Everglades: A Legal and Institutional Analysis*, 11 J. LAND USE & ENVTL. L. 473, 494–95 (1996).

184. *See* GEORGE H. STANKEY ET AL., ADAPTIVE MANAGEMENT OF NATURAL RESOURCES: THEORY, CONCEPTS, AND MANAGEMENT INSTITUTIONS 8 (2005), *available at* http://www.fs.fed.us/pnw/pubs/pnw_gtr654.pdf.

185. *See generally* Regan, *supra* note 174.

186. *See, e.g.*, Sporhase v. Nebraska *ex rel.* Douglas, 458 U.S. 941 (1982).

governments should handle water policy decisions.[187] Generally, localism tends to result in political decisions to use water where it is over transferring it to other areas.[188] Florida water law, for example, features a "local sources first" statute.[189] Pragmatically, localism ostensibly supports the notion that populations should move to places where water is instead of moving water to where people are.[190] One advantage of localism is that state and local governments are generally better able to identify and enact policies for their states and localities than a centralized government.[191] 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."[192] Another advantage of localism is that it might help to avoid the adverse environmental impacts traditionally associated with water transfers.[193] Water transfers out of a basin of origin result in a 100% consumptive use of that water resource with respect to the source basin.[194] By limiting out-of-basin transfers, localism policies can serve to protect those basins of origin and the environment.[195]

187. *See* Britain J. Bush, *A New Regionalist Perspective on Land Use and the Environment*, 56 HOW. L.J. 207, 213 (2012).

188. Klein, *supra* note 124, at 249, 260–61 (recounting the revolt that 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).

189. FLA. STAT. ANN. § 373.016(4)(a) (West, Westlaw through 2013 Sess.) ("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. ANN. § 373.223(3).

190. *See generally* Klein, *supra* note 124.

191. *See* Adler, *supra* note 21, at 31.

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

193. *See* Squillace, *supra* note 132, at 10800, 10807 (limiting water transfers to the basin of origin).

194. Klein, *supra* note 124, at 263 (finding that the default presumption is "moving water to the people," but that this should be changed).

195. *See* Draper, *supra* note 89, at 369–71 (discussing different methods of protecting basins of origin).

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.[196] While some Texas appropriators supported regulation in response to the Ogallala's decline, the Texas High Plains region organized underground conservation districts out of fear of outside regulation—by Texas or by the Texas Water Commission.[197]

Likewise, some might argue that localism tends to benefit those blessed with an abundance of water resources to the detriment of other areas.[198] This argument 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.[199] This uneven growth could cause the price of supplying water (including associated infrastructure costs) in the area with accelerated growth to increase due to increased demand. The price of water in the area with less growth would remain lower. Without localism policies, the area experiencing growth might meet its increased demand for water by buying water at a lower price from the other area. But by instituting localism policies this region could prohibit such transfers.

As an alternative to localism, some embrace a federal response to the effects of climate change on water resources.[200] Some have pointed to the role that federal law can play in water allocation—especially in the western United States.[201] Others have pointed out that while the federal government

196. *See* 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).

197. *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." (footnotes omitted)).

198. *See* Jamie W. Boyd, *Canada's Position Regarding an Emerging International Fresh Water Market with Respect to the North America Free Trade Agreement*, 5 NAFTA L. & BUS. REV. AM. 325, 328 (1999) ("Canada has an abundance of fresh water, with about nine percent of the entire world's renewable water resources.").

199. *See id*.

200. *See* Adler, *supra* note 21, at 6–7 (identifying drastic water changes due to climate change, limitations on legal systems, and the appropriateness of an increased federal role).

201. *See* David H. Getches, *The Metamorphosis of Western Water Policy: Have Federal Laws*

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.[202] Furthermore, a federal system of water law policy would avoid the "race to the bottom" that tends to result from leaving policymaking in the hands of the states.[203] The "race to the bottom" phenomenon has perhaps been most distinctly documented in the environmental law arena (which is one reason why the most successful environmental laws and policies in the United States tend to be federal).[204]

Other advantages of a federal water policy would be predictability, centralized decision making, and a way to resolve intrastate water disputes.[205] 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 state and county lines.[206] This advantage will be particularly felt in those states that have watersheds that extend across political boundaries.

A possible middle ground between localism and federalism is concurrent jurisdiction by state and local governments, and the federal government.[207] This overlap of state and federal powers has been labeled "dynamic federalism" and it has been successful in other areas of

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and Local Decisions Eclipsed the States' Role?, 20 STAN. ENVTL. L.J. 3, 8 (2001).

202. *See* Adler, *supra* note 21, at 7–8, 31–59.

203. *Cf.* Louis K. Liggett Co. v. Lee, 288 U.S. 517, 558–59 (1933) (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 "not of diligence but of laxity.").

204. Robin Kundis Craig, *Climate Change, Regulatory Fragmentation, and Water Triage*, 79 U. COLO. L. REV. 825, 884–85 (2008).

205. *Id.* (pointing out the attraction of this option because "[o]ne 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." (footnotes omitted)).

206. Florida, for instance, hypothetically divides its water management districts based on watersheds, but these watersheds involve interstate rivers that extend north into Georgia. *See* FLA. STAT. ANN. § 373.503 (West, Westlaw through 2013 Sess.).

207. *See* Adler, *supra* note 21, 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." (footnotes omitted)).

environmental law.[208] This middle ground would allow states to determine their own water policies, as long as they meet federally mandated minimums.[209] Such a scheme is attractive because it allows each state to consider its own interests, and would allow states facing imminent threats from climate change to act more quickly than would the federal government.[210] 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.[211]

B. Evaluating Water Transfers

The debate over the relative merits of water transfers implicates at least six issue clusters. Below, each is considered in turn as a guide to states considering the adoption of water transfer legislation.

1. Satisfying Demand

The satisfaction of urban demand 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.[212] California's transmountain diversions are the stuff of legend.[213] 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.[214] In the east, New York City pipes in water from several other watersheds, including transfers up and over the

208. Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 176–79 (2006).

209. *See supra* note 207 and accompanying text.

210. *See* Adler, *supra* note 21, at 7, 31.

211. *But see* Massachusetts v. EPA, 549 U.S. 497, 528 (2007) (finding that the EPA has the power to regulate greenhouse gases).

212. Boyd, *supra* note 198, at 352 (discussing inequitable distribution of fresh water throughout the earth and potential for sale of Canadian water resources to the United States).

213. Klein, *supra* note 124, at 264–67 (describing efforts of Los Angeles to acquire more water).

214. *Id*. at 267.

Catskill Mountains.[215] 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.[216] Some see this type of intrastate sharing as a matter of basic fairness and practicality.[217]

In contrast to the pragmatic appeal of transfers, some have noted their limitations.[218] Geographic transfers focus on supply-side management, to the neglect of demand-side management.[219] Overreliance on transfers can become an exercise in futility, with cities seeking ever more to ensure they have "enough" water.[220] Transfers can be magnets for undesirable settlement patterns, potentially encouraging urban sprawl.[221] Transfers also can sever water from its basin of origin, ensuring that unconsumed water (such as agricultural return flows) will not find its way back to its source.[222] This can have serious environmental impacts in the source region.[223] In addition, because water is heavy, the energy that it takes to move water 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.[224]

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.[225] In the western states (and in groundwater basins following priority allocation), most of the oldest and most reliable water rights are

215. SAX ET AL., *supra note* 103, at 80–88.

216. *Id*. at 79–80.

217. *See id*.

218. *See, e.g*., Draper, *supra* note 89, at 344–48.

219. Klein, *supra* note 124, at 263.

220. *Id*. at 264–65.

221. A. Dan Tarlock & Sarah B. Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 163, 166 (1999) (arguing that physical transfers promote urban sprawl and affect growth patterns).

222. Klein, *supra* note 124, at 253.

223. *Id*. at 273.

224. RONNIE COHEN ET AL., ENERGY DOWN THE DRAIN: THE HIDDEN COSTS OF CALIFORNIA'S WATER SUPPLY 2–4 (2004), *available at* http://www.nrdc.org/water/conservation/edrain/edrain.pdf.

