"*Review and Analysis of State Water Reuse Programs: A Primer for New Jersey* "

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Summer 2004

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INTRODUCTION

The nation's excessive water use is deeply concerning and the management of our water resources is extremely poor. Since water conditions are region specific, states must take the lead in protecting their precious water supplies. A clean and adequate water supply is essential for a healthy environment, citizenry, and economy. Conservation and management of water supplies is crucial to meeting water needs and protecting the environment. One way to conserve high-quality water and extend the life of current water sources is water reuse. Select states have taken the lead in implementing water reuse programs to secure a safe and abundant water supply, while others lack the foresight necessary for such an endeavor.

This paper briefly explains the concept of water reuse and discusses water reuse on the national level. It takes an in-depth look at the development, structure, regulatory aspects, and experiences of water reuse programs established in Florida, California, and Washington – states that lead the nation in water reuse. States with young and unstructured water reuse programs can learn from the successes and failures of other states as they struggle to develop their own programs. New Jersey, in particular, can benefit from the lessons learned by preceding programs, as the need for a sustainable beneficial reuse program in the state is great. The purpose of this paper is to provide background and recommendations for a water reuse program for New Jersey.

I. Background of Water Utilization

National water use statistics are startling. Federal estimates indicate that one person uses approximately 120 gallons of water per day.[1] Water withdrawals totaled 408,000 million gallons per day (mgd) in 2000, of which 85% were freshwater and 15% were saltwater. Surface water withdrawals totaled 323,000 mgd and groundwater withdrawals totaled 84,500 mgd. These numbers will continue to grow as the population increases, especially if we continue to use water at such an astonishing rate. The national breakdown of water use, both potable and non-potable, is as follows: [2]

Thermoelectric Power	48%
Irrigation	34%
Public Supply	11%
Industry	5%
Mining, Livestock, Aquaculture, and other	2%

The actual demand for potable water is between 11% and 60% of the total water demand. Depending on location and season, residential demand consists of indoor use (68%) and outdoor use (32%). Only 40% of the total residential demand actually requires water of potable quality.[3] For instance, toilets, at twenty-seven gallons per person per day, require the most water of all

[1] Clean Ocean Action, *Wasting our Waters Away: Technical Report*, 2001, p.6.
[2] Hutson, S.S., Barber, N.L., Kenny, J.F., Linsey, K.S., Lurnia, D.S., and Maupin, M.A, *Estimated Use of Water in the United States in 2000,* U.S. Geological Survey, Circular 1268, Updated 13 May 2004, http://water.usgs.gov/pubs/circ/2004/circ1268 (Accessed 5 August 2004).
[3] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.12.

indoor uses.[4] Such uses do not require water of potable quality. Instead, water of non-potable quality can be used for non-potable purposes, which also include irrigation, street cleaning, industrial cooling water, and decorative fountains.

II. Water Reuse Defined

Untreated domestic wastewater is over 99.9% water by weight.[5] With proper treatment, it can safely be reused. Treated wastewater is a significantly large source of non-potable water that is available for reuse. Water reuse, also known as water recycling or water reclamation, is the use of treated wastewater effluent for beneficial purposes. Beneficial purposes can include a variety of uses from landscape irrigation to wetland restoration.[6] The U.S. Environmental Protection Agency (EPA) characterizes beneficial reuse into the following categories:

(1) **Urban** (which includes irrigation of parks, schools and golf courses, toilet flushing, fire protection, car washing, and construction, for example)
(2) **Industrial** (which includes cooling water and process water, for example)
(3) **Agricultural** (including irrigation of food crops like orchards or non-food crops like pasture for animals, among other things)
(4) **Recreational** (which includes fountains, ponds, impoundments, snowmaking, for example)
(5) **Environmental** (for example: wetland restoration or enhancement and stream augmentation)
(6) **Groundwater Recharge** (including saltwater barrier and storage of reclaimed water)
(7) **Indirect Potable** (including augmentation of the drinking water supply and recharging potable aquifers)[7]

Since each water reuse application has a different level of contact with humans and the environment, each application requires different treatment methods and water quality criteria. The EPA, however, has not set forth water reuse standards. EPA's *Guidelines for Water Reuse* contains suggested criteria and design considerations to guide new water reuse programs, but implementing water reuse regulations is the responsibility of the states.[8] The EPA's 1992 manual is currently being updated to reflect advances in the field of water reuse.

At first, people may be hesitant to accept water reuse programs and to use reclaimed water, but wastewater treatment mirrors the cleansing of water in the natural hydrological cycle. Water, a finite resource, is continually moving between the ocean, lakes, and rivers, the sky, and land by means of evaporation, transpiration, condensation, precipitation, and percolation. Throughout the process, it is cleansed of contaminants. The public must also understand that the

[4] American Water Works Association, "25 Facts about Water," 2004, http://www.awwa.org/Advocacy/learn/info/425FactsAboutWater.cfm (Accessed 2 June 2004).
[5] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.10.
[6] U.S. EPA, "Water Recycling and Reuse: The Environmental Benefits," EPA document # EPA/909/F-98/001, http://www.epa.gov/region9/water/recycling/index.html (Accessed 2004 May 28).
[7] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.10.
[8] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.1.

unplanned reuse of water occurs all the time. Treated wastewater that is discharged to rivers and other water bodies is often extracted and used downstream for potable and non-potable uses. For example, 90% of the municipal wastewater discharged into the San Joaquin Valley in California is reused downstream.[9] Also, at times, over 85% of the Passaic River in New Jersey consists of discharged municipal wastewater.[10] The Passaic River travels through forty-five municipalities and provides drinking water for over two million residents.[11]

III. Benefits of Water Reuse

While the job of implementing a water reuse program is a complex and extensive undertaking, there are many benefits associated with water reuse. First, water reuse is an effective tool for conserving aquatic ecosystems, if implemented correctly. When less freshwater is extracted from such delicate and important ecosystems, more is available to preserve aquatic habitats and their organisms.[12] Reusing treated wastewater also reduces the volume of effluent and associated pollutants discharged into sensitive ecosystems.[13] Instead, some constituents that are considered pollutants in discharges can be used beneficially in different applications. Nutrients, such as phosphorus, can impair water bodies when discharged in effluent, but reduce the need for fertilizers when reclaimed water is properly reused for agricultural or landscape irrigation.[14] Less freshwater withdrawals also result in less saltwater intrusion in coastal areas, which damages estuarine areas and taints freshwater supplies. Furthermore, by matching water quality to water uses, the amount of potable water demanded decreases. For example, gray water (non-potable waste water from bathroom, kitchen, and laundry activities) can be routed for use in golf-course sprinkler systems. As a result, less dependence is placed on current potable water sources so sustainable rates of extraction can be achieved. Water reuse options are varied, including providing a drought resistant supply for important water uses, such as drinking supply, fire protection, and groundwater recharge.[15]

IV. Negative Impacts of Water Reuse

While the planned reuse of treated wastewater offers an array of benefits for communities and the environment, it also has the potential to cause harm if implemented carelessly. First, water reuse may reduce stream flows to levels too low to sustain healthy aquatic ecosystems. Water reuse reduces and eliminates discharges into streams and rivers whose habitats have become dependent on the discharged water. It also reduces the flow available for downstream

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[9] California Recycled Water Task Force, *Water Recycling 2030: Recommendations of California's Recycled Water Task Force*, June 2003, p.10.
[10] Raritan Basin Water Management Project, Lower Raritan Watershed Management Area: Water Quality Monitoring and Modeling Subcommittee, Strategy Worksheet LRWQ-S1A3, p.1, http://www.raritanbasin.org/RBWMPlan/LRaritan/LRWQ-S1A3.pdf (Accessed 12 August 2004).
[11] Great Swamp Watershed Association, "Great Swamp Watershed Water Quality Monitoring Program: Passaic River," http://www.greatswamp.org/StreamMonitoring/TxtPassaicRiver.htm#PassaicRiver (Accessed 12 August 2004).
[12] U.S. EPA, "Water Recycling and Reuse: The Environmental Benefits," EPA document # EPA/909/F-98/001, http://www.epa.gov/region9/water/recycling/index.html (Accessed 2004 May 28).
[13] *Id.*
[14] *Id.*
[15] WateReuse Association, "Fact Sheet: Frequently Asked Questions," http://www.watereuse.org/Pages/information.html (Accessed May 28, 2004).

users.[16] Water reuse, however, will not reduce stream flows as long as the reuse offsets an existing water demand and does not create an additional demand.[17] Second, water reuse has the potential to spur development in areas historically limited by water availability. If development is not regulated in a community's growth and land use plans, water reuse could possibly stimulate unwanted growth, thus creating an additional demand on both potable and reclaimed water supplies.[18]

V. Impediments to Water Reuse

One of the significant challenges to water reuse programs are the costs, which includes the price of new facilities and distribution systems and operation and maintenance. The price of water, however, is not accurately reflected in water and wastewater processes. For example, potable water costs consumers a national average of $1.90 per 1000 gallons or $0.0019 per gallon.[19] With water priced below its true value, water reuse options are often overlooked or deemed infeasible because of their high capital costs. Thus, communities opt to continue unsustainable use of current sources or spend money finding new sources, which will also eventually be depleted. The price of water is reportedly increasing, though, in cities where water is becoming a scarce resource. In a 2002 survey, numerous U.S. cities (Boston, Massachusetts, Dover, Delaware, Albany, New York, and Los Angeles, California) reported an annual increase of 10% in the price of drinking water, reflecting the true value of high-quality water and its increasing scarcity.[20]

It should seem unreasonable to utilities and communities (particularly those with ocean dischargers whose water does not have the opportunity to be reused downstream) to spend money to treat wastewater and then discard it. Treated wastewater is a valuable resource and should be utilized. With some financial incentives, the assurance of recovering costs through the sale of reclaimed water, and rising water prices, communities will find water reuse programs can be a viable water supply option. Potential water reuse programs have a variety of financing options available. Options include externally generated funding, like tax-exempt bonds, grants, and state revolving loan funds, and internally generated funding, like water, wastewater, and reuse revenues, connection fees, and taxes.[21] Significant advancements in water reuse can occur if states identify the financing options available to utilities.

Another major obstacle to the implementation of water reuse programs is public acceptance. A continuous flow of factual information between the public, the state, and a water utility is necessary to ensure that water reuse is an option supported by the public and the proposed program satisfies a community's needs and goals. Public involvement and communication can be achieved through fair media coverage, informational mailings, public

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[16] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.60.
[17] North Carolina Division of Water Resources, *Strategic Management Implications of Water Reclamation and Reuse on Water Resources*, NC AWWA/WEA Reclaimed Water Conference, 10 April 1996.
[18] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.59.
[19] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p. 11.
[20] WaterTech, *Study: Cost of Water Rising in Many Countries, Including US*, http://www.watertechonline.com/news.asp?mode=4&N_ID=36237 (Accessed 20 November 2002).
[21] U.S. Environmental Protection Agency (EPA) and U.S. Agency for International Development, *Guidelines for Water Reuse,* EPA document # EPA/625/R-92/004, 1992 September, p.152-4.

meetings and hearings, community workshops and other avenues. It may be beneficial for a project to designate an individual responsible for coordinating public participation and encouraging dialogue. Informing the community and addressing the public's concerns early in the process reduces costly delays and conflicts at later points in time.[22]

Currently, there is a lack of information available for states, utilities, or individuals interested in water reuse. The EPA's *Guidelines for Water Reuse* is a valuable source, but does not adequately describe the nuts and bolts behind a successful program or prepare states and communities for the many challenges they may encounter. It is important for states to research and analyze the pioneering water reuse programs in the country, and possibly abroad, to better understand how they were developed and how they are maintained. Examples of such programs include those in Florida, California, and Washington, and are described below.

[22] *Id.* at p.168-70.

STATE PROGRAMS

FLORIDA

I. History of Water Reuse in Florida

Water reuse in Florida's communities initially developed for land application systems as early as the 1960s in such places as Tallahassee and St. Petersburg. Reuse was another method of wastewater disposal since locations suitable for surface water discharge of effluent were increasingly scarce,[23] as Florida's small, sensitive, and low flow streams were unable to accommodate the large quantities of effluent the state generated.[24] The other alternative for coastal communities was ocean discharge, but this was difficult and expensive in most areas outside of southeast Florida because of the wide continental shelf and the Gulf Stream's far distance from shore.[25] In 1983, Florida's Department of Environmental Regulation, the parent agency of the state's Department of Environmental Protection (DEP), published *Land Application of Domestic Wastewater Effluent in Florida* to provide technical guidance for the many slow- and rapid-rate land application systems operating in Florida. Not only did these systems provide an alternative disposal method to surface water discharges, but they also appeared to carry with them the environmental benefit of water conservation. Thus, the motive behind the implementation of water reuse programs expanded beyond wastewater disposal to include water conservation and management.[26]

II. Development of Florida's Water Reuse Program

Early program directors faced many obstacles because the programs existed without regulations to facilitate coordination among the many parties involved in water reuse. In response to the growing interest in water reuse, DEP instated the Water Reuse Program in 1986 to provide regulatory guidance and coordination for the increasing numbers of reuse programs throughout the state. In 1989, the advancement of the water reuse program was adopted as a State objective in the Florida Statutes as follows:[27]

> *The encouragement and promotion of water conservation, and reuse of reclaimed water, as defined by the department, are state objectives and are considered to be in the public interest. The Legislature finds that the reuse of reclaimed water is a critical component of meeting the state's existing and future water supply needs while sustaining natural systems. The Legislature further finds that for those wastewater treatment plants permitted and operated under an approved reuse program by the department, the reclaimed water shall be considered environmentally acceptable and not a threat to public health and safety.*[28]

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[23] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.33-5.
[24] Florida Department of Environmental Protection, Water Reuse Pamphlet, p.1-2.
[25] York, David, Water Reuse Coordinator, Florida Department of Environmental Protection, Interview, 23 June 2004.
[26] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.33-5.
[27] *Id.* at p. 34.
[28] Florida Statute, § 403.064 (1).

