

THE EFFECTS OF GLOBAL CLIMATE CHANGE ON THE CALIFORNIA WATER RIGHTS SYSTEM

Stuart L. Somach and Jonathan R. Schutz*
Somach Simmons & Dunn

While one function of law is to give stability to institutions and predictability to the results of action, often the strength of law will lie not in immutability but in capacity for change and flexibility in the face of new forces.

Frank J. Trelease, *Climatic Change and Water Law*, in *Climate, Climate Change, and Water Supply*, 70 (1977).

I. INTRODUCTION

“Warming of the climate system is unequivocal, as now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.”¹ While the specifics of how and when climate change will affect California are not as certain,² the issue for California is whether and how we will adapt to and mitigate the effects of climate change. In California and in the world, the effects of climate change will be felt especially hard in the water sector. Climate change affects water supply in more ways than one. It will affect the amount of water available for use and the times when water is available. It will affect the reliability of our water delivery systems, which have been designed based on current climate models. Climate change will also affect how, when, and where we move water as a society. Nineteen percent of California’s energy use is used in water management—extraction, conveyance, treatment, and distribution. To address these concerns, one agency, the California Department of Water Resources (“DWR”), is attempting to diversify its water supplies so as not to rely too heavily on any one source, but is also attempting to reduce its energy consumption and greenhouse gas emissions associated with the State Water Project, the single largest energy user in California.³

* Stuart L. Somach is a shareholder and Jonathan R. Schutz is an associate at Somach Simmons & Dunn. Both focus on water and environmental law. Somach Simmons & Dunn specializes in water, natural resources, environmental, public land, public agency, toxics and hazardous waste, zoning, planning, and land development law. They may be reached at 916-446-7979 or ssomachaw@somachlaw.com and jschutz@somachlaw.com.

¹ Intergovernmental Panel on Climate Change, *A Report of Working Group I of the Intergovernmental Panel on Climate Change: Summary for Policy Makers*, 2, available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

² J. Anderson, et al. *Progress on Incorporating Climate Change in Management of California’s Water Resources* (2008) available at http://www.water.ca.gov/climatechange/docs/CCprogress_mar08.pdf (*Progress*).

³ N. Jacobs and J. Canger, *Climate Change and Water in California*, *Western Water Law and Policy Reporter*, 39 (December 2007) (*Climate Change and Water in California*).

In addition to adapting our water supply systems, we must be prepared for our water management laws to be tested, including water rights. This article sets forth basics of California water law and then analyzes how this system will hold up under the predicted climate change scenarios. In the end, it concludes that California's water rights law is robust and yet flexible enough to cope with the uncertainties of climate change.

II. CALIFORNIA WATER LAW

There are two very broad categories of water rights in California: surface water rights and groundwater rights. Each is discussed below in detail. As background, the California Constitution requires that any water use be reasonable, regardless of whether the underlying right is to surface water or groundwater. The concept of reasonableness requires that the use of water and the method of diversion be reasonable.⁴ Wasting water, or using more than is reasonably necessary, is not beneficial and is, therefore, not permitted under any water right. In other words, no matter which type of water right one claims, one can only obtain a right to use water for a reasonable and beneficial use. What is considered reasonable may change over time.⁵

A. Surface Water Rights

Surface water rights in California are part of a complex system of law that borrows from two distinct and separate bodies of law. This so-called "hybrid" water rights system includes riparian rights and appropriative rights.

1. Riparian Rights

The riparian rights doctrine developed in England and Europe. In essence, a riparian right to water is acquired by virtue of ownership of land that abuts a watercourse. Landowners are riparian landowners if their lands border a flowing surface water source, such as a river or stream, and are littoral landowners if their lands border a lake or pond. A riparian landowner is entitled to reasonably use water on riparian lands so long as the use does not interfere with the reasonable use of other riparian landowners.

In order to exercise a riparian right, one must own riparian lands. A riparian right only attaches to natural flow within a watercourse. Imported waters or "foreign" waters brought to a watercourse from another watershed or otherwise are not part of the natural flow and no riparian right attaches to the use of that water. Riparian rights are limited to use on riparian lands, and the lands must be within the watershed of the water source. A

⁴ Calif. Const. art. X, § 2.