225. *See* Klein, *supra* note 124, at 253–54 (identifying reallocation of water as being linked with changes in type of use, time of use, or authorized users).

locked into traditional uses—such as mining, ranching, and farming.[226] Agricultural irrigation, alone, uses a hefty eighty percent of western water supplies.[227] In some cases, these uses have not kept pace with society's values and needs.[228] For example, most of the oldest western priorities were established well before society thought about saving some water for environmental, recreational, and aesthetic uses.[229] 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.[230] 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.[231]

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.[232] 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.[233]

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226. *See* Getches, *supra* note 201, at 9 (noting that "[s]tate legal regimes committed water to uses that prevailed early in the century, primarily mining and agriculture.").

227. Brewer et al., *supra* note 116, 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." (footnote omitted)).

228. Charles W. Howe, *Protecting Public Values in a Water Market Setting: Improving Water Markets to Increase Economic Efficiency and Equity*, 3 U. DENV, WATER L. REV. 357, 361–64 (2000) (identifying social, cultural, environmental, recreational, and ecosystem values that have been—or can be—negatively impacted by water marketing).

229. A. Dan Tarlock, *The Recognition of Instream Flow Rights: 'New' Public Western Water Rights*, 25 ROCKY MTN. MIN. L. INST. 24, 24 (1979).

230. Brewer et al., *supra* note 116, at 1021–23.

231. *See* Irwin v. Phillips, 5 Cal. 140, 142 (1855) (recognizing as valid water right diversion dating back before 1855); Kaiser & McFarland, *supra* note 92, at 889 (asserting that "water marketing is consistent with the current belief that markets are an effective way to allocate scarce resources to meet the tripartite goals of efficiency, equity and conflict minimization.").

232. *See, e.g.*, FLA. STAT. ANN. § 373.236(1), (3) (West, Westlaw through 2013 Sess.) (authorizing the issuance of renewable "consumptive use permits" for periods generally extending for twenty to fifty years).

233. *See supra* Part II.C.2.

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.[234] 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.[235] Many—if not most—western jurisdictions modified their laws to permit the issuance of new water rights for instream flow, recreational, and aesthetic purposes.[236] 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.[237] To remedy this problem, states including Oregon, Colorado, and others began to allow the holders of appropriative water rights to sell or donate some or all of the right to maintain stream and lake levels.[238] 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 that would draw yet more water from streams and aquifers.[239] This conservation benefit may be of special importance in coastal communities, where excessive withdrawals from freshwater sources may

234. SAX ET AL., *supra* note 103, at 265.

235. *See generally* GETCHES, *supra* note 75, at 121–24 (Appropriations for instream uses "initially encountered the fundamental requirements of the appropriation doctrine that water be diverted and put to a beneficial use.").

236. *See id*.

237. SAX ET AL., *supra* note 103, at 265 (discussing purchase of existing water rights for new instream flow purposes).

238. *See* David R.E. Aladjem, *Innovation Within a Regulatory Framework: The Protection of Instream Beneficial Uses of Water in California, 1978 to 2004*, 36 MCGEORGE L. REV. 305 (2005); Michael F. Browning, *Instream Flow Water Rights in the Western States and Provinces*, 56 ROCKY MTN. MIN. L. INST. 1, 5–10 (2010); 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 U. DENV. WATER L. REV. 309 (2004).

239. SAX ET AL., *supra* note 103, 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." (footnote omitted)).

create a void filled by seawater.[240] As a consequence of such saltwater intrusion, freshwater sources become contaminated and unusable.[241]

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.[242]

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 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.[243] This dynamic has received particular attention in the context of maintaining minimum stream flows and lake levels to protect the natural environment.[244] These incentives can backfire, however. Some have argued that the possibility of selling excess water can lead to hoarding and speculation, rather than conservation.[245] As with the benefits of reallocating senior water rights, however, the conservation incentive of markets may have less force in eastern riparian jurisdictions.[246]

240. *Id.* (discussing saltwater intrusion).

241. *Id.*

242. *See generally* Klein, *supra* note 124.

243. SAX ET AL., *supra* note 103, 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).

244. *Id.*

245. *See, e.g.*, Robert Benjamin Naeser & Mark Griffin Smith, *Playing with Borrowed Water: Conflicts over Instream Flows on the Upper Arkansas River*, 35 NAT. RESOURCES J. 93 (1995).

246. *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 Appropriative or Riparian Water Right Transferred Instream for Conservation Purposes (with an Emphasis on California Water Law)*, 17 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 93 (2011).

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.[247] 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.[248] In this context, the literature cites often to California's experimental use of markets as a response to drought.[249] Transfer proponents recall the perceived benefits of markets in general, and anticipate that the same virtues will attach to water markets in particular.[250] This optimism is tempered, however, by studies revealing that the actual prevalence of water markets falls short of theoretical expectations,[251] and by articles citing necessary legal reforms before "robust" water markets can emerge.[252]

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.[253] In a similar vein, commentators note that water markets are subject to regulatory oversight.[254] As a result, the transaction costs imposed by marketing middlemen may render water markets less—rather than more—efficient than regulation.[255] 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

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

248. SAX ET AL., *supra* note 103, at 264–67.

249. *Id*. (citing RICHARD E. HOWITT ET AL., A RETROSPECTIVE ON CALIFORNIA'S 1991 EMERGENCY DROUGHT WATER BANK (1992)) (discussing California water bank implemented in 1991 during drought and noting that it saved about $100 for the state's economy).

250. *See* SAX ET AL., *supra* note 103, at 265–66.

251. Brewer et al., *supra* note 116, at 1021.

252. *Id*.

253. Joseph W. Dellapenna, *The Importance of Getting Names Right: The Myth of Markets for Water*, 25 WM. & MARY ENVTL L. & POL'Y REV. 317, 348–50 (2000).

254. *Id*. at 366.

255. *See generally* Robert H. Abrams, *Water Allocation by Comprehensive Permit Systems in the East: Considering a Move Away from Orthodoxy*, 9 VA. ENVTL. L.J. 255, 261–65 (1990) (discussing potential advantages and disadvantages of regulatory oversight of water allocation).

uses.[256] Based on such critiques, at least one scholar has discouraged the development of water markets in the eastern states.[257]

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.[258] 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.[259] As a result, an agricultural lifestyle may evaporate along with the region's water.[260] The literature describes additional third party impacts that may occur.[261] 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.[262] Less difficult to evaluate,

256. Klein, *supra* note 124, at 254.

257. *Id*. at 259.

258. *See* Draper, *supra* note 89, at 362.

259. *See, e.g*., Myrl L. Duncan, *High Noon on the Ogallala Aquifer: Agriculture Does Not Live by Farmland Preservation Alone*, 27 WASHBURN L.J. 16 (1987); Robert Benjamin Naeser & Lynne Lewis Bennett, *The Cost of Noncompliance: The Economic Value of Water in the Middle Arkansas River Valley*, 38 NAT. RESOURCES J. 445 (1998); *see also* Kaiser & McFarland, *supra* note 92, at 905–06 (describing adverse agricultural impacts—including "reductions in farm income, dislocation of farm workers, decreases in property tax revenues, a shrinking local tax base and decline in local services"—as negative impacts that "may or may not be offset by similar gains in the urban area" that receives the water.).

260. Kaiser & McFarland, *supra* note 92, at 905–06; *see also* Duncan, *supra* note 259, at 33 n.71.

261. Kaiser & McFarland, *supra* note 92, 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* GRANT & WEBER, *supra* note 71, at 217–18 (considering economic and social effects of water rights transfers); SAX ET AL., *supra* note 103, at 289 (quoting COMM. ON W. WATER MGMT., WATER TRANSFERS IN THE WEST: EFFICIENCY, EQUITY, AND THE ENVIRONMENT 45–54 (1992)).

