9.1 Water Management & Conservation Plan

9.1.1 Introduction

Water management consists of the prudent oversight by a water supplier to responsibly provide water resources for the benefit of users within its defined service area. Water conservation consists of any appropriate efforts toward a reduction in water losses, waste, or consumption. As water suppliers face growing demands upon their available resources, careful conservation planning is playing an increasingly important role in their management practices. In effect, conserved water increases the available supply without a commensurate increase in cost and effort to obtain that water.

Conservation measures also can have the effect of enabling water suppliers to reduce, postpone, or even avoid water system expansion projects. Costs for operations and maintenance as well as improvements may be substantially reduced as well by diligently applying conservation practices within a water system. Further benefits for the environment within and surrounding the service area include restoring stream flows in order to support aquatic life, sustaining recreational opportunities, and preserving the natural beauty of water-based landscapes.

A *water management and conservation plan* (WMCP) is a schema prepared by a particular water supplier to document and describe its current and projected utilization, management, and conservation of water resources. Oregon Administrative Rules (OAR) 690-086 govern the requirements for the development of a WMCP. Portions of OAR 690-315 (Permit Extensions) also affect the content of a WMCP. The Oregon Water Resources Department (OWRD) is the state agency entrusted with the responsibility of ensuring that the requirements of OAR 690-086 and 690-315 are met.

In many instances approval of an application for (or an extension of) a water right permit is contingent upon the submission and acceptance of an up-to-date WMCP. The rules in OAR 690-086 and 690-315 provide a process to promote efficient use of the water resources and to facilitate water supply planning. A WMCP is the tool which the State utilizes to require water suppliers to implement water conservation measures and to plan for future demands. A WMCP also assists the WRD and other interested parties to evaluate the efforts of a water supplier to properly manage water resources.

A WMCP generally involves a more comprehensive evaluation of water supply alternatives, including water conservation programs, than does a water system master plan (WSMP), which is required by the Department of Human Services (DHS) of Oregon. A WSMP is generally oriented more toward facilities and processes (especially, as they relate to satisfying regulations associated with the Safe Water Drinking Act). However, both a WMCP and a WSMP are tools utilized to assist water suppliers in systematically planning for the future. In this regard, Division 86 of the OAR allows the substitution of a WSMP for a WMCP if the WSMP substantially satisfies the requirements of a WMCP. Due to overlap of the plans, water suppliers should consider updating an outdated WSMP while creating a WMCP and wrapping the WMCP within the WSMP. This approach has been adopted for the report of this water system study.

It is important to point out that there is a difference between what the OWRD expects the City to submit as a WMCP and this section of this study. This section should be viewed as a resource that includes recommendations for what a WMCP should include. The City must actually put a plan together and put it into action before the OWRD considers it to be a "plan".

The OWRD is more interested in what the City is actually doing and what successes they are having with conservation efforts and are less interested in a consultants opinions or recommendations about what activities are recommended to be undertaken. Therefore, the City should utilize the information provided in this section and begin taking action, track and report results, and review and repeat their efforts in order to truly enter into a water management and conservation planning effort.

9.1.2 Proposed Submittal of Plan Updates

The City of Newport anticipates submitting the next update of its WSMP, with the included WMCP, in ten years time, corresponding to the year 2018. As required by OAR 690-086-0125(6), a progress report will be submitted in five years time, corresponding to the year 2013.

9.1.3 Required Elements of Plan

As outlined in OAR 690-086-0125(1)–(4), a water management and conservation plan shall include the following elements:

- A municipal water supplier description, as described under OAR 690-086-0140;
- A municipal water conservation element, as described under OAR 690-086-0150;
- A municipal water curtailment element, as described under OAR 690-086-0160;
- A municipal water supply element, as described under OAR 690-086-0170.

Among its other purposes, Section 9 summarizes much of the information contained elsewhere in the report of this water system study, and it includes data to support each of the elements listed above. Throughout this section, previous sections of the study are referenced for more detailed descriptions of certain topics. If further information is needed beyond the summary presented in this section, please consult the appropriate reference provided.