⁵ See *Tulare Dist. v. Lindsay-Strathmore Dist.* (1935) 3 Cal.2d 489, 567.

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riparian right cannot be exercised on lands, even if they are contiguous with the riparian tract, if those lands are not within the watershed of origin.

A riparian right can be severed from the land. The land to which a riparian right is claimed to be appurtenant must be contiguous to the source. When a larger parcel is divided, any subparcels that are no longer contiguous lose the right, unless expressly reserved in the transfer. Once severed, the right cannot be reattached. Riparian right attaches to the smallest parcel of land contiguous to the watercourse within the chain of title.⁶

A riparian use must be reasonable and will generally support domestic, irrigation, industrial and mining uses on riparian lands, as well as the generation of hydroelectric power and recreational uses. A riparian right, however, will not, in general, support a municipal use of water. A municipal use would, for example, include the development of a large water system to supply the full water needs of a municipality. While a municipality may exercise riparian rights for use on riparian lands owned by the municipality, the use (unless otherwise provided for) cannot be expanded for service to lands not owned by the municipality. In California, a riparian owner may not store water pursuant to a riparian right.

As a general rule, a riparian right cannot be lost through non-use. A riparian right, however, can be limited in a number of ways, including a loss of priority or loss of use for certain specific purposes.⁷

2. Appropriative Water Rights

The law of prior appropriation was first developed in California to support the early mining needs of the “49ers,” who came to California prior to Statehood to mine for gold. The system borrowed heavily from the mining law concepts that were developed based upon the needs, experiences, customs and usage within the early mining camps. In essence, the law was one of self-initiation with those who first staked out their claim to mineral resources or water having the senior or “prior” right.

The law of prior appropriation – a law of “first in time, first in right” – worked well in California because it was a satisfactory means to allocate a scarce resource through the granting of relative priorities or rights to all who claimed an interest in water. The first, or most senior, was able to have all of his or her beneficial needs for water met prior to the next in line having any claim to use water, and so forth, until all of the water within the system was exhausted.

⁶ *Boehmer v. Big Rock Creek Irrigation Dist.*, 117 Cal. 19, 48 P. 908 (1897).

⁷ *In re Waters of Long Valley Creek Stream System*, 25 Cal.3d 339, 599 P.2d 656 (1979).

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The right to water was also defined by the right to divert the water away from the stream (and adjacent lands) for use where the water was needed. In California, the requirement that water be diverted away from the stream still exists.

Historically, an appropriative right was perfected either by posting a Notice of Intent or by actually diverting water for beneficial use. The date of priority “related back” to the first act taken to initiate the right. The scope of the right was defined by the intended purpose and place of use at the time of initiation and the right existed so long as it was being developed with “due diligence.” The quantity of water obtained was the quantity needed to achieve the purpose(s) intended at the time of initiation.

In California, the law of prior appropriation was recognized shortly after Statehood (1850) as a means to perfect a right to water in California.⁸ The means to perfect the right, noted above, were codified in the Civil Code. The riparian rights doctrine was recognized as part of the common law in *Lux v. Haggin*, 69 Cal. 255; 10 P. 674 (1886), thus establishing the hybrid system of water rights that exists in California.

In 1913, the basic California law of prior appropriation was modified with the enactment of the Water Commission Act that became effective in 1914. This law replaced the informal process of obtaining water rights with a more formal application and permitting system. This system required one who wished to obtain an appropriative right to file an application with the State and proceed through a permitting process. No right to appropriate water is obtained in this system until a permit is issued although the priority of the right obtained “relates back” to the time the application was accepted. The permit issued specifies purpose and place of use of water, quantity of water obtained and the right may be otherwise limited based upon terms and conditions imposed by the permit. In allocating water, there will also be a determination that water is, in fact, available for appropriation and that the exercise of the right will not harm other lawful users. There will also be a determination that the appropriation is in the public interest. The State Water Resources Control Board (“SWRCB”) is the agency within California that currently administers this permitting system. Early pre-1914 appropriative rights are still valid and recognized under California law.

