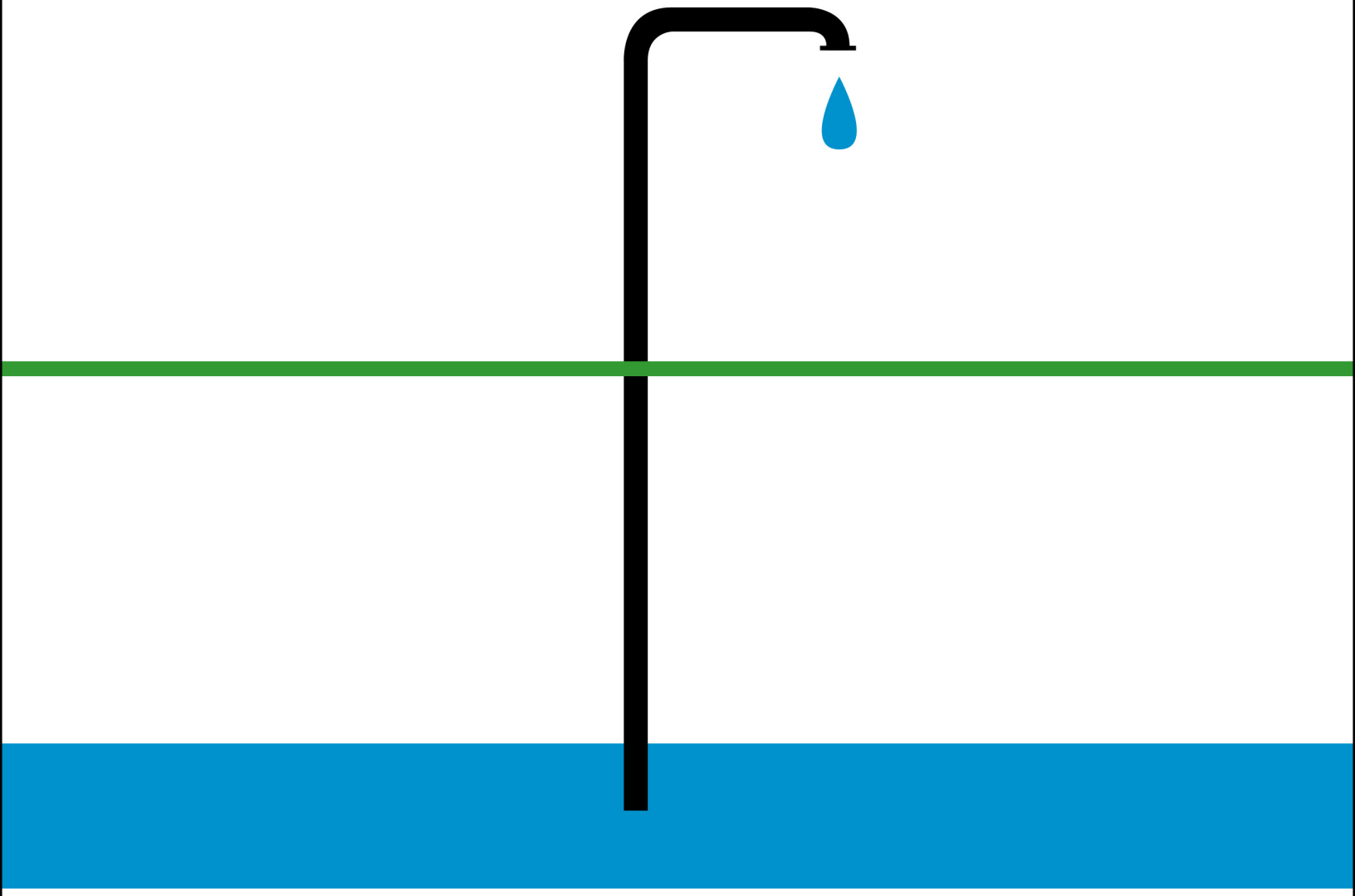
Groundwater Law Sourcebook of the Western United States

Gary Bryner and Elizabeth Purcell



Natural Resources Law Center
University of Colorado School of Law

The mission of the Natural Resources Law Center is to *"promote sustainability in the rapidly changing American West by informing and influencing natural resource laws, policies and decisions."*

Gary Bryner, (Research Associate), Natural Resources Law Center
Elizabeth Purcell, (Research Assistant), Natural Resources Law Center

September 2003

Natural Resources Law Center
University of Colorado at Boulder
School of Law
401 UCB
160 Fleming Law Building
Boulder, CO 80309-0401
Phone: 303.492.1286
Fax: 303.492.1297
Email: nrlc@colorado.edu
Website: http://www.colorado.edu/law/centers/nrlc/index.htm

GROUNDWATER LAW SOURCEBOOK OF THE WESTERN UNITED STATES

Gary Bryner and Elizabeth Purcell

Natural Resources Law Center
University of Colorado School of Law

September 2003

RR30

Table of Contents

Appendix – Selected State Groundwater Statutes

FORWARD

As the population of the American West continues to grow, one of the greatest challenges facing many communities is securing an adequate water supply. Cyclical droughts, the threat of reduced snowpack and other disruptions from climate variability, and other factors have added to the pressures to find new sources of water. Groundwater has become an increasingly important source for municipal and industrial water as well as water for irrigation, particularly in the West, where, in some areas, groundwater is the only dependable source of water. While groundwater resources will become increasingly important in the twenty-first century in meeting human and ecosystem needs, aquifers in the West are showing sobering signs of depletion and pollution. The legal and institutional systems for managing and protecting groundwater resources are complex; often separate from parallel systems for governing surface waters, even though ground and surface waters are often interconnected. The purpose of this report is to explain how groundwater law works in each of the western states, and to serve as a resource for discussions and analyses by policy makers and the general public about how to improve the governance of ground and surface waters in the West.

The Sourcebook begins with a brief overview of the problems and challenges surrounding the tremendous increase in reliance on groundwater in the West. The central core of the Sourcebook is a detailed explanation of groundwater law in the western states. Following the discussion of state laws, the Sourcebook concludes with a discussion of issues raised by the review of state laws. An appendix provides links to the major groundwater laws in western states. The states covered in this sourcebook include: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. It should also be noted that the focus here is on groundwater supply and does not examine issues of groundwater quality, the subject of a forthcoming study.

The Sourcebook was made possible by generous grants from the Richard and Rhoda Goldman Fund and the William and Flora Hewlett Foundation, and we thank them for their support of the Natural Resources Law Center. We also thank members of the Center's advisory board, and Professor James Corbridge in particular, for helpful comments on earlier drafts of the report.

INTRODUCTION AND OVERVIEW

Groundwater is found in water-bearing layers of saturated underground rock and sand, called aquifers, formed as surface water percolates through layers of earth and fills porous rock and sand. Groundwater moves very slowly, depending on the nature of the material in which it has accumulated. Aquifers are recharged naturally through precipitation that filters through a recharge area, but the process is typically very slow, taking from decades to centuries. If the withdrawal or pumping rate matches the recharge rate, the aquifer is a renewable resource; if the withdrawal rate exceeds recharge, typically described as overdrafting or mining, the aquifer becomes a nonrenewable resource.[1]

Some aquifers are confined where water is trapped between two impermeable layers of rock. When wells are drilled into confined aquifers, their pressure is usually sufficient to withdraw the water without a pump. The point at which confined aquifers are charged may be hundreds of miles from where the water is withdrawn. Unconfined aquifers form when water collects above an impermeable layer of rock or clay; the top of the saturated region of the aquifer is called the water table. Water is pumped out through wells and the water table rises and falls as the amount of precipitation and the withdrawal rate changes.[2]

Humans have been withdrawing groundwater for millennia, but it is only recently that technologies have been developed to pump sufficiently large quantities of water from aquifers to threaten their sustainability. Windmills, centrifugal pumps, and other devices were used to withdraw relatively small amounts of groundwater, but developments in pumping technology, the availability of cheap electricity, and sprinkler irrigation systems led to a dramatic increase in pumping in the 1930's and 40's, particularly in the Southern Plains.[3] Perhaps the most well-known aquifer, the Ogallala, underlies the Great Plains and supplies water to residents of eight states, and has been the subject of great concern because of decades of overdrafting. In some regions the withdrawal rate has been 14 times greater than that of the natural recharge rate, and has caused farmers in some areas to shift to dry land agriculture; in other areas, however, farmers continue to tap the aquifer for irrigation.[4]

More than 28 trillion gallons of water are pumped from underground sources each year in the United States.[5] Approximately 90 percent of fresh water in the United States is found in groundwater. According to one estimate, groundwater is the source of 33 percent of the fresh water used by 19 western states. Some 78 percent of the groundwater is used for irrigation, 14 percent for public supply systems, and 4 percent for rural domestic and livestock uses.[6] Another estimate found that groundwater accounts for from 40 to 45 percent of all water withdrawals in the West and as much as one-half of withdrawals in the Rio Grande, Great, and Lower Colorado basins.[7] The U.S. Geological Survey reports the following percentages of state populations that use groundwater for drinking water:[8]

Arizona	60%
California	45
Colorado	22
Idaho	96
Montana	52
Nevada	31
New Mexico	90
Oregon	40
Utah	56
Washington	61
Wyoming	57

Groundwater Problems and Challenges

There are several advantages to using groundwater. Rapidly growing cities are at a disadvantage under the legal system of prior appropriation that governs withdrawals from surface water. Prior appropriation gives senior rights to those who withdraw the water first, such as farmers; and cities may have junior rights that are only honored if all senior rights have been satisfied. While it is difficult to obtain new water rights for surface water, groundwater is usually not allocated according to the same rules. In some areas of the West, groundwater withdrawals are governed by the common law rule of capture, allowing anyone who can drill a well to get access to the water to use it. Prior appropriation rules that govern the withdrawal of groundwater operate as they do for surface water, allowing those who first make withdrawals to enjoy senior water rights.[9]

A second advantage of groundwater is that while water quality varies widely, much of it is of high quality and can be used without treatment, unlike some surface water that has high salinity resulting from agricultural runoff. Not only is groundwater pumped for municipal, industrial, and agricultural use, but it is increasingly being bottled as spring water and millions of gallons of water are pumped each day to meet the five billion gallon a year demand for bottled water in the United States. But bottled water is only a tiny fraction of groundwater use in the United States, where some 28 trillion gallons are withdrawn each year, two-thirds of which is used for irrigating crops. This represents more than 25 percent of the nation's water supply.[10]

Thirdly, groundwater is available throughout the year. This is in contrast to the rivers and streams in the desert west where water flow varies and may slow to a trickle in the summer and may be delivered at a lower cost than some surface water. Surface waters stored and transported in dams, canals, and ditches require expensive infrastructure, and evaporation and infiltration sap much of the available water. While pumps are required to extricate groundwater, the costs are generally much lower than the extensive storage and transmission systems that have been constructed in the West. [11]

However, the tremendous increase in groundwater pumping has resulted in serious environmental problems. Groundwater mining has caused land subsidence that has resulted in damage in areas of Arizona, California, Idaho, Nevada, Texas, and

Washington. In many areas where groundwater and surface waters are inextricably linked, pumping groundwater has dried up rivers and lakes and destroyed habitat for fish and riparian wildlife. Robert Glennon has described a number of cases in the West where our thirst for groundwater has damaged ecosystems:[12]

- The Santa Cruz River, west of Tucson, Arizona, once had perennial water flows and formed a lush riparian corridor and a fertile wildlife and bird habitat. Groundwater pumping met the needs of Tucson residents, mining operations, and farming which dramatically lowered the water table, drained the river and destroyed the habitat.

- The Upper San Pedro River in Southern Arizona was "an extraordinarily rich and diverse riparian habitat," supporting some 300 species of birds, 83 mammalian species, and 47 amphibian and reptile species; Congress established the San Pedro Natural Conservation Area in 1988 and created a federal water right to protect the aquatic and wildlife resources. However, groundwater pumping to fuel the rapidly growing population has resulted in the river being labeled by the conservation group *American Rivers* one of the ten most endangered rivers in the United States, and today has only a narrow ribbon of trees along its banks.

- California's Central Valley, described as an American Serengeti characterized by extensive grasslands during the summer, marshlands in the winter and spring, and home to grizzly bears, antelope, tule elk and wintering nests for ducks, geese, and cranes from Canada. By the end of the 1930's, irrigation had spread to millions of acres of farmlands, the Central Valley became a desert and the spawning waters for millions of Chinook salmon were lost.

Groundwater is also expensive to pump, generating electricity bills of thousands of dollars per month per well in some areas. As the water table is drawn down, drilling costs escalate and water quality often declines. In California and other coastal areas, groundwater withdrawals have allowed salt water to contaminate aquifers. Groundwater is a classic example of a commons, where the incentives of each user to overuse the commonly shared resource results in an unsustainable level of consumption and eventual decline or loss of the resource. Unlimited access to a limited resource can eventually cause its destruction.

The problems surrounding groundwater use are not unique to the United States. Worldwide, some one billion people lack access to clean water, 2.5 billion do not have access to modern sanitation services, and 10,000-20,000 children die each day from water-related problems that are preventable. Population growth in developing countries puts tremendous pressure on existing water sources.[13] Groundwater reservoirs are being pumped at unsustainable rates in China, Saudi Arabia, Mexico, and much of Africa. Southern European nations are also suffering from falling water tables and declining aquifers.[14] In many places groundwater has come to be viewed as a nonrenewable, exhaustible resource.[15]

Not everyone argues that overdrafting is necessarily a problem or that current laws are inadequate. A U.S. Geological Survey report, for example, argued that groundwater mining "is no more unsafe than the mining of any other mineral resource, provided it's recognized and planned."[16] In some areas, where recharging of aquifers does not occur except over long periods of time, overdrafting may be the only way to meet pressing needs for water. Some defend existing state laws as well suited to manage the interconnection of surface and groundwater.[17] Economists argue that transferability and marketability of water ensure that water is efficiently used and adequate supplies are available to users willing to pay for the resource.

From the perspective of ecological sustainability, groundwater laws and policies need to ensure that withdrawal and recharge rates are balanced, that pumping of groundwater meets both municipal and agricultural needs, and that human and ecosystem demands are satisfied. Critics argue that state and local governments have, for the most part, failed to put in place an effective regulatory scheme to protect groundwater resources and to integrate protection of ground and surface waters. Some western states use different rules to govern ground and surface waters, but even in states that have coordinated management of the two types of water sources, there are problems. One set of coordinated practices, conjunctive use, for example, allows senior water rights owners of surface waters to obtain water to which they are entitled by pumping groundwater in ways that reduce conflict between senior and junior water rights holders. But this coordinated use results in increasing the withdrawal of water from the hydrological system at unsustainable levels, and reduces water needed to sustain riparian habitat and in-stream wildlife.[18]

The fragmented nature of groundwater laws and agencies in western states has prompted the call for modernizing and reforming the patchwork of arcane, complex state laws. Their complexity is itself an impediment to a serious debate about how groundwater laws could and should be changed. The following section examines groundwater laws in western states as a first step in encouraging debate over how groundwater law might better contribute to the sustainability of communities throughout the West.

Groundwater Laws in Western States

For many years, state water laws failed in many areas to protect against the decline of aquifers because of a lack of understanding of how groundwater is formed and replenished and how it interacts with surface water. An 1850 Connecticut Supreme Court opinion explained the intersection of ground and surface water this way:

> *The laws of its existence and progress, although there, are not uniform and cannot be known or regulated. It rises to great heights and moves collaterally, by influences beyond our apprehension. These influences are so secret, changeable, and uncontrollable, we cannot subject them to the regulations of law, not build upon them a system of rules, as has been done with streams upon the surface*.[19]

Most western states have developed ways of responding to the interconnectedness of surface and ground- waters. Groundwater law and policy are moving targets, evolving in response to changes in demand, land use, growth, environmental protection goals, and other factors. Laws and policies are also complicated. Some states have enacted comprehensive groundwater statutes while others have relied on adaptations and interpretations of long-standing laws. Nonetheless, all states have relied on four different legal doctrines to govern groundwater:[20]

- The common law, or absolute ownership, doctrine provides for unlimited withdrawal of water below the owner's land, regardless of the impact on other landowners. The doctrine still guides water law in many eastern states, where water is abundant. It has served as the basis for developing groundwater resources in most western states until competition for the limited resource compelled changes.

- The American rule, or reasonable use, doctrine limits withdrawals to what is necessary for reasonable and beneficial purposes. Water cannot be wasted or transported off the land if that interferes with the rights of adjacent landowners to also enjoy the beneficial use of the groundwater.

- The correlative rights doctrine was devised as an alternative to absolute rights. It provides that landowners situated above a common groundwater source have equal or correlative rights to a reasonable amount of water for reasonable beneficial uses on their land.

- The prior appropriation doctrine, as is true for surface water, holds that the first party to put the water to beneficial use has a right to continue to do so, and those who appropriate water afterward have junior rights.

Beneficial use is a key principle underlying water law that seeks to encourage economic efficiency in the use of water, but there is no universal understanding of what uses should be considered "beneficial". Water for domestic purposes, irrigation, manufacturing, and stock watering are widely recognized as constituting beneficial use, but jurisdictions disagree over whether water reserved for instream flow to protect fish, riparian habitat, or recreational opportunities also qualifies as a beneficial use.[21]

Most states have adopted some form of the prior appropriation doctrine as a way to encourage landowners to make long term investments in pumping and water development. While that has provided stability in water development, it favors those who established water rights first, and has placed some limits on subsequent changes in land use and economic activity. Many states have developed flexible ways of interpreting prior appropriation to allow for changing circumstances, rather than rewriting water laws, but some states have responded to these by enacting groundwater statutes.

At one level, states appear to be quite similar in providing for coordinated management of surface water and groundwater, but groundwater laws are quite detailed

and complex and differ considerably across the West. Most states provide for coordinated management of groundwater and surface water, especially where the two sources of water are clearly interconnected. Arizona law provides for a comprehensive, innovative system of conjunctive management of groundwater. Colorado has a complicated system of groundwater management that provides different standards for different kinds of basins. Idaho's groundwater law also provides for conjunctive management. Montana law focuses on regular assessment of groundwater conditions and the development of plants to ensure their sustainability. New Mexico has a complicated scheme that designates 33 groundwater basins and requires integrated management of surface and groundwater. Oregon, Utah, Washington, and Wyoming also provide for conjunctive use and integrated management of connected water. Conjunctive use allows states to change a ground water right when withdrawals harm surface water rights owners

In Nevada, state law governs ground and surface water separately, although in practice there is some coordination. California's system separates management of ground and surface water, but integrated planning occurs at the local level. Some states have chosen to make water rights appurtenant to the land on which it is used in order to reduce the possibility of a change in the place of use and to reduce changing existing patterns of water runoff in order to protect appropriators. Some states limit the amount of pumping by placing a cap of the percent of the total reservoir that can be drawn down while others simply require beneficial use. This protects appropriators who rely on other uses. States also differ in how they define different kinds of ground water—definite underground channels, percolating water, underground water that is clearly connected to surface water versus water that is not connected, and other differences.

While there are considerable differences in the details of state ground water law, the western states share common challenges of ensuring an adequate supply of water to meet growing population needs and balancing withdrawals for human use with protecting instream flows and other ecological needs. As groundwater is depleted faster than it is recharged, state governments will need to choose whether to give priority to ensuring the sustainability of ground water and conserving resources for future generations or to give priority to meeting the growing demands of current users, and whether to secure sufficient water for healthy ecosystems or emphasize withdrawal to meet direct human demand. The descriptions of state laws that follow illustrate the kinds of legal tools states can use in pursuing their purposes and priorities.

It is difficult to compare state laws since what is described as prior appropriation in one state may be, in practice, much different than that which is practiced in another. As a result, we have provided rather detailed descriptions of state laws in order to examine differences and similarities.[22] The description of state groundwater law that follows begins with a brief overview and summary, followed by a more detailed discussion of (1) constitutional provisions, (2) general statutory provisions governing groundwater, and (3) other provisions.