In order to implement the water reuse program in accordance with state objectives, the Legislature established regulations in the Florida Statutes (F.S.) and the DEP established rules in the Florida Administrative Code (F.A.C.) to govern reuse practices. Most statutes are contained in Chapters 403, 120, 373, and 367, of the Florida Statutes and most rules are contained in Chapters 62-600, 62-610, 62-601, and 62-40, of the Florida Administrative Code.[29] Among other things, these rules set water quality standards, outlined the permitting process, and granted districts the authority to mandate the reuse of reclaimed water in areas with water supply problems.

III. Current Extent of Water Reuse

The rules set forth under the DEP's Water Reuse Program have helped Florida carefully manage its water resources while becoming the national leader in water reuse. With a population of over sixteen million that grows by four to five thousand people per week, Florida must be resourceful with its precious water supply.[30,31] Florida uses an average of 7.2 billion gallons of water per day and is heavily reliant on groundwater.[32] Groundwater accounts for ninety percent of the domestic water supply and eighty percent of Floridians live in coastal regions, where existing shallow groundwater supplies are most limited and vulnerable to contamination and salt-water intrusion.[33]

In Florida, 570 domestic wastewater treatment facilities have a permitted design capacity of 0.1 mgd – the minimum design average daily flow required to provide reclaimed water for public access use, or uses with a high incidence of public contact.[34, 35] Combined, these facilities treat approximately 1,570 million gallons of wastewater per day. This represents the total amount of water available for reuse in the state. As of 2003, 469 of the 570 facilities meeting the design requirement provided reclaimed water for reuse. Their reuse capacity totals 1,206 mgd, which is fifty-four percent of their treatment capacity. Florida reclaims 603 mgd for reuse – 38% of the domestic wastewater available for reuse.[36] The breakdown of current reuse applications is as follows:

Public access areas	45%
Agricultural irrigation	16%
Industrial	16%
Groundwater recharge	15%
Wetlands & other	8%[37]

[29] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.15-20.
[30] United States Census Bureau, "State and County Quick Facts: Florida," 2002, http://quickfacts.census.gov/qfd/states/12000.html (Accessed 26 May 2004).
[31] Florida Department of Environmental Protection, Water Reuse Pamphlet, p.1.
[32] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.3.
[33] Florida Department of Environmental Protection, Water Reuse Pamphlet, p. 1-2.
[34] Florida Department of Environmental Protection, 2003 Reuse Inventory, July 2004, p.2.
[35] Florida Administrative Code, § 62-610.451.
[36] Florida Department of Environmental Protection, 2003 Reuse Inventory, p.2.
[37] Florida Department of Environmental Protection, 2003 Reuse Inventory, p.12.

Reuse varies significantly between counties. Some counties reuse very little of their wastewater, while other counties, such as Leon and Walton, reuse 100% of their wastewater.[38]

IV. Structure of the Water Reuse Program[39]

The Water Reuse Program's success is directly correlated with the coordination and cooperation among the numerous state, regional, and local agencies involved. The Water Reuse Coordinator, who works in DEP, provides leadership and facilitates coordination. Cited as an essential position to any reuse program by Florida's Water Reuse Coordinator, the Coordinator chairs the Reuse Coordinating Committee and Reuse Technical Advisory Committee. In addition, a Water Reuse Specialist assists the Coordinator in his or her responsibilities and maintains an annual inventory of reuse programs throughout the State. Although there are only two full-time individuals devoted to the reuse program in DEP, the program requires staff from various DEP divisions and district offices, Water Management Districts, and other agencies.[40, 41] For example, the Southwest Florida Water Management District employs approximately nine individuals to manage the reuse programs in its jurisdiction.[42]

The Reuse Coordinating Committee was formed in 1992 to promote coordination and communication among the member agencies. The Committee continues to meet regularly and is composed of the following agencies: Florida DEP, Water Management Districts, Public Service Commission, Department of Health, Department of Agriculture and Consumer Services, Department of Transportation, and Department of Community Affairs.

The Florida DEP, through the Water Reuse Coordinator and its district offices, is the overarching agency responsible for reuse efforts. Its responsibilities include developing and maintaining rules concerning the water reuse program, administering water quality programs, and overseeing funding projects. The DEP's six district offices directly manage the domestic wastewater permitting program.[43, 44]

Each of the state's five Water Management Districts are represented on the Reuse Coordinating Committee and are charged with managing the regional water supply and implementing water quantity and quality programs delegated to them by DEP.[45] As stated in the Florida Statutes, the Water Management Districts exist to,

> [A]ssist counties, municipalities, private utilities, or water supply authorities in meeting water supply needs in such manner as will give priority to encouraging

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[38] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.7.

[39] See attached diagram.

[40] York, David, Water Reuse Coordinator, Florida Department of Environmental Protection, Interview, 23 June 2004.

[41] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.26.

[42] Andrade, Anthony, Senior Water Conservation Analyst, Southwest Florida Water Management District, Interview, 23 July 2004.

[43] Florida Department of Environmental Protection, "Coordination for Reuse Projects," Updated 16 April 2004, http://www.dep.state.fl.us/water/reuse/coordin.htm (Accessed 8 June 2004).

[44] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.26-7.

[45] Florida Department of Environmental Protection, "Water Management Districts," Updated 15 June 2004, http://www.dep.state.fl.us/secretary/watman (Accessed 25 June 2004).

conservation and reducing adverse environmental effects of improper or excessive withdrawals of water from concentrated areas.[46]

The districts manage flood protection, water supply, water quality, and natural system programs.[47] They are responsible for the issuance of consumptive use permits, in accordance with their water management plans. Within the realm of water reuse, the districts have the authority to designate water resource caution areas and advance reuse programs in those areas.[48]

The Public Service Commission (PSC) has the authority to regulate water, wastewater, and reclaimed water rates of investor-owned utilities. As Section 367.0817 (3) of the Florida Statutes states, utilities are entitled to recover the full costs of reuse programs through rates distributed among their water, wastewater, and reclaimed water customers as determined by PSC.[49] The PSC also conducts studies on the financial impacts of proposed reuse projects on customer rates and utility expenses.[50]

Another vital agency involved in water reuse is the Department of Health, which advises the Committee on technical issues related to public health, such as disinfection standards and cross-connection control.[51, 52]

The Department of Agriculture and Consumer Services represents agricultural interests in the reuse program, since the agricultural application of reclaimed water accounts for a significant portion of total reuse applications in Florida. The Department acts as a liaison between farmers and reuse officials during the development of agricultural reuse projects.[53]

Another significant user of reclaimed water and member of the Committee is the Department of Transportation. The Department can use reclaimed water to irrigate highway medians and to service highway rest areas. The Department is also involved in the planning of transmission lines to distribute reclaimed water.[54]

The Department of Community Affairs has been on the Committee since 1999. Its goal is to promote water reuse as part of community planning, particularly by establishing consistency between local building codes and state regulations regarding the indoor use of reclaimed water.[55, 56]

In addition to the Reuse Coordinating Committee, the Reuse Technical Advisory Committee provides technical guidance for the development of DEP reuse rules. The Committee

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[46] Florida Statute § 373.1961 (1)(b).
[47] Southwest Florida Water Management District, "Our Mission," Updated 14 July 2003, http://www.swfwmd.state.fl.us/about/mission.htm (Accessed 27 July 2004).
[48] Florida Department of Environmental Protection, "Coordination for Reuse Projects," available at www.dep.state.fl.us/water/reuse/coordin.htm.
[49] Florida Statute § 367.0817 (3).
[50] Florida Department of Environmental Protection, "Other Agency Reuse Programs: Public Service Commission," Updated 26 March 2004, http://www.dep.state.fl.us/water/reuse/otherag.htm (Accessed 8 June 2004).
[51] Florida Department of Environmental Protection, "Coordination for Reuse Projects."
[52] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.28.
[53] Florida Department of Environmental Protection, "Coordination for Reuse Projects."
[54] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.29.
[55] Florida Department of Environmental Protection, "Coordination for Reuse Projects," available at www.dep.state.fl.us/water/reuse/coordin.htm.
[56] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.29.

consists of representatives from DEP's district offices, the Water Management Districts, the Department of Health, utilities, and water and reuse associations. The Committee also includes technical and engineering experts in the field of water reuse.[57]

V. Development of State Regulations

As new concerns arise, technology advances, and research regarding water reuse proceeds, old rules must be amended and new ones created. One of the responsibilities of the Reuse Coordinating Committee is to identify the need to update DEP's current reuse rules. However, it is the Reuse Technical Advisory Committee that amends and creates rules, often at the suggestion of the Reuse Coordinating Committee, and drives the proposed rules through the rule-making process.[58]

The rule-making procedure for Florida's agencies are contained in Chapter 120 of the Florida Statutes. When creating a rule, an agency must provide a notice of development of the proposed rule in the Florida Administrative Weekly.[59] An agency may also use its website to publish notices.[60] After notification, any affected persons may request a workshop to be held regarding the proposed rule.[61] Once the rule or amendment is developed and before it is adopted, the agency must publish a notice of intended action, after which affected persons may call a public hearing or submit written comments. The notice includes an explanation of the proposed rule, a summary of the proposed rule, a copy of the proposed rule, and an estimation of costs.[62] If changes are made to the rule in response to comments heard at the hearing or received in writing, a notice of the changes must be issued.[63] Final adoption of a rule occurs between twenty-eight and ninety days after the notice of the proposed rule is issued if no changes are made. If the rule is rewritten or modified in response to public comments, the period during which a rule can be filed for adoption is extended to forty-five days from the publication of the notice of change.[64]

VI. Florida's Mandatory Water Reuse Program

As Florida realized the many benefits of water reuse, DEP passed rules in 1988 authorizing Water Management Districts to require reuse, if feasible, in areas with water supply problems. District water management plans are encouraged to "Advocate and direct the reuse of reclaimed water as an integral part of water and wastewater management programs."[65] The Water Management Districts designate 'water resource caution areas' – areas with critical water supply problems or anticipated problems within the next twenty years.[66] In water resource caution areas, Florida rules dictate that,

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[57] Florida Department of Environmental Protection, "Reuse Technical Advisory Committee Members," http://www.dep.state.fl.us/water/reuse/docs/reusetac.pdf (Accessed 25 June 2004).
[58] Walker-Coleman, Lauren, Reuse Specialist, Florida Department of Environmental Protection, Interview, 8 July 2004.
[59] Florida Statute § 120.54 (2)(a).
[60] Florida Statute § 120.551.
[61] Florida Statute § 120.54 (2)(c).
[62] Florida Statute § 120.54 (3)(a).
[63] Florida Statute § 120.54 (3)(d).
[64] Florida Statute § 120.54 (3)(e).
[65] Florida Administrative Code § 62-40.310(d).
[66] Florida Statute § 373.0391 (2)(e).

> In implementing consumptive use permitting programs, a reasonable amount of reuse of reclaimed water shall be required within designated water resource caution areas, unless objective evidence demonstrates that such reuse is not economically, environmentally, or technically feasible.[67]

Mandatory reuse, as determined by water management districts, may extend to areas outside water resource caution areas, provided that,

> (a) Reclaimed water is readily available;
> (b) Objective evidence demonstrates that such reuse is economically, environmentally, and technically feasible; and
> (c) The District has adopted rules for reuse in these areas.[68]

The practicality of reuse projects is determined by feasibility studies conducted during the application for discharge or consumptive use permits.

VII. State Permits

The Water Management Districts issue consumptive use permits, which allocate a specific volume of potable water to significant users. A consumptive use permit is often not required if reclaimed water is used. The DEP, through its district offices, issues discharge permits for domestic wastewater treatment facilities, which contain specifications for a facility's reuse system, as well. Domestic wastewater permits include operating requirements and quality standards for the facility and its disposal and/or reuse systems. Regulations in the permits meet Florida's and the EPA National Pollutant Discharge Elimination System's (NPDES) requirements.[69] Permits are often unique to facilities, as water quality limits depend on the type of discharge and/or reuse application.[70]

Domestic wastewater treatment facilities conduct feasibility assessments at times of construction and expansion. Permits to construct or operate a domestic wastewater facility in a water resource caution area must include an evaluation of the facility's capability to provide reclaimed water.[71] Furthermore, under Florida's Anti-degradation Policy, new or expanding surface water dischargers must use feasibility studies to demonstrate that, among other conservation methods, water reclamation is not economically or technologically feasible and that the proposed discharge is in the public interest.[72] In the preparation of feasibility studies, applicants are encouraged to consult with the appropriate DEP district office and local Water Management District to discuss water management in the area and decide which reuse alternatives will be evaluated in the feasibility study.[73]

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[67] Florida Administrative Code § 62-40.416 (2).
[68] Florida Administrative Code § 62-40.416 (4).
[69] Florida Department of Environmental Protection, "Domestic Wastewater Permitting," Updated 26 March 2004, http://www.dep.state.fl.us/water/wastewater/dom/dompermit.htm (Accessed 8 July 2004).
[70] Walker-Coleman, Lauren, Reuse Specialist, Florida Department of Environmental Protection, Interview, 8 July 2004.
[71] Florida Statute § 403.064.
[72] Florida Administrative Code § 62-4.242 (1)(c)(3).
[73] Florida Administrative Code § 62-610.820.