An appropriator must intend to divert water and apply it to beneficial use. The appropriator must exercise control over water by diverting it from the watercourse.⁹ Diversion is the exercise of physical control over the water. Water must be applied to a beneficial use. The use of water for domestic, municipal, agricultural and industrial uses

⁸ *Irwin v. Phillips*, 5 Cal. 40 (1855).

⁹ *Fullerton v. State Water Resources Control Bd.*, 90 Cal.App.3d 590 (1979); *California Trout Ltd. v. State Water Resources Control Bd.*, 90 Cal.App.3d 816 (1979).

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is deemed to be beneficial. The use of water for recreation, including snowmaking, is beneficial. In California beneficial uses are defined through statute or regulation although uses defined by statute or regulation are not exclusive. It is important to note that in most respects the appropriative right only extends to that amount of water that can be put to beneficial use. One cannot obtain a right to use water for purposes that are not beneficial.

The central feature of the doctrine of prior appropriation is priority. The date of appropriation determines the user's priority to use water. The earliest appropriator has the most senior right, and the last appropriator has the most junior right. In times of water shortage, those with the most senior rights will be allowed to divert their full supply, with those with junior rights forced to limit or even curtail entirely their diversion of water. As noted above, this is known as the doctrine of "first in time, first in right." In California, in general, but with some exceptions, a riparian right is senior to all appropriative rights.

The appropriative right is, in most respects, more flexible than the riparian right. The appropriative right can be transferred or modified to meet changed conditions. An appropriative right can also be transferred or modified to serve lands that did not benefit from the initial appropriation. An appropriation may also be modified so that diversion and application of water is, at times, not originally contemplated or from new points of diversion. In these situations a major consideration in allowing the transfer or modification will be the impact on other appropriators. So long as other appropriators are not harmed there should be no problem with the modification. With respect to post-1914 appropriative rights, in order to perfect these types of transfers or modifications, permission would need to be obtained from the SWRCB. Prior to allowing the transfer or modification, notice and an opportunity for a public hearing are required. Pre-1914 water rights may be changed without any governmental permission.

Other flexibilities exist for appropriative rights. An appropriative right may be used outside of the watershed of origin. One can obtain an appropriative right to store water for use at times other than when water naturally occurs. In semi-arid California, the right to store water is crucial to the entire water rights system. One can obtain a right to appropriate foreign waters. Foreign waters are waters that are not natural to a watercourse but occur there through human efforts.

An appropriator has a right to recapture and reuse water upon lands that were originally intended to be benefited by a diversion. This right extends to the use of water conserved or developed through more efficient methods of diversion, application and use. A major consideration in allowing an appropriator to recapture or reuse water is whether it will harm other appropriators. As long as it will not cause harm, it should be permitted.

In California, an appropriative right can be lost by abandonment. Abandonment is established through proof of non-use coupled with an intent to abandon the water. In contrast, an appropriative right may be forfeited merely through non-use for a statutorily provided time period. In California there is some question if an appropriative right can be lost through adverse possession. This is due to the fact that in most cases, by statute, an individual may only obtain a right to use water through the formal permitting process. This would preclude obtaining a right, at least as against the State, through adverse possession.¹⁰

B. Groundwater

In California, not all water that is found below the earth's surface is treated as groundwater. Water flowing underground in "known and definite channels" is treated, legally, as surface water. Underground water that does not occur in this manner is "percolating water" and is treated as groundwater, subject to the law of groundwater. Determining whether water occurring underground is subject to the law of surface water or the law of groundwater is difficult and makes resolution of disputes, with respect to underground water, technical and complex. Percolating water is usually found in aquifers or groundwater basins.

In dealing with aquifers, the safe yield of the groundwater basin is determined in order to fully understand relative rights. The safe yield of the groundwater basin is the amount of water that can be extracted over a period of time without reducing the total quantity of water available for use. Safe yield is calculated by comparing extraction with recharge. In order to be within the safe yield, the recharge must equal or exceed the extraction. If the safe yield of the groundwater basin is exceeded, the basin is said to be in a state of overdraft and groundwater mining occurs.

In general, water is extracted from a groundwater basin by pumping from a well. Pumping causes a cone of depression around the area of withdrawal. This cone of depression is an area where water has been removed. The effect of the cone of depression, as well as the reduction of groundwater levels due to extractions of groundwater, are critical aspects of groundwater law in California.