ARIZONA

Arizona has been a leader in the development of groundwater policy. Its first groundwater management law was passed in 1945. Arizona does not manage ground and surface waters conjunctively. Surface waters are governed by prior appropriation; percolating groundwater, in contrast, can be pumped by the overlying landowner under the doctrine of reasonable use. The party asserting that underground water is part of a stream flow has the burden of proving that by clear and convincing evidence. One important innovation is an agreement for Nevada to store some of its Colorado River water in Arizona aquifers to help Nevadans deal with water shortages. Arizona laws are complex, detailed, and include a wide range of exceptions to general rules.[23]

1. Constitutional Provisions

Arizona's Constitution includes an article on water rights. The first section states that riparian water rights shall not have any force; [24] the second section recognizes all existing rights to beneficial uses of water.[25]

2. General Provisions

The Arizona Department of Water Resources (ADWR) manages the state's water and administers all laws relating to groundwater. The department, through the director, succeeds to the authority, powers, duties and responsibilities of the Arizona water commission and the state water engineer relating to surface water, groundwater and dams and reservoirs.[26] The director may develop programs for the management and use of groundwater.[27]

Groundwater is defined as water under the surface of the earth regardless of the geologic structure in which it is standing or moving. Groundwater does not include water flowing in underground streams with ascertainable beds and banks.[28]

The 1980 Arizona Groundwater Management Code seeks to conserve, protect and allocate groundwater resources and provide a framework for the comprehensive management and regulation of the withdrawal, transportation, use, conservation, and conveyance of rights to use the groundwater of the state.[29] The Code has three specific goals: control overdrafting, provide a means to allocate the state's limited groundwater to most efficiently meet the changing needs of the state, and augment Arizona's groundwater through water supply development. [30]

Waters belong to the public and are subject to appropriation and beneficial use.[31] Beneficial use is the basis, measure, and limit of the use of water.[32] Five years of non-use is required for forfeiture of water rights,[33] and underground storage does not constitute abandonment or forfeiture,[34] nor does a water exchange of surface water for groundwater,

effluent, Colorado River water or groundwater for surface water constitute abandonment or forfeiture.[35]

Arizona's groundwater code establishes three levels of water management to respond to different conditions. At the base level, general provisions apply statewide. The next level of management occurs in Irrigation Non-Expansion Areas (INAs). The strictest level of management is applied to Active Management Areas (AMAs) where overdraft is most severe. Outside AMAs and INAs, groundwater rights are only limited by reasonable and beneficial use.[36]

Active Management Areas (AMAs)

The code establishes four initial AMAs: Tucson, Phoenix, Prescott, and Pinal.[37] In 1995, the Santa Cruz AMA was established.[38] The director may designate subsequent AMAs if necessary to preserve groundwater, if land subsidence is endangering property or potential groundwater storage, or if water quality is threatened.[39] An AMA may include more than one groundwater basin, but cannot be smaller than a groundwater basin or include only a section of a basin.[40] To designate an AMA, the director must hold a public hearing, make written findings, and issue an order.[41] An AMA can also be designated upon petition of ten percent of registered votes residing within the boundaries of the proposed AMA, followed by a general election.[42] After an AMA is designated, the director appoints an area director who will assist in the development and implementation of the management plan.[43] There is also a groundwater users advisory council in each AMA that advises the area director and makes recommendation on groundwater management programs and policies.[44]

Irrigation Non-Expansion Areas (INAs)

The code creates two initial irrigation non-expansion areas (INAs), Douglas groundwater area and Joseph City groundwater area.[45] The director may designate an INA if there is insufficient groundwater to provide a reasonable safe supply for irrigation and current rates of withdrawals and an AMA designation is not necessary.[46] An INA designation may be initiated by the director or by petition to the director if either: not less than twenty-five irrigation users of groundwater or one-fourth of the irrigation users sign the petition or ten percent of voters in the boundaries of the basin sign the petition.[47] The director will then have a hearing to consider whether to designate the area and the boundaries of the area.[48] At the hearing, the director will present factual data in support or in opposition to the proposed action.[49] After the hearing, the director will make written finds and an order if she decides to declare the area an INA.[50]

Within INAs, only land legally irrigated between 1975-80 may be irrigated with groundwater, effluent, diffused water or surface water.[51] In subsequent INAs, the use in the preceding five years before designation is the benchmark.[52] In INAs, groundwater users from nonexempt wells must use a water measuring device and file a report

estimating the quantity of water withdrawn.[53] Users may substitute irrigation acreage if it was done by 1995.[54] The lands retired and the substitute acres must be outside the service area of a city, located in the same irrigation district and same sub-basin, and Central Arizona project water must be adequate to supply substitute acres.[55] A person may substitute acres in the same basin if the legally irrigated acres were damaged by floods, if it is not economically feasible to restore the original acres, or if there is an impediment to efficient irrigation on the original acres, but the substitutes must be within the same farm unit.[56] The director may convert an INA to AMA if he determines the INA meets any of the criteria for designating an AMA.[57]

Groundwater Rights and Uses in General

In an AMA, a person may only withdraw and use groundwater or store water in a storage facility under the Groundwater Code.[58] In initial AMAs, no new acreage may be irrigated.[59] As is true in INAs, only acres which were legally irrigated between 1975 and 1980 may be irrigated with groundwater, but additionally, in AMAs, the acres must not have been retired from irrigation for a non-irrigation use and the grandfathered right must not have been conveyed for a non-irrigation use.[60] A person who owns acres which may be irrigated may substitute acres by retiring the old acres and using central Arizona project water to irrigate the same number of new substitute acres.[61] The substitute acres must have been legally irrigated between 1958 and 1968, and must be outside the service area of a city and be within the same irrigation district and same sub-basin.[62] The substitution must also be necessary to enable the irrigation district to more efficiently deliver central Arizona project water and benefit the management of the AMA.[63] In subsequent AMAs, the base line is the five years prior to the notice of the initiation of the designation process.

In an AMA, a person who was legally withdrawing and using groundwater as of the date of the designation of the AMA or who owns land legally entitled to be irrigated with groundwater has the right to withdraw or receive and use groundwater as determined by the director.[64] The rules governing grandfathered rights are detailed and complex. For example, in an initial AMA, a person who owns land which was legally entitled to be irrigated with groundwater and who retired such land from irrigation after January 1, 1965 but prior to the date of the designation of the AMA in anticipation of a non-irrigation use, has the right to withdraw from or receive for such land three acre-feet of groundwater per acre per year upon a showing that the land has been held under the same ownership since retired and a development plan for the proposed non-irrigation use existed at the time the land was retired.[65] There are three categories of grandfathered rights (1) Non-irrigation grandfathered rights associated with retired irrigated land, (2) Non-irrigation grandfathered rights not associated with retired irrigated land, and (3) Irrigation grandfathered rights. Each category subjects the owner to different restrictions and benefits.

Without a grandfathered right, a person may not withdraw groundwater from a non-exempt well in an AMA unless the person obtains a groundwater withdrawal permit

from the director. Arizona allows seven categories of groundwater withdrawal permits. They are the following:

1. Dewatering permit;
2. Mineral extraction and metallurgical processing permit;
3. General industrial use permit;
4. Poor quality groundwater permit;
5. Temporary permit for electrical energy generation conditions and temporary dewatering permit;
6. Drainage water permit; and
7. Hydrologic testing permit.

Each permit has separate requirements, priorities and durations. After receipt of an application, the director may conduct independent investigations to determine if the application should be accepted or rejected.[66] The director is to publish notice of the application once each week for two consecutive weeks in a newspaper of general circulation in the counties in which the applicable AMA is located.[67] Objections may be submitted in writing and must include the name and address of the objector and state the reasons the application should not be accepted.[68] An administrative hearing may be held if the director deems it necessary.[69] A person whose application is denied or a person who contested a permit may seek judicial review of the decision in superior court.[70]

Transportation of groundwater

Groundwater transportation rules in Arizona are extremely complex and contain multiple specific restrictions. The basic rule is that groundwater withdrawn may transported without payment of damages within a sub-basin of an AMA pursuant to a grandfathered right or a groundwater withdrawal permit.[71] Groundwater may be transported between sub-basins or away from an AMA, subject to damages, if the groundwater was withdrawn by a city within its service area or by an irrigation district within its service area and transported within its service area or pursuant to a groundwater withdrawal permit or from an exempt well.[72]

There are different rules for withdrawals of groundwater for transportation to AMAs. Groundwater that is withdrawn in a groundwater basin or sub-basin outside an initial AMA may not be transported directly or indirectly to an initial AMA unless specifically authorized, and any transportation authorized is subject to payment of damages. Basins have their own specific rules regarding groundwater withdrawn in its area and then transported to an AMA.[73]

Management of AMAs

Statutes establish management goals for each AMA.[74] The director must develop a management plan for each initial AMA for each of the five periods described below.[75] The plans shall include a continuing mandatory conservation program for all persons

withdrawing, distributing or receiving groundwater designed to achieve reductions in withdrawals of groundwater.[76] A person with an irrigation grandfathered right or any farm owner is exempt from farm water duties if there are ten or fewer irrigation acres and the farm is not part of an integrated farming operation.[77]

Arizona created five management periods for which the department must compose management plans with increasing water restrictions. The first period was from 1980 to 1990. Each subsequent period lasts ten years. In each subsequent period, both the water duty and conservation requirements are tightened. In the first management period, the management plan established an irrigation water duty and a conservation program for all non-irrigation uses.[78] In each subsequent period, the director must implement additional restrictions such as a non-per capita conservation program for municipal providers, public education programs relating to water conservation, creating a program for the purchase and retirement of grandfathered rights. The Arizona department of water resources develops the conservation requirement with assistance from users in the AMAs. Each plan is published after development.[79]
Arizona requires certificate of assured water supply for a person who wants to offer subdivided lands in an AMA.[80] Assured water supply means sufficient groundwater, surface water or effluent of adequate quality will be available to satisfy the water needs of the proposed use for at least 100 years.[81] Sufficient groundwater means that the proposed withdrawals the applicant will make over a period of 100 years will be of adequate quality and will not exceed in combination with other withdrawals a depth to water of one thousand feet or the depth of the bottom of the aquifer, whichever is less.[82]

3. Other Provisions

Out of State Transfers

Although Arizona has a specific out of state transfer statute used for surface water, ground water uses the transportation rules stated above to control all transfers, even out of state transfers. In Arizona, ground water transfers focus on basin to basin transfer, not on state lines.

Underground Storage

In 1986 the Arizona Legislature established the Underground Water Storage and Recovery program to allow persons with surplus supplies of water to store that water underground and recover it at a later time for use by the storer. In 1994, the Legislature enacted the Underground Water Storage, Savings, and Replenishment Act (UWS), which further defined the recharge program. The recharge program is administered by ADWR. A person who wishes to store, save, or recover water through the recharge program must apply for permits. Up to three permits may be required. The first is a facility permit; and there are four types of facility permits. An underground storage facility permit (USF) allows the permit holder to operate a facility that stores water in the aquifer. The director

may issue a permit to operate an underground storage facility if the director determines that all of the following apply:

1. The applicant has the technical and financial capability to construct and operate the facility.
2. Storage of the maximum amount of water is hydrologically feasible.
3. Storage at the facility will not cause unreasonable harm to land or other water users in the area over the duration of the permit.
4. The applicant has agreed in writing to obtain any required floodplain use permit from the county flood control district before beginning any construction activities.
5. The director of environmental quality has determined that the facility is not in a location that will promote either the migration of a contaminant plume or the migration of a poor quality groundwater area so as to cause unreasonable harm or is not in a location that will result in pollutants being leached to the groundwater table so as to cause unreasonable harm.[83]

The second facilities permit is a groundwater savings facility permit (GSF) which allows the permit holder to deliver a renewable water supply to a recipient who agrees to replace groundwater pumping with in lieu water. The recipient must agree in writing that for every gallon of water received, the recipient will reduce groundwater withdrawals from within an AMA or an INA by one gallon.[84] A constructed underground storage facility permit allows for water to be stored in an aquifer by using some type of constructed device like an injection well. The last type of facility is a managed underground storage facility permit which allows for water to be discharged to a naturally water-transmissive area such as a stream bed that allows the water to percolate into the aquifer without the assistance of a constructive device. A water storage permit allows the permit hold to store water at a USF or GSF. In order to store water, the storer must provide to the Department evidence of its legal right to the source water proposed for recharge. Water storage must occur at a permitted facility.[85] Finally, a recovery well permit allows the permit holder to recover long-term storage credits or to recover stored water annually. The recovery may not damage other land and water users.

Water that has been stored pursuant to a water storage permit may be used or exchanged only in the manner in which it was permissible to use or exchange the water before it was stored and may be used only in the location in which it was permissible to use the water before it was stored.[86] All recharge permit holders are required to file annual reports with the Arizona department of water resources (ADWR). The information compiled from these reports includes how much water was stored at each storage facility, how much water was stored under each permit, and how much stored water was recovered on an annual and long-term basis. ADWR uses this information to update long-term storage credits. When eligible water is stored underground for more than one year, long-term storage credits may be issued. Long-term storage credits are credits earned in the process of storing water. Stored water is usually eligible for long-term storage credits when:

1. The water cannot reasonably be used directly.
2. The water was not recovered on an annual basis.
3. The water would not have been naturally recharged within an AMA.

A holder of long-term storage credits may assign by grant, gift, sale, lease or exchange all or part of the holder's long-term storage credits, so long as the stored water would have qualified for long-term storage credits had the assignee stored the water.

CALIFORNIA

California has had a chronic concern with finding enough water to meet demand. State law does not coordinate surface water and groundwater use. Surface waters and "subterranean streams flowing through known and definite channels" are regulated through a comprehensive statutory structure. Groundwater that is not flowing in known and definite channels is regulated separately from surface water through common law principles. Landowners overlying a groundwater basin have an absolute right to withdraw water beneath their land; each landowner has equal and correlative rights, but these rights are superior to appropriative rights. Groundwater users who do not own overlying lands are appropriators; when basins are overdrawn, appropriation rights cannot be acquired, except by prescription; when basins are not in overdraft, rights can be acquired by developing wells and conveyance systems. Counties are increasingly adopting groundwater ordinances that seek to protect basins from overdraft and prohibit pumping when overdraft occurs, but the approaches taken by counties to do so vary widely. Counties manage groundwater through conjunctive use and banking projects.[87]

1. Constitutional Provisions

Under the California Constitution, the use of water is limited to its beneficial use without waste:[88] *"The right to water or to the use or flow of water in or from any natural stream or water source in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water."*[89] The state controls the use of water. Riparian use is limited to reasonable use. This constitutional provision has only been applied to surface but could be interpreted to include groundwater.[90]

2. General Provisions

Groundwater Rights

California is unique in western water because of its use of both riparian rights and prior appropriation rights. Riparian rights in a stream or water course attach to the land, but the flow may only be diverted under reasonable methods of diversion and used for reasonable and beneficial uses.[91] There are three basic rights in groundwater: an overlying right, an appropriative right, and a prescriptive right. An overlying right is analogous to that of a riparian; where as it is the right of owner of the land to take water from the ground underneath for use on his land within the watershed, this right is appurtenant to the land. An appropriative right is any taking of water for other than riparian or overlying use. Prescriptive rights refer to rights against either overlying or appropriative right holders that ripen under adverse possession. Each right has a different priority ranking.

Rights of the overlying landowner are paramount and the right of an appropriator is limited to the surplus. The appropriator must yield to the overlying owner in the event of shortage, unless the appropriator has gained prescriptive rights through taking non-surplus waters. Between overlying owners, the rights are correlative so each may only use his reasonable share when water is insufficient to meet the needs of all. Between appropriators, "first in time, first in right" applies. An appropriative taking of water which is not surplus is wrongful but it may ripen into a prescriptive right where the use is open and notorious, hostile and adverse to the original owner with continuous and uninterrupted use for 5 years.

No agency has comprehensive authority to define the character or extent of groundwater or regulate groundwater state wide. Courts have jurisdiction to determine some groundwater rights and to limit pumping through adjudication (only 12 basins have been adjudicated). Courts have resolved discrete conflicts or developed comprehensive allocation plans for particular basins. Courts only have authority to determine the existence, extent and character of a groundwater user's rights but not prospective rights of overlying owners. If there is insufficient water to satisfy overlying owners, courts can limit pumping to a safe yield and require proportional sharing to reduced extractions based on the historic pumping rate as an average of the past five years. (This may create a race to the pumphouse mentality where there is no benefit to conservation because it will only increase the supply available for prescription.)

Groundwater Agencies

The State Water Resources Control Board (SWRCB) regulates groundwater under authority of the state constitution for reasonable and beneficial use and to prevent waste. The state determines what surface and underground water can be converted to public use or controlled for public protection.[92] State law encourages water management at a local or regional level,[93] and local agencies manage groundwater. Special act districts create agencies to regulate groundwater in specific basins. Powers depend on each enabling act and may include the following:

1. Storing and capturing water in groundwater basins;
2. Requiring conservation;
3. Controlling groundwater extractions by regulating, limiting or suspending extractions from extraction facilities, the construction of new facilities, the enlargement of existing facilities and reactivation of abandoned extraction facilities;
4. Regulating replenishment programs;
5. Determining groundwater space available in the groundwater basin and allocate available storage space;
6. Commencing and prosecuting actions to enjoin unreasonable uses and methods of groundwater use;
7. Defining and quantifying rights to groundwater within the district in times of shortage;

8. Requiring well registration and extraction statement, determine well spacing and prohibiting well interference;
9. Controlling places of use;
10. Prioritizing uses;
11. Restricting and regulating exportation by requiring a permit.[94]

Districts may also be created by a General Act which includes Irrigation Districts, County Water Districts, Water Districts, Water Storage Districts Reclamation Districts County Waterwork Districts, Drainage Districts, Water Replenishment Districts, Levee Districts, Municipal Water Districts, and Water Conservation Districts.[95] These districts only have limited statutory powers to conduct certain groundwater management activities, and have no authority to directly regulate or limit extractions or define rights. They can only have indirect regulation through assessing fees, managing replenishment programs, and participating in litigation that affects the quality. Water Replenishment Districts are formed to replenish groundwater supplies within district boundaries. Their purpose is to replenish groundwater by buying, selling and exchanging water, protecting quality, and put to beneficial use water under their control.[96]

Four counties have passed their own ordinances to regulate groundwater extraction under state law providing for Groundwater Management Plans.[97] This provision applies to all groundwater basins in the state except for basins already adjudicated. Its purpose was to clarify the authority of local water agencies to manage and regulate groundwater and adoption by counties is optional. Plans are to include components relating to the monitoring and management of groundwater levels within the groundwater basin, groundwater quality degradation, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin.[98] The local agency must also have a plan that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the basin.[99] Finally, a map that details area of the groundwater basin must be prepared by the local agency.[100] The groundwater management plans may include the following:

1. The control of saline water intrusion;
2. Identification & management of wellhead protection areas & recharge areas;
3. Regulation of the migration of contaminated groundwater;
4. Administration of a well abandonment and well destruction program;
5. Mitigation of conditions of overdraft;
6. Replenishment of groundwater extracted by water producers;
7. Monitoring of groundwater levels and storage;
8. Facilitating conjunctive use operations;
9. Identification of well construction policies;
10. Construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects;
11. Development of relationships with state and federal regulatory agencies;

12. Review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.[101]

A local agency adopts rules and regulations to implement and enforce these plans, but the agency may not limit or suspend extractions unless it has determined through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen the demand for groundwater.[102] County groundwater management is seen as part of the municipal police power to enact laws protecting public health, safety and welfare. State law does not preempt county regulation because no comprehensive state-wide regulatory scheme exists.

Other Groundwater Provisions

Waste is defined as permitting water to flow from an artesian well either into a natural watercourse unless used thereafter for irrigation or domestic use; or into the street; or upon the public lands of the U.S. or State unless for irrigation, domestic use or propagation of fish.[103] If artesian well water is used for irrigation, and if over five percent escapes from the land, the use is waste.[104] Storage is not waste if thereafter used for beneficial use.[105] If an artesian well is not capped or equipped with a mechanical device to prevent flow of any water from the well, it is a public nuisance.[106]

Groundwater users who find an alternate non-tributary source in order to prevent further depletion of the water in the basin are protected by law.[107] The alternate source counts as reasonable use for the purpose of establishing and maintaining the right to extract. Groundwater rights are protected if the user fails to use any part of the water as a result of conjunctive use of surface water and groundwater involving the substitution of an alternate supply for the unused portion of the surface water or reduction in the use of the appropriated water. The non-use is to be considered as equivalent to a reasonable and beneficial use of water.[108]

Subterranean streams flowing through known and definite channels are subject to appropriation like surface water.[109] In contrast, underground water supply is expressly excluded from appropriation.[110] Specific basins (the Sacramento and Delta-Central Sierra) are banned from exporting groundwater unless in compliance with a groundwater management plan.[111] Underground storage of water is a beneficial use if applied for a beneficial purpose after storage.[112]

In Riverside, San Bernardino, Los Angeles and Ventura counties, groundwater pumpers who take more than 25 acre feet in any year must file with the Board a "Notice of Extraction and Division of Water."[113] Failure to file shall be deemed equivalent to non-use in such year.[114] These counties are distinguished due to the combination of light rainfall, concentrated population, the transition of considerable areas of land from agricultural use to urban use, and a similar dependence on groundwater supplies which

prevails in these counties. Also, most of their underground water supplies are overdrawn.[115]

State law prohibits the use of groundwater for certain purposes like golf courses if reclaimed water is available and reasonably priced.[116]

Every year, the Southern California Water Replenishment District must prepare a survey and report regarding groundwater supplies of the district including determination of the overdraft, production of groundwater, changes in water pressure, estimate of current and ensuing year overdraft, and estimate of production.[117] The Board compiles all the information from the districts and finds the annual overdraft for the preceding year, estimates for current and ensuing year, accumulating overdraft and production.[118] The board then determines cost of purchasing water paid by the replenishment assessment and what to spend.[119] The replenishment assessment is levied on each producer excess of said adjudicated share of the natural safe yield by the rate of replenishment assessment.[120]

California law recognizes that the conjunctive use of groundwater and surface water is an effective way to increase reliability of the water supply so it has set aside grant money for conjunctive use projects. The money, upon appropriation by the Legislature to the department, may be used by the department for grants for feasibility studies, project design, or the construction of conjunctive use projects on a pilot or operational scale.[121]

3. Other Provisions of California Law

Given the lack of state regulation of ground water, four counties have passed their own laws to deal with ground water pumping. Below are two examples of what counties are doing to regulate ground water.

County Ordinances

The Orange County Water district act authorizes county officials to do the following:

1. Distribute water to persons in exchange for ceasing or reducing groundwater extractions;
2. Provide for conjunctive use;
3. Store water in underground basins;
4. Determine the amount and percentage of water produced from groundwater supplies within the district to the total amount produced within the district by all persons and operators and require that persons produce more or less of their water needs from the groundwater;
5. Investigate groundwater conditions of the district;

6. Levy an assessment. [122]

The Mono County Tri-Valley Groundwater Management District Act authorizes their county management board to do the following:

1. Prepare an annual report on groundwater supplies and conditions in the district including groundwater management objectives and a plan of implementation of those objectives.
2. Store water either in reservoirs or in groundwater basins, acquire water, purchase and import water, buy and sell water, exchange water, commence and prosecute actions to enjoin unreasonable uses of water.
3. Issue water permits for the export of groundwater. In the event the board limits users because of overdraft, rights to use shall be allocated primarily on the basis of the number of acres overlying the basin or sub-basin that a user owns or leases in proportion to the total number of acres overlying the basin or sub-basin. The board will also consider the number of acres actually irrigated compared to the number of acres owned or leased, crop type, wasteful or inefficient use, reasonable need, water conservation activities, and other equitable factors.[123]

Groundwater Recharge Fund

Under the 1985 Water Conservation and Groundwater Recharge Bond Fund, the legislature can appropriate money for loans to local agencies for projects to recharge groundwater reservoirs. The department may enter into a contract for a loan if it finds that the agency has the ability to repay the requested loan, that the project is economically justified, and that the project is feasible from an engineering and hydrogeologic viewpoint. However, any contract concerning an eligible project for artificial groundwater recharge shall include, in substance, all of the following requirements:

1. An estimate of the reasonable cost and benefit of the project, including a feasibility report which shall set forth the economic justification and the engineering, hydrogeologic, and financial feasibility of the project, and shall include explanations of the proposed facilities and their relation to other water-related facilities in the basin or region.
2. An agreement by the agency to proceed expeditiously to complete the project in conformance with the approved plans and specifications and the feasibility report and to operate and maintain the project properly upon completion throughout the repayment period.
3. Loans shall be for a period of up to 25 years with an interest rate set annually by the department at 50 percent of the average interest rate paid by the state on general obligation bonds in the calendar year immediately preceding the year in which the loan agreement is executed.