9.2 Water Supplier Description (OAR 690-086-0140)

9.2.1 Service Area, Population, and System Overview

The City of Newport is located in Lincoln County Oregon, approximately in the center of the county coastline at the mouth of the Yaquina River. The city limits extend to both the north and south sides of Yaquina Bay in Townships 10, 11, and 12 South, Range 11 West. Development within the city extends north from the bayfront along the beach (which runs parallel to U.S. Route 101) to include Agate Beach, Yaquina Head, and Schooner Point, ending just south of Moolack Creek. South of the bay, it extends along the beach to include South Beach, the Newport Municipal Airport, and the lower drainage area of Thiel Creek. As of 2007, the city limits encompassed 6,619 acres or 10.3 square miles.

The service population consists of approximately 10,455 full-time residents (as of 2007). City services include water treatment and supply, sewage treatment and disposal, and other typical public works and maintenance services. A planning area map, which indicates the city limits along with the urban growth boundary (UGB) and other identified relevant features, is provided in Figure 2.1.1-1 in Section 2 of this study.

The existing water system includes intake, treatment, transmission, distribution, and storage elements. A brief description of each of these elements is provided in the discussion that follows. For a more detailed description of these elements, see Section 5 of this study. A system layout schematic is depicted in Figure 5.5-1 in Section 5 of this study.

9.2.2 Raw Water Supply and Storage

The City of Newport holds seven water diversion rights from various sources which are summarized below. Only three of the sources are currently utilized.

Table 9.2.2-1 – City of Newport Water Diversion Rights

Source Type	Applic. No.	Permit No.	Certif. No.	Max. Flow Rate (cfs)	Priority Date
Surface (Blattner Cr.)	S-00072	S-00020	01012	0.54	05/10/1909
Surface (Nye Creek)	S-08970	S-05882	08603	1.50	05/14/1923
Surface (Nye Creek)	S-09224	S-06197	09113	0.70	10/15/1923
Surface (Hurbert Cr.)	S-09221	S-06194	09112	0.10	10/15/1923
Surface (Big Creek)	S-11156	S-07722	09127	10.00	10/27/1926
Surface (Siletz River)	S-39121	S-29213	Not Issued	6.00	09/24/1963
Surface (Jeffries Cr.)	S-44381	S-33151	57650	0.40	01/09/1968

Source: Oregon Water Resources Department – Ground and Surface Water Rights Records

Figure 5.1.1 (in Section 5 of this study) indicates the approximate locations of the points of diversion for the various water rights held by the City.

Storage rights are held for two earthen reservoirs situated on Big Creek upstream from the location of the water treatment plant. These rights are listed below.

Table 9.2.2-2 – City of Newport Water Storage Rights

Storage Type	Applic. No.	Permit No.	Certif. No.	Total Storage (acre-feet)	Priority Date
Big Cr. Reservoir #1	S-26388	S-20703	21357	200	08/31/1951
Big Cr. Reservoir #2	S-43413	S-33127	48628	310	03/24/1967
Big Cr. Reservoir #2	S-43413	S-33127	48628	345	06/05/1968
Big Cr. Reservoir #2	S-52204	S-38220	Not Issued	970	07/19/1974

Source: Oregon Water Resources Department – Storage Water Rights Records

The City of Newport owns and operates an intake structure on the Siletz River (see Figure 5.1.1). This intake was constructed in 1992 in order to acquire water from the Siletz River and subsequently pump it into the Big Creek drainage basin above of the upper Big Creek reservoir. During winter months when precipitation continually resupplies the reservoirs the Siletz River pumps are not operated and the City relies entirely upon water within the Big Creek basin to supply system. This situation is advantageous in that electrical costs to power the pumps are avoided and the raw water quality of the reservoirs is superior to that available from the Siletz River during this time.

The lower and upper Big Creek reservoirs (#1 and #2) were constructed in 1951 and 1969, respectively. The upper reservoir was expanded in 1976 to create a total storage capacity of 970 acre-feet. Together, these reservoirs yield a total storage capacity of almost 1,200 acre-feet.