262. *See* ELLEN HANAK, WHO SHOULD BE ALLOWED TO SELL WATER IN CALIFORNIA? THIRD-PARTY ISSUES AND THE WATER MARKET (2003); Reed D. Benson, *Maintaining the Status Quo: Protecting Established Water Uses in the Pacific Northwest, Despite the Rules of Prior Appropriation*, 28 ENVTL. L. 881 (1998); A. Dan Tarlock, *The Future of Prior Appropriations in the New West*, 41 NAT. RESOURCES J. 769. Although some observers may be unbothered by this dichotomy, others would address it by restricting or prohibiting the right to sell water. *See* HANAK, *supra*; Bensen, *supra*; Tarlock, *supra*. Others suggest the opposite remedy: perhaps a charge or tax

perhaps, is what one court described as the "heirloom attitude"—the source region's resentful malaise that it has been deprived of something that rightfully "belongs" to it.[263]

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. Appendix 2 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, which 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.

should be attached to the initial appropriation of water, as well as to the subsequent sale of water rights. *See* HANAK, *supra*; Bensen, *supra*; Tarlock, *supra*.

263. Associated Enter., Inc. v. Toltec Watershed Improvement Dist., 656 P.2d 1144, 1147 (Wyo. 1983) (citations omitted) (internal quotation marks omitted).

APPENDIX 1—CONCEPTUAL MATRIX

Favor Source Basin

RESTRICT TRANSFERS	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 TRANSFER IMPACTS	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.
ENCOURAGE TRANSFERS	Compensation: Structural	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.
	Compensation: Penalties	Require receiving basin to pay damages or tax to basin-of-origin.
	Compensation: Market Value	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 Receiving Basin

APPENDIX 2—SURVEY OF THE LAW: TRANSFER TYPOLOGY BY STATE

ALABAMA ALA. CODE (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Riparian rights are appurtenant to riparian lands, *Ulbricht v. Eufaula Water Co.*, 6 So. 78, 79–80 (Ala. 1889).	§ 9-10B-27
	Geographic transfer	Interbasin: Generally governed by common law, *see* Alabama Water Agencies Working Group, *Water Management Issues in Alabama* (Aug. 1, 2012), *available at* http://www.adeca.alabama.gov/Divisions/owr/awawg/Documents/2012_08_31%20WAWG_Water_Issue_Report_31.pdf.	§ 9-10B-27
	Change of rights	--	
Use Regulation	Surface	Riparian: Riparian water rights; certificates of use may be restricted upon the designation of any area as a "capacity stress area" where "the aggregate existing or reasonably foreseeable uses" will exceed water availability; otherwise, certificates of use do not confer or modify water rights.	§§ 9-10B-2(6), -20, -22
	Groundwater	On-tract: Must be used on overlying tract if non-riparian use will injure adjacent landowners, *Martin v. City of Linden*, 667 So. 2d 732 (Ala. 1995); *Adams v. Lang*, 553 So. 2d 89 (Ala. 1989); nominal damages may be required for non-riparian use, *Ulbricht v. Eufaula Water Co.*, 6 So. 78 (Ala. 1889).	
ALASKA ALASKA STAT. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are generally appurtenant to land, and pass with land transfer, unless specifically exempted.	§ 46.15.160
	Geographic transfer	Interbasin: Water exports outside hydrologic unit generally prohibited; however, the state is authorized to participate in potential water export markets.	§§ 46.15.035, .160(b)
	Change of rights	Sale, lease, transfer, or change of appropriation requires commissioner's approval; water appropriated in the name of Alaska may be sold as "excess water;" for interbasin transfers,	§§ 46.15.035, .037, .160

		instream flow reservation and/or graduated water conservation fee required under specified circumstances.	
Use Regulation	Surface	Prior appropriation.	§§ 46.15.010 to .270
	Groundwater	Prior appropriation.	§§ 46.15.010 to .270
Other		Instream flows: Water rights may be reserved to maintain sufficient instream flows, including by private appropriators.	§ 46.15.145
ARIZONA ARIZ. REV. STAT. ANN. (Westlaw through First Sess. of the Fifty-first Legis.)			
Transfer Regulation	Simple substitution	Severable: Non-irrigation water rights may be severed from appurtenant land (subject to specified conditions); applications, permits, and certificates of water right may be assigned.	§§ 45-163, -172
	Geographic transfer	Sub-basins: Groundwater may be transferred within same sub-basin; if sub-basins fall within active management areas (AMAs), may be subject to payment of damages. Interbasin: Most interbasin groundwater transfers outside AMAs prohibited (subject to certain grandfathered exceptions). Interstate: Interstate transfers require notice, director's approval for reasonable/beneficial use, and satisfaction of additional requirements.	§§ 45-541 to -547 § 45-544 §§ 45-292, -293
	Change of rights	No injury: Changes to domestic, municipal, or irrigation rights require director's approval (subject to specified exceptions); changes to new hydroelectric or other power generation uses (greater than 25,000 horsepower) require legislative approval; changes must not affect vested water rights.	§§ 45-156(B), -172, -176
Use Regulation	Surface	Prior appropriation.	§§ 45-152, -153, -175
	Groundwater	Permit required.	§§ 45-451 to -555
ARKANSAS ARK. CODE ANN. (LEXIS through 2013 Sess.)			

Transfer Regulation	Simple substitution	Appurtenant: Groundwater rights may not be conveyed, marketed, or transferred apart from the realty; upon sale of property, water rights automatically transferred to new landowner.	§ 15-22-911
	Geographic transfer	Intra- and interbasin: 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. Interstate: Exports must be approved by General Assembly and consistent with interstate compact (subject to conditions and subject to exemption for water bottling).	§ 15-22-304(a), (d) § 15-22-303
	Change of rights	Not allowed.	§ 15-22-911
Use Regulation	Surface	Common law riparian: But can be regulated by commission during shortage.	§ 15-22-217
	Groundwater	Critical areas: In critical areas, withdrawals may be limited through the use of water rights.	§§ 15-22-901 to -915
CALIFORNIA CAL. WATER CODE (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Riparian rights are appurtenant to riparian land.	§ 101
	Geographic transfer	Interbasin: When legislature authorizes export projects, state policy requires consideration of additional water structures to satisfy source region's needs at present and reasonable time thereafter. Interstate: "[A]n appropriation of water in [California] for beneficial use in another State may be made only when, under the laws of the latter, water may be lawfully diverted therein for beneficial use in [California]."	§ 108 § 1230
	Change of rights	Transfers encouraged: 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. Local or regional public agencies: "[M]ay sell, lease, exchange, or otherwise transfer" surplus or voluntarily foregone water; with board approval, may change water appropriations if no injury to legal water users, to specified	§§ 109, 475, 480–484, 1217 §§ 380–387

		environmental uses, and to overall economy of source area. Appropriators: 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 and leases permitted.	§§ 1020–1031, 1700–1707, 1725–1732, 1735–1737, 1740
Use Regulation	Surface	Prior appropriation: (including subterranean streams), with recognition of riparian rights.	§§ 1200–1203, 1450
	Groundwater	Percolating groundwater: "[S]ubject to only sporadic state regulation of any sort," HARRISON C. DUNNING, *California*, *in* WATERS AND WATER RIGHTS (Michie Co. 2005 replacement volume), *available at* http://www.sierranevadaalliance.org/programs/db/pics/1282790744_19263.f_pdf.pdf; *see also* 5 WATERS AND WATER RIGHTS: A TREATISE ON THE LAW OF WATERS AND ALLIED PROBLEMS 467–69 (Robert E. Clark et al. eds., 1972).	
COLORADO COLO. REV. STAT. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: 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	Interbasin: Allowed. Interstate: Export prohibited without approval.	§§ 37-82-106, -83-101 §§ 37-81-101 to -104
	Change of rights	No injury: 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 Area Water & Sanitation District v. Trout Unlimited*, 219 P.3d 774 (Colo. 2009); *City of Thornton v. Bijou Irrigation Co.*, 926 P.2d 1 (Colo. 1996). Properties removed from irrigation: Court may require notice to county of origin if change constitutes a "significant water development activity;" court may impose "transition mitigation payment" equal to reduction in property tax revenues attributable to	§§ 37-90-103(10.5), 37-92-302(3.5), -305(3)(a), -305(3.5), -92-602 §§ 37-92-103(10.7), -305(3.5), -305(4.5)(b)(I)(A)