In California the right to groundwater is obtained in one of two ways: correlative or appropriate rights. The doctrine of correlative rights provides that all owners of lands overlying a groundwater basin have rights to the extraction and use of groundwater on their overlying lands, which are equal and correlative to the rights of other overlying landowners. Groundwater surplus to the needs of overlying users may be appropriated.

¹⁰ *People v. Shirokow*, 26 Cal.3d 301, 605 P.2d 859 (1980).

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Conflicts between overlying water users and appropriators are generally resolved in favor of the overlying landowner. However, in areas of significant overdraft the doctrine of mutual prescription has developed. This doctrine allows for an equitable apportionment of water based upon historic uses.¹¹ The doctrine of reasonable use, discussed above with respect to surface water, applies in California as a limit on the use of groundwater.

In California the appropriation of groundwater does not require a permit, *per se*, from any state agency. Local control or management is, however, increasing in California. Permits are required prior to the installation of a well. These permits focus upon protection of the resources from a health and safety perspective, rather than from a supply perspective. In some areas of California, groundwater basins are managed pursuant to special legislation. In these areas the state Legislature has established management plans for specific basins which control the extraction and use of groundwater. Among the most important means of managing groundwater basins in the context of general water conservation is the conjunctive use of surface water and groundwater sources and the storage of surface water within groundwater basin. In some areas of California, groundwater basins are managed pursuant to rules established in an adjudication of groundwater rights.¹²

C. Public Trust Doctrine

The public trust doctrine provides that certain natural resources are held in trust by the state for the benefit of the public. Originally a concept from Roman law, the public trust doctrine evolved in English common law to confer upon the sovereign ownership of “all of its navigable waterways and the lands lying beneath them ‘as trustee of a public trust for the benefit of the people.’”¹³ Upon its admission to the United States, California obtained title to its navigable waters and underlying lands to be held in trust.¹⁴

In two seminal cases, the California Supreme Court extended the public trust purposes to include environmental preservation and aesthetics.¹⁵ The California Supreme Court also held that water rights are subject to the public trust doctrine.¹⁶ Moreover, the

¹¹ See *Pasadena v. Alhambra*, 33 Cal.2d 908, 207 P.2d 17 (1949); *City of Los Angeles v. City of San Fernando*, 14 Cal.3d 199, 537 P.2d 1250 (1975)

¹² An adjudication is a court proceeding that establishes the relative rights of all parties claiming an interest in the water source. In these equitable proceedings the court usually maintains continuing jurisdiction, supervising, through a special master or watermaster, the use of water from the adjudication basins.

¹³ *Colberg, Inc. v. State of California ex rel. Dept. Pub. Wks.*, 67 Cal.2d 408, 416 (1967) citations omitted.

¹⁴ *National Audubon Society v. Superior Court* (“*National Audubon*”), 33 Cal.3d 419, 434 (1983), citing *City of Berkeley v. Superior Court*, 26 Cal.3d 515, 521 (1980).

¹⁵ *Marks v. Whitney*, 6 Cal.3d 251, 259-260 (1971); *National Audubon*, *supra*, 33 Cal.3d at 437.

¹⁶ *National Audubon*, *supra*, 33 Cal.3d at 426.

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public trust doctrine implies a duty of continuing supervision and the State is empowered to re-analyze water right allocations.¹⁷

In the past, California courts have applied the public trust doctrine in ways that significantly affected California's economy and property rights. For instance, it was a public trust doctrine decision of the California Supreme Court in 1884 that helped end the California gold rush.¹⁸ In *Gold Run*, hydraulic miners were diverting the waters of the American River to create high-powered water cannons used to wash away entire hillsides for gold mining purposes. The tailings from these operations went into the American River and were causing several problems, including increased flooding due to the raised riverbed, impairment of navigation, and impacts to water quality to the extent that American River water was no longer fit for domestic consumption.¹⁹ The *Gold Run* Court found that these mining operations impaired the public trust values of the American River and, on that basis, banned hydraulic mining. The Court's ruling effectively prohibited large-scale gold mining in California.