The pump station on the lower Big Creek reservoir, which functions to supply raw water to the treatment plant, was constructed in 1974. More recently, a variable-frequency drive (VFD) was installed to operate one of the pumps so that the raw water flow rate can be modulated in order to enhance the performance of the clarifiers and to avoid overtopping the filter cells.

9.2.3 Water Treatment Plant & Treated Water Storage

The water treatment plant in Newport is a custom-designed facility that has evolved over time. The primary elements of the existing treatment plant include:

- a pre-filtration chemical-injection station (for disinfection and coagulation)
- two clariflocculators, each with distinct flocculation-chamber and upflow-clarifier sections
- tube settlers immersed within the clariflocculators to enhance the sedimentation process
- four gravity driven rapid-sand filters of mixed-media composition
- a post-filtration chemical-injection station (for disinfection and pH adjustment)
- various instrumentation and controls for proper plant operation

The system elements for treated water reserves consists of seven storage tanks located throughout the service area, of which five are of welded-steel construction and two are of concrete construction. The total storage capacity resulting from these tanks is approximately 8.2 MG. The essential functions of these tanks include:

- attenuation of peak-demand effects during periods of high-volume consumption
- maintenance of proper supply pressures within various zones of the service area
- provision of an adequate supply of water for potential fire suppression efforts

The system elements for distribution of treated water include five operational pump stations and one pump station which is scheduled to enter service in the near future (2008). The pump stations facilitate transmission and distribution of water from the treatment plant to the various storage tanks and to areas not able to be served by the tanks. Distribution system piping includes a mixture of ductile iron, polyvinyl chloride (PVC), asbestos cement (AC), polyethylene, and galvanized steel pipes totaling over 90 miles in length.

The Newport service area is separated into nine pressure zones, as necessitated by the local terrain. The dominant pressure zones are the Main zone, the North Bayside zone, and the South Beach zone, each of which has a dedicated storage tank (or tanks). In each of the latter two zones, a portion of the zone is serviced by means of a pressure-reduction station in order to match the hydraulic grade provided by the storage tank (or tanks), and thereby produce reasonable pressures at the service connections.

In addition to these dominant, gravity-based pressure zones (which all stem from the Main storage tanks in the Main pressure zone) the other zones exist to serve higher elevations and are supplied by means of booster-pumps as previously described.

For further details on the description and discussion of the existing water system, see Section 5.

9.2.4 Existing Service Population

The U.S. Census data for Newport in 2000 indicates a population of 9,532 with 5,034 housing units, yielding 1.89 persons per household. The Portland State University (PSU) Population Research Center

(PRC) provides certified estimates for 2001 to 2006, and a preliminary estimate for 2007. This data is displayed in Table 9.2.4 below.

Table 9.2.4 – Newport Population and Housing Units

Year	People	Housing Units	Housing Units Added	People per Unit (Average)
2000	9,532	5,034	94	1.89
2001	9,660	5,128	26	1.88
2002	9,650	5,154	12	1.87
2003	9,740	5,166	22	1.89
2004	9,760	5,188	93	1.88
2005	9,925	5,281	95	1.88
2006	10,240	5,376	125	1.90
2007	10,455	5,501	—	1.90
Average			**66.7**	**1.89**

Source: U.S. Census Bureau, PSU PRC, City of Newport Records

The average value of 1.89 persons per household is a characteristic parameter for the population analysis and is utilized in projected population estimates for the prediction of future water demand.

As detailed in Section 6, the current residential service population of 10,455 persons corresponds to 11,270 equivalent dwelling units (EDUs) of total water usage. Thus, 1.078 EDU of water usage per person occurs in Newport. This value is based upon current consumptive conditions and patterns and it includes usages from other sectors besides the residential sector. The cited value is utilized to project future water demand based upon anticipated population growth. Also, any new development within the service area which cannot be directly associated with residential population increase must be taken into account by separate individual calculation.

Two areas of new development which are scheduled to be added to the Newport water system include:

- 74 domestic and 25 commercial service connections, formerly served by the Seal Rock Water District
- the new central campus of the Oregon Coast Community College

An assessment of the demands which will be imposed by these new developments has been included within the population, housing units, and EDU-value growth projections and are summarized in Table 2.2.2-1 in Section 2 of this study.