Rules establishing the process through which new wastewater facilities are issued permits are contained in Chapter 62-620 of the F.A.C. Conditions for reuse are included in a wastewater facility's discharge permit.[74] If the reuse system involves water collected from multiple wastewater facilities, a separate reuse permit is issued.[75] When a completed application is submitted to DEP, a decision is rendered in ninety days as to whether the draft permit will be issued or denied.[76] If issued, the draft permit contains all conditions and requirements to be met, including "All reclaimed water or effluent limitations, flow limitations, criteria, [and] prohibitions…", and is accompanied by a statement of basis or fact sheet used by DEP in rendering its decision.[77, 78] Notice of the draft permit and the ensuing thirty-day public comment period or public meeting is required.[79] After consideration of comments received from the public, DEP may issue a final permit and must respond to the public's comments at that time.[80] Permits are generally issued for no longer than five years.[81]

Furthermore, current reuse programs require new permits or permit revisions when: a) a facility seeks system expansion beyond areas already designated in a permit; b) a new major user is added that increases the capacity of the reuse system; c) a new area of irrigation of edible crops is added, or; d) there is a change in the irrigation system or crops grown in an area of edible crop irrigation.[82] Public notice is required when a facility seeks substantial permit revisions, minor revisions that decrease permit monitoring and reporting requirements, and when a facility's permit is up for renewal.[83]

Consumptive use permits are issued by the Water Management Districts. Consumptive use permits grant a set quantity of water for a specific use over a predetermined length of time for operations using a significant daily quantity of water. Although the specific conditions by which districts issue permits may vary, applications for a consumptive use permit usually require the completion of a reclaimed water feasibility study. The use of reclaimed water is required, if feasible, in water resource caution areas or if mandated by the district. Most districts do not require a consumptive use permit if reclaimed water is used, reasoning that facilities that use reclaimed water do not need consumptive use permits because they can use as much reclaimed water as necessary. Instead, the Water Management Districts provide incentives for the use of reclaimed water. For example, districts will help fund the retrofitting of a facility that uses reclaimed water or will not restrict the use of reclaimed water like they do the use of potable water for non-potable uses. [84]

For instance, the Southwest Florida Water Management District has an aggressive water reuse program. There are over 130 reuse facilities in its jurisdiction, which reuse more than 160 mgd, mostly in urban reuse applications and large natural restoration projects.[85, 86, 87] In order for

[74] Florida Administrative Code § 62-620.310 (10)(c).
[75] Florida Administrative Code § 62-610.800 (4).
[76] Florida Administrative Code § 62-620.510 (8).
[77] Florida Administrative Code § 62-620.510 (11).
[78] Florida Administrative Code § 62-620.510 (12).
[79] Florida Administrative Code § 62-620.550.
[80] Florida Administrative Code § 62-620.555 (3).
[81] Florida Administrative Code § 62-620.320 (8).
[82] Florida Administrative Code § 62.620.310 (10)(e).
[83] Florida Administrative Code § 62-620.550 (2)(a).
[84] Florida Department of Environmental Protection, "Water Management District Reuse Programs," Updated 26 March 2004, http://www.dep.state.fl.us/water/reuse/wmdprog.htm (Accessed 7 July 2004).
[85] Florida Department of Environmental Protection, 2003 Reuse Inventory, p.3.

consumptive users in the district to receive a permit, they must complete a reuse feasibility study. If the use of reclaimed water is found to be feasible and commences, users may apply for a reimbursement for 50% of the costs of designing, constructing, and implementing the new system. Although no consumptive use permit is issued to the user to ensure the proper use of the reclaimed water, reimbursement money is only distributed to operations that meet specific requirements that guarantee the efficient and effective use of the reclaimed water. Since the District cannot meet all the funding requests it receives, users are ranked based on how well they meet the district's requirements. Therefore, users are in competition with other reuse systems and other water management projects for funding.[88] Reclaimed water users must prove that they are helping to offset potable water demand and, thus, protecting fresh water resources.[89] The public can express their opinion of the ranking of applicants and the allocation of funds during the District's board meetings. Through multiple cooperative funding programs, the Southwest Florida Water Management District provides approximately $20 million per year in grants.[90]

Representatives from the six DEP districts meet regularly with representatives from the five Water Management Districts to coordinate permitting activities of reuse projects and develop strategies to enhance the program.[91] This allows DEP and Water Management Districts to match potential reclaimed water suppliers with potential users in order to allocate water in accordance with regional water supply plans.[92] Water management districts are given full authority to plan and regulate allocation and uses of water.[93] Also, the possible adverse environmental effects of water reuse programs are considered in the issuance of permits and are, ideally, addressed in regional water supply plans to prevent such things as inadequate stream flows.

VIII. Financial Incentives and Considerations

Facilities starting or expanding a water reuse program have a variety of financing options available to them, both at the state and local level. The state administers several loan and grant programs and many districts provide additional financial help for the construction, expansion, or improvement of domestic wastewater facilities and water reuse programs.

The DEP and the Division of Bond Finance of the State Board of Administration manage the State Bond Loan Program. Loans up to $300 million are issued annually on a first come, first served basis to districts, cities, and local agencies for the construction of pollution control facilities, including domestic wastewater treatment plants and reuse facilities.[94, 95]

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[86] Florida Department of Environmental Protection, 2003 Reuse Inventory, p.14.
[87] Andrade, Anthony, Senior Water Conservation Analyst, Southwest Florida Water Management District, Interview, 6 July 2004.
[88] Andrade, Anthony, Senior Water Conservation Analyst, Southwest Florida Water Management District, Interview, 6 July 2004.
[89] Southwest Florida Water Management District, *Cooperative Funding Initiative FY 2005: Reclaimed Water*, 1, http://www.swfwmd.state.fl.us/busfin/coopfnd/files/General%20and%20Specific%20Project%20Proposal%20Guidelines.pdf (Accessed 6 July 2004).
[90] Andrade, Anthony, SWFWMD 2004 Annual Alternative Water Supply Report, 23 July 2004.
[91] Florida Department of Environmental Protection, "Coordination for Reuse Projects," available at www.dep.state.fl.us/water/reuse/coordin.htm.
[92] York, David, Water Reuse Coordinator, Florida Department of Environmental Protection, Interview, 23 June 2004.
[93] Florida Statute § 373.250 (4).
[94] Florida Department of Environmental Protection, "Funding for Domestic Wastewater Projects," http://www.dep.state.fl.us/water/reuse/funding.htm (Accessed 8 June 2004).

The State Revolving Loan Fund is administered through DEP's Bureau of Water Facilities Funding. The Fund provides low-interest loans to finance "pre-construction" and "construction" costs for the building or expanding of wastewater treatment and reuse facilities. Applicants are placed on a priority list developed during a public hearing. Priority determination is primarily based on the project's ability to eliminate adverse water quality effects and protect public health. Domestic wastewater treatment facilities received almost $1 billion during the past ten years from the State Revolving Loan Fund.[96, 97]

The State Financially Disadvantaged Small Community Grant is administered by DEP's Bureau of Water Facilities Funding and provides 65-85% grants for small, low-income communities who wish to build or improve their wastewater facilities. To be eligible, communities must have a population of 7,500 or less and have an average per capita income below the state's average, which is $19,107. A priority list is adopted at a public hearing, with preference given to projects that eliminate public health hazards and pollution. The program began in July 2000 with $2.5 million and is predicted to reach $10 million by 2010.[98, 99, 100]

Furthermore, since Florida statutes allow that 100% of reclamation plant costs can be recovered through water, wastewater, and reclaimed water customers' rates, facilities do not need to be concerned about operating costs once the facility is up and running.[101] The allocation of reuse program costs among water, wastewater, and reclaimed water users is justified in that reuse programs conserve water of potable quality and extend the life of current potable water supplies, from which all customers benefit. Thus, reclaimed water in Florida is priced to encourage its use but also reflect its costs. The average 2003 rates for reclaimed water were as follows:[102]

Residential	Flat rate:	$8.31/month/connection
	Volume based rate:	$0.49/1000 gallons
Nonresidential	Flat rate:	$360.76/month/connection
	Volume based rate:	$0.31/1000 gallons

IX. Challenges Faced by Florida in Implementing a Water Reuse Program

While Florida's reuse program is very successful and often serves as a model for states or regions developing similar programs, it also has experienced many challenges. These challenges, however, serve as a valuable example of the potential obstacles budding reuse programs may encounter, especially as they mature and flourish.

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[95] Florida Department of Environmental Protection, "Water Facilities Funding: State Bond Loan Program," Updated 26 March 2004, http://www.dep.state.fl.us/water/wff/sbl/index.htm (Accessed 28 June 2004).
[96] Florida Department of Environmental Protection, "Funding for Domestic Wastewater Projects," http://www.dep.state.fl.us/water/reuse/funding.htm (Accessed 8 June 2004).
[97] Florida Administrative Code § 62-503.
[98] [98] Florida Department of Environmental Protection, "Funding for Domestic Wastewater Projects," http://www.dep.state.fl.us/water/reuse/funding.htm (Accessed 8 June 2004).
[99] Florida Department of Environmental Protection, "Water Facilities Funding: Wastewater State Revolving Fund Loan Program and Small Community Wastewater Facilities Grant Program," Updated 2 April 2004, http://www.dep.state.fl.us/water/wff/cwsrf/smalcwgp.htm (Accessed 28 June 2004).
[100] Florida Administrative Code § 62-40.550.
[101] Florida Statute § 367.0817 (3).
[102] Florida Department of Environmental Protection, 2003 Reuse Inventory, p.10, available at http://www.dep.state.fl.us/water/reuse.

The first hurdles water reuse programs in Florida faced were generating public support, achieving public acceptance, and acquiring a solid customer base. To do these, utilities initially charged customers low, flat monthly rates, which had many advantages. Flat monthly rates translated into lower costs for reclaimed water suppliers, whom did not have costs associated with maintaining and reading meters. Since facilities were able to market reclaimed water as cheap and in unlimited supply, they were able to maximize the amount of its reclaimed water that was reused.[103]

Although these low, flat rates helped build Florida's extensive reuse program, utilities quickly learned that without metering and a volume based rate system, reclaimed water was subject to abuse and overuse. In fact, in many cases, only 25% of reclaimed water used offset some potable water demand – the rest of the reclaimed water used was in excess of the demand. A 2002 study conducted by the Southwest Florida Water Management District compared the use of reclaimed water in metered and non-metered homes. The results indicated that the **average metered single-family residence used 534 gallons of reclaimed water per day for irrigation whereas the average non-metered single-family residence used 980 gallons of reclaimed water per day for irrigation**. Overuse of reclaimed water essentially defeats the purpose of water reuse, since it may not reduce the demand on potable supplies for non-potable uses and does not promote water conservation. Meters and volume based rate systems are ways to prevent the overuse of reclaimed water. Currently in Florida, less than half of utilities use meters or a volume based rate system for reclaimed water partially due to public opposition from moving away from the cheap, flat rates.[104]

Many water reuse systems in Florida experienced shortages in reclaimed water due to overuse and seasonal fluctuations in demand. During the dry season, demand is often three to four times the demand during the wet season. Since reclaimed water demand was so high, many facilities had to supplement the reclaimed water supply with other sources – surface water, groundwater and, in some cases, treated drinking water – to meet the dry season demand. This caused concern for the public water supply, which was being used to augment the reclaimed water supply instead of being conserved for future use. The 2000-2001 drought was responsible for many shortages in areas with well-developed systems, i.e. those with a large customer base. During the wet season, the supply of reclaimed water outstrips demand, causing heavy reliance on disposal systems such as surface discharge and groundwater injection, which reuse programs are supposed to eliminate.

As a result of shortages, utilities have attempted to switch to metering and volume based rate systems. The efforts to promote responsible use of reclaimed water through metering and rate systems, however, have proven unsuccessful in many districts and utilities are employing other conservation strategies to meet the current water demand.[105] Some district grants contain efficiency conditions to promote responsible reuse.[106] Instating watering limits, rationing methods, reducing system pressure, and augmenting reclaimed water supply with storm water, surface water, and non-potable quality groundwater have also helped facilities meet high

[103] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.35-6.
[104] *Id.* at p.36-8.
[105] Florida Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group, *Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water*, June 2003, p.36-8.
[106] *Id*. at p.41.

reclaimed water demand in dry seasons and during droughts.[107] In 2003, over 20 mgd of water augmented Florida's reclaimed water supply, including water from the following sources:[108]

Surface Water	14.80 mgd
Groundwater	5.01 mgd
Stormwater	0.16 mgd
Drinking Water	0.06 mgd

Conservation groups are concerned that since Florida's reuse program is booming and water appears to be abundant, it is being squandered. As previously explained, the use of reclaimed water in Florida has been so excessive that the State has experienced shortages and used water from other sources to meet the reclaimed water demand. Organizations claim that the advancement of water reuse overshadows the promotion of water efficiency and conservation measures, which are cheaper and safer alternatives to water reuse systems.[109, 110]

X. Related Growth Issues

Many critics of Florida's water reuse program acknowledge its many benefits but express doubts about its implementation, which they describe as unsustainable. The Florida Water Coalition, a joint venture of numerous environmental organizations including the Florida Wildlife Federation, Florida Public Interest Research Group, Clean Water Network, and EarthJustice, believes that expanding the water supply through water reuse programs spurs new, and often unwanted, growth. While state officials claim development will occur regardless of the availability of Florida's water resources, the Florida Water Coalition argues that development historically centers on water availability and that today's growth is not inevitable. While water reuse is a good option to help meet the current demand, Florida does not have the water resources to support more growth.[111, 112]

In many areas the lack of coordination between local governments' planning boards (who make development decisions) and the Water Management Districts (who make water allocation decisions) results in more development than the regional water supply can support.[113] In accordance with Florida law, the Water Management Districts serve to ensure that there exists an adequate water supply to meet regional need.[114] For example, the water supply mission of the Southwest Florida Water Management District is, "To ensure an adequate supply of the water resource for all reasonable and beneficial uses, now and in the future, while protecting and maintaining the water and water-related resources of the District."[115] This illustrates how managing development is not the responsibility of the Water Management District, but rather local planning boards. However, local development plans must be consistent with regional water

[107] *Id*. at 36-8.
[108] Florida Department of Environmental Protection, 2003 Reuse Inventory, p. 2, available at http://www.dep.state.fl.us/water/reuse.
[109] Glenn, John S., Safe Drinking Water: Issue Chair, Florida Chapter Sierra Club. Interview, 9 July 2004.
[110] Florida Water Coalition, *Water for Florida's Future: A Call for Leadership,* January 2003, p.11.
[111] Florida Water Coalition, *Water Policy for Protecting Nature, Not Promoting Growth*, no date, p.5-6, http://www.flawildlife.org/pubs/watercoa/FWC%20Water%20Policy%209-26%20final.pdf.
[112] Shaffer, Rosalie, Wetlands and Waters: Issue Co-Chair, Florida Chapter Sierra Club, Interview, 9 July 2004.
[113] Florida Water Coalition, *Water for Florida's Future: A Call for Leadership,* p.22.
[114] Florida Statute § 373.1961 (1)(b).
[115] Southwest Florida Water Management District, "Our Mission."

supply planning.[116] Recent pressure on the Water Management Districts to plan for and finance Florida's expanding water supply conflicts with their original responsibility of managing and protecting water resources, which increases the inconsistencies between the local boards and districts. Ultimately, there is the potential for development to occur in places that do not have the water resources to sustain it.[117]

XI. Public Response

Although many growing water reuse systems emulate Florida's mature program, some citizens criticize it. A common citizen concern about all water reuse programs is the potential health and environmental risks. Advocacy groups claim citizens are exposed to dangerous levels of chemical and biological pollutants that also threaten existing potable groundwater supplies as a result of the use of reclaimed water. Environmental organizations, such as the Florida Chapter of the Sierra Club, urge the State to adopt reclaimed water standards that are more protective of public health and natural resources.[118, 119]

While public opinion of water reuse is generally favorable, some organizations believe that public participation in the planning and decision-making process is insufficient. For example, many citizens support the Water Management Districts' use of Governing Boards, which are composed of appointed citizens, during the decision making process and even commend the Southwest Florida Water Management District for its high level of public involvement. Others, though, propose that major permits and water plans be reviewed by the Governor and the Cabinet. If so, decisions would be open to more public debate and the elected officials would be responsible for the decisions instead of appointed administrators.[120]

Nevertheless, water reuse has become *the* way of water management and conservation in Florida, analogous to a way of life. Public acceptance is high because people are able to witness the common success stories in surrounding communities and water reuse has proven to be safe and effective.[121] In some areas, people even demand reclaimed water and the availability of reclaimed water is often an attractive feature for people or businesses moving to an area, particularly because it is often exempt from water use restrictions.[122] As Florida continues to benefit from its water reuse program, public support continues to grow.