4. No single project may receive more than five million dollars ($5,000,000) from the department.

5. The department shall give priority to projects of agencies located in overdrafted groundwater basins and those projects of critical need, to projects whose feasibility studies show the greatest economic justification and the greatest engineering and hydrogeologic feasibility as determined by the department, and to projects located in areas which have existing water management programs.

COLORADO

In Colorado, groundwater regulations depend on how the basin is classified. First, Colorado groundwater is broadly classified into designated groundwater (groundwater within a designated groundwater basin and not available to or required for fulfilling surface water rights) and non-designated groundwater (water located outside of designated groundwater basins). Designated groundwater is regulated by the Colorado Groundwater Commission (CGWC); non-designated groundwater is regulated by the State Engineer and Water Courts. Eight groundwater basins have been designated in the Front Range and in Eastern Colorado. Groundwater basins located outside of designated areas are classified into one of three following sub-categories: Tributary Groundwater, Non-tributary Groundwater, and Not Non-tributary Groundwater. Although Colorado law is quite complex it is built on the idea that groundwater and surface waters are interconnected, and groundwater is presumed to be tributary unless otherwise designated. The Colorado Geological Survey's *Groundwater Atlas of Colorado* is a comprehensive study of the location, geologic and hydrologic characteristics, and water quality of the state's major aquifers and groundwater resources.[124]

1. Constitutional Provisions

Colorado is a traditional prior appropriation state. The Colorado Constitution establishes this regime in two sections that address water. First, Art. XVI. § 5 declares that water of streams is public property.[125] Art. XVI. § 6 states the right to divert unappropriated waters of any natural stream to beneficial uses shall never be denied. Priority of appropriation gives the better right. If there is insufficient water for all uses, domestic purposes have preferences over all other, and then agricultural purposes have a preference over manufacturing.

2. General Provisions Governing Groundwater

Categories of Groundwater

Colorado divides its water into two major categories, surface water and groundwater. Water courts adjudicate surface water. *Groundwater* is defined as any water not visible on the surface of the ground under normal conditions.[126] Groundwater is then further divided into designated basins, tributary water, non-tributary water, and not non-tributary water. The traditional prior appropriation system was modified when applied to groundwater in order to increase economic development. Colorado's legislature attempted to regulate pumping of groundwater and integrate surface water appropriation with groundwater appropriations when it passed the 1965 Groundwater Management Act and the 1969 Determination and Administration of Water Rights Act. The 1965 Groundwater Management Act differentiated groundwater by location and effect on surface water. The 1965 Act confirmed the standard of prior appropriation for

surface water, but implemented a modified prior appropriation system to determine groundwater rights to allow the full economic development of designated groundwater. The act protected prior appropriations of groundwater and maintained reasonable groundwater pumping levels, but prior appropriations of groundwater did not include the maintenance of historical water levels.[127] The four different kinds of groundwater are defined by this Act. Below is a summary of each type, but a detailed discussion follows.

Designated Water is not interconnected with surface water sources. The Colorado Groundwater Commission establishes designated groundwater basins and holds hearings to determine the extent of the basins. The Commission regulates the designated groundwater basins, and water courts have no authority. Water cannot be appropriated from a designated basin without a permit from the Groundwater Commission. The Commission is also responsible for the administration and the control of pumping in designated basins and has the power to limit extractions which interfere with the prior appropriations and establish reasonable pumping levels. The goal behind designated basins is to stop mining in these specific areas.

Tributary Water is water adjacent to and connected with streams. Water withdrawn that will deplete the natural stream's flow within 100 years of pumping at the rate of 0.1 percent of the annual rate is considered tributary. All groundwater is presumed to be of this type, but that presumption is rebuttable. Water courts have jurisdiction over Tributary Water. It is administered in conjunction with surface water and is governed by prior appropriation rules. Permits are issued via the 1969 Adjudication Act. The state engineer issues permits for new wells and regulates extractions under the priority system to minimize the effects of groundwater withdrawal on senior surface water right holders.

Non-tributary Groundwater is water outside designated basins that is not connected to surface water. More specifically, it will not deplete the flow of a natural stream within 100 years. The doctrine of prior appropriation does not apply to non-tributary groundwater. Thus, it will be allocated based on ownership of overlying land. Reduction of hydrostatic pressure levels and aquifer water levels are allowed for the economic development of this resource. Water courts may decree rights to non-tributary water outside of designated groundwater basins according to overlying land ownership, a hundred year aquifer life, and a withdrawal rate not exceeding one percent per year.[128] Its withdrawal is only limited by beneficial use in amounts based upon conservation of the resource and protection of vested water rights. Non-tributary groundwater is regulated by the state engineer and a permit from the state engineer is required before drilling a well.

Not Non-tributary Groundwater is water in the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers (Denver Basins) that does not satisfy the definition of non-tributary groundwater. Permits are issued by the water courts. The permits for withdrawals must include augmentation plans. Augmentation plans specify replacement water if needed to prevent injury to senior water users. These plans mitigate damages to both surface- and groundwater users. This category is aimed at protecting four aquifers underlying the Denver metropolitan area. Landowners are limited to withdrawing only

the amount of water determined to be underlying the owned land, and annual withdrawals are limited to one percent of the available water.[129]

Water Boards and Basins

The 1965 Act also created the Water Conservation Board. Its duty related to groundwater is to study, to determine the nature and the extent of the groundwater resources of the state; and to examine the effects of withdrawals of groundwater upon aquifer supply and surface flow.[130] The Act also authorizes the creation of groundwater management districts and boards. The district board works with the commission on all groundwater matters affecting the district to determine whether proposed regulations are suitable for the area. The board is also to assist the commission and the state engineer to conserve the groundwater supplies of the area for the maximum beneficial use.[131] The district board also has the authority to regulate the use, control, and conservation of the groundwater of the district covered by permits issued by the commission.

The 1969 Determination and Administration of Water Rights Act created seven divisions along major hydrographic divides with separate water courts and gave them jurisdiction over all surface water and groundwater tributary to surface water.[132] One of the purposes of the act was to focus on the development and use of underground waters of the state, and the Act claims the future welfare of the state depends upon a sound and flexible integrated use of both surface and groundwater.[133]

The 1969 Act integrated tributary groundwater into the surface water regime. Tributary water is administered under the prior appropriation system and the water courts have jurisdiction over it. The 1969 Act also stated that "it is the policy of the state to integrate the appropriation, use and administration of underground water tributary to a stream with the use of surface water in such a way as to maximize the beneficial use of all of the water of this state."[134] The same statute also claims that the existing use of groundwater, either independently or conjunctively with surface water, shall be recognized to the fullest possible extent, subject to preserving existing rights. In addition it goes on to maintain that the use of groundwater may be considered as an alternate or supplemental source of supply for surface decrees entered prior to June 7, 1969.[135]

Designated Basins

As stated above, the 1965 Act also created designated basins. These basins are taken out of water courts' jurisdiction and given to the Groundwater Commission. The Commission determines and administers water rights in designated basins. Any person desiring to appropriate groundwater for a beneficial use in a designated groundwater basin applies to the commission in a prescribed form.[136] The applicant must include the basin from which water will be appropriated, the beneficial use for the water, the location of the proposed well, the name of the owner of the land of the proposed well, the estimated average annual amount of water applied for in acre-feet, the estimated

maximum pumping rate in gallons per minute and the description of the land to be irrigated if appropriate.[137]

When the commission receives an application, it makes a preliminary evaluation to determine if the application may be granted. If so, the application is published and objections may be filed. If there are no objections, the commission grants the application if it finds the appropriation will not unreasonably impair existing water rights from the same source and will not create unreasonable waste. The state engineer then issues a conditional permit.[138] If there are objections, the commission holds a hearing. After the hearing, if it appears that there is no unappropriated water or the appropriation will unreasonably impair existing rights or will create unreasonable waste, the application will be denied; otherwise the state engineer will issue a conditional permit.[139]

When determining if the use will cause unreasonable waste or unreasonably affect other rights, the commission shall consider the area, geographic conditions, average yield and recharge rate, priority and quantity of existing claims, proposed method of use, and all other appropriate matters.[140] An *impairment* is the unreasonable lowering of the water level or the unreasonable deterioration of water quality, beyond reasonable economic limits of withdrawal or use.[141] The three-mile test is used in certain designated basins to assess the effect of the proposed use on other users in the district. Under the three-mile test, a circle with a three-mile radius is drawn around the proposed well site. A rate of pumping is determined which would result in a 40% depletion of the available groundwater in that area over a period of 100 years. If the rate of pumping is already being exceeded by the existing wells, the new application may be denied.[142] If a well application cannot be granted under the above limitations, a well permit may still be issued upon approval of the commission of a replacement plan.[143] A replacement plan is a detailed program to increase the supply of water available for beneficial use in a designated basin for the purpose of preventing material injury to other water rights by the development of new points of diversion, by pooling water resources, by water exchange projects, by providing substitute water supplies, by development of new sources of water or any other suitable means.[144] The commission must approve a replacement plan.[145]

After receiving a permit, the applicant has one year from the date of the issuance of the permit to construct the well or other necessary works to apply the water to a beneficial use. After completion of the well, the applicant has three years from the date of the issuance of the permit to actually put the water to a beneficial use.[146] If the commission finds the water has been put to a beneficial use supported by a sworn affidavit as evidence provided by the applicant, after publication of the information required in the final permit, the commission shall order the state engineer to issue a final permit to use designated groundwater containing such limitations and conditions as the commission deems necessary to prevent waste and protect the rights of other appropriators.[147] The final permit will contain the priority date, the name of the claimant, the quarter-quarter in which the well is located, the maximum annual volume of the appropriation in acre-feet per year, the maximum pumping rate in gallons per minute, and the maximum number of acres which have been irrigated if applicable.[148]

The state engineer has power to enforce this administration and may require valves, impart construction standards, gain access to inspect wells, order the cessation of the use of a well pending correction of the defect, and enjoin the illegal withdrawal of water. The state engineer also has the authority to approve permits for small capacity wells in designated basins if the wells do not exceed 50 gallons per minute and are used in the normal operation of a single-family dwelling, in watering of livestock, in one commercial business, in exclusively monitoring purposes, or in fire fighting.[149]

Non-designated Basins

If the groundwater is non-tributary water outside the designated basin, then permits are issued based on an aquifer life of 100 years.[150] The amount of groundwater available for withdrawal is the quantity of water underlying the land owned by the applicant. An applicant may withdraw water from another's land only with the original owner's consent. The Division of Water Resources published rules and regulations applying to well permits to withdraw groundwater.[151] The allowed annual withdrawal is based on an aquifer life of 100 years, and the allowed average annual amount of withdrawals for all of the wells on the overlying land is not to exceed one percent of the total amount of water, exclusive of artificial recharge, recoverable from a specific aquifer beneath the overlying land. The total amount of water recoverable from a specific aquifer is determined by multiplying the number of acres of overlying land by the average number of feet of saturated aquifer materials in the aquifer underlying those lands by the average specific yield of those saturated aquifer materials. The allowed average annual amount of withdrawal shall be one percent of the total recoverable water.[152] A well shall not be constructed 600 feet within any permitted or existing well.[153]

Denver Area Basins

Denver area basins include the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers that are not part of designated basins. For proposed wells outside designated groundwater basins, the user must apply to the state engineer to withdraw non-tributary or not non-tributary groundwater in these aquifers. The state engineer determines if the requested permit will materially injure the vested water rights of others.[154] If the state engineer finds that there is unappropriated water available for withdrawal by the proposed well and that vested water rights will not be materially injured and can be substantiated by hydrological and geological facts, the state engineer issues the permit. The Division of Water Resources has also promulgated rules and regulations applying exclusively to the withdrawal of groundwater from this basin which assign specific yields for each aquifer and the location of the water table for each aquifer.[155] Landowners are limited to withdrawing only the amount of water determined to be underlying the owned land, and annual withdrawals are limited to one percent of the available water.[156]

Tributary Groundwater

Water courts adjudicate both surface water and tributary groundwater as an integrated system. To withdraw water, an applicant must first show there is still unappropriated water available and that he can and will place the water to a beneficial use with diligence within a reasonable time.[157] Each water court publishes a monthly resume containing all the applications received. Other parties may file a statement of opposition with the water court. The referee of each district has the authority to rule upon determinations of water rights and conditional water rights. The referee looks for a diversion, injury to other users, waste and beneficial use; *beneficial use* is the limit of a water right. Users may not take more water than needed. The state engineer is responsible for the administration and distribution of the water.[158]

Tributary wells are divided into two types, exempt and non-exempt. The following are exempt wells:

1. Wells in designated groundwater basins;
2. Wells not exceeding 15 gallons a minute used for household purposes, fire protection, the watering of poultry or livestock, and for the irrigation of not over one acre of home gardens and lawns;
3. Wells not exceeding 15 gallons a minute and used for drinking and sanitary facilities in individual commercial business;
4. Wells used for firefighting only;
5. Wells not exceeding 50 gallons/minute in production as of May 22, 1971 and used for ordinary household purposes; and
6. Wells used exclusively for monitoring purposes. [159]

All other wells are considered non-exempt. Exempt wells still need to apply for permits from the state engineer, but are exempt for the administration within the priority system.

Not Non-tributary Groundwater

Not non-tributary is groundwater in the Dawson, Denver, Arapahoe, and Laramie Fox Hills aquifers that does not satisfy the definition of non-tributary and is outside any designated basins.[160] Owners of not non-tributary Dawson aquifer wells are required to replace the actual depletions from pumping; while owners of not non-tributary Denver, Arapahoe, and Laramie-Fox Hills aquifer wells are required to replace actual depletions only if the well is located within one mile of the aquifer or stream contact. For wells beyond the one-mile band, the replacement amount is four percent of the annual amount of withdrawal.[161]

3. Other Provisions

Colorado allowed for a test of water banking in the Arkansas River basin in 2001.[162] The rules governing the Arkansas River Water Bank Pilot Program expressly exclude groundwater from water available to be banked.[163] In 2003, the Colorado legislature extended the water banking program to all water districts that requested the program. It remains to be seen if these 2001 regulations will act as guidelines for new regulations promulgated under this new statute and if groundwater is excluded from this program.

Colorado also allows underground storage of water. *Storage* is defined as the impoundment, possession, and control of water by means of a dam. Waters in underground aquifers are not defined as storage except to the extent waters are placed there by other than natural means. Water placed in an underground aquifer is subject to a conditional or decreed right. The Denver Basin aquifers have specific rules and regulations for the permitting and use of water artificially recharged into the aquifers.[164] A recent Colorado Supreme Court decision found that water stored in an aquifer that enters portions of an aquifer beneath neighboring property does not constitute a trespass, so the permission of overlying owners is not necessary. Also, the court found there was no injury because no construction occurred on the neighbor's property.[165]

In Colorado, it is unlawful to divert, carry, or transport by ditches, canals, pipes, conduits, natural streams, watercourses, or any other means any of the water resources found in the state into any other state unless the party obtains a permit to construct a well; if a well permit is not required, the user must obtain an adjudication from the water court for the right to use water outside the state. If a permit has already been issued, a change in use to use outside the state must be approved. Prior to approving an application, the state engineer, groundwater commission or water judge must find that (1) proposed use outside the state is expressly authorized by interstate compact or credited as a delivery to another state pursuant to state law or that the proposed use does not impair the ability of this state to comply with its obligations under any judicial decree or interstate compact, (2) the proposed use of water is not inconsistent with reasonable conservation, and (3) the use will not deprive citizens of the state of the beneficial use of waters apportioned to it by interstate compact or judicial decree.[166]

Finally, inter-basin use of surface water is allowed in Colorado. An appropriator of surface water is not restricted to the basin of origin and this also applies to groundwater with the exception of designated basins. In designated basins, the district may prohibit the use of groundwater outside the boundaries of the district if that would materially affect the rights of any owner or operator of land within the district.[167]

IDAHO

The Idaho legislature determined that groundwater was subject to appropriation in 1951. Domestic wells do not require a permit, but all other appropriations of groundwater do require a permit and license. The state has in place a complicated scheme of conjunctive management. State law requires the Department of Water Resources (DWR) to designate and manage critical groundwater areas and groundwater management areas. Permits may be denied in critical groundwater areas that lack a "reasonably safe supply" for uses at current withdrawal rates; permits in groundwater management areas that have not yet reached critical status are granted only if the DWR determines there is sufficient water. In 2002, the state began implementing the conjunctive administration of groundwater and surface water, including rules for determining when junior rights should be limited and prohibitions on unauthorized uses of water. Idaho's Water Resources Board operates a water bank

1. Constitutional Provisions

The Idaho Constitution has an entire article dedicated to water rights. First, the use of waters is declared public use subject to the regulations and control of the state in a manner prescribed by law.[168] The right to divert and appropriate the unappropriated waters of any natural stream to beneficial uses shall never be denied, except that the state may regulate and limit the use for power purposes.[169] Priority of appropriation shall give the better right as between those using the water.[170] The Constitution also gives preferences to domestic uses over all other uses and agricultural purposes over manufacturing. Also, in any organized mining district, water for mining purposes or milling purposes connected with mining, shall have preference over manufacturing or agricultural purposes. When waters have been appropriated, the dedication is exclusive and the holder shall not be deprived of the annual use of the same when for domestic purposes or irrigation.[171] For persons who settled on land expecting water for agricultural purposes, priority of time shall give the superior right, but when supply is insufficient, the prior right shall be subject to reasonable limitations such as quantity and times of use.[172] Finally, the State Water Resource Agency has power to operate water projects, appropriate public waters as trustee for agency projects, and formulate and implement a state water plan for optimum development of water resources in the public interest.[173]

2. General Provisions

Water is administered by the Department of Water Resources (DWR). The director of the department is to supervise water distribution within water districts among appropriators and to adopt rules and regulations for distribution, pumping levels, and other matters.[174] The director was directed to divide the state into water districts so each public stream and its tributaries constitute a water district.[175] On a district level, a watermaster distributes the water in each district according to the prior rights of each user and shuts the headgates in times of scarcity or to supply the prior rights of others.[176] The

department also contains the Water Resources Board, responsible for implementing a comprehensive state water plan for conservation, development, management and optimum use of all unappropriated water resources and waterways in the public interest subject to legislative approval.[177]

Groundwaters are public waters.[178] Groundwater is treated the same as surface water and both are acquired by prior appropriation. *Groundwater* is defined as all water under the surface of the ground whatever the geological structure in which it is standing or moving.[179] Right to unappropriated waters including groundwater shall be acquired only by appropriation under an application, permit and license procedure.[180] Appropriation must be for a beneficial purpose and if the appropriator ceases to use the water, the right also ceases.[181] Priority is first in time, first in right.[182] Domestic purposes is limited to water for homes, organization camps, public campgrounds, livestock and for any other connected purpose including irrigation of up to one-half acre of land if the total use is not in excess of 13,000 gallons per day or any other uses if total use does not exceed a diversion rate of four one-hundredths cfs and a diversion volume of 2,500 gallons per day.[183] Wells for domestic purposes do not require a permit, provided they are subject to inspection by the DWR and the Department of Environmental Quality and the drilling is authorized by a license.[184] Rights to groundwater for domestic purposes may be acquired by withdrawal and use.[185] Any application for a water permit that seeks to transfer groundwater outside the immediate basin for the purposes of irrigating 5,000 or more acres on a continuing basis for an excess of 10,000 acre feet per year must be approved by the director and the Idaho legislature.[186]

Administrative rules deal with how to manage the conjunctive use of surface and groundwater. These rules prescribe procedures for responding to a delivery call made by the holder of a senior-priority surface or groundwater right against the holder of a junior priority groundwater right in an area having a common groundwater supply.[187]

Critical Groundwater and Groundwater Management Areas

Groundwater areas can be designated either a critical groundwater area or a groundwater management area. A critical groundwater area does not have sufficient groundwater to provide a reasonable safe supply for irrigation or other uses at the current rates of withdrawal.[188] The director may approve a groundwater management plan that provides for managing the effects of groundwater withdrawals on the aquifer or on any other hydraulically connected sources of water.[189] If an application is made for a critical area, the director may deny the application if he finds from investigation that there is insufficient water available at the location. Within a critical area, the director may require all right holders to report withdrawals of groundwater and other necessary information for the purpose of assisting him in determining available groundwater supplies and their usage. Upon determination that there is insufficient groundwater supply to meet the demands of water right holders within all or portions of a critical groundwater area, the director shall order water rights holders on a time priority basis to

cease or reduce withdrawal of water until the director determines there is sufficient groundwater.[190]

A groundwater management area is any groundwater basin or designated part that may be approaching the conditions of a critical groundwater area.[191] They are treated the same as critical areas in many ways. The director may approve a groundwater management plan for these areas that will provide for managing the effects of groundwater withdrawals on the aquifer and on any other hydraulically connected sources of water. The director may require all water right holders to report withdrawals of groundwater and other necessary information for determining available groundwater supplies and their usage. Upon determination that there is insufficient groundwater supply to meet the demands of water rights holders within all or a portion of a water management area, the director shall order rights holders on a time priority basis to cease or reduce withdrawal of water until the director determines there is sufficient groundwater.[192] Management area applications for permits have a slightly lower standard than critical areas. Applications made within a groundwater management area shall be approved by the director only after he has determined on an individual basis that sufficient water is available and that other prior water rights will not be injured.[193]

Within two years after a decree determining the water rights within a critical groundwater area becomes final, the director of the department of water resources will make a finding as to whether an adequate management program exists to bring withdrawals into balance with recharge.[194]

Groundwater Withdrawals

Any person intending to use groundwater must apply to the department of water resources for a permit before commencing construction.[195] An application must include the nature of proposed uses, the location of the diversion, the amount of water to be diverted, and the time required for completion of the project. [196] The application must also include a plan and map of the proposed works for the diversion and application of the water to a beneficial use, showing the location and dimensions of the proposed reservoir, dams, canals, etc. and the area and location of the lands proposed to be irrigated, or location of use.[197] All rights to use water acquired will be lost and forfeited by a failure for the term of five years to apply it to the beneficial use for which it was appropriated.[198] The water will then revert to the state and be subject for appropriation.[199]

Upon receipt of an application to appropriate the water, the department of water resources publishes a notice in a newspaper printed in the county where the point of diversion lies.[200] Any person concerned with the application may file a written protest.[201] A hearing must be held if there are protests; if no protest is filed, then the director of the department may approve the application.[202] The director of the department of water resources may reject an application for any one of the following reasons:

1. It will reduce the quantity of water under existing water rights;
2. The water supply itself is insufficient for the purpose for which it is sought to be appropriated;
3. It appears to the satisfaction of the director that such application is not made in good faith, is made for delay or speculative purposes;
4. The applicant has not sufficient financial resources with which to complete the work involved;
5. It will conflict with the local public interest;
6. It is contrary to conservation of water resources within the state; or
7. It will adversely affect the local economy of the watershed or local area within which the source of water for the proposed use originates in the case where the place of use is outside of the watershed or local area where the source of water originates. [203]

Adjudication of Water Rights

If an owner of a groundwater right believes her right is being adversely affected by a user with a later priority, she may make a written statement to the director.[204] Local groundwater boards are formed for hearing these claims.[205] The board consists of the director, a qualified engineer or geologist, and a third member appointed by the other two who shall be a resident irrigation farmer.[206] The board has the authority to determine the existence and nature of the respective water rights claimed by the parties and whether the use of the junior right affects the use of the senior.[207] If the board finds the junior use affects the senior, the board may order the junior right to cease using the right to protect the senior.[208]

Any claimant may also file suit in the district court for the purpose of adjudicating rights to the use of water from any water system for which a general adjudication has not been commenced or completed in the county where the point of diversion or place of use of the claimed right is located.[209] The claimant must join all other water users from the water system whose joinder is necessary to resolve the dispute over rights to the use of water from the system. Five or more or a majority of the users of water from any water system may petition the director to request the attorney general to file an action to commence a general adjudication.[210] If the director deems that the public interest and necessity will be served by a determination of the water rights of that water system, the director shall request the attorney general to file an action to commence the general adjudication. The director may also request adjudication on his own initiative.[211] Each claimant of a water right acquired under state law has the ultimate burden of persuasion for each element of a water right.[212]

3. Other Provisions

Idaho's legislature encourages groundwater recharge projects.[213] Appropriation and underground storage of water for purposes of groundwater recharge is a beneficial use and the Department of Water Resource may issue permits for the appropriation and underground storage of unappropriated waters in an area of recharge.[214] These rights are secondary to all prior perfected water rights. Incidental recharge may not be used as the basis for a claim of a separate or expanded water right.[215] In 1997 the state legislature enacted a pilot program for four counties, Jerome, Lincoln, Gooding and Twin Falls counties.[216]

Any person intending to withdraw water from any underground water source in the state and transport it for use outside the state must meet all normal requirements for any water appropriation and the director must also find the use of water outside the state is consistent with minimum stream flow requirement. He will also consider the following:

1. Supply of water available to the state of Idaho
2. The current and anticipated water demands of Idaho
3. Whether there are anticipated water shortages in Idaho:
    a. If the water subject to appropriation would alleviate anticipated shortages;
    b. Supply and sources available in the state of use; and/or
    c. Demands placed on the supply in the state of use.[217]

MONTANA

Montana state law provides that water resources be put to the optimum beneficial use without waste.[218] The state seeks to promote the conservation, development, and beneficial use of the state's water to secure maximum economic and social prosperity for its citizen and to protect and conserve adequate supplies of water for public recreation and for the conservation of wildlife and aquatic life.[219] The Department of Natural Resources coordinates the development and use of water and is required to adopt and amend a State water plan that establishes programs for the conservation, development, and utilization of the water and proposes ways to apply the water for the benefit of the people.[220] The state also implemented a Groundwater Plan in 1999. The Montana Groundwater Plan sets forth recommendations for improving public and private management of the State's groundwater with a goal of sustaining current and future uses.[221] In addition, the state created a groundwater characterization program which systematically assesses and documents the hydrogeology and quality of the state's major aquifers, and implemented a groundwater monitoring program which produces and maintains a long-term record of groundwater chemistry and water level changes based on information collected from a statewide network of observation wells.[222]

1. Constitutional Provisions

The new Montana Constitution ratified in 1972 recognized and confirmed all existing rights to use the waters for any useful or beneficial purpose.[223] All surface, underground, flood and atmospheric waters within the boundaries of the state are the property of the state subject to appropriation for beneficial uses as provided by law.[224] In addition, the Constitution requires the legislature to provide for the administration, control and regulations of water rights and establish a system of centralized records.[225]

2. General Provisions

Under Montana law, *groundwater* means any water that is beneath the ground surface.[226] In 1979, the Montana Supreme Court issued an order to commence procedures for the general adjudication of existing rights to the use of water.[227] All persons claiming an existing right to use water were given a three-year window to file their use with the department.[228] The order declared that failure to file a claim as required by law would result in a conclusive presumption that the water right or claimed water right has been abandoned.[229] Claims for existing rights for livestock and individual domestic uses based upon instream flow or groundwater sources and certain claims for rights in the Powder River basin were exempt from the filing requirement, but the claims could be voluntarily filed.[230]

Montana is divided into four water divisions and the Water court presides over each division for the purpose of adjudicating existing water rights. Since all claims cannot be adjudicated at once, claims are being decreed basin by basin for each of Montana's 85 basins.[231]

Prior Appropriation

Montana is a prior appropriation state for groundwater,[232] but priority does not include the right to prevent changes by later appropriators in the condition of water occurrence, such as the increase or decrease of the water table, artesian pressure, or water level, if the prior appropriator can reasonably exercise the water right under the changed conditions.[233] If an appropriator ceases to use all or part of an appropriation with the intention of abandoning the right or if the appropriator ceases using the appropriation right according to its term or ceases to use the right for a period of ten successive years, the right is considered abandoned and must immediately expire.[234] District courts supervise the distribution of water among all appropriators.[235]

A person may not appropriate water or commence construction of diversions without a permit from the Department of Natural Resources.[236] There are different criteria for obtaining a permit depending on how much water the application requires. If the amount is less than 4,000 acre feet, then the applicant must prove by a preponderance of evidence that:

1. The water is physically and legally available at the point of diversion in the amount the applicant seeks;
2. The water rights of a prior appropriator will not be adversely affected;
3. The proposed means of diversion, construction, and operation are adequate;
4. The proposed use is beneficial; and
5. The applicant has a possessory interest, or written consent from a person with possessory interest, in the property where the water is to be beneficially used.[237]

If the appropriation is for 4,000 or more acre-feet of water a year and 5.5 or more cubic feet per second of water, the applicant must also prove all the above requirements but by clear and convincing evidence. In addition, the applicant must prove by clear and convincing evidence that the proposed appropriation is for a reasonable use. Follows is a list of what reasonable use is based on:

1. The existing demands on the state water supply as well as projected demands and minimum stream flows for the protection of existing water rights and aquatic life;
2. The benefits to the applicant and the state;
3. The effects on the quantity and quality of water for existing beneficial uses in the source of supply;

4. The availability and feasibility of using low-quality water for the application's purpose;
5. Effects on private property rights by any creation of or contribution to saline seep; and
6. The probability of significant adverse environmental impact of the proposed use of water as determined by the department.[238]

The above standards apply to all water appropriations, but groundwater has an additional requirement which is: the department may not approve a permit to appropriate groundwater in excess of 3,000 acre-feet per year unless the applicable criteria for issuing a permit is met and the department petitions the legislature and the legislature affirms the decision of the department after one or more public hearings.[239] This limitation does not apply to appropriations by municipalities for municipal use or to appropriation for public water supplies.[240]

Limits on Appropriations

There are two methods for limiting groundwater appropriations in Montana. The first is by creating control areas, which only applies to groundwater withdrawals. The second is by a legislative or administrative order. The department may control withdrawals from certain areas by designating them as control areas. For an area to be eligible for controlled status, the groundwater withdrawals must be within the following parameters:

1. Must be in excess of recharge;
2. Excessive groundwater withdrawals are very likely to occur in the near future based on current increases in withdrawals;
3. Significant disputes regarding priority of rights, amount of water in use, and other issues are in progress;
4. Groundwater levels are declining or have declined excessively;
5. Excessive groundwater withdrawals would cause contaminated migration;
6. Groundwater withdrawals adversely affecting water quality are occurring or are likely to occur; and
7. Water quality in the area is not suited for a specific beneficial use.[241]

Three entities may request a designation of control areas. The department may make such a motion, a state or local public health agency may petition for identified public health risks, or water users may petition for the designation. After holding a public hearing, the department may designate the area as controlled if the public health, safety, or welfare requires such action and if there is either wasteful use from wells or undue interference with existing wells.[242]

Once an area is designated as controlled, the order may allow closing the controlled groundwater area to further appropriation. The order may determine a permissible total withdrawal of groundwater in the controlled area by day, month, or year and allow the department to apportion the permissible totals among appropriators holding

valid rights to use groundwater in the control area in accordance with the priority dates. The order may also accord preference to certain uses like domestic without reference to the priority date. The department may reduce the permissible withdrawal of groundwater by any appropriator in the control area or require a rotation system. The department may make any additional requirements that are necessary to protect the public health, safety and welfare of the state.[243]

If, after the hearing, there is not sufficient evidence to designate the area as controlled, the department may order it to be a temporary controlled groundwater area. The order may include all the corrective provisions as a control area, but may only continue for two years. The order may be extended for an additional two years if there is sufficient cause. During the two-year period, the department must study the area to assist in the designation of the area.

To receive a permit in a control area, an appropriator must follow the same procedure as described above. The department may not grant a permit if the withdrawal would be beyond the capacity of the aquifer to yield groundwater within a reasonable or feasible pumping lift or within a reasonable or feasible reduction of pressure.[244]

The second way to limit appropriations is for the legislature to preclude permit applications by law or the department may by rule reject permit applications or condition permits already issued by rule. A petition must be signed by at least 25 percent or ten of the users of water in the source, whichever is less, or upon petition of the Department of Environmental Quality. The petition must allege either there is no unappropriated water in the source, rights of prior appropriators will be adversely affected, further uses will interfere unreasonably with other planned uses for which a permit has been issued, or water quality issues.[245]

This method of limiting appropriations has been used multiple times in Montana, but has usually excluded groundwater. For example, the legislature has closed the Teton River Basin to future appropriations, but the closure does not apply to groundwater.[246] The legislature also closed the Upper Clark Fork River basin.[247] This closure also does not apply to groundwater, but another statute requires a report addressing the hydrologic connection between the source of the groundwater and surface water for groundwater applications in the Upper Clark Fork River.[248] The department may issue a permit to appropriate groundwater if the applicant includes an augmentation plan and if the applicant proves by a preponderance of evidence, in addition to other permit criteria, that the augmentation plan provides sufficient augmentation water in amount, time, and location to replace depletions of senior water rights.[249] In addition, multiple administrative rules have been passed that close basins to surface application, but allow groundwater applications if the applicant provides sufficient factual information so the department can determine if the source of the groundwater is part of or substantially connected to surface water.[250] The legislature has also closed the Jefferson River basin and the Madison River basin.[251] This also excludes groundwater, but groundwater is defined as any water beneath the land that is not immediately or directly connected to surface water.[252] A similar statute applies to the upper Missouri River basin.

The department has also promulgated special administrative rules that only apply to Yellowstone National Park.[253] Applicants within the Park must meet all the ordinary requirements. Permits issued must also comply with the U.S. National Park Service-Montana Compact. The rule requires a well log report and supplement after drilling the well. Only the National Park Service can object to these permits.

Beneficial Uses

The state, any political subdivision or agency of the state, or any federal agency may apply to the department to obtain a state water reservation for existing or future beneficial uses or to maintain a minimum flow, level, or quality of water throughout the year.[254] The application follows the same procedure as application for the use of water.[255] The applicant must establish to the satisfaction of the department by a preponderance of evidence the purpose and need for the reservation, the amount of water necessary for the purpose of the reservation and that the reservation is in the public interest.[256]

3. Other Provisions

Compacts

Many of the state's compacts with both Indian reservations and with the U.S. government do include groundwater provisions in the terms. For example, the Fort Peck Indian/Montana compact states the tribes of the Fort Peck Indian Reservation have the right to divert from the Missouri River and groundwater beneath the Reservation a specific quantity of water.[257] The compact with the National Park Service also includes limitations on groundwater appropriations.[258]

Out of State Use

The department cannot approve a permit for out-of-state use unless the applicant proves by clear and convincing evidence that the applicant meets the in state permit conditions which vary depending on the amount of the appropriation. The applicant must then show the out-of-state use is not contrary to water conservation in Montana and the out-of-state use is not otherwise detrimental to the public welfare of the citizens of Montana. The department will consider the factors that influence in-state needs like whether there are present or projected water shortages within the state of Montana and if the proposed water could feasibly be transported to alleviate water shortages within the state. The department will also consider the state of use's water supply availability to the applicant, and the demands placed on the applicant's supply in the state where the applicant intends to use the water.[259]

Oil and Gas Development

Within a designated controlled groundwater area where oil and/or gas wells produce water associated with oil and gas, the volume of production is dependent entirely on the oil and or gas withdrawals, and under the jurisdiction of the Board of Oil and Gas Conservation. This board holds hearings pertaining to the production, use, or disposal of water from those wells. The department may only petition the board of oil and gas conservation for hearings.

Coal bed methane extraction is distinguished from other oil and gas wells. Groundwater produced in association with a coal bed methane wells must be managed either by using it for irrigation or stock water or for any other beneficial use, reinjected to an acceptable subsurface strata or aquifer, discharged to the surface or surface waters or managed through other methods allowed by law.[260] A developer of a coal bed methane well that involves groundwater which is a source of supply for appropriative rights holders must offer reasonable mitigation to each appropriator of that water who holds an appropriation right or a permit that is within one mile of the coal bed methane well or one-half mile of a well that is adversely affected by the coal bed methane well.[261] The mitigation must address the reduction or loss of water resources and provide for prompt supplementation or replacement of water adversely affected by the well. The mitigation is not required to address a loss of well productivity if it does not result in a reduction in the amount of water available.[262]

NEVADA

Under Nevada law, groundwater and surface water are regulated separately under prior appropriation rules; yet in practice, they are managed conjunctively. State law also provides a method for storing surface water underground and then recovering for future use. The mission of the Department of Conservation and Natural Resources - Division of Water Resources is to conserve, protect, manage and enhance the State's water resources for Nevada's citizens through the appropriation and reallocation of the public waters.

1. Constitutional Provisions

The Nevada Constitution provides that the legislature may not restrict municipalities in their procurement of water.[263]

2. Major Provisions

All water in the state may be appropriated for beneficial use; beneficial use shall be the basis, the measure, and the limit of the right to use the water.[264] Water rights are limited to a reasonable amount for beneficial use and for irrigation purposes.[265] Water is appropriated through permits granted by the state engineer; when two or more applications are made for irrigation from the same basin, the state engineer shall observe the following priorities: (1) owner of land for use on that land, and (2) owner of land for use on adjacent land for which he intends to file an application.[266] The state engineer shall approve an application if it is accompanied by the prescribed fees, does not adversely affect the cost of water for other water right holders or lessen the efficiency in delivery, and the applicant proves good faith intent to apply to beneficial use, financial ability and reasonable diligence. The Engineer must approve or reject within one year after the final date for filing a protest and must reject the application if there is no unappropriated water or it is not in the public interest.[267]

Underground waters belong to the public and are subject to appropriation for beneficial use.[268] The engineer can designate basins either by petition or by calling a public hearing. Once a basin is designated, parties must apply and obtain from the state engineer a permit to appropriate the water before performing any work in connection with the boring or sinking of the well. In basins that have not been designated, no permit is necessary until after the well is sunk or bored and water is developed.[269] The state engineer may only issue permits if there is unappropriated water.

Each permit is issued on the condition that the right is related to a specific quantity of water and that right must allow for a reasonable lowering of the static water level at the appropriator's point of diversion. The engineer may grant a permit that lowers the point of diversion of a prior appropriator, so long as any protectible interests in existing domestic wells and the rights of holders of existing appropriations can be satisfied under such express conditions. If the well is for municipal, quasi-municipal or

industrial use and the reasonably expected rate of diversion is one-half cubic foot per second or more, the engineer shall include as a condition that the right to pump water may be limited or prohibited to prevent any unreasonable adverse effects on an existing domestic well located within 2,500 feet of the well, unless the holder of the permit and the owner of the domestic well have agreed to alternative measures that mitigate those adverse affects.

The engineer may also issue rules and regulations for designated areas if the basin is being depleted. He may also designate preferred uses of water and issue temporary permits, and may revoke them if and when water can be furnished by an entity such as a water district.[270] Permits are not required for wells for domestic purposes where the withdrawal does not exceed 1,800 gallons/day. [271]

3. Other Provisions

Projects for recharge, storage and recovery of water require a permit.[272] The California-Nevada Interstate Compact authorizes each state to develop groundwater as long as they don't reduce the amount of water the other state would have received if groundwater were not developed.[273]

NEW MEXICO

New Mexico residents are particularly dependent on groundwater. Groundwater is considered to be public water that is subject to appropriation for beneficial use. The state is divided into 33 groundwater basins, and each basin has a declared date. Water put to beneficial use before that date is recognized as a water right; withdrawals after that date require a permit. Groundwater can be mined as long as that does not cause the aquifer to decline at a rate faster than that which is allowed by the state engineer. Groundwater and surface waters are conjunctively managed: groundwater rights are subject to prior appropriations and applications for new wells must show that drilling will not impair existing rights. Depletion of groundwater may be required to be offset by a return of water to rivers. The City of Albuquerque, for example, offsets water it depletes from wells by returning treated effluent water to the Rio Grande River. The state has developed water banks and water leasing arrangements to deal with prolonged drought. For example, it launched in 2002 a water banking system along the Pecos River in Eastern New Mexico to encourage farmers to make available water that could be delivered to Texas in order to satisfy a compact between the two states. The legislature has also authorized the underground storage and recovery of water so that depleted aquifers can be used as underground reservoirs to store injected water.

1. Constitutional Provisions

The New Mexico Constitution provides that "all existing rights to the use of any waters in this state for any useful or beneficial purpose are hereby recognized and confirmed"[274] and that the water rights available to the public are subject to prior appropriation for beneficial use.[275] Beneficial use shall be the basis the measure and the limit of the right to the use of water.[276] The Constitution also states that all appeals to the district court from a decision of any state executive officer or body in matters relating to water rights will be tried de novo.[277]

2. General Provisions

The Constitution does not mention groundwater, but groundwater was made subject to the prior appropriation doctrine when the legislature passed a comprehensive groundwater statute in 1978. All existing water rights based upon application to beneficial use were recognized and the law was not intended to impair these rights or disturb their priority.[278] Any person claiming to have a vested water right from any underground source by application of waters to a beneficial use may make and file with the state engineer a declaration setting forth the relevant information, and this verified declaration is prima facie evidence of the truth of its contents.[279]

Prior Appropriation and Permits

New Mexico law provides that the water of underground streams, channels, artesian basins, reservoirs or lakes, having reasonably ascertainable boundaries, are declared to be public waters and subject to appropriation for beneficial use.[280] The state engineer declares which underground sources are reasonably ascertainable.[281] Once declared, these sources become available for appropriation, and withdrawal requires permits issued by the state engineer. No permit and license to appropriate underground waters for in-state use is required except in basins declared by the state engineer to have reasonable ascertainable boundaries.[282] Most, but not all groundwater is located in designated basins, and basins are designated by the State Engineer in Special Orders.[283] A permit is required to drill a well, and a permit is also needed to use the water. There are two major exemptions from the permitting process they are: minimal domestic uses and wells deeper than 2,500 feet. Although not exemptions, replacement wells and supplemental wells also have less stringent requirements.[284]

A person desiring to use public waters for irrigation of noncommercial trees, for use on a lawn or garden not to exceed one acre or for household or other domestic use needs to apply to the state engineer. [285] Upon this filing, the state engineer must issue a permit to use the water with the only condition that the user must comply with all applicable municipal ordinances.[286] A person desiring to use public waters for watering livestock must also apply to the state engineer, but the applicant must include proof that the applicant is legally entitled to place livestock on the state or federal land where the water is to be used, has been granted access to the drilling site, and has permission to occupy the portion of the state or federal land as is necessary to drill and operate the well.[287] Also, the state engineer is required to issue a permit if a person wants less than three acre-feet of water not to exceed one year for either prospecting, mining, construction of public works, highways and roads or drilling operations designed to discover or develop the mineral resources of the state, if the state engineer finds the use will not permanently impair existing rights.[288]

Extremely deep wells are also exempt from requiring water permits. No past or future order of the state engineer, declaring an underground water basin having reasonably ascertainable boundaries shall include water in an aquifer, the top of which is 2,500 feet or more below the surface at a location at which a well is drilled and which the aquifer contains non-potable water.[289] Any person wanting to drill wells in these areas must only file a notice of intention with the state engineer and publish, in a newspaper of general circulation, the details of the wells including the depth and purpose of the well.[290] No permit is required. The engineer may require pertinent data and require the well to be metered and the volume reported.[291] Any person who believes his existing water rights are injured from this non-potable water use may file in the district court for damages or injunctive relief.[292]

Groundwater and Artesian Waters

New Mexico distinguishes artesian waters from groundwater, and each has its own use requirements. To appropriate groundwater, an appropriator applies to the state engineer. After receiving an application, the state engineer publishes a notice that the application has been filed in a local newspaper in each county where the water will be or has been put to beneficial use or where other water rights may be affected; any person objecting that the application will impair the objector's water right has standing to file objections or protests. Any entity objecting that the application will be contrary to the conservation of water within the state or detrimental to the public welfare of the state and showing that the objector will be substantially and specifically affected by the application also has standing to file objections or protests.[293] If there are no objections, the state engineer will issue a permit if he finds that there is unappropriated water in the source. He must also find the appropriation would not impair existing water rights from the source, find that it is not contrary to conservation of water within the state, and is not detrimental to the public welfare of the state.[294]

If the owner of a water right or water permit fails to appropriate the water and apply them to use for which the right or permit allows within four years, the state engineer must give the appropriator notice.[295] If one year after the notice, the appropriator still has not used the water, the right will be forfeited and the water unused will revert to the public.[296] The state engineer may grant an extension if there is a proper showing of reasonable cause for the delay or for non-use or if the non-use is in the public interest.[297]

A user may receive a certified decree after adjudication. Either the state engineer or a private party may bring a suit for determination of a right to use the waters of any stream system which includes groundwater basins. All who claim to use the water of the system, as far as they can be ascertained, with reasonable diligence, are made parties.[298] After the adjudication, a decree is issued that includes the priority, amount, purpose, periods and place of use, and if applicable the land to which the right will be appurtenant for each water right adjudged to each party.[299]