		"significant water development activit[ies]." Temporary: "Interruptible water suppl[ies]" provide for temporary sales or transfers. Climate change: 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." Instream flows: Water rights may be sold or donated for instream flow purposes.	 § 37-92-309 §§ 37-92-302(3.5), -305 § 37-60-123.7
Use Regulation	Surface	Prior appropriation.	§§ 37-82-101, -92-102(1)(a)
	Groundwater	Tributary groundwater: Allocated under prior appropriation doctrine. Designated groundwater: Allocated under modified prior appropriation doctrine, to permit full economic development. "Not nontributary" groundwater: Allocated under modified prior appropriation. Nontributary groundwater: Right to withdraw based on ownership of overlying land and maintenance of 100-year aquifer life, *Water Rights of Park County. Sportsmen's Ranch LLP v. Bargas*, 986 P.2d 262 (Colo. 1999).	§ 37-90-137(2) §§ 37-90-102, -103(6) §§ 37-90-103(10.7), -137(1), -137(2), -137(4)(a), -92-102(1)(a) §§ 37-90-103(10.5), -92-602
Other		Instream flows: Only specified governmental entities may appropriate new instream flow water rights.	§ 37-92-102(3)
CONNECTICUT CONN. GEN. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Approval: Requires written approval of commissioner.	§ 22a-368(c)
	Geographic transfer	Interbasin: Commissioner may require environmental impact report, which includes among other things, plan for meeting donor basin's needs and demands for at least twenty five years and alternatives to transfer.	§§ 22a-367(5), -369
	Change of rights	--	
Use	Surface	Regulated riparian: Riparian, with	§§ 22a-366, -368 to

Regulation		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). Conservation: Applicants must specify conservation measures instituted prior to application, and conservation plan to be implemented after permit issuance.	-370, -377 § 22a-369(9)
	Groundwater	Regulated riparian: Permit required.	§§ 22a-367(2), -368(a)
DELAWARE DEL. CODE ANN. tits. 7, 23 (LEXIS through 79 Laws 2013)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Natural flow doctrine, with specified exceptions for stream alterations by municipalities, *Murphey v. City of Wilmington*, 5 Del. Ch. 281 (1879); *Delaney v. Boston*, 2 Del. 489 (Del. Super. Ct. 1839).	
	Groundwater	--	
FLORIDA FLA. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: Water rights are not appurtenant to any particular parcel of land.	
	Geographic transfer	Local sources first policy: "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. Interbasin: Interdistrict transfers have been adjudged to fall within the spirit of the statute, *Osceola County. v. St. Johns River Water Management District*, 504 So. 2d 385, 388	§§ 373.016(4)(a), .223(3) §§ 373.223(2), .2295(4)

		(Fla. 1987); must satisfy an enhanced public interest test that considers factors including projected population and future needs of both withdrawal and use areas. Inter-county: Intercounty transfers must satisfy an enhanced public interest test that favors local sources first and that considers factors including: "[t]he 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;" "[a]ll 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)
	Change of rights	Change of water rights: "[P]ermittee[s] may seek modification of any terms of an unexpired permit."	§ 373.239
Use Regulation	Surface	Regulated riparian: Integrated permit system for surface diversions/groundwater withdrawals, subject to exemptions for domestic consumption by individual users; supplants common law riparianism. Renewable permits: Permits generally endure for up to twenty years (fifty years, for certain governmental entities).	§§ 373.019(20), .203, .219, .223(1), .250 § 373.236(1), (3)
	Groundwater	Renewable permits: Permits generally endure for up to twenty years (fifty years, for certain governmental entities).	§ 373.236(1), (3)
GEORGIA GA. CODE ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	Irrigation permits: Modest compensation system operates during drought under "irrigation permit retirement program."	§ 12-5-546
Use Regulation	Surface	100,000 gallons per day: For surface waters and subterranean streams, withdrawals and diversions less than 100,000 gallons per day	§§ 12-5-31, -90, 44-8-1, 51-9-7

		follow common law riparian doctrine; *Price v. High Shoals Mfg. Co.*, 132 Ga. 246 (1909); permits required for withdrawals and diversions of 100,000 gallons per day or more; farm uses enjoy broad exemption from water permit criteria.	
	Groundwater	100,000 gallons per day: Permit required for withdrawals greater than 100,000 gallons per day; statute authorizes some groundwater reporting and regulation rules; relaxed requirements for farm uses.	§§ 12-5-95, -96, -105
HAWAII HAW. REV. STAT. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: 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 ninety days of transfer.	§§ 174C-59, -63
	Geographic transfer	Interbasin: Prohibited under common law, *Reppun v. Board of Water Supply*, 656 P.2d 57 (Haw. 1982); *McBryde Sugar Co. v. Robinson*, 504 P.2d 1330 (Haw. 1973); statute now allows permitting of interbasin surface and groundwater transport, if consistent with public interest and with state/county land use policies.	§ 174C-49(c)
	Change of rights	New permit: Application for change in place or type of use treated as application for new permit.	§ 174C-57
Use Regulation	Surface	Common law riparian doctrine: Subject to regulation in designated water management areas.	§§ 174C-45, -48
	Groundwater	Common law correlative rights doctrine: Subject to regulation in designated water management areas, *In re Water Use Permit Applications*, 9 P.3d 409 (Haw. 2000).	§§ 174C-44, -48
IDAHO IDAHO CODE ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are appurtenant to the land and pass with conveyance of the land.	§ 42-1402
	Geographic transfer	Interstate: Under appropriate conditions where specified public interest factors are satisfied,	§§ 42-401, -1501

		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.	
	Change of rights	No injury: Must cause no injury to existing rights. Sale or transfer: Water rights are real property that can be sold or transferred apart from the land, *In re Robinson*, 103 P.2d 693 (Idaho 1940); sale of irrigation water rights requires petition for certificate of authority.	§§ 42-108, -2501 § 42-2601
Use Regulation	Surface	Prior appropriation.	§ 42-101
	Groundwater	Prior appropriation.	§ 42-101
ILLINOIS 70 ILL. COMP. STAT. ANN. (West, Westlaw through 2013 Sess.); Water Use Act of 1983, 525 ILL. COMP. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Riparian rights are appurtenant to land at water's edge, *Bouris v. Largent*, 236 N.E.2.d 15, 18 (Ill. App. Ct. 1968).	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian (reasonable use): Subject to local authority "[t]o 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 ILL. COMP. STAT. 3715/6(5)
	Groundwater	Reasonable use rule: (established by statute).	525 ILL. COMP. STAT. 45/3(c), 45/4, 45/6
INDIANA IND. CODE ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: Riparian rights may be conveyed apart from the land, *see generally* INDIANA DEP'T OF NATURAL RESOURCES, 1 THE INDIANA WATER RESOURCE: AVAILABILITY, USES, AND NEEDS (1980).	
	Geographic transfer	Interbasin: Water diversions out of the Great Lakes basin subject to "the Great Lakes–St.	§ 14-25-1-11(b)(2)