CALIFORNIA

I. History of Water Recycling in California

Water reuse in California dates back to the late 1800s when towns discovered that irrigating agricultural land with wastewater was a convenient and cost-effective disposal option that benefited farmers, as well. By 1952, 107 Californian communities were irrigating

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[116] Florida Water Coalition, *Water Policy for Protecting Nature, Not Promoting Growth*, no date, p.6, http://www.flawildlife.org/pubs/watercoa/FWC%20Water%20Policy%209-26%20final.pdf.
[117] *Id.* at p.3.
[118] Glenn, John S., Safe Drinking Water: Issue Chair, Florida Chapter Sierra Club. Interview, 9 July 2004.
[119] Florida Water Coalition, *Water for Florida's Future: A Call for Leadership*, p.11-2.
[120] Florida Water Coalition, *Water Policy for Protecting Nature, Not Promoting Growth*, 4-5.
[121] York, David, Water Reuse Coordinator, Florida Department of Environmental Protection, Interview, 23 June 2004.
[122] Andrade, Anthony, Senior Water Conservation Analyst, Southwest Florida Water Management District, Interview, 23 July 2004.

agricultural and urban lands with recycled water.[123] Groundwater recharge through percolation has been practiced in California since 1962 and through direct injection since 1970.[124] A 1970 estimate placed the amount of water recycled that year at 175 thousand acre-feet.[125] [Note: 1 thousand acre-feet ≈ 326 million gallons][126] Although early water recycling programs in California were implemented as convenient and cost-effective disposal methods, recent motives behind the advancement of reuse have expanded to include water supply benefits, crop production advantages, and environmentally benign wastewater treatment and disposal.[127]

II. Development of California's Water Recycling Program

The state's involvement with water reuse began in 1974 when the Legislature passed the Water Reuse Law. The Law directed the Department of Water Resources (DWR) to investigate reclaimed water technology, quantity, and quality. In it, the Legislature declared that:

> [T]he primary interest of the people of the state in the conservation of all available water resources requires the maximum reuse of reclaimed water in the satisfaction of requirements for beneficial uses of water.[128]

California's water recycling program regulations are contained in several government documents, including Titles 22 and 17 of the California Code of Regulations, the Water Code, and the Health and Safety Code. These regulations ascertain that the State Water Resources Control Board (SWRCB), under the direction of the California Environmental Protection Agency (EPA), and the California Department of Health Services (DHS) have joint responsibility for the water recycling program.

III. Current Extent of Water Recycling in California

As California's population of 35 million continues to increase – estimates suggest a 50% increase by 2030 – and water supplies continue to diminish, current water recycling programs are fueled by the desire to increase the water supply in suffering communities.[129] There are currently over 200 water recycling projects in the state which recycle approximately 10% of California's wastewater, or 525,000 acre-feet of the 5 million acre-feet of municipal wastewater produced annually.[130,131] The amount of treated wastewater is expected to increase to 6.5 million acre-feet

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[123] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.5 (July 2003).
[124] *Id*. at 11-12.
[125] *Id*. at 5.
[126] "Online Conversion" website, available at http://www.onlineconversion.com/volume.htm (Accessed 30 July 2004).
[127] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.7 (July 2003).
[128] California Water Code, § 460, et. seq.
[129] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.5 (July 2003).
[130] *Id.* at p.17.
[131] Office of Water Recycling, California State Water Resources Control Board, *Recycled Water Use in California*, June 2003, http://www.swrcb.ca.gov/recycling/recyfund/wrreclaim1_attb.pdf (Accessed 4 June 2004).

per year by 2030.[132] The breakdown of current water reuse applications in California is as follows:

Agricultural irrigation	48%
Landscape irrigation	20%
Groundwater recharge	12%
Wildlife habitat or misc.	6%
Industrial	5%
Seawater barrier	3%
Other	6%[133]

Similar to Florida, the amount of recycled water and the recycled water applications vary dramatically throughout the state. One area with an advanced water recycling program is Marin Municipal Water District. Marin currently has fifteen buildings that use recycled water for toilet flushing – the most anywhere in the United States.[134]

IV. Structure of the California's Water Reuse Program

The creation and maintenance of California's water recycling program is the joint responsibility of the DHS and SWRCB. The 1996 Memo of Agreement between the two agencies outlines each agency's specific duties and affirms that,

> *[T]he respective authority of the Department [DHS], the SWRCB, and the RWQCBs [Regional Water Quality Control Boards] relative to use of reclaimed water will be exercised in a coordinated and cohesive manner designed to eliminate overlap of activities, duplication of effort, gaps in regulation, and inconsistency of action.*[135]

The DHS' responsibilities include the establishment of statewide criteria for the different applications of recycled water that protect water quality and public health, consultation with the RWQCBs in the drafting of permits, management of contamination when recycled water and public health are involved, and the control of cross connections.

The SWRCB was created in 1967 by the Legislature and is comprised of appointed members. It has water allocation and quality protection authority to protect the beneficial uses of the state's waters.[136] It also provides financial assistance for water recycling projects. The SWRCB operates through nine RWQCBs to regulate reuse programs. Their functions include

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[132] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.12 (July 2003).

[133] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," Figure 2, p.7 (July 2003).

[134] Castle, Bob. Water Quality Manager, Marin Municipal Water District, Co-chair WateReuse CA Section Legislative/Regulatory Committee. Presentation at California Water Environment Association's Water Reuse Seminar, 20 May 2004.

[135] California Recycled Water Task Force, Appendix B: Memorandum of Agreement Between DHS and SWRCB on Use of Reclaimed Water, B-1.

[136] California State Water Resources Control Board, "Mission Statement," Updated 2003, http://www.swrcb.ca.gov/about/mission.html (Accessed 2 August 2004).

the development, issuance, and enforcement of recycled water producer and user permits, regulation of plant operators, and determination of water rights.[137]

The DWR is also involved in water recycling in California. DWR is responsible for long-term water planning, and thus, water recycling planning and operates some funding sources.[138]

At the state level, there are approximately two or three staff members who work full-time on water recycling issues. They are supported, however, by full- and part-time at the state, regional, and local level.[139]

California also created the Recycled Water Task Force in Assembly Bill No. 331 in 2001 to help the state increase the use of recycled water by examining current obstacles facing the program. The DWR was responsible for assembling the Task Force, although the SWRCB and DHS also contributed greatly. The Task Force consisted of forty members representing a variety of interests. Members included representatives from the California EPA, DWR, SWRCB, DHS, Department of Food and Agriculture, Building Standards Commission, local health officials, water districts, recycled water purveyors and retailers, industry, recycled water associations, and environmental and consumer advocacy groups. The Task Force met between April 2002 and May 2003 to identify key issues restricting water recycling in California and recommend ways to overcome them. [140, 141]

V. Development of State Regulations

As stated, one of the main responsibilities of the DHS is the development of water quality criteria. These criteria are found in Title 22 of the California Code of Regulations and are, therefore, law. They were last updated in 2000. The regulatory process for adoption of new standards includes review by DHS' Office of Regulations, DHS' Budget Office, Department of Finance, Health & Human Services Agency, and Office of Administrative Law. The Office of Administrative Law then announces the regulation for public review by publication in the *California Regulatory Notice Register*. A 45-day public comment period ensues. If any changes are made in response to public comments, then a 15-day public comment period occurs. If the regulation is approved by DHS Director's Office, it then undergoes final review by Office of Administrative Law, is filed with the Secretary of State, and is effective in 30 days.[142]

VI. Promotion of California's Water Reuse Program

The state has encouraged the development of water recycling programs and declared it a safe way to meet California's water needs.[143] In fact, in the Water Recycling Act of 1991, the Legislature set statewide water recycling goals for a total of 700,000 acre-feet per year by 2000

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[137] California Recycled Water Task Force, Appendix B: Memorandum of Agreement Between DHS and SWRCB on Use of Reclaimed Water, B-2.
[138] Mills, Richard, State Water Resources Control Board, Interview, 13 August 2004.
[139] *Id.*
[140] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.2-3 (July 2003).
[141] California Water Code, § 13578
[142] California Department of Health Services, "Status of Future Regulations: Drinking Water and Recycled Water," April 2004, http://www.dhs.ca.gov/ps/ddwem/publications/Regulations/regsdevelopment.html (Accessed 4 June 2004).
[143] California Water Code, § 13576

and 1,000,000 acre-feet per year by 2010.[144, 145] The Recycled Water Task Force was established to help California reach its goals.[146]

In addition to the state's promotion of water recycling, it has worked with the WateReuse Association (WateReuse) to advance its program. WateReuse is a non-profit organization that helps member agencies develop and promote successful water reuse programs. WateReuse sponsors research, educates the public and government officials, and helps members overcome regulatory obstacles for reuse. California is one of over 290 members worldwide, others who include government agencies, consultants, municipalities, and researchers. WateReuse established a California Section and has advocated the passage of more than thirty-five laws related to water recycling since 1990.[147, 148]

VII. State Permits

The standards developed by the DHS are upheld by the RWQCBs through the issuance and enforcement of permits. The RWQCBs can either issue individual permits for water discharge or reuse, or issue master permits to reuse producers and users after consultation with DHS. Master permits contain stipulations for waste discharge in accordance with NPDES, water recycling in accordance with state regulations, and periodic inspections by the regional board.[149] Permits are issued only after an engineering evaluation is performed, approved, and released to the public, prior to holding 3 public hearings on the proposed project.[150]

VIII. Financial Incentives and Considerations

California's Recycled Water Task Force found that the extra costs to treat and deliver recycled water, which include annualized capital and operational costs, range from $0 to $2000 per acre-foot, with an average unit price of $600 per acre-foot. Although such figures may seem exorbitant to customers and the public, they are comparable to the costs of other options to increase the water supply, such as reservoirs or desalination plants.[151] Operation and maintenance costs for water recycling projects vary widely, with the average being $300 per acre-foot. These costs, along with capital expenses, are recovered through wastewater customers, recycled water buyers, and water customers.[152]

Although funds are available through the DWR and DHS, the SWRCB provides substantial funding for recycled water projects in both the planning and development stage and the construction stage. The Water Recycling Facilities Planning Grant Program provides up to $75,000 in grants to local agencies to conduct water recycling feasibility studies. Also, the Water Recycling Construction Program provides low-interest grants and loans to local agencies

[144] California Water Code, § 13575
[145] California Water Code, § 13577
[146] California Water Code, § 13578
[147] WateReuse Association, "Homepage," http://www.watereuse.org/ (Accessed 3 August 2004).
[148] WateReuse Association, "Benefits of Membership," http://www.watereuse.org/Pages/membership.html (Accessed 4 August 2004).
[149] California Water Code § 13523.1
[150] California Health and Safety Code § 116551
[151] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.14 (July 2003).
[152] *Id.* at 15-16.

to aid in the design and construction costs of water recycling facilities. Applicants are placed on a priority list and the SWRCB determines which projects are most beneficial to fund.[153]

Much of the money for financing water recycling projects through the SWRCB has been appropriated by the Legislature as a result of Proposition 50. Voters passed the proposition, called the Water Security, Clean Drinking Water, Coastal and Beach Protection Act in 2002. It authorized the state to sell $3.4 billion in bonds to fund water related programs. Approximately $100 million of bond funds are used for water pollution prevention, water recycling, and water quality improvements.[154]

IX. Challenges Faced by California in Implementing a Water Reuse Program

There have been many obstacles impeding California's path to a successful water-recycling program. A major obstacle to water reuse has been public acceptance. As facilities proposed water-recycling projects that put humans in greater contact with recycled water, public concern increased. In some communities, public outcry based on misconceptions caused the abandonment of water recycling plans for indirect potable reuse.[155] In hopes of increasing public acceptance, the Legislature amended regulations and statutes that read 'reclaimed water' and 'water reclamation' to read 'recycled water' and 'water recycling' in 1995. Utilities also tried to make warning signs and symbols as least alarming as possible.[156] From its experiences, California learned that public involvement is crucial in gaining public acceptance. The Task Force noted that the law does not require public involvement during all aspects of project development under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). In most cases, the public is only notified and asked to comment on whether or not to implement a project without being given a chance to comment on the development of a project and the consideration of other alternatives.[157] It is necessary to involve the public earlier in the planning and decision-making stages of project development and to provide them with facts about proposed projects.[158]

Not only has the state faced public opposition, but it has also faced opposition from environmental groups. Many environmental organizations see recycled water as sewage and water recycling as another problem, not a solution to water supply and quality problems.[159]

Another problem California encounters in implementing its water-recycling program is the misinterpretation of its standards. Since many regional agencies implement the program, there are various interpretations of the regulations governing the program. For example, the DHS has twenty-one districts throughout the state involved in the water-recycling program along

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[153] State Water Resources Control Board, "Water Recycling Funding Programs," http://www.swrcb.ca.gov/recycling/recyfund/index.html (Accessed 8 June 2004).
[154] Rosenblith, Lara Jill. *California Proposition 50 – 2002 Election* (Water Security, Clean Drinking Water, Coastal and Beach Protection Act), About.com, Updated 2004, http://environment.about.com/cs/politics/a/californiabal.htm (Accessed 2 August 2004).
[155] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p. 21 (July 2003).
[156] State of California, Department of Water Resources, Recycled Water Task Force, "Background Information," May 3, 2002, available at http://www.owue.water.ca.gov/recycle/docs/TF_BackgroundInformation.pdf.
[157] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p. 23 (July 2003).
[158] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p. xii (July 2003).
[159] Castle, Bob, Water Quality Manager, Marin Municipal Water District, Interview, 14 June 2004.

with some county health departments. Also, nine independently appointed boards govern the nine RWQCBs. Since different water issues and perspectives exist in different areas, the state's criteria are subject to various interpretations.[160]

Furthermore, more inconsistencies arise when the local health boards establish regulations that are stricter than statewide criteria by incorporating them into the RWQCB's permits. It is unclear as to whether or not local agencies actually have the authority to do this. Although their intentions to protect public health are generally good, critics argue that it makes water-recycling programs overly restrictive and less feasible. Legal debate continues as to whether or not local agencies have the authority to adopt more stringent standards than the state has promulgated.[161, 162]

X. Public Response

As previously discussed, California has experienced trouble in obtaining unanimous public support for water recycling. While many communities are accepting of the idea, there are some that staunchly protest water recycling programs in their areas, particularly public access or indirect potable reuse systems, such as groundwater recharge, saltwater intrusion barriers in potable aquifers, and surface reservoir augmentation. Some of this opposition most likely stems from misconceptions of the program, while other opposition is just disfavor.[163, 164] Nevertheless, a large sum of California's citizens and officials are working to expand the water recycling program to help California meet the water demands of its citizens.