One century later, the California Supreme Court again invoked the public trust doctrine in the context of water rights for diversions from non-navigable tributaries to Mono Lake.²⁰ In *National Audubon*, the Court held that water rights were subject to ongoing review under the public trust doctrine. The *National Audubon* decision did not determine whether the Los Angeles Department of Water and Power's ("LADWP") diversions should be reduced. Instead, subsequent proceedings before the SWRCB resulted in amendments to LADWP's licenses that significantly reduced the amount of water that may be lawfully diverted from the streams tributary to Mono Lake.

III. THE EFFECTS OF CLIMATE CHANGE ON CALIFORNIA'S WATER SUPPLY SYSTEM

Global climate change is predicted to increase the average global temperature by 3.2° to 7.2°F and may increase temperatures by 3.6° to 9°F in the West.²¹ An increase in temperature has the potential to greatly affect California's water supply due to its effects of snowpack — which stores as much water as all of California's surface storage reservoirs. Furthermore, warmer temperatures increase the capacity of the atmosphere to

¹⁷ *Id.* at 447.

¹⁸ See *People v. Gold Run Ditch & Mining Co.* ("Gold Run"), 66 Cal. 138 (1884).

¹⁹ *Id.* at 152.

²⁰ *National Audubon*, *supra*, 33 Cal.3d at 446-447.

²¹ Noah D. Hall, Bret B. Stuntz, and Robert H. Abrams, *Climate Change and Freshwater Resources*, *Natural Resources and the Environment*, Winter 2008, 30 (*Climate Change and Freshwater Resources*).

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hold moisture, leading to the possibility of decreased rainfall. Less rain will obviously adversely affect California's water supply.²²

If an increase in temperature occurs, under some models the Sierra Nevada snowpack could decrease by as much as 90 percent — estimates range from 30 to 90 percent reduction depending on the amount of temperature increase.²³ If temperature increases, more of California's precipitation will fall as rain instead of snow and the snow that does fall will melt earlier than it does currently.²⁴ This reduced snow pack will cause reservoirs to fill more quickly instead of gradually over the spring and summer months when supplies are needed most. Because the reservoirs will fill sooner, they will either be less able to cope with flood events due to decreased storage space or will have to pass more water through to preserve space for flood events, which will decrease the amount of water available in the summer months when demand is highest.²⁵ Reduced spring run-off and storage capabilities translates into less deliveries into the State Water Project ("SWP") and the Central Valley Project ("CVP"), which translates into less water available to SWP and CVP water users.²⁶ More than 20 million people rely on these two projects.²⁷ This year, DWR anticipates delivering 35% of contract allocations on the SWP.²⁸

Climate change is also expected to cause fewer cold days and nights and increase the number of hot days and nights.²⁹ This leads to increased susceptibility of trees to pests, which increases their susceptibility to fire.³⁰ Increased air temperatures also lead to increased water temperatures, which affect aquatic life.³¹ Increased temperatures also cause reduced agricultural yields due to heat.³²

²² Approximately 75 percent of California's water falls in the winter in Northern California and the greatest demand for water is in Southern California in the spring and summer months.

²³ *Progress on Incorporating Climate Change in Management of California's Water Resources*, *supra*, note 2 at 13-14.

²⁴ *Id.* at 4.

²⁵ *Climate Change and Water in California*, Western Water Law and Policy Reporter, *supra*, note 2 at 37. *Progress on Incorporating Climate Change in Management of California's Water Resources*, *supra*, note 2 at 4, 14.

²⁶ *Progress on Incorporating Climate Change in Management of California's Water Resources* (2008), *supra*, note 2 at 7-10.

²⁷ *Id.* at 1.

²⁸ DWR News Release April 15, 2008, available at <http://www.water.ca.gov/news/newsreleases/2008/041508snowsurvey2.pdf>

²⁹ Andrea Ray, Climate Change & Water In the West: A Look at the 21st Century (December 3, 2007), 28, PowerPoint presentation to Utah Water Users Association, available at http://wwa.colorado.edu/products/Ray_utahwater_3dec2007.pdf.

³⁰ *Id.* at 28.