		Lawrence River Basin Water Resources Compact" and some implementing legislation.	
	Change of rights	--	
Use Regulation	Surface	Regulated riparian: Some statutory modification of traditional common law principles, *Center Townhouse Corp. v. City of Mishawaka*, 882 N.E.2d 762, 767 (Ind. Ct. App. 2008). Significant facilities: "Significant water withdrawal facilit[ies]" (capable of withdrawing more than 100,000 gallons per day) must register and report on annual withdrawals.	 § 14-25-7-15
	Groundwater	Percolating groundwater: Follows English rule of capture, *Wiggins v. Brazil Coal & Clay Corp.*, 452 N.E.2d 958 (Ind. 1983). Subterranean streams: Likely follows same law as surface streams, *Gagnon v. French Lick Springs Hotel Co.*, 72 N.E. 849, 851 (Ind. 1904). Significant facilities: "Significant water withdrawal facilit[ies]" (capable of withdrawing more than 100,000 gallons per day) must register and report on annual withdrawals. Restricted use areas: Department may restrict use in designated areas "where the withdrawal of ground waters exceeds or threatens to exceed natural replenishment;" withdrawals of more than 100,000 gallons per day (in addition to quantity of use at time of area designation) require permit.	 § 14-25-7-15 §§ 14-25-3-4, -6
IOWA IOWA CODE ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Permits for water withdrawal are appurtenant to the land described through the date specified in the permit and any extension of the permit.	§ 455B.265(3)
	Geographic transfer	Interstate: Interstate transfers are permitted, but such permits are the first to be regulated under emergency conditions.	§ 455B.266(2)(a)
	Change of rights	--	
Use Regulation	Surface	Riparian: Requires renewable administrative permit, to be issued if investigation indicates	§§ 455B.265, .266, .268

		that the proposed diversion, storage, or withdrawal is consistent with beneficial use and conservation; subject to priority allocation under specified emergency conditions.	
	Groundwater	Riparian: Requires renewable administrative permit, to be issued if investigation indicates that the proposed diversion, storage, or withdrawal is consistent with beneficial use and conservation; subject to priority allocation under specified emergency conditions.	§§ 455B.265, .266, .268
KANSAS KAN. STAT. ANN. (West, Westlaw through 2013 Sess.)			
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 are not regulated as a "transfer."	§ 82a-701(g)
	Geographic transfer	Outside 35-mile radius: State regulates transfers of surface and groundwater for use more than thirty-five miles from source, subject to exemption for transfers of less than 2000 acre feet per year; transfers may not be approved under specified conditions, generally including those that interfere with source area's present and reasonably foreseeable future uses; transfer applicants generally must implement conservation plans for at least twelve months prior to filing of application. Interstate: Permitted under specified conditions.	§§ 82a-1501, -1502 § 82a-726
	Change of rights	No injury: Change of use, point of diversion, or type of use permitted under specified conditions. Water banking: Under the Kansas water banking act, water rights holders (surface and groundwater) may place unused water into "safe deposit accounts" for future withdrawal, or for sale or leasing to others.	§ 82a-708b(a) §§ 82a-761 to -773
Use Regulation	Surface	Prior appropriation.	§§ 82a-702, -705
	Groundwater	Prior appropriation. Multi-year flex account: Users may place a	§§ 82a-702, -705 § 82a-736

		portion of their water into an account for flexible withdrawal over a five year period.	
KENTUCKY KY. REV. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Permits may be granted for transfer or diversion of water between streams or watersheds, consistent with wise use and public interest.	§ 151.200(2)
	Change of rights	Easement: Riparians can transfer right to use water via easement, *Scott v. Long Valley Farm Kentucky, Inc.*, 804 S.W.2d 15 (Ky. Ct. App. 1991); permits for nonexempt uses represent a limited right of use and do not vest ownership nor an absolute right to use.	§ 151.170(1)
Use Regulation	Surface	Riparian: Some administrative permits required, but with exemptions for agricultural and domestic purposes including irrigation; the cabinet "shall" issue requested permit if specified conditions met—including finding that water use will not be detrimental to the public interests or rights of other public water users. Emergency: During drought or emergency, officials may make temporary allocation of water supply among users.	§§ 151.140, .150, .170 § 151.200(1)
	Groundwater	Riparian: Some administrative permits required, but with exemptions for agricultural and domestic purposes including irrigation; the cabinet "shall" issue requested permit if specified conditions met—including finding that water use will not be detrimental to the public interests or rights of other public water users. Emergency: During drought or emergency, officials may make temporary allocation of water supply among users.	§§ 151.140, .150, .170 § 151.200(1)
LOUISIANA LA. REV. STAT. ANN. (Westlaw through 2013 Sess.); LA. CIV. CODE ANN. (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights probably cannot be severed from adjacent riparian land.	LA. CIV. CODE ANN. art. 650
	Geographic	Interbasin: Riparians may use surface water on	LA. CIV. CODE ANN.

	transfer	adjacent land, but must return water to its ordinary channel where it leaves the property. Inter-parish: Export of surface or groundwater from specific parishes prohibited, with exemption for bottled water.	art. 658 LA. REV. STAT. ANN. §§ 14:224, 33:1236.9
	Change of rights	--	
Use Regulation	Surface	Riparian: Follows common law riparianism.	LA. CIV. CODE ANN. arts. 657–658
	Groundwater	Capture: Follows English absolute ownership rule, *Adams v. Grigsby*, 152 So. 2d 619 (La. Ct. App. 1963).	LA. REV. STAT. ANN. § 31:8
MAINE ME. REV. STAT. (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Intra-municipal: Intra-municipal transfers for commercial purposes forbidden in containers greater than ten gallons (subject to specified exceptions). By distance: 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).	tit. 22, § 2660-A(1) tit. 38, §§ 470-B, -D
	Change of rights	--	
Use Regulation	Surface	Riparian: Natural flow, but moving toward reasonable use, *Lockwood Co. v. Lawrence*, 77 Me. 297, 316 (1885).	tit. 38, § 480-D(4)
	Groundwater	Rule of capture: "Absolute dominion" rule, *Chase v. Silverstone*, 62 Me. 175, 177 (1873).	
MARYLAND MD. CODE ANN., ENVIR. (LexisNexis, LEXIS through 2013 Sess.); MD. CODE REGS. (2013)			
Transfer Regulation	Simple substitution	Severable: Permits can be transferred with written approval of Department of the Environment.	MD. CODE REGS. 26.17.06.06(A)(9)
	Geographic transfer	--	
	Change of rights	--	

Use Regulation	Surface	Riparian: Administrative permit required, generally for non-domestic uses of 10,000 gallons per day or more.	MD. CODE ANN., ENVIR. § 5-502
	Groundwater	Riparian: Administrative permit required, generally for non-domestic uses of 10,000 gallons per day or more.	MD. CODE ANN., ENVIR. § 5-502
MASSACHUSETTS MASS. GEN. LAWS ANN. (West, Westlaw through Ch. 1 of 2014 Sess.); 313 MASS CODE REGS. (2013)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Under Interbasin Transfer Act, all "significant" new interbasin transfers (including all new diversions greater than one million gallons per day) 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. Safe yield: Cumulative impact "of existing, permitted and proposed withdrawals" generally may not exceed water source's safe yield. Common law: Diversions are allowed for reasonable use unless the diversion causes "actual perceptible damage to the present or potential enjoyment of the property of the lower riparian proprietor," requiring actual injury to present or future use, *Stratton v. Mt. Hermon Boys' School*, 103 N.E. 87, 88 (Mass. 1913); specific legislation may authorize municipal and other off-tract uses, *see Town of Somerset v. Dighton Water District*, 200 N.E.2d 237 (Mass. 1964).	313 MASS. CODE REGS. 4.02–.05 MASS. GEN. LAWS ch. 21, §§ 8B–8D MASS. GEN. LAWS ANN. Ch. 21G, §11
	Change of rights	--	
Use Regulation	Surface	Regulated riparian: Statute governs large-scale consumptive withdrawals exceeding threshold volume of 100,000 gallons per day, generally integrating surface and groundwater; different permitting requirements for "existing" and "new" withdrawals. Common law reasonable use: resolves issues not covered by statute, *see, e.g., DeSanctis v. Lynn Water & Sewer Commission*, 666 N.E.2d	MASS. GEN. LAWS ANN. ch. 21G, §§ 2, 4–6