WASHINGTON

I. History of Water Reuse in Washington

Washington's water reuse program is relatively young. Very little planned water reuse occurred in the state before the commencement of the Water Reclamation and Reuse Program. Utilities and industries such as the Boeing Company in King County placed pressure on the state to develop standards that would permit the reuse of wastewater for industrial heating and cooling. At the same time, Washington experienced a moderate drought. Thus, the pressure from public and private partnerships in the Seattle area and the possible occurrence of a severe drought motivated the state to develop the water reuse program.[165] Washington realized that water reuse would reduce wastewater effluent discharges to sensitive water bodies, such as Puget Sound, and secure an abundant water supply to meet the state's growing demand, in spite of its unpredictable climate.[166] Since very few reuse projects occurred before the start of the water reuse program, the state has been active in promoting and advancing the program.

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[160] Castle, Bob, Water Quality Manager, Marin Municipal Water District, Co-chair WateReuse CA Section Legislative/Regulatory Committee, *Uniform Statewide Recycling Criteria*, p.1.
[161] *Id*. at p.1-2.
[162] State of California, Department of Water Resources, Recycled Water Task Force, "Water Recycling 2030: Recommendation's of California's Recycled Water Task Force," p.45 (July 2003).
[163] *Id.* at 21.
[164] *Id* at xii.
[165] Schlender, George, Regional Environmental Manager, Rural Community Assistance Corporation, Former Reuse Program Manager for Washington Department of Health, Interview, 2 August 2004.
[166] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.

II. Development of Washington's Water Reuse Program

The Washington State Legislature passed the Reclaimed Water Act (Chapter 90.46) in the Revised Code of Washington (RCW) in 1992 to promote the reuse of reclaimed water and establish the appropriate rules to govern the program.[167]

> [The Act] declared that the people of the state of Washington have a primary interest in the development of facilities to provide reclaimed water to replace potable water in non-potable applications, to supplement existing surface and ground water supplies, and to assist in meeting the future water requirements of the state.[168]

The Departments of Ecology and Health were delegated authority to develop and administer the reclaimed water program to help meet the state's increasing water demand by developing standards protective of public health and the environment, expanding public support, and identifying cost-effective options for implementation.[169] Washington's program was modeled after Florida, California, and Arizona's programs.[170] The Departments first developed interim standards by 1992 for pilot projects involving land application, commercial application, and industrial application of reclaimed water.[171] Reclaimed water standards for the direct recharge of groundwater, streamflow augmentation, and discharge to wetlands followed 1995 legislation.[172, 173] Final standards were issued in September 1997. The system design and water quality criteria for the four classes of reclaimed water (A, B, C, and D) are contained in the document *Water Reclamation and Reuse Standards*.[174] Although the actual standards are not law, they are incorporated into permits issued by the Department of Ecology, and consequently, are enforceable.[175] The reclaimed water standards were initially modeled after California's criteria and are being refined by the Department of Ecology and Department of Health to better suit Washington's unique geological, climatic, and geographical conditions.[176, 177] Further, treatment and distribution design standards for reclaimed water and reuse were added to

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[167] Washington Department of Ecology, "Water Reclamation and Reuse," http://www.ecy.wa.gov/programs/wq/reclaim/index.html (Accessed 12 July 2004).
[168] Revised Code of Washington Chapter 90.46.005
[169] Washington Department of Ecology, "Water Reclamation and Reuse," http://www.ecy.wa.gov/programs/wq/reclaim/index.html (Accessed 12 July 2004).
[170] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[171] Revised Code of Washington Chapter 90.46.020.
[172] Revised Code of Washington Chapter 90.46.042
[173] Revised Code of Washington Chapter 90.46.044
[174] Washington Department of Ecology, "Water Reclamation and Reuse," http://www.ecy.wa.gov/programs/wq/reclaim/index.html (Accessed 12 July 2004).
[175] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[176] Washington Department of Ecology, *Water Reuse Planning for the State of Washington: Workshop Report,* Publication # 03-10-061, June 2003, 3-4.
[177] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.

Ecology's *Criteria for Sewage Works Design* in 1998. It contains information regarding cross connection control, signage, and treatment reliability.[178]

III. Current Scope of Water Reuse in Washington

There are currently seventeen facilities in Washington operating with reuse systems and eighteen more in the planning phase.[179, 180] There is not, however, one centralized inventory of the quantity of water reused and the application for which it is used. At this time, this information is collected and managed by the Department of Ecology's regional offices.[181] A preliminary compilation of this data indicates that Washington's facilities reclaim an average of 20 mgd during maximum flow months. The majority of the reclaimed water is reused in landscape and agricultural irrigation and groundwater recharge.[182]

IV. Structure of Washington's Water Reuse Program

The Department of Ecology and the Department of Health share responsibility for Washington's water reuse program and coordinate their efforts through formal agreements in order to administer a safe and efficient program.[183]

In 1999, the Departments received funding from the Legislature to staff their growing reuse program. At that time, the Departments hired a total of five employees dedicated to water conservation and reuse, of which two were engineering positions in the Department of Ecology's Water Quality Program for Water Reclamation and Reuse.[184] Similar to Florida's water reuse program, Washington's program is decentralized, as many staff members throughout the Department of Ecology's regional offices work on issues related to water reuse.[185]

The Department of Health, in conjunction with the Department of Ecology, developed the Water Reuse Advisory Committee in 1995, as directed by the Legislature. The Committee's purpose was to provide technical assistance in the development of the standards and rules governing the use of reclaimed water. It also included representatives of public water and wastewater utilities, the landscaping industry, potential commercial and industrial reclaimed water users, and other interests considered beneficial to the development of the program.[186] However, the committee disbanded in 1997 once the reuse standards were developed.[187]

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[178] Washington Department of Ecology, *Criteria for Sewage Works Design*, Publication No. 98-37 WQ, December 1998.
[179] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[180] Anderson, Gerald, Water Reclamation and Reuse Engineer, Washington Department of Ecology, Email Communication, 23 July 2004.
[181] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[182] Anderson, Gerald, Water Reclamation and Reuse Engineer, Washington Department of Ecology, Email Communication, 23 July 2004.
[183] Revised Code of Washington Chapter 90.46.005
[184] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, December 2000, Publication # 00-10-062, 2.
[185] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[186] Revised Code of Washington Chapter 90.46.050
[187] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.

V. Development of Water Quality Standards and Guidelines

The Departments developed Washington's *Water Reclamation and Reuse Standards*, in consultation with the Water Reuse Advisory Committee, national water reuse experts, utilities, industries, environmental interest groups, public interest groups, and tribal groups.[188, 189] The *Water Reclamation and Reuse Standards* were finalized in 1997 and contain requirements for treatment, water quality, application, monitoring, storage, and other system components for the four classes of reclaimed water.[190]

The Department of Ecology and the Department of Health developed water quality standards and guidelines to implement a water reuse program pursuant to legislative statute.[191] The reclaimed water quality standards are not administrative regulations; however, the other aspects of the program, particularly the allowable uses for each reclaimed water class, are statutorily regulated. Thus, the Departments have enforcement authority under the permitting regulations to enforce the water quality standards.

VI. Promotion of Washington's Water Reuse Program

Washington realized that although the standards for a reuse program are in place, without clear direction or a promotion strategy, the program would not grow and flourish. The Legislature authorized the Department of Ecology and the Department of Health to advance water reuse in the following Revised Code of Washington section:

> *It is the intent of the legislature that the department of ecology and the department of health undertake the necessary steps to encourage the development of water reclamation facilities so that reclaimed water may be made available to help meet the growing water requirements of the state*.[192]

Thus, the state outlined the following key strategies to guide the Department of Ecology and the Department of Health in the implementation of Washington's water reuse program.

- Build on knowledge and experience from other states
- Provide state standards, guidance, and procedures
- Require consideration of water reuse in planning
- Regulate through permits
- Simplify water rights by allowing exclusive rights to reclaimed water
- Develop pilot and demonstration projects
- Provide technical assistance[193]

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[188] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, December 2000, Publication # 00-10-062, 2

[189] Schlender, George, Regional Environmental Manager, Rural Community Assistance Corporation, Former Reuse Program Manager for Washington Department of Health, Interview, 2 August 2004.

[190] Washington Departments of Ecology and Health, *Water Reclamation and Reuse Standards*, Publication #97-23, September 1997, 5.

[191] Revised Code of Washington, Title 90, Chapter 90.46, Reclaimed Water Use.

[192] Revised Code of Washington Chapter 90.46.005.

[193] Washington Department of Ecology, *Overview of Washington's Reclaimed Water Program*, PowerPoint Presentation, 10 June 2002, http://www.ecy.wa.gov/programs/wq/reclaim/June2002.pdf (Accessed 12 July 2004).

The state also promotes the use of reclaimed water by requiring facilities to evaluate opportunities for water reuse when design plans and engineering reports are submitted to the Department of Ecology during the approval process for the construction of new systems or modification of existing facilities.[194, 195] Washington is also considering whether a mandatory reuse program, similar to Florida's, should be mandated at the state level, if reclaimed water is available and reuse is feasible. Reuse is currently encouraged at the state level with authority to mandate reuse at the local level. For example, the City of Yelm has a mandatory reuse ordinance.[196]

Furthermore, the Legislature directed the Department of Ecology and the Department of Health to develop water reuse demonstration projects with government funding assistance at five locations. The cities of Ephrata, Royal City, Sequim, Yelm, and Lincoln County were chosen from the communities that volunteered to host demonstration projects.[197, 198] The demonstration projects reuse reclaimed water in a variety of applications, including landscape irrigation, maintenance, wetlands enhancement, groundwater recharge, and stream augmentation.[199] The purposes of the projects are to test and amend the standards, methods, and techniques used in water reuse for application in Washington and to find the most cost-effective means of implementation.[200, 201] The demonstration projects were a way to prove that reuse was possible in Washington and to tailor the program to fit Washington's needs.[202] Once the demonstration projects were complete and running, the new facilities reported to the Department of Ecology any problems they encountered and suggestions they had for improvements. Some comments included difficulty in interpretation of some design requirements, questions about alternative treatment methods, desire for improved coordination between the Department of Ecology and the Department of Health, and requests for increased technical assistance.[203]

The city of Yelm is home to one of the demonstration projects. The goals of the project were to provide reclaimed water for irrigation, industrial, and commercial applications to offset the increasing demand for potable water and to protect the environment by enhancing the Nisqually River and developing wetlands. The reuse facility was completed in 1999 and is designed to reclaim up to 1.0 mgd of Class A water.[204] The wastewater facility treats 250,000 gallons of wastewater per day, of which approximately 190,000 gallons are reclaimed for reuse.[205] When demand is high during the summer, 100% of the reclaimed water is used for irrigation and groundwater recharge and when the demand is low, the water is discharged to the Centralia Power Canal.[206] The water in the Canal has been diverted from the Nisqually River

[194] Revised Code of Washington Chapter 90.48.112.
[195] Revised Code of Washington Chapter 90.48.110 (1).
[196] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.2.
[197] Revised Code of Washington Chapter 90.46.110.
[198] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[199] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.1.
[200] Revised Code of Washington Chapter 90.46.005.
[201] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[202] *Id.*
[203] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13.
[204] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13-4.
[205] Doty, Jim, City of Yelm, Reclaimed Water System Operator, Interview, 23 July 2004.
[206] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13-14.

and powers the company's turbines to generate electric power.[207] Costs for Yelm's demonstration project totaled $9.6 million, which were provided by state and federal grants, loans, and city funds and are being recovered through service rates and fees. One of the highlights of the Yelm water reuse system is Cochrane Memorial Park, an ornamental wetland park, complete with a three-quarter acre fishpond stocked with rainbow trout. This wetland park is used to simultaneously treat the reclaimed water and recharge the groundwater.[208] Approximately 50,000 gallons of reclaimed water is sent to the park daily.[209] Cochrane Memorial Park helps to educate citizens by serving as a highly visible and pleasant display of water reuse.