Artesian waters are defined to be an artificial well which derives its water supply from any artesian stratum or basin.[300] All artesian waters which have been declared to be public waters shall be under the supervision and control of the state engineer, unless artesian conservancy districts have been organized pursuant to New Mexico laws, then districts shall have concurrent power and authority with the state engineer to enforce the regulatory provisions.[301] The owner of the lands upon which any artesian well is situated shall make application to the state engineer for a permit to drill, repair, plug or abandon an artesian well, setting forth the plan of operations to be performed before work can proceed.[302] Artesian wells have different construction standards than non-artesian wells.[303]

3. Other Provisions

Mine Dewatering

New Mexico passed the Mine Dewatering Act to promote maximum economic development of mineral resources while ensuring that development does not impair existing water rights.[304] The legislature recognized that administering water rights under prior appropriation might cause severe economic hardship when applied to mineral production. Under this act, a person needs a permit to engage in mine dewatering issued by the state engineer.[305] If the engineer finds there is not impairment to existing rights, he will issue the permit.[306] If the state engineer finds the mine dewatering would impair existing rights, he will notify the applicant, and the applicant may appeal or file a plan of replacement. The legislature allows replacement water to be used to counteract any impairment to existing water rights due to mine dewatering.[307] Application for replacement of water shall be made to the state engineer and shall be at the sole expense of the applicant.[308]

Export of Water

Anyone wishing to withdraw water from any surface or underground water source in the state and transport it for use outside the state must apply to the state engineer for a permit.[309] The application goes through the same process as other permits except the state engineer shall also consider the following factors:

1. Supply of water available to the state of New Mexico;
2. Water demands of the state of New Mexico;
3. Whether there are water shortages within the state of New Mexico;
4. Whether the water that is the subject of the application could be feasibly transported to alleviate water shortages in the state;
5. Supply and sources available to the applicant in the state where the applicant intends to use the water; and
6. Demands placed on the applicant's supply in the state where the applicant intends to use the water.[310]

The state engineer may condition the permit to insure that the use of water is subject to the same regulations and restriction that may be imposed on use in the state.[311] Also, the applicant must designate an agent in New Mexico for reception of service of process and other legal notices.[312]

Groundwater Storage

In 1999, the state legislature passed the Ground Water Storage and Recovery Act to save money through groundwater recharge, storage, and recovery; reduce the rate of decline in aquifers; promote conservation; serve the public welfare; and lead to more

effective use of the state's water resources.[313] A permit is required to operate the project, and only governmental entities such as Indian nations, tribes, or pueblos, or state political subdivisions, including municipalities, counties, acequias, irrigation districts, or conservancy districts may apply for a permit.[314] When the state engineer receives a permit application, notice of the application is published in a newspaper of general circulation.[315] Objectors only have standing if the application will impair the objector's water right, will be contrary to the conservation of water, or will be detrimental to the public welfare. Objectors must also show that they will be substantially and specifically affected by the granting of the application.[316] If the state engineer receives a valid objection, he will schedule a hearing on the application. The state engineer will only issue a permit if the applicant proved that the following is applicable:

1. The applicant has the technical and financial capability to construct and operate the project;
2. The project is hydrologically feasible;
3. The project will not impair existing water rights or the state's interstate obligations;
4. The project will not be contrary to the conservation of water within the state;
5. The project will not be detrimental to the public welfare of the state;
6. The applicant has completed applications for all permits required by state and federal law;
7. The applicant has a valid water right; and
8. The project will not cause harm to users of land and water within the area of hydrologic effect.[317]

Water added to an aquifer to be stored for subsequent diversion and use pursuant to a project permit is not public water and is not subject to forfeiture. A permittee may only use recovered water for the same purpose for which the water was originally diverted unless the change is approved by the state engineer.[318]

OREGON

Oregon requires a permit for both surface water and groundwater appropriations. Permits require beneficial use and may impose conditions to prevent undue interference with existing wells. Where surface and groundwater sources are hydraulically connected, detailed rules apply that govern the issuance of permits and groundwater and surface waters are managed conjunctively to protect water resources, water rights, and the public interest. State law provides for the designation of special areas such as critical groundwater management areas, where there are overdrafts, contamination, and other problems; these areas may be closed to further appropriation and existing rights may be limited in terms of withdrawals. The state is also experimenting with water banking and underground storage in areas where groundwater rights exceed the capacity of aquifers to satisfy them. In the Butter Creek area of Eastern Oregon, for example, a plan has been developed to inject flood waters in the creek into the aquifer for use during dry periods, but the task of ensuring injected water does not contaminate or degrade the aquifer is complex.

1. Constitutional Provisions

Oregon's Constitution has no provision governing either surface water or groundwater.

2. General Provisions

Waters of the state are defined by statute as any surface or groundwater located within or without the state over which the state has sole or concurrent jurisdiction. Groundwater means any water, except capillary moisture, beneath the land surface or beneath the bed of any stream, lake, reservoir or other body of surface water in which the water stands, flows, percolates, or otherwise moves.[319] A permit is required in Oregon to use any groundwater or construct any well.[320]

The Water Resource Commission establishes policies for the operation of the Water Resources Department[321] and adopts and enforces rules to protect groundwater and govern the construction and maintenance of wells.[322] In addition, the commission shall perform any other duty vested in it by law.[323] The Water Resource Director administers and enforces water resources laws.[324]

Beneficial use without waste is the basis, measure and extent of the right to appropriate groundwater.[325] Whenever the owner of a water right ceases or fails to use all or part of the right for five successive years, the failure shall create a rebuttable presumption of forfeiture.[326] The statute lists fourteen exceptions to the forfeiture rule.[327]

All claims to rights to appropriate groundwater must be made a matter of public record.[328] State law seeks to ensure adequate and safe supplies of groundwater for human consumption while conserving maximum supplies of groundwater for agricultural,

commercial, industrial, thermal, recreational, and other beneficial uses.[329] Depletion of groundwater supplies below economic levels, impairment of natural quality of groundwater by pollution and wasteful practices in connection with groundwater is to be prevented or controlled within practicable limits.[330]

The Water Resource Commission has the power to classify water for the highest and best use, and may restrict uses and quantities of use.[331] Subject to existing rights, all waters within the state may be appropriated for beneficial use.[332] An example of a classification is a statute regulating Wild and Scenic Rivers. Recreation and preservation of wildlife and fish are declared the best beneficial use in these areas. Use of groundwater in these areas is not affected unless it is proven that the use of the groundwater would measurably reduce the surface water flows necessary for fish and wildlife.[333]

Oregon law also provides a number of unique definitions concerning groundwater. For example, the definition of *well* does not include a hole drilled for the purpose of either prospecting, exploration or production of oil or gas, prospecting or exploration for geothermal resources, production of geothermal resources derived from a depth of greater than 2,000 feet or exploration for minerals.[334] The Administrative Code includes definitions to be used for groundwater and includes definitions for *economic pumping levels*, *declined excessively*, and *substantial or undue influence*.[335]

Certain water uses are exempt from the permitting process, such as watering stock, domestic use of less than 15,000 gallons/day, or industrial or commercial uses of less than 5,000 gallons/day. Exempt uses are also limited to the amount necessary for beneficial use. The Water Resources Department may regulate exempted uses by using priority dates if necessary. After declaration of a groundwater management area, a new user must apply for a groundwater permit even for normally exempted uses of water.[336]

Groundwater Permitting

Applications for permits to appropriate water are made to the Water Resources Department which must determine if the proposed use will ensure the preservation of the public welfare, safety, and health. The department will presume that the use will ensure the public welfare if the proposed use is allowed in the applicable basin program or given a preference, if water is available, if the proposed use will not injure other water rights and if the proposed use complies with rules of the Water Resources Commission.[337] This rebuttable presumption may be overcome by a preponderance of evidence. After the Department reviews the application, it will issue a proposed final order.[338] Any person may protest against a proposed final order.[339] After the period for receiving protests, the Water Resources Director will either issue a final order or schedule a contested case hearing. A contested case hearing will be held if a protest has been submitted and there are significant disputes or if the applicant requests a contested case hearing.[340] If the director determines the proposed use would ensure the preservation of the public welfare, safety and health, she issues a final order approving the application or modifying the

proposed final order.[341] A final order may include provisions or restrictions concerning the use, control and management of the water to be appropriated for the project.[342] The construction of a well under a permit must be prosecuted with reasonable diligence and be completed within a reasonable time fixed in the permit by the Water Resources Department, not to exceed five years after the date of approval of the application.[343]

Oregon law explains in great detail how to determine if there is injury to other water users or waste. When an application discloses the probability of wasteful use or undue interference with existing wells or that any proposed use or well will impair or substantially interfere with existing rights to appropriate surface water by others, or that any proposed use or well will impair or substantially interfere with existing rights to appropriate groundwater for the beneficial use of the water for its thermal characteristics, the Water Resources Department may impose conditions or limitations in the permit or request the Water Resources Commission to initiate a rulemaking proceeding to declare the affected area a critical groundwater area.[344]

All wells that produce water from an aquifer that is determined to be hydraulically connected to a surface water source shall be assumed to have the potential to cause substantial interference with the surface water source if the existing or proposed groundwater appropriation is within one of the following categories:

1. The point of appropriation is less than one-fourth mile from the surface water source;
2. The rate of appropriation is greater than five cubic feet per second, if the point of appropriation is less than one mile from the surface water source;
3. The rate of appropriation is greater than one percent of the pertinent adopted minimum perennial streamflow or instream water right with a senior priority date, if one is applicable, or of the discharge that is equaled or exceeded 80 percent of time, as determined or estimated by the Department, and if the point of appropriation is less than one mile from the surface water source; or
4. The groundwater appropriation, if continued for a period of 30 days, would result in stream depletion greater than 25 percent of the rate of appropriation, if the point of appropriation is less than one mile from the surface water source.[345]

All wells that produce water from an aquifer that is not hydraulically connected to a surface water source shall be assumed not to interfere with the surface water source.[346]

Basin Programs

The Commission also establishes basin programs. Basin programs are administrative rules which establish water management policies and objectives and which govern the appropriation and use of the surface and groundwater within each of the respective basins. The rules classify surface and groundwaters according to the uses

which are permitted, may establish preferences among uses, may withdraw surface and groundwater from further appropriation, may reserve waters for specified future uses, and may establish minimum perennial streamflows.[347] Currently, seventeen basins have these plans.

The regulation of groundwater changes if the area is designated as critical. The Water Resources Commission designates an area as a critical groundwater area when the following occurs:

1. Groundwater levels in the area are declining or have declined excessively;
2. The Department finds substantial interference between wells or appropriators;
3. The available groundwater supply in the area in question is being or is about to be overdrawn;
4. The purity of the groundwater in the area in question has been or reasonably may be expected to become polluted to an extent contrary to the public welfare, health and safety; or
5. Groundwater temperatures in the area in question are expected to be, are being, or have been substantially altered.[348]

Rules designating a critical groundwater area must define the boundaries of the area, include a provision requiring a periodic review of conditions and occur no less frequently than every ten years.[349] The rule may also contain corrective provisions such as:

1. Closing the area to any further appropriation of groundwater;
2. Determining the permissible total withdrawal of groundwater in the critical area each day, month or year;
3. Discarding any application for a water right permit for the use of water in the area that is pending at the time the commission initiates the rulemaking process or that is received during the rulemaking process;
4. Making additional requirements as are necessary to protect the public welfare, health and safety;
5. Closing all or part of the critical groundwater area to further appropriation of groundwater for its thermal characteristics; or
6. Determining the permissible change in thermal characteristics of groundwater in all or part of the critical groundwater area each day, month or year.[350]

Any time after the commission adopts a rule for a critical groundwater area, it may initiate a contested case proceeding to further limit the use of groundwater in the area if the commission believes that any of the qualifying criteria listed above exists.

The commission may also encourage and recognize voluntary agreement in critical areas among groundwater users from the same groundwater reservoir.[351] When the commission finds that this agreement is consistent with the intent, purposes and requirements of the law, particularly in control areas, the commission will approve the

agreement. The agreement will control in lieu of a formal order or rule of the commission. The agreement may be terminated by lapse of time as provided in the agreement, by consent of the parties to the agreement or by order of the commission if it finds that the agreement is not being substantially complied with by the parties or that conditions have changed that have the made the agreement a detriment to the public welfare, safety or health or contrary to the intent purposes and requirements for which it was established.[352]

3. Other Provisions

Exporting Water from a Basin

Before approving an out-of-basin application, the commission is to reserve an amount of water adequate for future needs in the basin of origin, including an amount sufficient to protect public uses, and subordinate the out-of-basin use to that reservation.[353] No water located or arising from within a basin is to be diverted or impounded or in any manner appropriated for diversion or use beyond the boundaries of that basin except upon the express consent of the legislature, which may also attach conditions, exceptions, reservations, restrictions and provisions necessary to ensure the protection of the natural resources of the basin and the health and welfare of the present and future inhabitants of the basin within which the water arises or is located.[354]

Groundwater Storage

Oregon has two types of groundwater storage, aquifer recharge and aquifer storage and recovery (ASR). Both are administered by the Water Resource Department, and both have been determined to be beneficial uses. Aquifer storage and recovery is the storage of water in a suitable aquifer for later recovery from a separate source that meets drinking water standards; the restoration of an aquifer may not be one of the primary purposes of storing the water.[355] The Water Resources Commission has standards for aquifer recharge that an applicant must meet before the department allows someone to appropriate water for the purpose of recharging groundwater.[356] The recharge application must follow the same requirements as any permit to appropriate water.[357] Another permit called a secondary permit is required to beneficially use artificially stored water in groundwater basins.[358] This application must include the artificially recharged groundwater basin or reservoir as a supply of water and the written consent of the holder of the recharge permit or certificate to appropriate the artificially recharged water.[359] Before issuing a permit for recharging groundwater the department must find that the recharge project would not impair or be detrimental to the public interest.[360] The recharge permit will only be allowed if the supplying stream has a minimum perennial stream flow established for the protection of aquatic life. The Water Resources Commission may also establish rules to allow a limited license to use or store groundwater if authorized and in accordance with a contract with a local state or federal government.[361]

In 1995, Oregon enacted an aquifer storage and recovery statute (ASR). Under ASR, only one permit is required to divert, store, and recover water, provided the water is applied to its originally intended beneficial use. The Department issues limited licenses to store and use water injected into an underground basin. To obtain a limited license, applicants must submit detailed information about well construction, water quality, storage time and recovery schedule, as well as hydrologic conditions.[362] Aquifer storage and recovery under a limited license may be conditioned by the department to protect existing groundwater rights that rely upon the receiving aquifer or the injection source water. The department may revoke or modify the limited license if that use causes injury to any other water right or to a minimum perennial streamflow. The Water Resources Director may issue a limited license for aquifer storage and recovery purposes for a term of not more than five years. Only after completion of a test program under a limited license may the applicant apply for a permanent aquifer storage and recovery permit. The Water Resources Department has passed administrative rules that govern aquifer storage and recovery and aquifer recharge.[363]

UTAH

Early in Utah's history, groundwater was classified into three categories: water flowing in definitive underground streams, the underflow of streams, and percolating water which included all groundwater not included in the other two categories. Underground streams were open to appropriation by diversion and beneficial use. Underflow water was considered part of the surface stream. Percolating groundwater was considered part of the soil and owned by the landowner under correlative rights. In 1935, the Utah Supreme Court abandoned the legal fiction that groundwater and surface water were separate resources, and held that all groundwater should be treated as an integrated resource with surface water and subject to appropriation under the permit system. Utah now uses prior appropriation for both surface water and groundwater.

1. Constitutional Provisions

The only provision in the Utah Constitution regarding water states that municipalities are forbidden from selling or disposing of waterworks or water rights.[364]

2. General Provisions

All waters in the state, whether above or below the ground, are property of the public,[365] and beneficial use is the basis, limit and measure of all rights to the use of water in the state.[366] Surface water and groundwater appropriation are treated identically under Utah law. The appropriation must be for some useful and beneficial purpose. Prior appropriation gives the better right, but domestic purposes shall have preference over all other uses, and agricultural use shall have preference over all uses except domestic.[367] The state engineer may issue a permit for a limited amount of time.[368] At the expiration date the water reverts back to the public and again is subject to appropriation. No right to use water can be acquired by adverse use or adverse possession.[369]

An application to the state engineer is necessary before commencing any construction.[370] Once the state engineer receives the application, he publishes it in a newspaper of general circulation in the county in which the source of supply is located and where the water is to be used.[371] Any interested person may file a protest with the state engineer and the engineer shall consider the protest and either approve or reject the application.[372] The state engineer shall approve the application if:

1. There is unappropriated water in the proposed source;
2. The proposed use will not impair existing rights or interfere with a more beneficial use of the water;

3. The proposed plan is physically and economically feasible and would not prove detrimental to the public welfare;
4. The applicant has the financial ability to complete the proposed works; and
5. The application was filed in good faith and not for the purposes of speculation or monopoly.[373]

If the state engineer accepts the permit, he will also decide the time limit in which the construction work must be completed and the water applied to beneficial use.[374] The construction of the works and the application of water to beneficial use must be diligently prosecuted to completion within the time period set by the state engineer.[375] Extensions of time up to fifty years may be granted on proper showing of diligence or reasonable cause for the delay.[376] Public agencies can get extensions beyond fifty years if they can demonstrate the water will be needed to meet the reasonable future demand of the public.[377] Any other applicant or water user may file a request for agency action with the state engineer alleging that such work is not being diligently prosecuted to completion.[378]

Groundwater Management Plans

The state engineer also issues groundwater management plans for geographic regions where he suspects the safe yield of the aquifer may soon be reached. The engineer uses these plans to establish area specific guidelines for use when reviewing applications and managing groundwater. The purposes of these plans are specific to the area but may include promoting efficient use, maximizing the benefits, and protecting existing rights. The state engineer uses his statutory authority to administer the measurement, appropriation and distribution of the groundwater of the state to implement these plans. The state engineer studies each area to find the annual precipitation, recharge rate and discharge rate. He also estimates future needs and demands. In these management plans, he may limit the amount of new appropriations, set total maximum annual withdrawals, or even close the area to any new appropriations.[379] His decision rests upon his belief of whether or not there is unappropriated water in the area. Some of the plans assert that groundwater and surface water systems need to be jointly managed as one system because the groundwater system is hydrologically connected to some surface sources.[380] If surface flows are not sufficient to supply all rights, both surface and groundwater rights should be distributed according to priority. Currently there are twelve management plans.

3. Other Provisions

Interstate Transfer

Utah allows transfers of water outside the state in certain circumstances. An appropriator must follow the same steps as any appropriator and fill out an application. The application requires the same information as an in-state use, but also requires an

agent in the state of Utah designated to be served with legal notices. The state engineer will publish a notice of the application. He will then investigate the application and approve the application if he finds that the proposed appropriation meets the same requirements as in-state appropriations. In addition, the state engineer must find that the appropriation is consistent with Utah's reasonable water conservation policies or objectives, is not contrary to the public welfare, and does not impair the ability of the state of Utah to comply with its obligation under any interstate compact or judicial decree which apportions water among Utah and other states.[381] The engineer must also find that the water can be transported, measured, delivered, and beneficially used in the recipient state.

Groundwater Recharge

Utah implemented the Groundwater Recharge and Recovery Act in 1991. Under this Act, a person needs a permit to both recharge and recover water from a groundwater basin. A person who wants to recharge water must have a valid water right for the water proposed for storage. A person who holds a recovery permit may only use or exchange the recovered water for the same use as was permitted before the water was stored, unless a change or exchange application is filed.[382] The state engineer will issue a recharge permit if the applicant has the technical and financial capability to construct and operate the project. The project must also be hydrologically feasible, not cause unreasonable harm to land, not impair any existing water rights within the area, and not adversely affect the water quality of the aquifer.[383] The state engineer may also attach any conditions to the permit he determines appropriate. The state engineer will issue the recovery permit if the proposed recovery will not impair any existing rights and the recovery point of diversion is located within the area of hydrologic impact of the project.[384] The applicant of the recovery permit also needs a valid agreement with the owner of the recharge permit, if he is not the owner. Again, the state engineer may attach any conditions he determines to be appropriate. Any person holding either a recharge or recovery permit must monitor the operation of the project and its impact on the land, the aquifer, and water rights within the project's area.[385] He must then file reports with the state engineer regarding the quantity of water stored and recovered and the water quality of the recharged water, receiving aquifer and recovered water.[386] As of 2002, one project had been undertaken by the Jordan Valley Water Conservancy District.[387] The state engineer approved the application subject to conditions that limit the district's groundwater recovery to approximately 80% of the water it injected into the basin to insure that other groundwater rights are not impaired by the later withdrawal of the stored water.[388]

WASHINGTON

Washington passed a comprehensive water code for surface water rights in 1917. The groundwater code was enacted in 1945 to extend surface water statutes to the appropriation and beneficial use of groundwater. The groundwater code is supplemental to the surface water code.[389] The Department of Ecology administers both surface and groundwater rights. Both the surface water code and the groundwater code are premised on the doctrine of prior appropriation, which applies when an applicant seeks to obtain a water right in this state.[390] Before 1945, groundwater was allocated under the American rule of reasonable use. The current statutes state no rights to use either surface or groundwater may be acquired by prescription or adverse use.[391] Under the prior appropriation doctrine, a water right may be acquired where available public water is appropriated for beneficial use, subject to existing rights.[392] The same is true of groundwater. "Subject to existing rights, all natural groundwaters of the state . . . are hereby declared to be public groundwaters and to belong to the public and to be subject to appropriation for beneficial use under the terms of this chapter and not otherwise."[393] The groundwater code provides that groundwater applications shall be made in the same way as provided in the surface water code.[394] A permit system is administered for both surface water and groundwater. The priority date of the right relates back to the date of filing of the original permit application with the department.[395]

1. Constitutional Provisions.

Washington's Constitution has one provision which establishes water policy: "The use of the waters of this state for irrigation, mining, and manufacturing purposes shall be deemed a public use."[396]

2. General Provisions

Groundwater "means all waters that exist beneath the land surface or beneath the bed of any stream, lake or reservoir or other body of surface water within the boundaries of this state, whatever may be the geological formation or structure in which such water stands or flows, percolates or otherwise moves."[397] Washington differentiates between natural groundwater and artificial groundwater. Natural groundwater is defined as water that exists in underground storage due wholly to natural processes.[398] Artificially stored groundwater is water made available in underground storage artificially, either intentionally or incidentally from irrigation and that otherwise would have been dissipated by natural processes.[399] Only natural groundwaters and artificial groundwaters that have been abandoned or forfeited are public groundwaters and subject to appropriation.[400]A person who either abandons or voluntarily fails to beneficially use all or any of part of their water right to withdraw for any period of five successive years shall relinquish such right of portion there of and the right will revert to the state and the water will become available for appropriation.[401]

The Water Resources Act of 1971[402] set out general policy statements regarding water use in both surface and groundwater areas. It required the department to create a comprehensive state water resources program that would provide a process for making decisions on future water resource allocation and use.[403] It listed beneficial uses and recognized allocation will be based generally on the securing of the maximum net benefits for the people of the state. Also, quality of the natural environment will be protected and where possible enhanced, full recognition shall be given in the administration of water allocation and use programs to the natural interrelationships of surface and groundwaters, and expressions of the public interest will be sought at all stages of water planning and allocation discussions.[404] Under this Act, the department established Watershed Resource Inventory Areas (WRIA) to develop a water program in regional segments so that immediate attention may be given to waters of a region of the state or to specific critical problems of water allocation and use.[405] The state is divided into 62 WRIAs.[406] As sufficient data is obtained for each WRIA, the department formulates a water resource planning and management program for each area, and by regulation establishes policies for the beneficial use of public waters.[407]

The 1979 Family Farm Water Act reaffirmed that water should be managed to maximize the benefit to the greatest possible number of its citizens, but added the maximum benefit to the greatest number of citizens through the use of water for the irrigation of agricultural lands will result from providing for the use of such water on family farms.[408]

The Permitting Process

Since 1945, no withdrawal of public groundwater has been permitted without a permit issued by the water resources department.[409] Exceptions include the withdrawal of public groundwaters for stock-watering purposes, for the watering of a lawn or of a noncommercial garden not exceeding one-half acre in area, for single or group domestic uses in an amount not exceeding 5,000 gallons a day, or for an industrial purpose not exceeding 5,000 gallons a day and is equal in right to a permit right.