		1292, 1296 (Mass. 1996).	
	Groundwater	Regulated riparian: Statute governs large-scale consumptive withdrawals exceeding threshold volume of 100,000 gallons per day, generally integrating surface and groundwater; different permitting requirements for "existing" and "new" withdrawals.	MASS. GEN. LAWS ANN. ch. 21G, §§ 2, 4–6
MICHIGAN MICH. COMP. LAWS ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: 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, MICH. COMP. LAWS ANN. § 324.34201
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use riparianism, with some statutory regulation; for inland water, new or increased withdrawals exceeding two 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." Great Lakes and tributaries withdrawals: Permits are required for withdrawals exceeding five million gallons per day from the Great Lakes and their tributaries.	§ 324.32723 § 324.3723(6)
	Groundwater	Riparian: Reasonable use riparianism, *see U.S. Aviex Co. v. Travelers Ins. Co.*, 336 N.W.2d 838, 844 (Mich. Ct. App. 1983); some statutory modification and regulation.	§ 600.2941
MINNESOTA MINN. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: 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, *Nelson v. De Long*, 7 N.W.2d 342, 346 (Minn. 1942).	§ 103G.271
	Geographic	--	

	transfer		
	Change of rights	--	
Use Regulation	Surface	Riparianism: Reasonable use riparianism applies to surface diversions, *Pinney v. Luce*, 46 N.W. 561, 562–63 (Minn. 1890). Permit: Required for use of 10,000 gallons per day or more; priorities listed by use category. Reuse: Treatment and reuse for non-consumptive uses "shall be encouraged"	 § 103G.271 § 103G.261
	Groundwater	English absolute ownership: Applied until the enactment of Minnesota Water Appropriation Law and Minnesota Environmental Policy Law in 1978, *see Crookston Cattle Co. v. Minnesota Dep't of Natural Resources*, 300 N.W.2d 769 (Minn. 1980). Minnesota Water Appropriation Law: Common law now modified by statute and permits are required for withdrawals greater than 10,000 gallons per day or one million gallons per year.	 §§ 103G.271, 116D.04
MISSISSIPPI MISS. CODE ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are appurtenant to the land where they are used.	§ 51-3-5
	Geographic transfer	--	
	Change of rights	No injury: 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	Pre-1985: Western prior appropriation law applied to surface water. Regulated riparianism: Comprehensive permit system for surface and groundwater adopted in 1985.	 §§ 51-3-3(b), -3(e), -5
	Groundwater	Regulated riparianism: Comprehensive permit system for surface and groundwater adopted in 1985.	§§ 51-3-3(b), -3(e), -5
MISSOURI MO. ANN. STAT. (Westlaw through 2013 Sess.)			

Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use riparianism, *Edmondson v. Edwards*, 111 S.W.3d 906 (Mo. Ct. App. 2003).	
	Groundwater	Riparian: Reasonable use riparianism applies to both percolating groundwater and underground streams, *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. Ct. App. 1971).	
MONTANA MONT. CODE ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are generally appurtenant to the land, *Kruer v. Three Creeks Ranch of Wyoming, L.L.C.*, 194 P.3d 634 (Mont. 2008); *Axtell v. M.S. Consulting*, 955 P.2d 1362 (Mont. 1998).	
	Geographic transfer	Interbasin: Transfers out of specifically named watersheds are prohibited. Interstate: Temporary (ten years or less) and intermittent changes of use allowed with DNRC approval; statute described petition mechanism where compacts are concerned.	§ 85-2-301 §§ 85-2-311, -319, -803, -2-436
	Change of rights	Change of water right: Changes permitted if prior appropriator can reasonably exercise right under changed conditions; DNRC must approve changes; changes probably limited to original basin of use. Temporary changes: Temporary (ten years or less) and intermittent changes of use allowed with DNRC approval.	§§ 85-2-401 to -402 §§ 85-2-402, -407
Use Regulation	Surface	Appropriation: Water Use Act of 1973 repealed previous surface appropriation laws (dating back to at least 1885), *see Montana Dep't of Natural Resources & Conservation v. Intake Water Co.*, 558 P.2d 1110, 1117 (Mont. 1976).	§ 85-2-102(22)
	Groundwater	Appropriation: Permitting system initiated in 1961, then largely folded into 1973 Water Use Act.	§ 85-2-102(22)

	Miscellaneous	Instream flow water rights: Private persons must "divert, impound, or withdraw," but various federal agencies may "reserve" water for instream uses.	§§ 85-2-102, 320, -316
NEBRASKA NEB. REV. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Transfer must satisfy public interest criteria; source stream must be greater than 100 feet wide and transfer volume must be less than seventy-five percent regular stream flow; transfer must not jeopardize the continued existence of endangered/threatened species, *Central Platte Natural Resources District v. City of Fremont*, 549 N.W.2d 112 (Neb. 1996); *In re A–16027*,, 495 N.W.2d 23 (Neb. 1993); *Little Blue Natural Resources District v. Lower Platte North Natural Resources District*, 294 N.W.2d 598 (Neb. 1980). Interbasin groundwater transfers: 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.	§§ 46-206, -235(1), -288, -289 §§ 46-288, -638, -677, -691,
	Change of rights	Water markets: 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.	§§ 46-702, -714
	Miscellaneous	Instream flow water rights: Game and Parks Commission (and natural resources districts) can appropriate instream flow appropriations for fish and wildlife and recreational uses. Conjunctive management: Relates to hydrologically connected ground and surface	§ 46-2,108 § 46-714

		water; no new uses if basin declared fully or over-appropriated.	
NEVADA NEV. REV. STAT. ANN. (West, Westlaw through 2011 Sess.)			
Transfer Regulation	Simple substitution	Severable: Water rights may be conveyed apart from the property on which they are used, *Adaven Mgmt., Inc. v. Mountain Falls Acquisition Corp.*, 191 P.3d 1189, 1193 n.21 (Nev. 2008) (citations omitted).	
	Geographic transfer	Interbasin: Procedures for considering interbasin applications.	§ 533.370
	Change of rights	Authorization: Transfers or assignments of water rights authorized by statute. No injury: 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(2)
Use Regulation	Surface	Prior appropriation.	§§ 533.325,.370(2), .3705
	Groundwater	Prior appropriation.	§§ 534.020, .050
NEW HAMPSHIRE N.H. REV. STAT. ANN. (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: Water rights may be severed from the property on which they are used, *Concord Mfg. Co. v. Robertson*, 25 A. 718 (N.H. 1890).	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use doctrine, *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569 (1862).	
	Groundwater	Riparian: Reasonable use doctrine, *Bassett v. Salisbury Mfg. Co.*, 43 N.H. 569 (1862). Large withdrawals: Withdrawals equal to or greater than 57,600 gallons per day are subject to permitting and regulation.	 §§ 485-C:4, :21
NEW JERSEY			

N.J. STAT. ANN. (West, Westlaw through 2013 Legis.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	On-tract: Water may not be sold or used on nonriparian land, *McCarter v. Hudson County. Water Co.*, 65 A. 489 (N.J. 1906).	
	Change of rights	--	
Use Regulation	Surface	Riparian: Generally adheres to natural flow doctrine, *Merritt v. Parker*, 1 N.J.L. 460 (1795). Regulated riparian: Permit overlay.	 § 58:1A-1 to -26.
	Groundwater	Riparian: Correlative rights doctrine, *Woodsum v. Township of Pemberton*, 412 A.2d 1064 (N.J. Super. Ct. Law Div. 1980). Regulated riparian: Permit overlay.	 § 58:1A-1 to -26 .
NEW MEXICO N.M. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: All irrigation water considered appurtenant to land.	§§ 72-5-22 to -23
	Geographic transfer	Downstream: Upper valley residents may protect against downstream transfers by impounding and utilizing a reasonable share of the stream. Interbasin: Unlawful to divert waters to other valleys "to the impairment of valid and subsisting prior appropriators of such waters." Interstate: Permit required for out-of-state transport.	§ 72-5-29 § 72-8-5 § 72-12B-1
	Change of rights	No injury: Change must cause no "detriment to existing to existing . . . rights," be "not contrary to conservation," and "not detrimental to the public welfare." Leasing: Rights may be leased if certain conditions are satisfied.	§§ 72-5-23 to -24 §§ 72-6-1 to -7
Use Regulation	Surface		§§ 72-5-1 to -39
	Groundwater		§§ 72-12-1 to -28