The Department of Ecology is actively addressing problems encountered by utilities and answering questions posed by workers regarding water reuse. In April of 2003, the Department sponsored the "State Reclaimed Water Facility Operators Workshop" to listen to the concerns of wastewater facility operators and grant the operators the opportunity to meet and discuss their experiences. Discussion at the forum concentrated on operator training and continued technical education, operational considerations, interpretation of reuse rules and regulations, and operator responsibilities. The Department of Ecology and the operators agreed to meet continually to address emerging concerns and improve communication.[210]

Furthermore, the Department of Ecology collaborated with the National Water Research Institute to conduct a workshop titled "Water Reuse Planning for the State of Washington" in June 2003. The two-day workshop had over thirty participants from the Department of Ecology, the Department of Health, city governments, private consulting firms, non-governmental water associations, and academia. The main purpose of the workshop was to answer the question, "What issues must be addressed to enable the State of Washington to facilitate the development and implementation of a sustainable water reuse program?" The workgroup prioritized key issues facing water reuse and identified approaches through which to address them.[211]

VII. State Permitting Process

Since 1997, the application for the construction of a new facility or expansion of an existing facility requires the consideration of opportunities for water reuse.[212, 213] The Department of Ecology and the Department of Health provide financial and technical assistance for the evaluation of water reuse in comprehensive sewer plans or facility plans.[214] If a facility proposes to implement water reuse in their system, the facility must include the design of the reclaimed water project in the engineering report, conduct a water rights impairment self-assessment, and obtain a reclaimed water permit.[215] The water rights self-assessment evaluates

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[207] Doty, Jim, City of Yelm, Reclaimed Water System Operator, Interview, 23 July 2004.
[208] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13-4.
[209] Doty, Jim, City of Yelm, Reclaimed Water System Operator, Interview, 23 July 2004.
[210] Washington Department of Ecology, *A Report on the State Reclaimed Water Facility Operators Workshop,* Publication # 03-10-054, Prepared by Jerry Anderson and Katharine Cupps, April 2003, p.1.
[211] Washington Department of Ecology, *Water Reuse Planning for the State of Washington: Workshop Report,* p. i-ii.
[212] Revised Code of Washington Chapter 90.48.112.
[213] Revised Code of Washington Chapter 90.48.110 (1).
[214] Washington State Departments of Ecology and Health, *Consideration of Reclaimed Water Within General Sewer Plans: Guidance for RCW 90.48.112*, March 2000, p.1.
[215] Washington State Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, available at http://www.ecy.wa.gov/pubs/0010062.pdf .

the impact of the proposed diversion of the current wastewater discharge on groundwater or stream flows and, thus, downstream water rights.[216, 217]

Water reuse permits are issued to the generator of reclaimed water. Unless public health concerns arise that warrant consultation with the Department of Health, the Department of Ecology issues permits for water reclamation through its wastewater permitting program as a result of a formal agreement between the two agencies. The reuse conditions and criteria are incorporated into the facility's discharge permit. The permitting program operates through the Department of Ecology's four regional offices.[218, 219, 220] The permits are issued in accordance with Chapter 90.48 of the Revised Code of Washington. When an application is received for a permit regulating a new or modified wastewater treatment or reuse facility, notice of the proposal must be published twice in a widely circulated newspaper or other media as directed by the Department of Ecology. The notice shall contain information about how interested parties may comment on the proposal within the thirty days allotted for comment.[221] If the Department of Ecology concludes that a significant public health risk exists in a proposed reuse application, the Department of Health also reviews the application and provides consultation.[222] Permits are valid for no more than five years.[223]

Facilities permitted to operate a water reuse system are granted the exclusive right to the use and distribution of the reclaimed water under the permit's conditions. Permit condition specifications include: the purpose, location, operation, and rate of reuse and the treatment, quality, and monitoring of the water.[224, 225] The supplier, however, is exempt from the permit requirements for the appropriation of water under the State Water Code.[226, 227, 228] Thus, in accordance with permit conditions, the supplier of reclaimed water makes individual contracts with the users of the reclaimed water.[229]

VIII. Financial Incentives and Considerations

Similar to other states, the implementation of Washington's water reuse program involves a substantial amount of funding. Reclaimed water projects are in competition with other water and wastewater projects for state funding. In order to help reclaimed water projects compete for

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[216] *Id.*
[217] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 2 August 2004.
[218] Washington Department of Ecology, *Overview of Washington's Reclaimed Water Program*, PowerPoint Presentation, 10 June 2002, http://www.ecy.wa.gov/programs/wq/reclaim/June2002.pdf (Accessed 12 July 2004).
[219] Washington Department of Ecology, "Water Reclamation and Reuse," more information available at http://www.ecy.wa.gov/programs/wq/reclaim/ (last visited July 27, 2005).
[220] Revised Code of Washington Chapter 90.46.030 (5).
[221] Revised Code of Washington Chapter 90.48.170.
[222] Revised Code of Washington Chapter 90.46.040 (3).
[223] Revised Code of Washington Chapter 90.48.180.
[224] Washington Department of Ecology, "Water Reclamation and Reuse," http://www.ecy.wa.gov/programs/wq/reclaim/index.html (Accessed 12 July 2004).
[225] Washington Department of Ecology, *Overview of Washington's Reclaimed Water Program*, PowerPoint Presentation, 10 June 2002, http://www.ecy.wa.gov/programs/wq/reclaim/June2002.pdf (Accessed 12 July 2004).
[226] Revised Code of Washington Chapter 90.46.120 (1).
[227] Revised Code of Washington Chapter 90.03.250.
[228] Revised Code of Washington Chapter 90.03.252.
[229] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.

financial assistance, the Department of Ecology revised its selection process. Projects involving water reclamation were given bonus points in the Department's point-based system.[230] Applicants compete for low interest loans and grants through the Centennial Clean Water Fund and the State Revolving Loan Fund, which provide funding for wastewater treatment facilities and projects related to pollution control.[231, 232] For the 2005 fiscal year, the Department of Ecology expects to have $11.2 million available through the Centennial Clean Water Fund and $73.5 million available through the State Revolving Loan Fund, among other smaller grants.[233] The Legislature also passed a bill in 2001 providing public utilities with a tax deduction. The program exempted up to 75% of reclaimed water revenues from the State's excise tax and up to 75% of costs associated with the promotion of water use efficiency measures from the utility's gross income. The bill, however, expired in 2003.[234] No more bills establishing tax deductions have been enacted because very few facilities took advantage of the 2001-2003 deductions.[235]

Revenues collected from customers may be used only to pay back debts and cover operating costs.[236] Which customers bear the costs depends on the individual facility.[237] For example, to recover the costs of developing and operating the water reclamation facility in Yelm, citizens' sewer rates and sewer connection fees have increased significantly to $35 per month and $4,850.00, respectively.[238] Non-residential users pay $35 per 900 cubic feet of wastewater generated.[239] Yelm collects revenues from the sale of reclaimed water at 80% of the potable water rate.[240]

IX. Challenges Faced by Washington in Implementing a Water Reuse Program

Although Washington was able to look at other states' water reuse programs as models, the state still encountered obstacles in developing and implementing its water reuse program. Learning from its own experiences, Washington encourages other states to plan early for water reuse through an integrated approach. The state professes that planning early by including water reuse into initial planning phases for water *and* wastewater projects results in the greatest benefits. By doing so, communities are able to maximize the system's flexibility and minimize the costs and delays. If developed in a coordinated and comprehensive manner, water reuse can simultaneously solve multiple water-related problems.[241]

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[230] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects,* p.3.
[231] Washington Department of Ecology, "General Information About Water Quality Financial Assistance," Updated July 2004, http://www.ecy.wa.gov/programs/wq/funding/index.html (Accessed 13 July 2004).
[232] Washington Department of Ecology, "General Information About Water Quality Financial Assistance," available at http://www.ecy.wa.gov/programs/wq/funding/ (last visited July 27, 2005).
[233] *Id.*
[234] Washington Department of Ecology, *Focus: Public Utility Tax Deductions for the Use of Reclaimed Water*, Publication No. 01-10-044, August 2001.
[235] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 2 August 2004.
[236] Revised Code of Washington Chapter 90.46.120 (1).
[237] Cupps, Katharine, State Lead, Water Reclamation and Reuse Program, Washington Department of Ecology, Interview, 21 July 2004.
[238] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13-14.
[239] City of Yelm, "Water Service," at http://www.ci.yelm.wa.us/default.asp (Accessed 23 July 2004).
[240] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.13-14.
[241] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.2.

Another common challenge facing Washington is lack of resources. The number of staff needed for a successful water reuse program is more than the number of staff available in Washington.[242]

Furthermore, Washington recommends including *all* the costs and benefits of such projects to estimate the *true* costs of constructing water reclamation facilities and infrastructure. Since water and wastewater services are usually priced below true costs and are subsidized programs, water reuse does not appear to be initially cost-effective, until all factors are considered. Factors to include in the analyses are avoided costs of developing new water sources and expanding existing facilities, the environmental benefits of reuse, and the projected revenues from the sale of reclaimed water.[243] Determining funding eligibility was also difficult for equipment and expenses not conventionally described as wastewater expenditures.[244]

Washington proposes financial incentives to overcome cost-related challenges that include standardized funding specific to reclaimed water facilities, tax exemptions, rates subsidies, and high surface or ground water extraction and wastewater disposal fees. These approaches would make the price of new potable sources equal to or higher than the cost of reclaimed water sources.[245, 246]

X. Related Growth Issues

Washington is experiencing an unprecedented population increase, which places enormous stress on resources, including the water supply. Since 1990, the state's population increased by over one million people. In the 1990s, Washington's total population growth ranked as the seventh fastest in the nation.[247] The management and allocation of resources, particularly land and water, is very important for the state.[248] Similar to Florida, water resource decisions are the responsibility of Ecology and growth issues are under local control. Thus, no reservations exist among Ecology officials about promoting water reuse because of its potential to increase development. Washington, however, is managing growth through its 1990 Growth Management Act by requiring local governments to develop land use plans, which require the consideration of resource availability. The Growth Management Act states:

> *The legislature finds that uncoordinated and unplanned growth, together with a lack of common goals expressing the public's interest in the conservation and the wise use of our lands, pose a threat to the environment, sustainable economic development, and the health, safety, and high quality of life enjoyed by residents of this state. It is in the public interest that citizens, communities, local governments, and the private sector cooperate and coordinate with one another in comprehensive land use planning. Further, the legislature finds that it is in the*

[242] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.2.
[243] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.3.
[244] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.2-3.
[245] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.3.
[246] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.2-3.
[247] Trohimovich, Tom, Planning Director, 1000 Friends of Washington, *The Growth Management Act After More than 10 Years: Another Look & A Response to Criticism*, April 2002, p.4, at http://www.1000friends.org/current_work/publications/GMA_another_look.pdf (Accessed 27 July 2004).
[248] McDonald, Tom, Municipal Research and Services Center of Washington, *Water Supply and the Growth Management Act*, April 1998, at http://www.mrsc.org/Subjects/Environment/water/MCD4-98.aspx (Accessed 27 July 2004).

public interest that economic development programs be shared with communities experiencing insufficient economic growth.[249]

Two of the goals of the Act are to 1) protect and enhance the environment and the availability of water, and; 2) ensure that public facilities, including domestic water facilities, are adequate to serve development without decreasing current service levels below locally established minimum levels.[250, 251, 252] All towns or counties meeting certain population growth criteria are required to coordinate with surrounding localities to designate areas for urban growth.[253, 254, 255] Twenty-nine counties and their cities currently meet the criteria and are required to plan.[256] The Act does not directly state that growth is limited to areas with a sufficient water supply, but through these goals and other requirements to protect wetlands and rivers, it recognizes that water availability is an important factor in the planning of local development.[257] There are, however, no provisions against water reuse programs increasing the water supply to meet projected growth. Nonetheless, supporters applaud the Act for providing better resource protection and financing tools, which are important foundations for the development of water reuse programs.[258]

XI. Public Response

Public reception to the idea of reclaimed water has generally been favorable in Washington. The state government has been important in overcoming the public's misconceptions of water reuse and resistance to change by assuring the public of its safety and providing impetuses for the change.[259] Part of Washington's successful public education and promotion campaign for water reuse were the demonstration projects, which served as high-profile educational centers about water reuse.[260]

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[249] Revised Code of Washington 36.70A.010
[250] Revised Code of Washington 36.70A.020 (10)
[251] Revised Code of Washington 36.70A.020 (12)
[252] Revised Code of Washington 36.70A.030
[253] Revised Code of Washington 36.70A.040
[254] Revised Code of Washington 36.70A.100
[255] Revised Code of Washington 36.70A.110
[256] 1000 Friends of Washington, "Washington's Growth Management Act," at http://www.1000friends.org/smart_growth/gma.cfm (Accessed 27 July 2004).
[257] McDonald, Tom, Municipal Research and Services Center of Washington, *Water Supply and the Growth Management Act*, April 1998, at http://www.mrsc.org/Subjects/Environment/water/MCD4-98.aspx (Accessed 27 July 2004).
[258] Trohimovich, Tom, Planning Director, 1000 Friends of Washington, *The Growth Management Act After More than 10 Years: Another Look & A Response to Criticism*, April 2002, p.6, at http://www.1000friends.org/current_work/publications/GMA_another_look.pdf (Accessed 27 July 2004).
[259] Washington Department of Ecology, *Water Reclamation and Reuse: The Demonstration Projects*, p.4.
[260] *Id.*

I. History of Water Reuse in New Jersey

Historically, water reuse was not a common practice in New Jersey. Most of the state's wastewater effluent was discharged into its 6,450 miles of rivers, along its 120 miles of Atlantic coastline, or to other water bodies.[261] It was not until the drought of 1999 and the subsequent drought of 2002, when New Jersey faced severe water supply problems, that the benefits of conserving and reusing water were apparent. The droughts drained New Jersey's water supply to dangerously low levels. In 1999, average rainfall totals were ten to eighteen inches below normal in many parts of the state. The period of April through July registered as the driest on record for 105 years and one of the ten hottest.[262] As a result, Governor Christie Todd Whitman declared a state of water emergency in August 1999.[263] When similar conditions existed in 2002, Governor James E. McGreevey declared another state of water emergency in March.[264] The drought restrictions set forth by the New Jersey Department of Environmental Protection (DEP) during the water emergency periods limited public and private uses of water, except for people who used non-potable water, making reuse a very desirable option.[265]