Under the surface water statute, each permit application must include the source of the water supply, the nature and amount of the proposed use, the time during which water will be required each year, the location and description of the proposed ditch, canal, or other work, the time within which the completion of the construction, and the time for the complete application of the water to the proposed use.[410] If for agricultural purposes, then the legal subdivision of the land, the acreage to be irrigated, and the amount of water in acre feet to be supplied per season are required.[411] If for power purposes, then the nature of the means of which the power is to be developed, the head and amount of water to be utilized, and the uses to which the power is to be applied is required.[412] Other requirements are necessary depending upon the usage.

In addition to the requirements in the surface water statute, the groundwater statute further requires the name and post office address of the owner of the land on which the wells or works will be located, the location of the proposed wells or other works for the proposed withdrawal, the groundwater area, sub-area, or zone from which the withdrawal is proposed provided the area has been designated, the amount of water proposed to withdrawn, in gallons a minute and in acre feet a year or millions of gallons a year, and the depth and type of construction proposed for the wells.[413]

Upon receipt of an application, the department instructs the applicant to publish notice in a form prescribed by the department in a newspaper of general circulation published once a week for two weeks in the counties in which the storage, diversion, and use is to be made.[414] The department sends notice of the application to the director of fish and wildlife.[415] After receipt of the application, the department has the duty to investigate all facts relevant and material to the application and determine if there is unappropriated water. It also determines what beneficial uses can be applied for in that area.[416] The department makes written findings of fact concerning the application, and if it finds that there is water available for appropriation for beneficial use, and the proposed appropriation will not impair existing rights or be detrimental to the public welfare, it issues a permit which states the amount of water allowed and the beneficial use to which it may be applied.[417] The right becomes appurtenant to the land if the use is for irrigation purposes.[418] An application may be approved for an amount less than applied for if there is a substantial reason, and the amount of the appropriation is limited to the amount of water that can be applied to beneficial use for the purposes listed in the application.[419]

No permit is to be granted for the withdrawal of groundwater beyond the capacity of the underground bed to yield water within a reasonable or feasible reduction of pressure.[420] The department will also determine whether granting the permit will injure or damage any vested right under prior permits.[421] A prior appropriator will enjoy the right to have any withdrawals by a subsequent appropriator of groundwater limited to an amount that will maintain and provide a safe sustaining yield in the amount of the prior appropriation.[422]

Designated Areas

The department has authority to limit withdrawals of appropriators to enforce the maintenance of a safe sustaining yield.[423] For this purpose, the department may designate groundwater areas or sub-areas, and designate separate depth zones in each area to the end that the withdrawals may be administratively controlled to prevent overdraft.[424] Each area should be designated as to enclose a single and distinct body of public groundwater. These areas may be proposed by the department or by petition of at least fifty or one-fourth, which ever is less, of the users of groundwater in a proposed area. The criteria used to guide the department on what areas to designate are:

1. Aquifer systems that are declining due to restricted recharge or over-utilization;

2. Aquifer systems in which over-appropriation may have occurred and adjudication of water rights has not yet been completed;
3. Aquifer systems currently being considered for water supply reservation for future beneficial uses;
4. Aquifers identified as the primary source of supply for public water supply systems;
5. Aquifers designated as a sole source aquifer by the federal environmental protection agency; and
6. Geographical areas where land use may result in contamination or degradation of the groundwater quality.[425]

To designate an area, the department must publish notice which describes the area boundaries, the purpose of the designation, and where to object.[426] After hearing any objections, the department will make findings and if it approves the designation, it will enter a written order designating the area. Within 90 days of a designation, any person claiming to own artificially stored groundwater must file a certified declaration describing the operation and the water claimed.[427]

After an area is designated, the department or holders of valid rights may request a hearing to determine whether the water supplies in the area are adequate for the current needs of all holders.[428] If such a hearing finds that the total supply is inadequate for the current needs of all rights, the department will order the aggregate withdrawal from such area decreased so that withdrawals will not exceed the available supply.[429] The decreases will conform to the priority of the existing rights. But if there is mutual agreement between right holders and the department, the ordered decreases may be accomplished by the waiving of all or part of a senior right in favor of a junior right. This waiving of a right will not modify the relative priorities of such right as recorded in the department.[430] The department may appoint groundwater supervisors for each designated groundwater area to supervise the withdrawal of groundwater.[431]

After an area is designated, the department creates a groundwater management program for each area. The programs must include the following:

1. A description of the specific groundwater area or sub-areas, or separate depth zones within any such area or sub-area, and the relationship of this zone or area to the land use management responsibilities of county government.
2. A management program based on long-term monitoring and resource management objectives for the area or sub-area.
3. Identification of water resources and the allocation of the resources to meet state and local needs.
4. Projection of water supply needs for existing and future identified user groups and beneficial uses.
5. Identification of water resource management policies and/or practices that may impact the recharge of the designated area or policies that may affect the safe yield and quantity of water available for future appropriation.

6. Identification of land use and other activities that may impact the quality and efficient use of the groundwater, including domestic, industrial, solid, and other waste disposal, underground storage facilities, or storm water management practices.
7. The design of the program necessary to manage the resource to assure long-term benefits to the citizens of the state.
8. Identification of water quality objectives for the aquifer system which recognize existing and future uses of the aquifer and that are in accordance with Department of Ecology and Department of Social and Health Services drinking and surface water quality standards.
9. Long-term policies and construction practices necessary to protect existing water rights and subsequent facilities installed in accordance with the groundwater area or sub-area management programs and/or other water right procedures.
10. Annual withdrawal rates and safe yield guidelines which are directed by the long-term management programs that recognize annual variations in aquifer recharge.
11. A description of conditions and potential conflicts and identification of a program to resolve conflicts with existing water rights.
12. Alternative management programs to meet future needs and existing conditions, including water conservation plans.
13. A process for the periodic review of the groundwater management program and monitoring of the implementation of the program.[432]

After completing the management plan, the department holds a public hearing to take public testimony on the proposed program.[433] The department and affected local governments will then prepare findings which either accept the program or identify revisions and then adopt regulations, ordinances, or programs for implementing those provisions of the management program which are within their respective jurisdictional authorities.[434] These programs do not affect any water right existing as of May 21, 1985.[435]

After receiving a permit, actual construction work must be commenced within a reasonable time and be prosecuted with diligence and completed within the time prescribed by the department.[436] When fixing the time for both commencement and completion, the department will consider the cost and magnitude of the project and the engineering and physical features to be encountered, and then allow a reasonable time under the existing conditions.[437] The department also must consider the public welfare and public interests affected. After an applicant shows to the department's satisfaction that the appropriation has been perfected, the department must issue a water right certificate.[438] The showing must include the following information:

1. The location of each well.
2. The depth and diameter of each well.
3. The thickness in feet and the physical character of each bed, stratum or formation penetrated by each well.

4. The length and position, in feet below the land surface, and the commercial specifications of all casing.
5. The tested capacity of each well in gallons a minute as determined by measuring the discharge of the pump after continuous operation for at least four hours or in the case of a flowing well, by measuring the natural flow at the land surface.
6. For each non-flowing well, the depth to the static groundwater level as measured in feet below the land surface immediately before the well-capacity test, also the draw-down of the water level, in feet, at the end of said well capacity test.
7. For each flowing well, the shut-in pressure measured in feet above the land surface or in pounds per square inch at the land surface.
8. Any additional factual information as reasonably required by the department to establish compliance.[439]

3. Other Provisions

Out-of-State Use

No permit for the appropriation of water will be denied because any portion of the works or the use may be in another state or nation.[440] The permit will be issued as in other cases provided that the department may in its discretion decline to issue a permit where the point of diversion described in the application is within the state of Washington, but the place of beneficial use is in some other state or nation, unless the laws of the other state or nation allow water to be lawfully diverted within that state or nation for beneficial use in Washington.[441]

Underground Storage

Washington allows aquifer storage and recovery projects (ASR). An ASR project is a project "where the intent is to artificially store water in an underground geological formation through injection, surface spreading and infiltration, or other department-approved method, and to make subsequent use of the stored water."[442] A water user first needs a water right to a water source. Any water to be used as part of an ASR program must be obtained under a valid water right permit, certificate or registered water claim. In addition to the water right, a reservoir permit is also required. For an underground geological formation to qualify for a reservoir permit, it must meet standards for review and mitigation of adverse impacts identified for the following issues:

1. Aquifer vulnerability and hydraulic continuity;
2. Potential impairment of existing water rights;
3. Geotechnical impacts and aquifer boundaries and characteristics;
4. Chemical compatibility of surface waters and groundwaters;
5. Recharge and recovery treatment requirements;

6. System operation;
7. Water rights and ownership of water stored for recovery; and
8. Environmental impacts.

The project may also require a secondary permit. An application is required if the proposed use to apply the stored water is not the same beneficial use as the original water right.[443] This permit will be treated the same as a change in place of use permit. The secondary application must refer to the reservoir as its source of water and show documentary evidence that an agreement has been entered into with the owners of the reservoir for a permanent and sufficient interest in the reservoir to impound enough water for the purposes set forth in the application.[444]

After receiving both the reservoir permit and the secondary permit, the applicant must then apply for an ASR project. This application goes into the same line as water right applications.[445] An application for an ASR project must contain at a minimum the following data:

1. A description of the hydrogeologic system prepared by a hydrogeologist licensed in the State of Washington.
2. A project operation plan with a description of the pilot and operational phases of the ASR project prepared by an engineer or geologist licensed in the state of Washington.
3. A description of the legal framework.
4. An environmental assessment and analysis of any potential adverse conditions or potential impacts to the surrounding ecosystem that might result from the project, along with a plan to mitigate such conditions or impacts. The environmental assessment will establish whether a determination of non-significance or an environmental impact statement is required per the State Environmental Policy Act.
5. A project mitigation plan.
6. A project monitoring plan.[446]

Any application reviewed under the ASR Act will be considered by the department, the department of fish and wildlife, the department of health, and the appropriate Indian tribes, specifically to ensure that the following do not occur during ASR project injections or withdrawals:

1. Alteration of the normative hydrology which may result in adverse impacts to fish.
2. Detrimental changes in temperature, nutrient, heavy metals, hydrocarbon, or other deleterious material levels during critical spawning and rearing periods.
3. Disruption of natural downwelling or upwelling within stream during critical spawning and rearing periods.

4. Saturation of stream bank which could lead to erosion, bank failure, and excess sedimentation entering the stream which can alter stream chemistry, flow, and bed morphology.[447]

Once sufficient information is developed and provided to the department to verify the project is viable and the requirements have been met, the department will issue proper documentation for the reservoir and secondary permit, if any, with the priority date or dates based on the underlying source water right.[448]

WYOMING

Wyoming law historically gave the overlying landowner the right to capture and use the groundwater.[449] In 1947, Wyoming passed its first groundwater statute, which established prior appropriation for groundwater and provided for a registration system, but no regulation of groundwater use was provided. In 1957, Wyoming rewrote the statutes and added a permit requirement.

1. Constitutional Provisions

Wyoming's Constitution states that "the water of all natural streams, springs, lakes or other collection of still water, within the boundaries of the state, are hereby declared to be the property of the state."[450] It declares that prior appropriations for beneficial uses shall give the better right.[451] The constitution makes no specific mention of groundwater. Article 8, Section 2 of the Constitution establishes the State Board of Control composed of the state engineer and the superintendent from each of the four water divisions. The Board supervises the waters of the state and its appropriation, distribution and diversion.

2. General Provisions

Groundwater in Wyoming is defined as any water under the surface of the land or the bed of any stream, lake, reservoir, or other body of surface water, including water that has been exposed to the surface by an excavation.[452] The definition includes hot water and geothermal steam. Wyoming also distinguishes by-product water. It is water that has not been put to a prior beneficial use, but is a by-product of some non water-related economic activity and has been developed only as a result of such activity such as the dewatering of a mine. Any person who wants to appropriate this water must file a groundwater application with the state engineer.

Wyoming law provides that where aquifers are so interconnected as to in fact constitute one source of supply; or where ground and surface water are so interconnected as to in fact constitute one source of supply, priorities of rights to the use of all interconnected waters shall be correlated and such single schedule of priorities shall relate to the whole common water supply.[453] Every groundwater permit includes an express condition that it may be subject to regulation and correlation with surface water rights if the ground and surface waters are determined to be interconnected.

Control Areas

The State created control areas in the 1957 statute. A control area is any groundwater district or sub-district that has been so designated by the Board of Control.[454] The Board may designate a control area for one of the following reasons:

1. The use of groundwater is approaching the current recharge rate;
2. Groundwater levels are declining or have declined excessively;
3. Conflicts between users are occurring or are foreseeable;
4. The waste of water is occurring or may occur; or
5. Other conditions exist or may arise that require regulation for the protection of the public interest.[455]

Once an area is declared to be a control area, the Board of Control creates a control area advisory board. Also, all unadjudicated wells within the control area must be adjudicated. The Board then enters into its records the priorities to use water in the control area, the amount of appropriation of the parties claiming, the character and kind of use for which the appropriation is made, and the places or points of use.[456] After the adjudication, the state engineer, either on his own motion or on the petition of 20 appropriations or one-tenth of the appropriators, may determine whether the under groundwater in the area is sufficient to meet all the needs of all appropriators in the area. If he finds, after receiving advice from the control area advisory board, that there is insufficient water he may adopt one or more of the following corrective controls:

1. Close the area to any further appropriation;
2. Determine the permissible withdrawal in the area for either each day, month or year and apportion the permissible total among appropriators holding valid rights in accordance with the relative priority dates;
3. Cease or reduce withdrawals from junior appropriators if they have a material effect on seniors;
4. Specify a system of rotation of use, or
5. Institute well spacing requirements.[457]

Another possibility for the appropriators in the control area is to voluntarily agree to a method of control of withdrawals, well spacing, apportionment, rotation or proration of the common supply of water.[458] The state engineer by statute should encourage and approve agreements that are consistent with the intent of the legislature and are not detrimental to the public interest or the rights of others who are not parties to the agreement.[459]

The designation of an area as a control area provides a mechanism to slow development and ensure that senior rights are protected and not subject to interference.[460] Designation also creates the control area advisory board which is comprised of five people living in the control area who advise and assist the state engineer in forming

policies concerning groundwater development. Finally, the designation provides a means to develop and implement regulations of groundwater.

Obtaining a Groundwater Right

The procedure for obtaining a right depends on where the well will be located and the declared use. The application process differs if the well is located in a control area. Domestic and stock water uses also have separate rules. Finally, appropriating by-product water also has specific distinctions. Any person who intends to acquire underground water must apply to the state engineer before performing any work in connection with the proposed appropriation.[461] No work shall begin before the applicant is issued a permit.[462] The application must include the name and address of the applicant, a detailed description of the proposed use, the location of the proposed well or means of obtaining the groundwater, the estimated depth of the proposed well, the quantity of water proposed to be withdrawn and beneficially utilized in gallons per minute and acre feet per calendar year, the location of the area of point of use, and other information the state engineer requires.[463]

A permit to appropriate groundwater includes an express condition that the right of the appropriator does not include the right to have the water level or artesian pressure at the appropriator's point of diversion maintained at any level or pressure higher than that which is required for maximum beneficial use.[464] This condition implies that the senior appropriator's well must meet certain standards that achieve maximum beneficial use to be considered an adequate well. "Not only must the well be of an adequate depth, but it must also be adequately constructed and the pump must be of sufficient power to pump the groundwater."[465] But, if an appropriator wishes to deepen his well without increasing the amount of the appropriation, he must file and obtain permission from the state engineer. The state engineer applies a no-injury standard.

There are also special rules for appropriations around Yellowstone National Park. Proposed appropriations within 15 miles of Yellowstone must additionally include a written report prepared by a qualified professional and containing information necessary to show the proposed development will not impair or produce an injurious effect on the hydrothermal features or hydrothermal system located within the boundaries of Yellowstone, but domestic and stock wells are exempt from the Yellowstone requirement.[466]

Groundwater Outside a Control Area

Applications for permits not in control areas are granted as a matter of course if the proposed use is beneficial and the state engineer finds the proposed means of diversion and construction are adequate.[467] The state engineer may deny a permit if he finds it is not in the public's water interest.[468] The state engineer has never denied a permit using public interest. To receive a permit, an applicant must apply to the state

engineer.[469] The state engineer will then review the application, and if in proper form the application is approved and becomes a water permit.[470] The permittee is required to submit written notification to the State Engineer's Office of the date that work on the well is to commence, the date it is completed and the date the water is beneficially used.[471] The permittee must also submit pertinent information about the well, such as water level and a driller's log.[472]

Groundwater in a Control Area

If the application is for a well is a control area, but not for domestic, stock water, or miscellaneous purposes that requires only a minimal quantity of water, the procedure is more complicated than for wells outside control areas. First, the state engineer will publish in a newspaper or general circulation a notice of the filing.[473] Objections must be filed within ten days of the last notice on the ground there is not unappropriated water or the application is detrimental to the public interest.[474] The engineer will have a hearing on the application if there are objections. If no objections, the state engineer may still have a hearing if he feels the application is detrimental to the public interest.[475] The application shall be granted and the permit issued only if the state engineer finds, after receiving the advice of the control area advisory board, that there are unappropriated waters in the proposed source, that the proposed means of diversion or construction is adequate, that the location of the proposed well does not conflict with any well spacing or well distribution regulation, and that the proposed use would not be detrimental to the public interest.[476]

Once a permit is granted, the applicant has three years from the date of the approval to complete the construction and apply the water to beneficial use.[477] After the completion of the well, the permit holder has 30 days to report to the state engineer.[478] The water permit will then be adjudicated into a water right upon completion of all the terms of the permit and the filing of a map signed by a Wyoming licensed professional engineer or land surveyor, showing the location of the well and the point of use. The process of adjudication finalizes a water right and fixes the amount of the appropriation and the point or area of use. Upon receipt of the map, the state engineer's office will examine the well; if everything is in order and no protests are filed, a certificate of appropriation is issued by the Board of Control.[479] If there are protests filed, a public hearing is held to allow all interested persons an opportunity to be heard. Following the hearing, the Board will issue an order either approving or rejecting the adjudication of the water right. The decision may be appealed to the courts.[480]

If a well is found to unreasonably interfere with an adequate well developed for domestic or stock uses, whether or not in a control area, the State Engineer may order the interfering appropriator to cease or reduce the withdrawal of groundwater from the well.[481] The interfering pumper can at his own expense furnish sufficient water at the former place of use to meet the need for domestic or stock use. In the case of two interfering domestic pumpers, the appropriation with the earliest priority shall have the better right. Any appropriator of either surface or groundwater may allege interference

with his water right by a junior right, but this is not applicable if the conflict is between two surface users.[482] The complainant must show by a preponderance of the evidence that the junior use injured the seniors.[483]

Domestic and Stock Use

Appropriations of groundwater for domestic or stock use have a preferred right over rights for all other uses, regardless of the priority dates.[484] This preference does not include municipal use by any person of water appropriated by a municipality or company, or any instance where water is purchased or held out for sale.[485] *Domestic use* is defined as household use and the water of lawns and gardens for noncommercial family use where the area to be irrigated does not exceed one acre, and where the yield or flow does not exceed .056 cubic feet per second or twenty-five gallons per minute. Domestic or stock wells require a permit before any construction is started. The Board may consider adjudication of the groundwater rights upon proof of beneficial use submitted by the appropriator.[486] These rights are adjudicated after completion of the well like other groundwater rights except a filing of a map signed by a Wyoming licensed professional engineer is not required, unless deemed necessary and appropriate by the state engineer.[487]

By-Product Water

Any person intending to use by-product water must file an application with the state engineer.[488] By-product water is filed for using groundwater procedures, but two conditions must be met. First, the water must be intercepted while it is readily identifiable and has not yet commingled with other water. Second, the developer-grantor of the by-product water must be the applicant or must consent and sign an agreement in the state engineer's office.[489] The granting of this right does not imply that the developer must maintain or provide the water. Although the statutes say a permit is needed to appropriate the by-product water, there is no mention of needing a permit to create by-produce water or dewater a mine. The State Engineer interprets the groundwater statute as to require a permit before dewatering a mine and has granted several hundred permits to dewater coal and uranium mines. This allows the state engineer to protect surrounding prior appropriators from injury from the lowering of the water table or a loss of pressure.[490]

Water for Temporary Purposes

The State Engineer promulgated rules regarding the temporary use of water. There are two ways to obtain the right to temporarily use water. An applicant can apply for a permit following the same procedures as filing for other uses of groundwater. The priority date is the date the state engineer accepted the application and the permit is only valid for a limited time after which it is automatically cancelled. The second option is to

acquire the temporary use of an already existing adjudicated or valid unadjudicated water right. The use cannot exceed two years. This option requires a written agreement between the temporary user of the water and the owner of the right be filed with the state engineer. The agreement must include the source of supply, priority, amount of appropriation, point of diversion of the original right and amount of water to be diverted by the temporary use.[491] A temporary transfer will only be allowed if no other appropriator is injured.[492]

3. Other Provisions

Groundwater Storage

The Board of Control has ruled that storage of groundwater in a reservoir is a beneficial use. [493] Groundwater may be pumped and stored to use as a supplemental supply for irrigation. But, there has been no case of storing surface water in an underground basin. One commentator states that Wyoming's groundwater laws are sufficiently flexible to accommodate such management, but to date there has been little need for these techniques.