NEW YORK N.Y. ENVTL. CONSERV. LAW (McKinney, Westlaw through 2013 Legis.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Permit required "for withdrawals equal to or greater than the threshold volume;" aquifers that are the sole source of drinking water receive special protection. Intrastate: Permit required for transfer of more than 10,000 gallons per day. Interstate: Permit required.	§§ 15-1501, -1505 § 15-1506 § 15-1505
	Change of rights	--	
Use Regulation	Surface	Regulated riparian: Law defines rights, uses, and protection of water; environmental assessment form must accompany applications for discretionary permits to use water. Reasonable use: Common law defines residual rights.	§ 15-1503
	Groundwater	--	
NORTH CAROLINA N.C. GEN. STAT. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: 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	On-tract: Water must generally be used on the riparian land, *City of Durham v. Eno Cotton Mills*, 54 S.E. 453 (N.C. 1906).	
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *Dunlap v. Carolina Power & Light Co.*, 195 S.E. 43 (N.C. 1938). Permit overlay: In "capacity use areas," withdrawals may be limited.	 § 143-215.11 to -215.22B
	Groundwater	Capture: American reasonable use, *Rouse v. City of Kinston*, 123 S.E. 482 (N.C. 1924).	

		Permit overlay: In "capacity use areas," withdrawals may be limited.	§ 143-215.11 to -215.22B
NORTH DAKOTA N.D. CENT. CODE ANN. (West 2012)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	No injury: Permit holder may change point of diversion if State Engineer determines it will not adversely affect other appropriators. Purpose: Permit holder may change right only to superior purpose, as ranked by statute (e.g., irrigation use may change to superior municipal use).	§ 61-04-15.1 §§ 61-04-06.1, -15.1
Use Regulation	Surface	Prior appropriation: Permit required.	§ 61-04-02
	Groundwater	--	
OHIO OHIO REV. CODE ANN. (LexisNexis, LEXIS through 2013 File 47)			
Transfer Regulation	Simple substitution	Appurtenant.	
	Geographic transfer	On-tract: Rights must be used on riparian land, *Cooper v. Hall*, 5 Ohio 320 (1832). Interbasin: Interbasin transfers are generally unlawful, *City of Canton v. Shock*, 66 Ohio St. 19 (1902). Specific basins: Water generally cannot be transferred out of the Great Lakes Basin; permit required to transfer more than 100,000 gallons per day out of Lake Erie and Ohio River Basins.	 § 1522.01(4.8), (4.9) § 1501.32
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *Cline v. American Aggregates Corp.*, 474 N.E. 2d 324, 324 (Ohio 1984); *City of Canton v. Shock*, 66 Ohio St. 19 (1902).	§ 1521.17
	Groundwater	Restatement: Follows RESTATEMENT (SECOND) OF TORTS section 858 (1979), *see Cline v. American Aggregates Corp.*, 474 N.E.	§ 1521.17

		2d 324, 324 (Ohio 1984).	
OKLAHOMA OKLA. STAT. tit. 82 (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Irrigation water rights are appurtenant to the land upon which they are used, subject to approval of transfer application.	§ 105.22
	Geographic transfer	Interstate: Permits authorizing use of water outside the state can be granted, but subject to stringent conditions; statute survived constitutional challenge under the Dormant Commerce Clause, *see Tarrant Regional Water District v. Herrmann*, 133 S. Ct. 2120 (2013).	§§ 105.12 to .12A
	Change of rights	Water rights: Water rights can be transferred to other places of use, if there will be no detriment to existing rights.	§ 105.22
Use Regulation	Surface	Appropriation: Legislature established appropriative water rights system, but rights existing prior to June 10, 1963, (riparian and appropriative) are entitled to continuation without interference.	§ 105.1A
	Groundwater	Correlative rights: Under statute, groundwater permits shall allocate the basin's total annual yield on the basis of the percentage of overlying land owned by the applicant.	§ 1020.9
OREGON OR. REV. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: 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	Interbasin: Out of basin diversions receive special review of the "significant impacts" they may generate.	§§ 537.801 to .870
	Change of rights	No injury: Change of water right must cause no injury to existing rights; unneeded surplus water from original use may not be transferred, OR. ADMIN. R. 690-380-6010 (2013).	§§ 540.505 to .539

		Conserved water: 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. Flexibility: Law allows temporary transfers and transfers between surface and groundwater sources. Instream water rights: Individuals may change or lease (including "split season" leases during part of the year) existing water rights to instream rights.	§§ 537.455 to .500 §§ 537.211, 540.510, .520, .523, .531 § 537.348
Use Regulation	Surface	Regulated riparian: Comprehensive code requires permits for all non-exempt appropriations of surface and groundwater; historical riparian rights also recognized.	§§ 536.007 to 538.540
	Groundwater	Regulated riparian: Comprehensive code requires permits for all non-exempt appropriations of surface and groundwater; historical riparian rights also recognized.	§§ 536.007 to 538.540
PENNSYLVANIA 32 PA. CONS. STAT. ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Severable: Water rights can be conveyed apart from riparian lands, *Borough of Media v. Edgmont Gulf Club, Inc*., 288 A.2d 803 (Pa. 1972).	
	Geographic transfer	On-tract: Surface water must be used on riparian land, *Lackawanna Mills v. Scranton Gas & Water Co.*, 150 A. 633 (Pa. 1930); groundwater must be used on the overlying tract of land, *Township of Hatfield. v. Lansdale Municipal Authority*, 168 A.2d 333 (Pa. 1961). Interbasin transfers: Riparian rights may not be used outside the watershed if it causes actual injury to other riparian users, *Belin v. Dep't of Environmental Resources*, 291 A.2d 553 (Pa. 1972).	
	Change of rights	--	
Use Regulation	Surface	Riparian: Riparian water rights attach to riparian land.	
	Groundwater	Underground streams: Riparian water rights extend to underground streams and to artesian	

		basins, *Moeller v. Metzger*, 491 A.2d 1356 (Pa. 1985); *Ross Common Water Co. v. Blue Mountain Consol. Water Co.*, 77 A. 446 (Pa. 1910). Percolating groundwater: Riparianism (reasonable use), *Burr v. Adam Eidemiller, Inc.*, 126 A.2d 403 (Pa. 1956).	
RHODE ISLAND R.I. GEN. LAWS (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Natural flow theory, *Tyler v. Wilkinson*, 24 F. Cas. 472, (C.C.D.R.I. 1827).	
	Groundwater	--	
SOUTH CAROLINA S.C. CODE ANN. (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Permits required, subject to public notice and comment.	§ 49-4-70, -90
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *White v. Whitney Mfg. Co.*, 38 S.E. 456 (S.C. 1901).	
	Groundwater	Common law: Common law with statutory overlay; in declared "capacity use areas," groundwater withdrawals require a permit.	§ 49-5-60
SOUTH DAKOTA S.D. CODIFIED LAWS (Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Subject to statutory exceptions, irrigation water may not be transferred apart from the land.	§ 46-5-34
	Geographic transfer	--	