II. Development of New Jersey's Water Reuse Program

Droughts prompted the development of "reclaimed water for beneficial reuse" (RWBR) programs in New Jersey as a way to extend the state's water supply and conserve a valuable resource. During the drought of 2002, NJDEP Commissioner Bradley M. Campbell issued Administrative Order 2002-21, which authorized the "revision of the mandatory water use restrictions, and…certain uses and discharges of treated wastewater…to ensure an adequate water supply to the State, to alleviate the water emergency and to be in the public interest." This order allowed domestic wastewater treatment facilities, with no prior approval for reuse in their New Jersey Pollutant Discharge Elimination System (NJPDES) permit, to begin planned beneficial reuse programs after receiving written approval from DEP. Water reuse was approved for restricted access applications – street sweeping and irrigation of non-food crops, golf courses, and select landscaping beds – in accordance with DEP's *Technical Manual for Reclaimed Water for Beneficial Reuse* as long as the system met the facility's current NJPDES permit requirements and did not negatively impact a water body's base flow or uses downstream.[266] Approximately seventy-five wastewater treatment facilities were granted approval for beneficial reuse programs through the drought emergency order, which was in effect from August 2002 to January 2003.[267, 268]

New Jersey's guidelines for water reuse are contained in DEP's *Technical Manual for Reclaimed Water for Beneficial Reuse*. This manual was initially developed in the early 1990s

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[261] New Jersey Department of Environmental Protection, Division of Water Quality, "Did You Know?" Updated 3 May 2002, at http://www.state.nj.us/dep/dwq/dyk.htm#dyk (Accessed 29 June 2004).
[262] Associated Press, USA Today: Weather, "Mid-Atlantic, Northeast Drought Facts," 6 August 1999.
[263] New Jersey Governor Christie Todd Whitman, Executive Order #98, 5 August 1999.
[264] New Jersey Governor James E. McGreevey, Executive Order #11, 4 March 2002.
[265] New Jersey Department of Environmental Protection Commissioner Bradley M. Campbell, Administrative Order #2002-05, 11 March 2002.
[266] New Jersey Department of Environmental Protection Commissioner Bradley M. Campbell, Administrative Order #2002-21, 20 August 2002.
[267] New Jersey Department of Environmental Protection, Division of Water Quality, "Effluent Reuse Program," Updated 20 January 2004, at http://www.state.nj.us/dep/dwq/reuseff.htm (Accessed 16 June 2004).
[268] New Jersey Department of Environmental Protection, "New Jersey Drought Information: Drought Related News Releases," Updated 10 June 2004, at http://www.njdrought.org/press.html (Accessed 2 July 2004).

by DEP and was updated in January 2003. It has remained in a working draft form since its release, although many facilities used the document to implement their water reuse programs.[269] It is open for constant public review and is scheduled for updating every six months.[270] However, the manual has not been updated since the release of the January 2003 version. An updated version is scheduled to be released in February 2005. The manual provides recommended system design and water quality limits for four main water reuse applications: public access; restricted access and non-edible crops; agricultural edible crops; and industrial, maintenance, and construction.[271] However, the manual is only a guideline for reuse programs as it currently lacks regulatory backing.

Unlike other states with flourishing water reuse programs, New Jersey has not clearly identified the promotion of the reuse of reclaimed water as a state objective. The DEP's authority to develop and advance a water reuse program stems from the agency's current interpretation of existing water management objectives, which state:

> *The Legislature finds that the people of the State have a paramount interest in the restoration, maintenance and preservation of the quality of the waters of the State for the protection and preservation of public health and welfare, food supplies, public water supplies, propagation of fish and wildlife, agricultural and industrial uses, aesthetic satisfaction, recreation, and other beneficial uses…*[272]

Although currently there is no proposed legislation to adopt the advancement of water reuse as a state objective, the state has supported water reuse, usually as a response to droughts, in the states Water Supply Action Plan. New Jersey's Water Supply Action Plan examines all aspects of water supply management in the state by providing an analysis of the state's water resources, current and projected supply and demand, guidelines for ways to conserve, protect, and manage the state's supply, and evaluations of projects to meet the state's need.[273]

In fact, in response to the droughts that plagued New Jersey in 2001-2002, DEP has developed the Water Supply Action Plan 2003-04. In doing so, the NJDEP revised the Statewide Water Supply Plan, stating that "[b]ased on the lessons learned during this [2003] and previous drought events, DEP has prepared the 'Water Supply Action Plan 2003-04,' a policy program that identifies key initiatives which aim to maximize clean and plentiful water Statewide."[274] The Department included in the initiatives "the need to promote Beneficial Reuse of Reclaimed Water and the adoption of mandatory conservation measures, where appropriate," reasoning that "[e]xpediting these measures will help safeguard the State against future drought emergencies and provide critical information in support of the comprehensive Statewide Water Supply

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[269] Tompkins, Howard, Bureau Chief: Point Source Permitting Region 1, New Jersey Department of Environmental Protection, Interview, 15 July 2004.
[270] New Jersey Department of Environmental Protection, Conference Call with COA staff and Division of Water Quality staff Howard Tompkins, 29 July 2004.
[271] New Jersey Department of Environmental Protection, Division of Water Quality, *Technical Manual for Reclaimed Water for Beneficial Reuse*, January 2003, p. 7-11.
[272] New Jersey Water Quality Planning Act, N.J.S.A. 58:11A-2 (a).
[273] New Jersey Department of Environmental Protection, *Water for the 21st Century: The Vital Resource, New Jersey Statewide Water Supply Plan*, 1996.
[274] NJ Dep't of Env'l Protection, Division of Water Quality, information available at http://www.state.nj.us/dep/cleanwater/masprev.html (last visited August 2, 2005).

Plan."[275] The Plan is undergoing another major update and is expected to be complete in January 2007. Currently, the Water Supply Action Plan 2003-04 identifies eleven key actions the state can do immediately to enhance the quality and quantity of New Jersey's water supply before the updated Water Supply Plan is complete.[276, 277] Action Nine is the advancement of the beneficial reuse of water by developing strategies to overcome the higher costs associated with water reuse programs. Preliminary suggestions include:

1) Increased costs of potable water to make RWBR [Reclaimed Water for Beneficial Reuse] cost-competitive;
2) Financial incentives for cost recovery, such as tax incentives…or reduced NJPDES permit fees;
3) Revised water allocation regulations to mandate RWBR for large consumptive water users in the coastal areas.[278]

Additionally, there is a resolution pending in the New Jersey Assembly Environment and Solid Waste Committee to assess the feasibility of reusing reclaimed water in New Jersey.[279, 280] The passage of Assembly Joint Resolution No. 92 would establish a "Wastewater and Grey Water Reuse Study Commission" charged with investigating "all economic, legal and public perception issues that currently are impediments to the reuse of treated wastewater in the State." The ten-member Commission would be comprised of the DEP Commissioner, President of the Board of Public Utilities, Secretary of Agriculture, and a representative from each of the following interests: water purveyors, industrial water dischargers, publicly owned treatment works facilities, academics, golf industry, 'green' industry, and environmental organizations.[281]

Importantly, the current suggestions for New Jersey's Reclaimed Water for Beneficial Reuse program do not contain a Vision Statement, nor the creation of a Program Director or Coordinator. Without a Vision Statement, that establishes a goal to restore and enhance New Jersey's watersheds and to protect the aquatic integrity of New Jersey's groundwater, surface water, and wetland habitats for future generations, the Program is lacking an integral piece.

III. Current Extent of Water Reuse in New Jersey

Although New Jersey's water reuse program is still in its early stages of development, twenty-three facilities are authorized in their current NJPDES permit to operate water reuse systems. In 2003, the nine of these facilities that were in operation reused total of 1,159,298,891

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[275] NJ Dep't of Env'l Protection, Division of Water Quality, information available at http://www.state.nj.us/dep/cleanwater/masprev.html (last visited August 2, 2005).
[276] New Jersey Department of Environmental Protection, "Clean and Plentiful Water: Revisions to the Statewide Water Supply Plan," Updated 3 December 2003 at http://www.state.nj.us/dep/cleanwater/masprev.html (Accessed 6 July 2004).
[277] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04:* DRAFT, New Jersey Statewide Water Supply Planning Process, p.3, at http://www.state.nj.us/dep/watershedmgt/DOCS/pdfs/WaterSupplyActionPlan03-04.pdf.
[278] *Id*. at 14.
[279] Calvo-Hahn, Carrie Anne, Office of Legislative Service Aide, Interview, 14 July 2004.
[280] New Jersey State Legislature, "Bills 2004-2005: AJR 92," at http://www.njleg.state.nj.us/bills/BillView.asp (Accessed 14 July 2004).
[281] Assembly Joint Resolution No. 92

gallons, mostly for restricted access applications (sewer jetting, street sweeping, and irrigation) and industrial uses.[282] The breakdown of reuse applications was as follows:[283]

Restricted Access Use:	
Non-contact cooling water	86.4%
Street sweeping, sewer jetting, other	1.2%
Public Access Use:	12.4%

IV. Structure of New Jersey's Water Reuse Program

Management of water reuse systems in New Jersey is the sole responsibility of DEP. Thus far, the program is under the supervision of DEP employees from various sections, including the Division of Water Quality, Water Supply Administration, and Division of Watershed Management. Each DEP staff person involved in water reuse advises on the part of the program related to his or her division. However, **no one staff member works solely on coordinating these employees' efforts**.[284]

Currently, the Statewide Water Supply Plan Beneficial Reuse Sub-committee also exists to address water reuse related issues and make recommendations for the inclusion of water reuse policy actions in the updated Water Supply Plan.[285] The sub-committee consists of representatives from the DEP, USGS, and other state agencies, as well as developers, consultants, utilities, water associations and environmental groups. Over eighty individuals initially showed interest in participating in the sub-committee; however, a significantly smaller number of individuals have attended the one or two meetings held since 2002.[286]

V. Development of State Guidelines

New Jersey's water reuse guidelines are contained in the *Technical Manual for Reclaimed Water for Beneficial Reuse*. Since the guidance document is a policy of DEP and not law, it did not undergo the rule-making process outlined in the Administrative Procedures Act, which would subject the document to formal public review. The DEP did, however, solicit comments about the manual from the Statewide Water Supply Plan Beneficial Reuse Sub-committee.[287] Furthermore, DEP continually accepts comments from the public regarding the manual and uses them to update it on a six-month schedule.[288] However, as of January 2005, the Manual has not been updated.

VI. Mandatory Water Reuse

Similar to Florida, New Jersey officials wish to implement a mandatory water reuse program in locations where reuse is feasible. Ideally, NJDPES permitting programs will require

[282] New Jersey Department of Environmental Protection, Reuse Facility Log 2003.
[283] New Jersey Department of Environmental Protection, "DEP Plans Expansion of Reclaimed Water for Beneficial Reuse (RWBR) Program," *NJ Discharger*, Winter 2003, p.7.
[284] New Jersey Department of Environmental Protection and Clean Ocean Action Meeting, 21 June 2004.
[285] New Jersey Department of Environmental Protection and Clean Ocean Action Conference Call, 29 July 2004.
[286] Mattle, Joseph, Division of Watershed Management, New Jersey Department of Environmental Protection, Email Attachment, 3 August 2004.
[287] Tompkins, Howard, Bureau Chief: Point Source Permitting Region 1, New Jersey Department of Environmental Protection, Interview, 2 August 2004.
[288] New Jersey Department of Environmental Protection, Conference Call with COA staff and Division of Water Quality staff Howard Tompkins, 29 July 2004.

the evaluation of water reclamation and reuse feasibility at facilities with a design flow of 0.1 mgd or greater.[289] In the feasibility study, facilities would be required to evaluate the implementation of a restricted access reuse system and the implementation of a public access and restricted access reuse system. If a public access system is technically infeasible, other alternatives must be evaluated. Suggested alternatives include groundwater recharge through land-application and underground injection to create a saltwater barrier.[290] Furthermore, water allocation permits require an assessment of using reclaimed water by consumptive use applicants who, a) are within five miles of a potential reclaimed water source; b) do not require potable quality water; and, c) do not already use reclaimed water.[291] However, the mandatory reuse program has no regulatory support, so the completion of a feasibility study is only part of the current permitting process by DEP policy and the state can not require either a treatment facility to provide reclaimed water or a consumptive user to use reclaimed water.