Interstate Use of Groundwater

The legislature must specifically approve all water appropriated, stored or diverted for use outside the state or for use as a medium of transportation to another state if the use requires more than 1,000 acre feet. Also, no one may transfer the use of a water right to outside the state without prior approval by the legislature. Applications for use out of state must be submitted to the state engineer with sufficient information to analyze the proposed appropriation. The state engineer will then comprehensively review the application and issue a preliminary analysis of the application. The analysis will be published for three weeks. The state engineer will then hold a public hearing. The state engineer will consider all comments received at the public hearing in his final opinion. He shall then submit his final opinion to the state legislature. The legislature then bases its decision on ensuring the state's interest in conserving and preserving its water resources for the maximum beneficial use.[494]

LINKS TO WESTERN STATE CONSTITUTIONS AND STATUTES CONCERNING GROUNDWATER

ARIZONA

ARIZONA CONSTITUTION
ARTICLE 17 WATER RIGHTS
http://www.azleg.state.az.us/Constitution.asp?Article=17

ARIZONA STATUTES
TITLE 45 WATERS
http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=45

CALIFORNIA

CALIFORNIA CONSTITUTION
ARTICLE 10 WATER
http://www.leginfo.ca.gov/.const/.article_10

CALIFORNIA WATER CODE
http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=wat&codebody=&hits=20

COLORADO

COLORADO CONSTITUTION
ARTICLE XVI MINING AND IRRIGATION
http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm&2.0

COLORADO STATUTES
TITLE 37 WATER AND IRRIGATION : WATER RIGHTS AND IRRIGATION ARTICLE 90
UNDERGROUND WATER
http://198.187.128.12/colorado/lpext.dll?f=templates&fn=fs-main.htm&2.0

IDAHO

CONSTITUTION OF THE STATE OF IDAHO
ARTICLE XV WATER RIGHTS
http://www3.state.id.us/legislat/idstat.html

IDAHO CODE
TITLE 42 IRRIGATION AND DRAINAGE -- WATER RIGHTS AND RECLAMATION
CHAPTER 2 APPROPRIATION OF WATER -- PERMITS, CERTIFICATES, AND LICENSES – SURVEY
http://www3.state.id.us/idstat/TOC/42FTOC.html

MONTANA

MONTANA CONSTITUTION
ARTICLE IX ENVIRONMENT AND NATURAL RESOURCES
http://leg.state.mt.us/css/mtcode_const/const.asp

MONTANA CODE
TITLE 85 WATER USE
Chapter 2. Surface Water and Ground Water. Part 5. Ground Water
http://leg.state.mt.us/css/mtcode_const/laws.asp

NEVADA

NEVADA CONSTITUTION
http://www.leg.state.nv.us/Const/NVConst.html

NEVADA STATUTES
TITLE 48 WATERS
CHAPTER 534 UNDERGROUND WATER AND WELLS
http://www.leg.state.nv.us/NRS/Index.cfm

NEW MEXICO

NEW MEXICO CONSTITUTION
http://www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=newmexico:statutes

NEW MEXICO STATUTES ANNOTATED
http://www.amlegal.com/nxt/gateway.dll?f=templates&fn=default.htm&vid=newmexico:statutes

OREGON

OREGON CONSTITUTION
http://www.leg.state.or.us/orcons/orcons.html

OREGON REVISED STATUTES
http://www.leg.state.or.us/ors/537.html

UTAH

UTAH CONSTITUTION
http://www.le.state.ut.us/~code/const/const.htm

UTAH CODE ANN.
http://www.le.state.ut.us/~code/code.htm

WASHINGTON

WASHINGTON STATE CONSTITUTION
http://www.courts.wa.gov/education/constitution/?fa=education_constitution.display&displayid=Article-21

WASHINGTON STATE REVISED CODES
http://www.leg.wa.gov/rcw/index.cfm#RCW_by_Title

WYOMING

WYOMING CONSTITUTION
http://legisweb.state.wy.us/statutes/titles/title97.htm

WYOMING STATUTES
http://legisweb.state.wy.us/statutes/sub41.htm

Notes

[1] See Jeffrey S. Ashley and Zachary A. Smith, GROUNDWATER MANAGEMENT IN THE WEST 5 (1999).
[2] Ashley & Smith, GROUNDWATER MANAGEMENT IN THE WEST 5-6 (1999).
[3] Ashley & Smith, GROUNDWATER MANAGEMENT IN THE WEST 6-7 (1999.
[4] Ashley & Smith, GROUNDWATER MANAGEMENT IN THE WEST 15 (1999).
[5] Robert Glennon, "Pinching Straws: Reforming Ground and Surface Water Law to Protect the Environment," Rocky Mountain Mineral Law Institute (2003).
[6] Ashley & Smith, GROUNDWATER MANAGEMENT IN THE WEST 3-4 (1999).
[7] A. Dan Tarlock, "Groundwater and Growth Management in the New West: Evolving Law and Practice," paper presented at the annual conference of the Natural Resources Law Center, Boulder CO, June 7-9,2000, at 2.
[8] Cited in Robert Glennon, WATER FOLLIES 31 (2002).
[9] Robert Glennon, WATER FOLLIES 30-31 (2002).
[10] Robert Glennon, WATER FOLLIES 1-3 (2002).
[11] Robert Glennon, WATER FOLLIES 28-29 (2002).
[12] See Glennon, chs 3,4,8,11, and 12.
[13] Peter Gleick, THE WORLD'S WATER: THE BIENNIAL REPORT ON FRESHWATER RESOURCES, 2002-2003 2 (2002).
[14] Marq de Villiers, WATER: THE FATE OF OUR MOST PRECIOUS RESOURCE 6-7, 20-21 (2001).
[15] Gleick, at 49-50, 77.
[16] Quoted in Ashley & Smith, at 15.
[17] David R.E. Aladjem, "California's Other 'Dual System:' Coordinated Management of Groundwater and Surface Water," Rocky Mountain Mineral Law Institute (2003).
[18] Robert Glennon, "Pinching Straws: Reforming Ground and Surface Water Law to Protect the Environment," Rocky Mountain Mineral Law Institute (2003).
[19] Quoted by Glennon, at 29.
[20] The discussion of these four doctrines is based on Ashley & Smith, at 8-10.
[21] Ashley & Smith, at 10.
[22] See Ashley & Smith, at 10.
[23] "Arizona," 6 W. WATER L. & POL'Y REP. 297 (2002).
[24] AZ. CONSTIT. ART. XVII, § 1
[25] AZ. CONSTIT. ART. XVII, § 2
[26] ARIZ. REV. STAT. ANN. § 45-103 (2002).
[27] ARIZ. REV. STAT. ANN. § 45-105 (2002).
[28] ARIZ. REV. STAT. ANN. § 45-101(5) (2002).
[29] ARIZ. REV. STAT. ANN. § 45-401 (2002).
[30] Arizona Department of Water Resources, *Overview of AZ's Groundwater Management Code, available at* http://www.water.az.gov/adwr/Content/Publications/files/gwmgtovw.pdf.
[31] ARIZ. REV. STAT. ANN. §45-141(A) (2002).
[32] ARIZ. REV. STAT. ANN. §45-141(B) (2002).
[33] ARIZ. REV. STAT. ANN. §45-141(C) (2002).
[34] ARIZ. REV. STAT. ANN. §45-141(D) (2002).

[35] ARIZ. REV. STAT. ANN. §45-141(E) (2002).
[36] ARIZ. REV. STAT. ANN. § 45-453 (2002).
[37] ARIZ. REV. STAT. ANN. § 45-411 (2002).
[38] ARIZ. REV. STAT. ANN. § 45-411.03 (2002).
[39] ARIZ. REV. STAT. ANN. § 45-412 (2002).
[40] ARIZ. REV. STAT. ANN. § 45-412 (2002).
[41] ARIZ. REV. STAT. ANN. § 45-413 (2002).
[42] ARIZ. REV. STAT. ANN. § 45-415 (2002).
[43] ARIZ. REV. STAT. ANN. § 45-419 (2002).
[44] ARIZ. REV. STAT. ANN. § 45-421 (2002).
[45] ARIZ. REV. STAT. ANN. § 45-431 (2002).
[46] ARIZ. REV. STAT. ANN. § 45-432 (2002).
[47] ARIZ. REV. STAT. ANN. § 45-433 (2002).
[48] ARIZ. REV. STAT. ANN. § 45-435 (2002).
[49] ARIZ. REV. STAT. ANN. § 45-435 (2002).
[50] ARIZ. REV. STAT. ANN. § 45-436 (2002).
[51] ARIZ. REV. STAT. ANN. § 45-437(A) (2002).
[52] ARIZ. REV. STAT. ANN. § 45-437(B) (2002).
[53] ARIZ. REV. STAT. ANN. § 45-437(C) (2002).
[54] ARIZ. REV. STAT. ANN. § 45-437.01 (2002).
[55] ARIZ. REV. STAT. ANN. § 45-437.01 (2002).
[56] ARIZ. REV. STAT. ANN. § 45-437.03 (2002).
[57] ARIZ. REV. STAT. ANN. § 45-439 (2002).
[58] ARIZ. REV. STAT. ANN. § 45-451 (2002).
[59] ARIZ. REV. STAT. ANN. § 45-452 (2002).
[60] ARIZ. REV. STAT. ANN. § 45-452(A) (2002).
[61] ARIZ. REV. STAT. ANN. § 45-452(B) (2002).
[62] ARIZ. REV. STAT. ANN. § 45-452(B) (2002).
[63] ARIZ. REV. STAT. ANN. § 45-452(B) (2002).
[64] ARIZ. REV. STAT. ANN. § 45-462 (2002).
[65] ARIZ. REV. STAT. ANN. §45-463(A) (2002).
[66] ARIZ. REV. STAT. ANN. § 45-522 (2002).
[67] ARIZ. REV. STAT. ANN. § 45-523 (2002).
[68] ARIZ. REV. STAT. ANN. § 45-523 (2002).
[69] ARIZ. REV. STAT. ANN. § 45-523 (2002).
[70] ARIZ. REV. STAT. ANN. § 45-526 (2002).
[71] ARIZ. REV. STAT. ANN. § 45-541 (2002).
[72] ARIZ. REV. STAT. ANN. § 45-543 (2002).
[73] ARIZ. REV. STAT. ANN. § 45-552 to 555 (2002).
[74] ARIZ. REV. STAT. ANN. § 45-562 (2002).
[75] ARIZ. REV. STAT. ANN. § 45-563 (2002).
[76] ARIZ. REV. STAT. ANN. § 45-563 (2002).
[77] ARIZ. REV. STAT. ANN. § 45-563.02 (2002).
[78] ARIZ. REV. STAT. ANN. § 45-564 (2002).
[79] ARIZ. REV. STAT. ANN. § 45-570 (2002).

[80] ARIZ. REV. STAT. ANN. § 45-576 (2002).
[81] ARIZ. REV. STAT. ANN. § 45-576 (2002).
[82] ARIZ. REV. STAT. ANN. § 45-576 (2002).
[83] ARIZ. REV. STAT. ANN. § 45-811.01(C) (2002).
[84] ARIZ. REV. STAT. ANN. § 45-812.01 (2002).
[85] ARIZ. REV. STAT. ANN. § 45-831.01 (2002).
[86] ARIZ. REV. STAT. ANN. § 45-832.01 (2002).
[87] "California," 6 W. WATER . & POL'Y REP. 300 (2002).
[88] CAL. CONST. ART. X § 2
[89] CAL. CONST. ART. X § 2
[90] CAL. CONST. ART. X § 5
[91] CAL. WATER CODE § 101 (West 1970).
[92] CAL. WATER CODE § 104 (West 1970).
[93] CAL. WATER CODE § 380 (Supp. 2003).
[94] Ella Foley-Gannon, *Institutional Arrangements for Conjunctive Water Management in California and Analysis of Legal Reform Alternatives*, 6 HASTINGS W.-N.W.J. ENVTL. L. & POL'Y 273, 291-92 (2000).
[95] Ella Foley-Gannon, *Institutional Arrangements for Conjunctive Water Management in California and Analysis of Legal Reform Alternatives*, 6 HASTINGS W.-N.W.J. ENVTL. L. & POL'Y 273 (2000), FN 193.
[96] CAL. WATER CODE §§ 60000-60449 (West 1966).
[97] CAL. WATER CODE §§ 10750 to 10755.4 (West 1992 & Supp. 2003).
[98] CAL. WATER CODE § 10753.7(a)(1) (Supp. 2003).
[99] CAL. WATER CODE § 10753.7(a)(2) (Supp. 2003).
[100] CAL. WATER CODE § 10753.7(a)(3) (Supp. 2003).
[101] CAL. WATER CODE § 10753.8 (Supp. 2003).
[102] CAL. WATER CODE § 10753.9 (Supp. 2003).
[103] CAL. WATER CODE § 301 (West 1970).
[104] CAL. WATER CODE § 302 (West 1970).
[105] CAL. WATER CODE § 303 (West 1970).
[106] CAL. WATER CODE § 305 (West 1970).
[107] CAL. WATER CODE § 1005.1-1005.4. (West 1970 & Supp. 2003).
[108] CAL. WATER CODE § 1011.5 (Supp. 2003).
[109] CAL. WATER CODE § 1200 (West 1970).
[110] CAL. WATER CODE § 1205 (Supp. 2003).
[111] CAL. WATER CODE § 1220 (Supp. 2003).
[112] CAL. WATER CODE § 1242 (West 1970).
[113] CAL. WATER CODE § 5001 (West 1970).
[114] CAL. WATER CODE § 5004 (West 1970).
[115] CAL. WATER CODE § 4999 (West 1970).
[116] CAL. WATER CODE §§ 13550-13554.3 (West 1992 & Supp. 2003).
[117] CAL. WATER CODE § 60233.5 (Supp. 2003).
[118] CAL. WATER CODE § 60233.5 (Supp. 2003).
[119] CAL. WATER CODE § 60233.5 (Supp. 2003).
[120] CAL. WATER CODE § 60233.5 (Supp. 2003).

[121] CAL. WATER CODE § 79174 (Supp. 2003).
[122] CAL. WATER CODE APP. § 40-2 . (West 1968 & Supp. 2003).
[123] CAL. WATER CODE APP. §§ 128-1 to 128-906 (Supp. 2003).
[124] Colorado Geological Survey, GROUNDWATER ATLAS OF COLORADO (2003).
[125] COLO. CONST. ART. XVI § 5, § 6.
[126] COLO. REV. STAT. § 37-90-103(19) (2002).
[127] COLO. REV. STAT. § 37-90-102(1) (2002).
[128] COLO. REV. STAT. § 37-90-137(4)(a)-(b) (2002).
[129] COLO. REV. STAT. § 37-90-137(4) (2002).
[130] COLO. REV. STAT. § 37-90-117 (2002).
[131] COLO. REV. STAT. § 37-90-130 (2002).
[132] COLO. REV. STAT. § 37-92-201, 203 (2002).
[133] COLO. REV. STAT. § 37-92-102(2) (2002).
[134] COLO. REV. STAT. § 37-92-102(1)(a) (2002).
[135] COLO. REV. STAT. § 37-92-102(2)(d) (2002).
[136] COLO. REV. STAT. § 37-90-107 (2002).
[137] COLO. REV. STAT. § 37-90-107(1) (2002).
[138] COLO. REV. STAT. § 37-90-107(3) (2002).
[139] COLO. REV. STAT. § 37-90-107(4) (2002).
[140] COLO. REV. STAT. § 37-90-107(5) (2002).
[141] COLO. REV. STAT. § 37-90-107(5) (2002).
[142] *Fundingsland v. Colorado Ground Water Comm'n*, 468 P.2d 835, 836 (Colo. 1970). In this case, the proposed well was in the Northern High Plains Designated Groundwater Basin, so the allowable depletion rate was 40%. Also in 1970 the average life was 25 years. Now the commission uses 100 years. Code of Colorado Regulations, 2 COLO. CODE REGS. § 402-4. (2002).
[143] COLO. REV. STAT. § 37-90-107(5) (2002).
[144] COLO. REV. STAT. § 37-90-103(12.7) (2002).
[145] COLO. REV. STAT. § 37-90-107.5 (2002).
[146] COLO. REV. STAT. § 37-90-108 (2002).
[147] COLO. REV. STAT. § 37-90-108(3)(a)(I) (2002).
[148] COLO. REV. STAT. § 37-90-108(5). A quarter-quarter means a fourth of a fourth of a section of land and is equal to approximately forty acres. COLO. REV. STAT. § 37-90-103(12.5) (2002).
[149] COLO. REV. STAT. § 37-90-105 (2002).
[150] COLO. REV. STAT. § 37-90-137(4)(b) (2002).
[151] 2 COLO. CODE REGS. § 402-7 (2002).
[152] 2 COLO. CODE REGS. § 402-7 (2002).
[153] 2 COLO. CODE REGS. § 402-7 (2002).
[154] COLO. REV. STAT. § 37-90-137(1)-(2) (2002).
[155] 2 COLO. CODE REGS. § 402-6 (2002).
[156] COLO. REV. STAT. § 37-90-137(4) (2002).
[157] Justice Gregory Hobbs Jr., *Citizens Guide to Colorado Water Law*, Colorado Foundation for Water Education 16 (2003).
[158] COLO. REV. STAT. § 37-92-301(1) (2002).

[159] COLO. REV. STAT. § 37-92-602 (2002).
[160] COLO. REV. STAT. § 37-90-103(10.7) (2002).
[161] COLO. REV. STAT. § 37-90-137(9)(c.5) (2002); *Danielson v. Castle Meadows, Inc*., 791 P.2d 1106 (Colo. 1990).
[162] COLO. REV. STAT. § 37-80.5-101 (2002).
[163] 2 COLO. CODE REGS. § 402-12 (2002).
[164] 2 COLO. CODE REGS. § 402-11 (2002).
[165] *Bd. of County Comm'rs of County of Park v. Park County Sportsmen's Ranch, L.L.P.*, 45 P.3d 693 (Colo. 2002).
[166] COLO. REV. STAT. § 37-81-103 (2002).
[167] COLO. REV. STAT. § 37-90-130(2)(f) (2002); *See Coffin v. Left Hand Ditch Co.*, 6 Colo. 443 (1882).
[168] IDAHO CONSTIT. ART. XV, § 1
[169] IDAHO CONSTIT. ART. XV, § 3
[170] IDAHO CONSTIT. ART. XV, § 3
[171] IDAHO CONSTIT. ART. XV, § 4
[172] IDAHO CONSTIT. ART. XV, § 5
[173] IDAHO CONSTIT. ART. XV, § 7
[174] IDAHO CODE § 42-603 (2003).
[175] IDAHO CODE § 42-604 (2003).
[176] IDAHO CODE § 42-607 (2003).
[177] IDAHO CODE § 42-1734A (2003).
[178] IDAHO CODE § 42-226 (2003).
[179] IDAHO CODE § 42-230(a) (2003).
[180] IDAHO CODE § 42-103; § 42-229 (2003).
[181] IDAHO CODE §42-104 (2003).
[182] IDAHO CODE § 42-106 (2003).
[183] IDAHO CODE § 42-111 (2003).
[184] IDAHO CODE § 42-227 (2003).
[185] IDAHO CODE § 42-227 (2003).
[186] IDAHO CODE § 42-226 (2003).
[187] IDAHO ADMIN. CODE § 37.03.11.029 (2003).
[188] IDAHO CODE § 42-233a (2003).
[189] IDAHO CODE § 42-233a (2003).
[190] IDAHO CODE § 42-233a (2003).
[191] IDAHO CODE § 42-233b (2003).
[192] IDAHO CODE § 42-233b (2003).
[193] IDAHO CODE § 42-233b (2003).
[194] IDAHO CODE § 42-1416B(4) (2003).
[195] IDAHO CODE § 42-202 (2003).
[196] IDAHO CODE § 42-202 (2003).
[197] IDAHO CODE § 42-202(4) (2003).
[198] IDAHO CODE § 42-222(2) (2003).
[199] IDAHO CODE § 42-222(2) (2003); *but see* § 42-223 which lists exceptions or defenses to forfeitures.