	Change of rights	No injury: Upon approval of application, changes of purpose or "change [of] place of diversion, storage, or use, in a manner and under conditions approved by the Water Management Board" are allowed (subject to some exceptions), *Jewett v. Redwater Irrigating Ass'n*, 220 N.W.2d 834 (S.D. 1974).	§ 46-5-31, -34 to -36
Use Regulation	Surface	Appropriation.	§§ 46-1-1 to -3
	Groundwater	Appropriation: Permit for groundwater "mining" may not be approved if officials find "it is probable 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, 3.1
TENNESSEE TENN. CODE ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Unclear: Law unclear; some cases discuss—but do not decide—issue of severance, *Hodges v. Town of Bluff City, Tenn.*, 32 F.2d 779 (6th Cir. 1929).	
	Geographic transfer	Interbasin: Interbasin transfers of water rights acquired through eminent domain or for public water supply system are prohibited, unless permitted under the Inter-basin Transfer Act.	§§ 69-7-201 to -212
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *Cox v. Howell*, 65 S.W. 868 (Tenn. 1901).	
	Groundwater	--	
TEXAS TEX. WATER CODE ANN. (West, Westlaw through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	Interbasin: Commission rules define an interbasin transfer as a transfer of state water from a river or coastal basin to another. Area of origin balancing: Interbasin transfer of surface or groundwater of 3000 acre-feet per year or more requires protection of area of origin through a balancing of the interests of the basin of origin against those of the	§§ 11.002, .085 § 11.085(k)–(l), (v)

		receiving basin (and replaces a more protective "no prejudice" test in effect pre-1997)—consideration includes needs-assessment spanning at most fifty years, and evaluation of alternative available supplies and economic impact. 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."	
	Change of rights	Conservation and conditions: 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. Marketing: Marketing is permitted, subject to approval by the Commission; minimal changes may be approved without notice or hearing, 5 WATERS AND WATER RIGHTS: A TREATISE ON THE LAW OF WATERS AND ALLIED PROBLEMS ch. 14 (Robert E. Clark et al. eds., 1972).	§§ 11.1271, .1351
Use Regulation	Surface	Appropriation.	§ 11.021
	Groundwater	Capture: Groundwater subject to rule of capture, *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814, 823–24 (Tex. 2012).	
UTAH UTAH CODE ANN. (LexisNexis, LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: 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.	§ 73-1-11
	Geographic transfer	Interstate: "[U]nder certain conditions the transportation of water for use outside the state may not be contrary to: (a) the conservation of Utah's waters; or (b) the public welfare," and therefore, permitted.	§§ 73-3a-101, -108
	Change of rights	No injury: Appropriators may change purpose, place of use, and point of diversion, provided it does not "impair[] a vested water right	§ 73-3-3(2)

		without just compensation." Deeds: Water rights to be conveyed by deed. Markets: For limited period water rights, state officials (rather than market) control reallocation.	 § 73-1-10(1) § 73-3-5.5
Use Regulation	Surface	Appropriation: Permit required. Short duration: Water rights may be granted for limited periods of time, rather than in perpetuity.	§§ 73-1-1, -3-1 § 73-3-5.5
	Groundwater	Appropriation: Permit required. Short duration: Water rights may be granted for limited periods of time, rather than in perpetuity.	§§ 73-1-1, -3-1 § 73-3-5.5
VERMONT VT. STAT. ANN. tit. 10 (LEXIS through 2013 portion of 2013–2014 Sess.)			
Transfer Regulation	Simple substitution	Severable: Water rights may be severed from the land on which they are used, *Rood v. Johnson*, 26 Vt. 64, 71 (1853).	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Statute articulates purpose of "assur[ing] as nearly continuous flow of waters . . . as may be possible consistent with reasonable use of riparian rights;" snowmaking policy permits withdrawals "based on an analysis of the need . . . and a consideration of alternatives."	§§ 1001, 1031
	Groundwater	Correlative rights: Statute abolishes common law absolute ownership doctrine, and establishes that "all persons have a right to the beneficial use . . . of groundwater free from unreasonable interference by other persons." 57,600 gallons per day: As of July 1, 2010, permits are required for commercial and industrial users making new or increased "withdrawal of more than 57,600 gallons a day" (exemptions apply, including public emergencies; domestic, residential use; farming; dairy processors; public water systems; and geothermal heat pumps.	§ 1410 § 1418

VIRGINIA VA. CODE ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: "[R]iparian rights appurtenant to highland, whether adjacent to inland streams or tidal waters, may be severed and alienated as a separate property interest," *Virginia, Marine Resources Commission v. Forbes*, 197 S.E.2d 195, 198 (Va. 1973) (citations omitted).	
	Geographic transfer	On-tract: 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).	
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *Virginia Hot Springs Co. v. Hoover*, 130 S.E. 408, 410 (Va. 1925). Regulated riparian: Statutory overlay requires permit for certain withdrawals from areas designated as "surface water management area[s]."	§§ 62.1-243, -247, -248, -249, -253
	Groundwater	Permit system: Under Groundwater Management Act of 1992, permits required for certain withdrawals in "ground water management area[s]" that face threats to their water quality or quantity.	§§ 62.1-257, -259
WASHINGTON WASH. REV. CODE ANN. (West, Westlaw through 2013 legislation)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are appurtenant to the place where used, but the right can be transferred to others or become appurtenant to other land under specified procedures.	§ 90.03.380
	Geographic transfer	--	
	Change of rights	No injury: Water rights may be changed or expanded to irrigate additional acreage, provided, among other things, existing users will not be injured; when evaluating applications for water transfers or changes of water rights, department shall consider benefits and costs—including environmental effects. Interbasin: After July 22, 2011, interbasin	§§ 90.03.030, .03.255, .03.380, .03.397, .44.100 § 90.03.380(10)

		water rights transfer applications require notice to county of origin. Public interest: The public interest may only be considered where the water rights to be changed involve the use of groundwater. Interstate: Water rights can be conveyed for use in neighboring states under specified conditions—including requirement that neighboring state reciprocally allows use of its waters within the state of Washington. Water banking: The legislature established a water banking pilot program in the Walla Walla watershed.	§§ 90.30.290, .44.100 §§ 90.03.030, .300 §§ 90.92.010, .070
Use Regulation	Surface	Appropriation: Appropriative system, *Washington Dep't of Ecology v. Grimes*, 852 P.2d 1044 (Wash. 1993). Lingering riparianism: Existing riparian rights protected, but subject to condemnation.	§§ 90.03.010, .250 § 90.03.040
	Groundwater	Appropriation: Permit required.	§§ 90.03.010, .03.250, .44.050, .44.070
WEST VIRGINIA W. VA. CODE ANN. (LexisNexis, LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	--	
	Geographic transfer	--	
	Change of rights	--	
Use Regulation	Surface	Riparian: Reasonable use, *Whorton v. Malone*, 549 S.E.2d 57 (W. Va. 2001).	
	Groundwater	Riparian: American reasonable use, *Pence v. Carney*, 52 S.E. 702, 706 (W. Va. 1905).	
WISCONSIN WIS. STAT. ANN. (West, Westlaw through 2013 Wisconsin Act 116)			
Transfer Regulation	Simple substitution	Appurtenance: Water rights may transfer as appurtenance to transfer of real property, *ABKA Ltd. P'ship v. Wisconsin Dep't of Natural Resources*, 648 N.W.2d 854 (Wis. 2002).	

	Geographic transfer	--	
	Change of rights	Generally prohibited: Statute prohibits sale of water rights "by an 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	Riparian: Reasonable use, *Wisconsin ex rel. Chain O'Lakes Ass'n v. Moses*, 193 N.W.2d 708 (Wis. 1972). Regulated riparian: Permit overlay.	 § 30.18
	Groundwater	Capture: American reasonable use, *Wisconsin v. Michels Pipeline Construction, Inc*., 217 N.W.2d 339, 350 (Wis. 1974). Regulated riparian: Permit overlay.	 §§ 281.34(5)(a), .35
WYOMING WYO. STAT. ANN. (LEXIS through 2013 Sess.)			
Transfer Regulation	Simple substitution	Appurtenant: Water rights are appurtenant to the land, *Toltec Watershed Improvement District v. Associated Enterprises, Inc.*, 829 P.2d 819 (Wyo. 1992).	
	Geographic transfer	Interbasin: 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. City of Rawlins*, 594 P.2d 951, 957 (Wyo. 1979).	
	Change of rights	No injury: Water transfers initially prohibited,, but current law provides authority for transfers. Additional limits: Prior to approving transfers, officials shall consider pertinent facts—which may include economic loss to source community, and availability of other sources for new use.	§ 41-3-104 § 41-3-104
Use Regulation	Surface	Appropriation: Permit required, *Wyoming Hereford Ranch v. Hammond Packing Co*., 236 P. 764 (Wyo. 1925).	§§ 41-4-512, -3-503
	Groundwater	Appropriation: Permits required; additional regulation may apply in "control areas."	§§ 41-3-901 to -919