VII. State Permitting Process

A domestic wastewater treatment facility must obtain NJDEP approval, via a NJPDES permit, to implement a reuse program.[292] The conditions of the reuse program are incorporated into a NJPDES permit when it is first issued, by modifying the current permit, or including reuse conditions in the permit at the time of renewal.[293] To modify an existing permit, prospective reuse facilities must submit a "Reclaimed Water for Beneficial Reuse (RWBR) Authorization Request" form.[294] New or expanded reuse facilities must also submit such a Request and include an engineering report, an operations protocol, and copies of all the Reuse Supplier and User Agreements.[295]

The process through which an NJPDES permit is issued, modified, or renewed is long and complex. This is why DEP authorized restricted access water reuse programs through written approval under DEP Commissioner Campbell's Administrative Order 2002-21 during the 2002 drought. When the drought restrictions were lifted and the reuse authorizations expired, DEP found that interest in reuse was high. In a phone survey of 80% of the facilities that were granted reuse authorizations through the drought emergency order, approximately 70% were interested in continuing the operation of their reuse program.[296] Thus, DEP hopes to quickly reissue reuse permits to them and other facilities through a General Permit. The General Permit authorizes the reuse of treated wastewater for restricted access applications. These applications include, but are not limited to, sewer jetting, street sweeping, fire protection, specific industrial processes, and landscape irrigation of areas with protected perimeters. Although still in draft

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[289] New Jersey Department of Environmental Protection, *Appendix RFS1: Guidelines for Preparation of Reuse Feasibility Studies,* p.2.
[290] New Jersey Department of Environmental Protection, *Appendix RFS1: Guidelines for Preparation of Reuse Feasibility Studies*, p.14-15.
[291] New Jersey Department of Environmental Protection, *Appendix RFS2: Reuse Feasibility Study Requirements for Water Allocation Permit Renewals*, p.2.
[292] NJDEP, Division of Water Quality, Technical Manual for Reclaimed Water for Beneficial Reuse, January 2003, "Implementing an RWBR Plan," p.10-11.
[293] *Id.*
[294] *Id*.
[295] New Jersey Department of Environmental Protection, *Technical Manual for Reclaimed Water for Beneficial Reuse*, p. 12-8.
[296] Tompkins, Howard, Bureau Chief: Point Source Permitting Region 1, New Jersey Department of Environmental Protection, Interview, 15 July 2004.

form and under review, DEP eventually will use this General Permit for reuse authorization in facilities with a valid NJPDES permit, regardless of prior reuse experience. The General Permit, however, will only last until the facilities' next NJPDES renewal, at which time reuse conditions would be incorporated into the NJPDES permit. According to DEP, the General Permit adequately regulates restricted access applications, and not public access applications. Therefore, public access applications are still only authorized through inclusion in a facility's NJPDES permit.[297]

However, the general permit for restricted access reuse raises issues that should be evaluated and addressed prior to the distribution of the permit for public review and comment. COA has discussed these concerns directly with DEP staff. Specifically, any authorizations or permits granted for beneficial reuse should clearly state that the permittee must comply with any modifications to guidelines in the *Technical Manual for Reclaimed Water for Beneficial Reuse*. This is especially important in light of the fact that the Manual is constantly being updated and changed in response to comments and technical/scientific improvements, in lieu of regulations clearly outlining reuse methods and restrictions. Yet, DEP's approach, at this time, is to require compliance with the manual at the time of the permit issuance. Instead, **DEP should include a condition in the general permit requiring that permits or authorizations are consistent with any changes to the Manual when guidelines are changed.** This will ensure that there are no lapses in environmental protection. For example, in the permit and fact sheet, DEP could state that "As the Technical Manual is updated during the lifetime of this general permit and its authorizations, permittees must comply with the most recent version of the Technical Manual." Issuance of a General Permit raises other concerns, as well, including:

- Enterococcus levels in coastal discharges of wastewater, and by extension, levels in wastewater to be reused. Some facilities discharge elevated levels of enterococcus. For the purposes of beneficial reuse, these levels raise concerns about pathogens similarly resistant to chlorination. Recently, the detection methods for enterococcus have raised questions about the validity of data. DEP must address enterococcus in wastewater discharges.
- Regarding "other pollutants," the draft general permit states that "water to be beneficially reused shall be in compliance with all effluent limitations contained in the permittee's individual NJPDES discharge permit…" Water Quality Based Effluent Limits (WQBELs) for priority pollutants in ocean discharges may not be protective for land-based irrigation purposes. Instead, this section should read "water to be beneficially reused shall be in compliance with all effluent limitations contained in the permittee's individual NJPDES discharge permit and EPA's guidance manual *Guidelines for Water Reuse*."
- Frequency of monitoring is unclear for all parameters. Priority pollutants should be monitored on a monthly basis to ensure that uses are protective of human health and the environment.
- Enforcement measures are not accountable. Permit requirements depend on self-reporting by a facility. This is concerning since some requirements demand careful oversight by facility employees and there does not appear to be a system for

[297] New Jersey Department of Environmental Protection, DRAFT Fact Sheet/Summary of Basis: General Permit to Distribute Effluent for Reclaimed Water for Beneficial Reuse Applications to Restricted Access Sites, NJ0142581 – BRG Permit.

accountability. For example, it is uncertain how DEP will ensure that ponding limitations in restricted access irrigation areas are enforced, or how DEP defines "times of least contact" and enforces restrictions at such times.

VIII. Financial Incentives and Considerations

One significant restraint to beneficial reuse is the financial investment involved in the investigation, design, construction, operation, and permitting of reuse programs. The DEP has a few resources for facilities in order to overcome this obstacle. First, there are no additional permit fees for adding reuse conditions to a discharge permit. Second, the state provides low interest loans for wastewater treatment facility improvements.[298] One fund is the Clean Water State Revolving Fund, which is a component of the Environmental Infrastructure Financing Program. It provides zero percent interest loans to local governments for up to half of the construction costs of wastewater collection, treatment, and conveyance facilities, among other projects.[299]

Furthermore, in 2002, the Legislature passed bills providing tax incentives for the purchase of equipment used in the reuse of water for industrial purposes. N.J.S.A. 54:10A-5.31 provides a business tax credit of 50% of the cost of treatment or conveyance equipment purchased for reuse programs, provided that the reuse of the water is beneficial to the environment, as determined by DEP, and is reused in an industrial process. Candidates must file a determination of environmental benefit with DEP to receive the tax credit from the Department of Treasury's Division of Taxation.[300] Also, N.J.S.A. 54:32B-8.36 provides a sales tax refund for treatment or conveyance equipment purchased for reuse programs, provided that the reuse of the water is beneficial to the environment, as determined by DEP, and is reused in an industrial application. Again, candidates must file a determination of environmental benefit with DEP to receive the tax credit from the Department of Treasury's Division of Taxation.[301] The processes by which a party applies for a determination of environmental benefit (DEB) and DEP issues a DEB for the business tax credit or sales tax refund is outlined in N.J.A.C. 7:14D-1 et seq., Determination of Environmental Benefit of the Reuse of Further Treated Effluent in Industrial Facilities. In determining whether or not the reuse project that the equipment will be used for is beneficial for the environment, DEP considers minimum passing stream flow restrictions, impact of interbasin transfer (if applicable), reduction of pollutant loading, and conservation of state waters.[302]

Recently, the State provided $35M for 23 water reuse demonstration projects, which include residential irrigation, non-contact cooling water for industrial generator cooling, wash down water, toilet flushing, and golf course irrigation.[303]

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[298] Beneficial Reuse in New Jersey, PowerPoint Presentation at Water Reuse and Recycle Symposium, Pennsylvania State University, 19-20 May 2003.
[299] New Jersey Department of Environmental Protection, "Municipal Finance and Construction Element," Updated 31 October 2001, http://www.nj.gov/dep/dwq/mface.htm#finance (Accessed 28 July 2004).
[300] N.J.S.A. § 54:10A-5.31.
[301] N.J.S.A. § 54:32B-8.36.
[302] N.J.A.C. § 7:14D-1, et seq.
[303] NJ Dep't of Env'l Protection, Alescia Marie Teel, PIO, email inquiry and Press Release "DEP Furthers Water Conservation Efforts with $35 Million for Water Reuse Projects" dated January 31, 2005.

IX. Support for More Water Reuse in New Jersey

New Jersey is facing a critical moment in history. As the quantity and quality of the state's precious water resources declines, the beneficial reuse of reclaimed wastewater offers the opportunity to secure a clean and abundant water supply. Water reuse presents many advantages for New Jersey and its citizens. Reserving potable water for potable uses and using reclaimed water for non-potable purposes decreases the demand for potable water, which is currently 1.2 billion gallons per day.[304] Rough estimates place the demand for water by golf courses and other major consumptive users in New Jersey's coastal areas alone at over five billion gallons per month.[305] This current demand for potable water could be significantly reduced by reclaimed water.

When the demand for potable water is high, more freshwater is removed from the state's surface and groundwater supplies, which are already stressed. Permanently removing too much freshwater from surface waters, 1) damages aquatic ecosystems, which require certain stream flow levels to survive; 2) impedes downstream water use; and 3) increases the water body's sensitivity by reducing its ability to assimilate contaminants.[306] Current water and wastewater practices allow for humans to take water from natural ecosystems but not return the water to the proper place. For groundwater, extraction at a faster rate than recharge will deplete the source. Groundwater tables have continuously dropped over the last 30 years. Also, when groundwater sources are over drawn in coastal areas, salt water intrudes into the system and contaminates traditionally freshwater sources. Such saltwater intrusion dramatically and detrimentally changes the ecosystem. Additionally, saltwater intrusion affects the public water supply. In Cape May County, for example, 10 public supply wells, 3 industrial supply wells, and more than 100 domestic supply wells have been closed since 1960 as a result of salt water intrusion.[307]

Threatening water supply conditions are heightened during droughts, which New Jersey has experienced frequently in the past several years. The 2002 drought brought the lowest stream flow and groundwater levels ever recorded in the state's history.[308] These low levels during drought conditions make it even more important to replace as much of the water removed from the water cycle as possible. Unfortunately, of the 3.1 billion gallons per day (bgd) of water available for human use during summer drought conditions in New Jersey, approximately 2.0 bgd of it is *not* returned to the source where it originated. Instead, it is lost to consumptive uses such as irrigation or discharged to another source, i.e. another watershed, reducing stream flows and groundwater levels to dangerously low levels.[309, 310] An added benefit of water reuse is that the reclaimed water supply can offer a drought resistant source of non-potable water.

When a community implements a water reuse program, less water is extracted from existing sources. Ultimately, this delays or prevents the need to develop new water sources.

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[304] New Jersey Department of Environmental Protection, "Every drop *does* count: Learn about New Jersey's water shortage and how you can help," Educational Pamphlet, May 2002.
[305] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04:* DRAFT, p.14.
[306] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04: DRAFT*, p.15.
[307] LaCombe, Pierre J. & Carleton, Glen B, U.S. Geological Survey, *Hydrogeologic Framework, Availability of Water Supplies, and Saltwater Intrusion, Cape May County, New Jersey*, Water Resources Investigations Report 01-4246, p.1.
[308] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04:* DRAFT, p.15.
[309] New Jersey Statewide Water Supply Plan Beneficial Reuse Sub-committee, *Why Reuse and Conservation Have to be the Focus of the Next NJ Statewide Water Supply Plan*.
[310] New Jersey Statewide Water Supply Plan Beneficial Reuse Sub-committee, *Next NJ Statewide Water Supply Plan Problem Definition/Potential Strategic Solutions.*

Also, since water is reclaimed from the wastewater effluent stream to be reused, less effluent needs disposal. New Jersey's wastewater treatment facilities discharge approximately one billion gallons per day of treated freshwater throughout the state.[311] Moreover, water reuse reduces the release of wastewater contaminants that may result from disposal.

It is especially important to implement water reuse programs in coastal communities where wastewater treatment facilities discharge to the ocean. In these situations, the effluent is not reused indirectly by users downstream of its discharge. Valuable time and money are used to treat the wastewater to a satisfactory quality only for the water to be disposed of offshore and unavailable for reuse. Of the one billion gallons per day of effluent that New Jersey facilities discharge, 750 million gallons are discharged into saltwater bodies, including the ocean and bays.[312] The state found that reusing even less than 1% of this 750 million gallons could offset the state's entire consumptive water use.[313]

X. Related Growth Issues

Although water reuse programs hold the promise of a secure water supply in New Jersey, it also has the potential to greatly impact growth in the state. In the Water Supply Action Plan 2003-04, DEP acknowledges that "the availability of fresh water is a limiting factor in the potential development and redevelopment of the State."[314] New Jersey's growing population almost exceeds 8.6 million people.[315] More specifically, Monmouth County and Ocean County have populations of almost 630,000 and 537,000, respectively.[316, 317] Population density counts reveal that New Jersey's density of 1,134 persons per square mile is significantly larger than the national average of 80 persons per square mile.[318] These numbers are undoubtedly putting stress on natural resources, particularly water. In fact, as the population increases and more water is pulled from the underground water supply, the likelihood of saltwater intrusion increases.

Regardless of whether provisions are made to manage the state's limited water resources in a sustainable manner, water will have a significant impact on development in New Jersey. If water sources are managed in a sustainable manner, growth will be limited by the availability of water and other resources. Since water reuse expands the public water supply, developers may see it as a validation to further increase the state's high population. **Thus, it is essential to put in place safeguards that protect against growth stimulated by water reuse programs.** If water is allocated at the discretion of water supply and allocation officials with no regard for local and state growth plans, areas of unwanted development will occur. Currently, DEP's water allocation staff is the only safeguard against development spurred by water reuse and has the responsibility for governing the use of water in a sustainable manner. Allocation permits allowing increased water use threatens the supply and may spur unwanted growth. Rather, the

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[311] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04*: DRAFT, p.7.
[312] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04*: DRAFT, p.7.
[313] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04:* DRAFT, p. 14.
[314] New Jersey Department of Environmental Protection, *Water Supply Action Plan 2003-04:* DRAFT, p.3.
[315] United States Census Bureau, "State and County Quick Facts: New Jersey," available at http://quickfacts.census.gov/qfd/states/34000.html (Accessed 26 May 2004).
[316] United States Census Bureau, "State and County Quick Facts: Monmouth County," available at http://quickfacts.census.gov/qfd/states/34/34025.html (Accessed 26 May 2004).
[317] United States Census Bureau, "State and County Quick Facts: Ocean County," available at http://quickfacts.census.gov/qfd/states/34/34029.html (Accessed 26 May 2004).
[318] United States Census Bureau, "State and County Quick Facts: New Jersey," available at http://quickfacts.census.gov/qfd/states/34000.html (Accessed 26 May 2004).

potable water saved through reuse should be conserved and used to eliminate salt-water intrusions, sustain adequate levels of drinking water, and maintain historic levels of water in bays, creeks, and wetlands, among other similar goals.

XI. Public Response

Although little data exists that assess the public's response to reusing treated wastewater effluent, a 2001 Clean Ocean Action survey found that 71% of individuals surveyed would not oppose the reuse of wastewater if the water was properly treated.[319] Also, since water reuse in New Jersey is a novel idea, the public lacks the information the need to formulate their own opinion of water reuse.

CONCLUSION

In sum, water reuse can be an effective tool for state's to conserve potable water supplies and recharge ground water supplies while protecting the public health and environment. A successful water reuse program requires careful thought and planning and, at a minimum, includes a clear vision statement, comprehensive regulations and a Program Director. Clean Ocean Action intends for the summaries of Florida's, Washington's and California's water reuse programs to serve as a model for both the right and wrong ways to implement a water reuse program in New Jersey.

[319] Clean Ocean Action, *Wasting our Waters Away: Technical Report*, 2001, p.17.

.APPENDIX A
WATER REUSE INFORMATIONAL CONTACTS

Clean Ocean Action

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