³¹ U.S. Environmental Protection Agency, *National Water Program Strategy: Response to Climate Change* (March 2008), ii, 7-8.

³² Ray at 28.

Global climate change may also cause sea levels to rise as water temperatures warm.³³ Different models predict that sea levels could rise from 7-23 inches up to 20-55 inches by the year 2100.³⁴ Rising sea levels can push salt water further up freshwater streams and further into coastal groundwater aquifers that would already be compromised by decreased supplies.³⁵ Higher sea levels could also increase the likelihood of levee failure in the Delta.³⁶

Climate change may also affect evapotranspiration rates, which would affect water demand.³⁷ In California, evapotranspiration is the largest consumer of DWR project water, about 80% in normal years.³⁸ Climate change may also affect the length of the agricultural growing season and land use patterns.³⁹

Under the driest modeled scenario of one study, it concluded that:

[O]verall, the climate scenario reduces average annual water availability by 27%, which results in an average annual reduction in water deliveries of 17%. Statewide, average agricultural areas see water deliveries 24% lower than demand targets and average urban areas see 1% less than their demand targets. There are great regional disparities as well. Urban Southern California sees almost all scarcity in urban water deliveries; urban water scarcity is almost absent north of Southern California.⁴⁰

IV. THE EFFECTS OF CLIMATE CHANGE ON CALIFORNIA'S WATER RIGHTS LAW

The test of California water law, with regard to climate change, will be whether it is rigid enough to provide stability to protect existing systems and expectations, yet flexible enough to deal with changing, likely diminished, water supplies.⁴¹ As discussed below, California water law does manage this balance and should be able to weather climatic variability in water supply.

³³ *Climate Change and Freshwater Resources*, *supra*, note 21 at 31.

³⁴ *Id.* at 31-32; Blue Ribbon Task Force, *Delta Vision: Our Vision for the California Delta* (January 29, 2008), 3.

³⁵ *Climate Change and Water in California*, *supra*, note 3 at 37.

³⁶ *Progress on Incorporating Climate Change in Management of California's Water Resources*, *supra*, note 2 at 11-12.

³⁷ *Id.*

³⁸ *Id.* at 15.

³⁹ *Id.*

⁴⁰ J. Medellin, et al., *Climate Warming and Water Supply Management in California* (March 2006), 30.

⁴¹ Frank J. Trelease, *Climate Change and Water Law*, in *Climate, Climate Change and Water Supply*, 71, 81 (1977).

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California's appropriative water rights permit system is an adequate, but not perfect, system to provide both security to preserve water rights, while at the same time providing the flexibility to be able to shift water to where it is needed most.⁴² One of the features of an appropriative right that make it able to cope with change is that it may be transferred or modified to serve water users, lands, and uses that did not benefit from the initial appropriation. An appropriation may also be modified so that diversion and application of water is, at times, not originally contemplated or from new points of diversion. Furthermore, an appropriative right may be used outside of the watershed of origin. One can obtain an appropriative right to store water for use at times other than when water naturally occurs. In other words, an appropriative right may be shifted to the most beneficial use without the holder of the right losing title to the water right. This ability to shift water to other users is critical to coping with decreased water supplies from climate change.

One of the overarching principles of California water law, as discussed above, is that all water use in California must be reasonable.⁴³ This applies to diversions based on riparian or appropriative water rights. However, case law instructs that what constitutes a reasonable use in California may change as the conditions of the state change.⁴⁴ *Tulare Dist. v. Lindsay-Strathmore Dist.* and other cases instruct that what is considered a reasonable use at one time may, with changed conditions, be considered an unreasonable use at a later time. Ignoring for now the process that is involved in discontinuing uses that are deemed unreasonable, because unreasonable uses are prohibited, uses that become unreasonable may be adjusted or phased out. In other words, California has in place a constitutional provision and case law allowing it to discontinue unreasonable uses. Therefore, if and when global climate change alters water supply conditions in California, any uses that become unreasonable may be phased out and shifted to the most important reasonable and beneficial uses based on existing priorities.

California water law also allows for and encourages water transfers.⁴⁵ The ability to transfer water from one area to an area of greater need without the loss of the transferor's water right is critical to provide the certainty of water rights with the

⁴² *Id.*

⁴³ Cal. Const. Art. X, § 2.