[200] IDAHO CODE § 42-203A(2) (2003).
[201] IDAHO CODE § 42-203A(4) (2003).
[202] IDAHO CODE § 42-203A (2003).
[203] IDAHO CODE § 42-203A(5) (2003).
[204] IDAHO CODE § 42-237b (2003).
[205] IDAHO CODE § 42-237d (2003).
[206] IDAHO CODE § 42-237d (2003).
[207] IDAHO CODE § 42-237c (2003).
[208] IDAHO CODE § 42-237c (2003).
[209] IDAHO CODE § 42-1404 (2003).
[210] IDAHO CODE § 42-1405 (2003).
[211] IDAHO CODE § 42-1405 (2003).
[212] IDAHO CODE § 42-1411(5) (2003).
[213] IDAHO CODE § 42-234 (2003).
[214] IDAHO CODE § 42-234 (2003).
[215] IDAHO CODE § 42-234 (2003).
[216] IDAHO CODE § 42-4201 (2003).
[217] IDAHO CODE § 42-401(3) (2003).
[218] MONT. CODE ANN. § 85-1-101 (2003).
[219] MONT. CODE ANN. § 85-1-101 (2003).
[220] MONT. CODE ANN. § 85-1-203 (2003).
[221] Plan can be found at the Department of Natural Resources web page at: http://www.dnrc.state.mt.us/wrd/gw_plan.htm
[222] IDAHO CODE § 85-2-903 (2003).
[223] MONT. CONST., ART IX §3(1).
[224] MONT. CONST., ART IX §3(3).
[225] MONT. CONST., ART IX §3(4).
[226] MONT. CODE ANN. § 85-2-102(11) (2003).
[227] MONT. CODE ANN. § 85-2-212 (2003).
[228] MONT. CODE ANN. § 85-2-212 (2003).
[229] MONT. CODE ANN. § 85-2-212 (2003).
[230] § MONT. CODE ANN. § 85-2-222 (2003).
[231] Montana Department of Natural Resources and Conservation, *Water Rights in Montana* (2001); *available at* http://www.dnrc.state.mt.us/wrd/home.htm.
[232] MONT. CODE ANN. § 85-2-401(1) (2003).
[233] MONT. CODE ANN. § 85-2-401(1) (2003).
[234] MONT. CODE ANN. § 85-2-404(1) (2003).
[235] MONT. CODE ANN. § 85-2-406 (2003).
[236] MONT. CODE ANN. § 85-2-302 (2003).
[237] MONT. CODE ANN. § 85-2-311(1) (2003).
[238] MONT. CODE ANN. § 85-2-311(3) (2003).
[239] MONT. CODE ANN. § 85-2-317 (2003).
[240] MONT. CODE ANN. § 85-2-317 (2003).
[241] MONT. CODE ANN. § 85-2-506 (2003).
[242] MONT. CODE ANN. § 85-2-507 (2003).

[243] MONT. CODE ANN. § 85-2-507(4) (2003).
[244] MONT. CODE ANN. § 85-2-508 (2003).
[245] MONT. CODE ANN. § 85-2-319 (2003).
[246] MONT. CODE ANN. § 85-2-330 (2003).
[247] MONT. CODE ANN. § 85-2-336 (2003).
[248] MONT. CODE ANN. § 85-2-337 (2003).
[249] MONT. CODE ANN. § 85-2-337(3) (2003).
[250] See MONT. ADMIN R. 36-12-1019 (2003)(Truman Creek Basin Closure); MONT. ADMIN R. 36-12-1018 (2003)(Willow Creek Basin Closure); MONT. ADMIN R. 36-12-1017 (2003)(Sharrott Creek Basin Closure).
[251] MONT. CODE ANN. § 85-2-341 (2003).
[252] MONT. CODE ANN. § 85-2-340(2) (2003).
[253] MONT. ADMIN R. 36-12-1201 (2003).
[254] MONT. CODE ANN. § 85-2-316(1) (2003).
[255] MONT. CODE ANN. § 85-2-316(3) (2003).
[256] MONT. CODE ANN. § 85-2-316(4) (2003).
[257] MONT. CODE ANN. § 85-20-201 (2003).
[258] MONT. CODE ANN. § 85-20-401 (2003).
[259] MONT. CODE ANN. § 85-2-311(4) (2003).
[260] MONT. CODE ANN. § 82-11-175(2) (2003).
[261] MONT. CODE ANN. § 82-11-175(3)(a) (2003).
[262] MONT. CODE ANN. § 82-11-175(3)(b) (2003).
[263] NEV. CONST. ART. 8 § 8.
[264] NEV. REV. STAT. § 533.035 (Michie 1995).
[265] NEV. REV. STAT. § 533.070 (Michie 1995).
[266] NEV. REV. STAT. § 533.357 (Michie 1995).
[267] NEV. REV. STAT. § 533.370 (Michie 1995 & Supp. 2001).
[268] NEV. REV. STAT. § 534.020 (Michie 1995).
[269] NEV. REV. STAT. § 534.090 (Michie 1995).
[270] NEV. REV. STAT. § 534.120 (Michie 1995 & Supp. 2001).
[271] NEV. REV. STAT. § 534.180 (Michie 1995 & Supp. 2001).
[272] NEV. REV. STAT. § 534.250 (Michie 1995).
[273] NEV. REV. STAT. § 538.600 (Michie 1995).
[274] N.M. CONST. ART. XVI, § 1.
[275] N.M. CONST. ART. XVI, § 2.
[276] N.M. CONST. ART. XVI, § 3.
[277] N.M. CONST. ART. XVI, § 5.
[278] N.M. STAT. ANN. § 72-12-4 (Michie 1978).
[279] N.M. STAT. ANN. § 72-12-5 (Michie 1978).
[280] N.M. STAT. ANN. § 72-12-1 (Michie 1978).
[281] *Bliss, State ex rel v. Dority*, 225 P.2d 1007, 1101 (N.M. 1950). See also, N.M. STAT. ANN. § 72-12-12 (Michie 1978).
[282] N.M. STAT. ANN. § 72-12-20 (Michie 1978).
[283] eg. Thomas C. Turney, Office of the State Engineer, *Estancia Underground Water Basin Guidelines for Review of Water Rights Applications* (June 20,2002).

[284] N.M. STAT. ANN. § 72-12-12 (Michie 1978).
[285] N.M. STAT. ANN. § 72-12-1.1 (Michie 1978 & Supp. 2003).
[286] N.M. STAT. ANN. § 72-12-1.1 (Michie 1978 & Supp. 2003).
[287] N.M. STAT. ANN. § 72-12-1.2 (Michie 1978 & Supp. 2003).
[288] N.M. STAT. ANN. § 72-12-1.3 (Michie 1978 & Supp. 2003).
[289] N.M. STAT. ANN. § 72-12-25 (Michie 1978).
[290] N.M. STAT. ANN. § 72-12-26 (Michie 1978).
[291] N.M. STAT. ANN. § 72-12-27 (Michie 1978).
[292] N.M. STAT. ANN. § 72-12-28 (Michie 1978).
[293] N.M. STAT. ANN. § 72-12-3 (Michie 1978 & Supp. 2003).
[294] N.M. STAT. ANN. § 72-12-3(E) (Michie 1978 & Supp. 2003).
[295] N.M. STAT. ANN. § 72-12-8 (Michie 1978 & Supp. 2003).
[296] N.M. STAT. ANN. § 72-12-8 (Michie 1978 & Supp. 2003).
[297] N.M. STAT. ANN. § 72-12-8 (Michie 1978 & Supp. 2003).
[298] N.M. STAT. ANN. § 72-4-17 (Michie 1978).
[299] N.M. STAT. ANN. § 72-4-19 (Michie 1978).
[300] N.M. STAT. ANN. § 72-13-1 (Michie 1978).
[301] N.M. STAT. ANN. § 72-13-2 (Michie 1978).
[302] N.M. STAT. ANN. § 72-13-2 (Michie 1978).
[303] State Engineer's Office, *Governing Drilling of Wells and Appropriation and Use of Ground Water in New Mexico*; available at http://www.seo.state.nm.us/doing-business/well-drilling/Well-Drilling-Rules-Regs.pdf.
[304] N.M. STAT. ANN. § 72-12A-2 (Michie 1978).
[305] N.M. STAT. ANN. § 72-12A-6 (Michie 1978).
[306] N.M. STAT. ANN. § 72-12A-7 (Michie 1978).
[307] N.M. STAT. ANN. § 72-12A-4 (Michie 1978).
[308] N.M. STAT. ANN. § 72-12A-4 (Michie 1978).
[309] N.M. STAT. ANN. § 72-12B-1 (Michie 1978).
[310] N.M. STAT. ANN. § 72-12B-1 (Michie 1978).
[311] N.M. STAT. ANN. § 72-12B-1 (Michie 1978).
[312] N.M. STAT. ANN. § 72-12B-1 (Michie 1978).
[313] N.M. STAT. ANN. § 72-5A-8 (Michie 1978 & Supp. 2003).
[314] N.M. ADMIN. CODE tit. 19.25.8.10 NMAC - N, 01-31-2001
[315] N.M. STAT. ANN. § 72-5A-5 (Michie 1978 & Supp. 2003).
[316] N.M. STAT. ANN. § 72-5A-5 (Michie 1978 & Supp. 2003).
[317] N.M. STAT. ANN. § 72-5A-6 (Michie 1978 & Supp. 2003).
[318] N.M. STAT. ANN. § 72-5A-8(Michie 1978 & Supp. 2003); see N.M. ADMIN. CODE tit. 19.25.8.2 NMAC - N, 01-31-2001.
[319] OR. REV. STAT. § 537.515(5) (2001).
[320] OR. REV. STAT. § 537.535 (2001).
[321] OR. REV. STAT. § 536.025 (2001).
[322] OR. REV. STAT. § 537.780 (2001).
[323] OR. REV. STAT. § 536.025 (2001).
[324] OR. REV. STAT. § 536.037 (2001).
[325] OR. REV. STAT. § 537.525 (2001).

[326] OR. REV. STAT. § 540.610 (2001).
[327] OR. REV. STAT. § 540.610 (2001).
[328] OR. REV. STAT. § 537.525 (2001).
[329] OR. REV. STAT. § 537.525 (2001).
[330] OR. REV. STAT. § 537.705 (2001).
[331] OR. REV. STAT. § 536.340 (2001).
[332] OR. REV. STAT. § 536.340 (2001).
[333] OR. REV. STAT. § 390.835(9) (2001).
[334] OR. REV. STAT. § 537.515(9) (2001).
[335] OR. ADMIN. R. 690-008-0001 (2001). "Declined excessively" is defined as meaning any cumulative lowering of the water levels in a groundwater reservoir or a part thereof which (a) precludes or could preclude the perpetual use of the reservoir, or (b) exceeds the economic pumping level; or (c) constitutes a decline determined to be interfering with a senior right; or (d) constitutes a lowering of the annual high water level within a groundwater reservoir, or part there of greater than fifty feet below the highest know level; or (e) results in groundwater pollution; or (f) constitutes a lowering of the annual high water level greater than 15% of the greatest known saturated thickness of the groundwater reservoir. The stated thickness shall be calculated using pre-development water levels and the bottom of the groundwater reservoir, or the economic pumping level, whichever is shallower. Id. at 690-008-0001(4). "Economic pumping levels means the level below land surface at which the per-acre cost of pumping equals 70 percent of the net increase in annual per- acre value derived by irrigating. (The Value is to be calculated on a five year running average of the per - acre value of the three, if there are that many, prevalent irrigated crops in the regions minus the five year running average of the per-acre value of the three, if there are that many, prevalent regional non-irrigated crops." Id. at 690-008-0001(5)
[336] OR. REV. STAT. § 537.545 (2001).
[337] OR. REV. STAT. § 537.621(2) (2001).
[338] OR. REV. STAT. § 537.621(3) (2001).
[339] OR. REV. STAT. § 537.621(7) (2001).
[340] *See* OR. REV. STAT. §§ 183.310-183.550 (2001).
[341] OR. REV. STAT. § 537.625(2001).
[342] OR. REV. STAT. § 537.625 (2001).
[343] OR. REV. STAT. §537.630(1) (2001).
[344] OR. REV. STAT. § 537.629 (2001).
[345] OR. ADMIN. R. 690-009-0040(4) (2001).
[346] OR. ADMIN. R. 690-009-0040(6) (2001).
[347] OR. ADMIN. R. 690-500-0010 (2001).
[348] OR. REV. STAT. § 537.730 (2001).
[349] OR. REV. STAT. § 537.735 (2001).
[350] OR. REV. STAT. § 537.735 (2001).
[351] OR. REV. STAT. § 537.745 (2001).
[352] OR. REV. STAT. § 537.745 (2001).
[353] OR. REV. STAT. § 537.809 (2001).
[354] OR. REV. STAT. § 537.810 (2001).

[355] OR. REV. STAT. § 537.531 (2001).
[356] OR. REV. STAT. § 537.135 (2001).
[357] OR. REV. STAT. § 537.135 (2001).
[358] OR. REV. STAT. § 537.135 (2001).
[359] OR. REV. STAT. § 537.135(2) (2001).
[360] OR. REV. STAT. § 537.135(4) (2001).
[361] OR. REV. STAT. § 537.143 (2001) & OR. REV. STAT. § 537.534 (2001).
[362] OR. REV. STAT. § 537.534 (2001).
[363] OR. ADMIN. R. 690-350-0010 (2001).
[364] UTAH CONST. Art. XI §6. One court was of the opinion that this section was not intended to apply to an adjudication of water rights. *Wayman v. Murray City Corp*., 458 P.2d 861 (Utah 1969) fn 11.
[365] UTAH CODE ANN. § 73-1-1 (2003).
[366] UTAH CODE ANN. § 73-1-3 (2003).
[367] UTAH CODE ANN. § 73-3-21 (2003).
[368] UTAH CODE ANN. § 73-3-8(2) (2003).
[369] UTAH CODE ANN. § 73-3-1 (2003).
[370] UTAH CODE ANN. § 71-3-2(2) (2003).
[371] UTAH CODE ANN. § 73-3-6 (2003).
[372] UTAH CODE ANN. § 73-3-7 (2003).
[373] UTAH CODE ANN. § 73-3-8 (2003).
[374] UTAH CODE ANN. § 73-3-10 (2003).
[375] UTAH CODE ANN. § 73-3-12(2)(a) (2003).
[376] UTAH CODE ANN. § 73-3-12(2)(b) (2003).
[377] UTAH CODE ANN. § 73-3-12(2)(c) (2003).
[378] UTAH CODE ANN. § 73-3-13 (2003).
[379] *See* groundwater management plans for the Bountiful Sub-Area of the East Shore Area(1/95), Cedar Valley (11/95), Interim Cache Valley (9/99), Northern Juab Valley (11/95), Pahvant Valley (4/94), Salt Lake Valley (6/02), Snyderville/Park City Basin (12/02), Tooele Valley (2/96), Upper Provo River (11/95), Utah/Goshen Valley (11/95), Weber Delta Sub-Area of the East Shore Area (10/95), Monticello Mill Tailing Site and Adjacent Areas(5/99).
[380] Cache Valley Ground-Water Management Plan.
[381] UTAH CODE ANN. § 73-3a-108 (2003).
[382] UTAH CODE ANN. § 73-3b-106 (2003).
[383] UTAH CODE ANN. § 73-3b-202 (2003).
[384] UTAH CODE ANN. § 73-3b-205 (2003).
[385] UTAH CODE ANN. § 73-3b-301 (2003).
[386] UTAH CODE ANN. § 73-3b-301 (2003).
[387] "Utah" Groundwater Management, Conjunctive Use and Water Banking, 6 W. WATER L. & POL'Y REP. 321 (2002).
[388] Waiting for more info!
[389] WASH. REV. CODE § 90.03.005 to 90.03.605 (surface water code) and 90.44.020 to 90.44.500 (groundwater code).

[390] WASH. REV. CODE § 90.03.010 (1992); *State of Washington Dept. of Ecology v. Campbell & Gwinn, L.L.C.*, 43 P.2d 4 (Wash. 2002)
[391] WASH. REV. CODE § 90.14.220 (1992).
[392] WASH. REV. CODE § 90.03.010 (1992)
[393] WASH. REV. CODE § 90.44.040 (1992).
[394] WASH. REV. CODE § 90.44.060 (1992).
[395] WASH. REV. CODE § 90.03.340 (1992).
[396] WA Const. Art. 21 § 1
[397] WASH. REV. CODE § 90.44.035(3) (1992).
[398] WASH. REV. CODE § 90.44.035(4) (1992).
[399] WASH. REV. CODE § 90.44.035(5) (1992).
[400] WASH. REV. CODE § 90.44.040 (1992).
[401] WASH. REV. CODE § 90.14.180 (1992).
[402] WASH. REV. CODE §§ 90.54.005-920 (1992).
[403] WASH. REV. CODE § 90.54.040 (1992 & Supp. 2003).
[404] WASH. REV. CODE § 90.54.020 (1992 & Supp. 2003).
[405] WASH. ADMIN. CODE § 173-500-010 (1992).
[406] WASH. ADMIN. CODE § 173-500-040 (1992).
[407] WASH. ADMIN. CODE § 173-500-060 (1992).
[408] WASH. REV. CODE § 90.66.030 (1992).
[409] WASH. REV. CODE § 90.44.050 (1992).
[410] WASH. REV. CODE § 90.03.260 (1992).
[411] WASH. REV. CODE § 90.03.260 (1992).
[412] WASH. REV. CODE § 90.03.260 (1992).
[413] WASH. REV. CODE § 90.44.060 (1992).
[414] WASH. REV. CODE § 90.03.280 (1992 & Supp. 2003).
[415] WASH. REV. CODE § 90.03.280 (1992 & Supp. 2003).
[416] WASH. REV. CODE § 90.03.290 (1992 & Supp. 2003).
[417] WASH. REV. CODE § 90.03.290(3) (Supp. 2003).
[418] WASH. REV. CODE § 90.03.290(3) (Supp. 2003).
[419] WASH. REV. CODE § 90.03.290(4) (Supp. 2003).
[420] WASH. REV. CODE § 90.44.070 (1992).
[421] WASH. REV. CODE § 90.44.070 (1992).
[422] WASH. REV. CODE § 90.44.130 (1992).
[423] WASH. REV. CODE § 90.44.130 (1992).
[424] WASH. REV. CODE § 90.44.130 (1992).
[425] WASH. REV. CODE § 90.44.400 (1992).
[426] WASH. REV. CODE § 90.44.130 (1992).
[427] WASH. REV. CODE § 90.44.130 (1992).
[428] WASH. REV. CODE § 90.44.180 (1992).
[429] WASH. REV. CODE § 90.44.180 (1992).
[430] WASH. REV. CODE § 90.44.180 (1992).
[431] WASH. REV. CODE § 90.44.200 (1992).
[432] WASH. REV. CODE § 90.44.410 (1992).
[433] WASH. REV. CODE § 90.44.420 (1992).

[434] WASH. REV. CODE § 90.44.420 (1992).
[435] WASH. REV. CODE § 90.44.440 (1992).
[436] WASH. REV. CODE § 90.03.320 (1992 & Supp. 2003).
[437] WASH. REV. CODE § 90.03.320 (1992 & Supp. 2003).
[438] WASH. REV. CODE § 90.03.330 (1992).
[439] WASH. REV. CODE § 90.44.080 (1992).
[440] WASH. REV. CODE § 90.03.300 (1992).
[441] WASH. REV. CODE § 90.03.300 (1992).
[442] WASH. ADMIN. CODE § 173-157-040 (Supp. 2003).
[443] WASH. REV. CODE § 90.03.370(2) (1992 & Supp. 2003).
[444] WASH. REV. CODE § 90.03.370(1)(a) (1992 & Supp. 2003).
[445] Doug McChesney, *2001 Report to the Legislature, Artificial Storage and Recovery of Ground Water Progress Report*; found at http://www.ecy.wa.gov/biblio/0111019.html.
[446] WASH. ADMIN. CODE § 173-157-110 (Supp. 2003).
[447] WASH. ADMIN. CODE § 173-157-200(3) (Supp. 2003).
[448] WASH. ADMIN. CODE § 173-157-200(7)
[449] *Hunt v. City of Laramie*, 26 Wyo. 160 (1919). The Wyoming Supreme Court stated Wyoming followed the absolute ownership rule of groundwater. Absolute ownership of groundwater is a rule of capture that allows the landowner to use the water for any purpose including wasteful uses and uses on other lands.
[450] WYO. CONSTIT. ART. 8 § 1.
[451] WYO. CONSTIT. ART. 8 § 3.
[452] WYO. STAT. § 41-3-901(a)(ii) (2003).
[453] WYO. STAT. § 41-3-916 (2003).
[454] WYO. STAT. § 41-3-912(a) (2003).
[455] WYO. STAT. § 41-3-912(a) (2003).
[456] WYO. STAT. § 41-3-914(d) (2003).
[457] WYO. STAT. § 41-3-915(a) (2003).
[458] WYO. STAT. § 41-3-915(c) (2003).
[459] WYO. STAT. § 41-3-915 (c) (2003).
[460] WYO ADMIN. CODE, ST. ENG'R GROUNDWATER Ch. 1, § 16 (2003).
[461] WYO. STAT. § 41-3-930(a) (2003).
[462] WYO. STAT. § 41-3-930(a) (2003).
[463] WYO. STAT. § 41-3-930(a) (2003).
[464] WYO. STAT. § 41-3-933 (2003).
[465] Larence J. Wolfe & Jennifer G. Hager, *Wyoming's Groundwater Laws: Quantity and Quality Regulation*, 24 LAND & WATER L. REV. 40, 50 (1989).
[466] WYO. STAT. § 41-3-930(b) (2003).
[467] WYO. STAT. § 41-3-931 (2003).
[468] WYO. STAT. § 41-3-931 (2003).
[469] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 2 (2003).
[470] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 2 (2003).
[471] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 2 (2003).
[472] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 2 (2003).
[473] WYO. STAT. § 41-3-932(a) (2003).

[474] WYO. STAT. § 41-3-932(a) (2003).
[475] WYO. STAT. § 41-3-932(b) (2003).
[476] WYO. STAT. § 41-3-932(c) (2003).
[477] WYO. STAT. § 41-3-934 (2003).
[478] WYO. STAT. § 41-3-934 (2003).
[479] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 10 (2003).
[480] WYO. STAT. § 41-3-918 (2003).
[481] WYO. STAT. § 41-3-911(a) (2003).
[482] WYO. STAT. § 41-3-911(b) (2003).
[483] *Willadsen v. Christopulos*, 731 P.2d 1181 (Wyo. 1987).
[484] WYO. STAT. § 41-3-907 (2003).
[485] WYO. STAT. § 41-3-907 (2003).
[486] WYO. STAT. § 41-3-935(b) (2003).
[487] WYO. STAT. § 41-3-935(b) (2003).
[488] WYO. STAT. § 41-3-904 (2003).
[489] WYO. STAT. § 41-3-904(a)(ii) (2003); WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch.1, § 19 (2003).
[490] Larence J. Wolfe & Jennifer G. Hager, *Wyoming's Groundwater Laws: Quantity and Quality Regulation*, 24 LAND & WATER L. REV. 40, 67 (1989) Authors cite an interview with the ex state engineer.
[491] WYO. ADMIN. CODE, ST. ENG'R, GROUNDWATER Ch. 2, § 13
[492] WYO. STAT. § 41-3-110(a) (2003).
[493] *John Meier & Son, Inc. v. Horse Creek Conservation Dist. of Goshen***,** 603 P.2d 1283 (Wyo. 1979).
[494] WYO. STAT. § 41-3-115 (2003).