⁴⁴ See *Tulare Dist. v. Lindsay-Strathmore Dist.*, 3 Cal.2d 489, 567 (1935) (stating "what is a beneficial use, of course, depends upon the facts and circumstances of each case. What may be a reasonable beneficial use, where water is present in excess of all needs, would not be a reasonable beneficial use in an area of great scarcity and great need. What is a beneficial use at one time may, because of changed conditions, become a waste of water at a later time.") See also *Gin S. Chow v. City of Santa Barbara*, 217 Cal. 673, 706 (1933); and *People ex rel. State Water Resources Control Bd. v. Forni*, 54 Cal. App. 3d 743, 750 (1976).

⁴⁵ Wat. Code, §§ 475, 1725 et seq., 1735 et seq., 380 et seq.

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flexibility needed to adjust to climate variability.⁴⁶ Though California does not have a fully functional water market, California does have a fairly robust voluntary water transfer system.⁴⁷ That is to say, there are many large and small voluntary water transfers between individuals and public agencies. A more robust water market would eliminate some of the inefficiencies that exist now in the bureaucratic allocation of water and facilities transferring water from one use and user to another.⁴⁸ Because the SWP and CVP run almost the length of the state, wheeling water from the north to the south of the state is physically possible. California's water transfer laws will allow it to shift water to the areas of greatest need, without causing a loss of the underlying water right so the water right holder will later be able to resume his use of the water.

California's public trust doctrine also provides a potent tool to shirting water users to adapt to decreased water supply from climate change.⁴⁹ The public trust doctrine includes public goods that should be maintained for the benefit of all the citizens of the state.⁵⁰ As discussed above, *National Audubon* determined that the public trust did apply to water rights. *National Audubon* did not determine whether LADWP diversions should be reduced, but referred it to the SWRCB. The SWRCB then amended LADWP's licenses to significantly reduce the amount of water that could be lawfully diverted from the streams tributary to Mono Lake. Though the full reach of the public trust doctrine is not known because it has not been applied extensively, it could possibly be asserted in the context of climate change to curb water diversions and uses that have significant adverse affects to the water supply of the State.

V. CONCLUSION

California has a rich history and system of water rights law that, over the past 160 years, has adapted to changing water uses and places of use. California's appropriative water rights system is flexible and allows water to be transferred from one water user to another and from one place of use to another, without a loss of the underlying water right. This system that encompasses both flexibility and certainty should allow California water law and, in turn, its water delivery systems and water users to weather the possible effects of climate change on California's water supply.

⁴⁶ *Trelease, supra*, note 41 at 73.

⁴⁷ *See, generally*, Ellen Hanak, California's Water Market, By the Numbers, Public Policy Institute of California (2002), available at http://www.ppic.org/content/pubs/op/OP_1002EHOP.pdf, and Ellen Hanak, *Who Should Be Allowed to Sell Water in California? Third-Party Issues and the Water Market*, Public Policy Institute of California (2003), available at <http://www.ppic.org/main/publication.asp?i=337>.

⁴⁸ *Trelease, supra*, note 41 at 82.

⁴⁹ Some even argue that the public trust doctrine should be included in an amendment to the California Constitution. *See* Antonio Rossman, *Bring Us Laws to Match Our Rivers*, *Western Water Law and Policy Reporter*, 100 (January 2008).

⁵⁰ *National Audubon, supra*, 33 Cal.3d 419.

Appendix A

The following cases address aspects of the connections between water and climate change. While, they do not address climate change and water rights specifically, they do address how they courts are viewing the connection between water and climate change generally.

Massachusetts v. Environmental Protection Agency, 127 S.Ct. 1438 (2007).

Natural Resources Defense Council v. Kempthorne, 506 F.Supp.2d 322 (2007).

People of the State of California v. General Motors Corp., 2007 U.S. Dist. LEXIS 68547 (2007).

Northwest Environmental Defense Center v. Owens Corning Corp., 434 F.Supp.2d 957 (2006).

Pacific Coast Federation of Fishermen's Associations v. Gutierrez, 2008 U.S. Dist. LEXIS 31462 (2008).