9.2.5 Existing Water Demand

The City of Newport provides treated water to residential, commercial, and municipal consumers, as well as a substantial industrial sector. Residential water consumption is proportionately similar to that observed in many coastal communities. Because of the wet conditions and cool temperatures typical of the coastal environment, water usage for outdoor recreation and landscape irrigation is generally less than that for communities in more arid regions.

As revealed in Figure 6.1.3-1 in Section 6 of this study, 53.1% of water usage is due to residential consumers, 14.9 % and 11.7% are due to commercial and industrial consumers, respectively, and the remaining 20.3% is attributed to various other groups related to public facilities and recreation/tourism.

The existing water demand in Newport has been determined from records of treatment plant operation for the years 2004 through 2007. An average annual demand (AAD) of 785 million gallons has occurred over these years. Average values for pertinent daily demand measures over these same years are the maximum monthly demand (MMD) and maximum daily demand (MDD) values, which are 3.51 and 3.93 million gallons, respectively.

9.2.6 Unaccounted Water

The difference between the quantity of water diverted from the supply source to the water treatment plant and the quantity of water recorded by usage meters (i.e., water sold) is unaccounted water. This difference is the combined result of leakages, filter backwashing, system flushing, fire fighting, or other non-metered usages (e.g., usage by city offices, parks, schools, libraries, etc.).

OAR 690-086 stipulates that a water supplier should strive to reduce the amount of unaccounted water to 15% of the water delivered to the distribution system. If it is determined that this objective can be readily achieved, then the water supplier should seek to attain an objective of 10% when feasible.

The Newport water system experiences water losses on the order of 16% (see Table 6.1.5-1). In order to comply with both the purpose and intent of OAR 690-086, the City should investigate and identify the contributing causes of these losses. In the process of this investigation and identification, insight into the potential ways in which these losses can be reduced or mitigated will be gained and efforts toward conservation can then be effectually initiated.

9.2.7 Adequacy and Reliability of Supply Sources

As mentioned above, many of the water rights held by the City of Newport are impractical to exercise and the water right with the largest capacity (Big Creek) cannot be fully utilized during the period of highest demand for a typical year because of seasonal declines in the stream flow associated with this source. Additional supply capacity is available from the Siletz River, but water from this source must be pumped from a distance of over six miles into the drainage basin for the Big Creek reservoirs.

Analysis has revealed that a sufficient water supply is available to the system provided that it is pumped from the Siletz River and stored within the Big Creek reservoirs prior to the period of highest demand. This strategy will be addressed later in subsection 9.11.

Of further concern is the production capacity of the treatment plant itself. During the period of highest demand for a typical year it has been observed over the past several years that the plant must be operated virtually 24 hours per day for nearly a month. Even then, it has been found from inspection of water system records that storage supplies have been continuously depleted, meaning that the plant is not able to meet current maximum daily demand. When properly designed and operated, the plant should be capable of meeting the maximum daily demand while maintaining a full storage system, with only demands due to peak hourly usage or fire suppression efforts causing storage system levels to temporarily drop.

The City of Newport has an intertie with the Seal Rock Water District, which lies immediately south of the Newport service area. Ordinarily water is not exchanged between these two entities and the Seal Rock Water District actually obtains its supply from the City of Toledo (but is currently endeavoring to develop its own water production facilities). As previously mentioned, the City of Newport will be acquiring 74 domestic and 25 commercial service connections served by the Seal Rock Water District within the next few years.

9.3 <u>Water Conservation Discussion</u> (OAR 690-086-0150)

9.3.1 Introduction

Water suppliers are in the business of producing and selling treated water. The sale of that water allows a supplier to pay for operations and maintenance expenses, retire debts for system development loans, and create an income stream for the financing of future system upgrades and facilities. Consequently, some suppliers may view conservation as an activity that is contrary to the financial survival of their system. However, nearly every water system should be capable of incorporating changes in its operations that would result in reducing "lost water" and thereby lower production costs. A balanced and coordinated conservation effort should also involve educating the public about the benefits of wise usage practices. The following quote by the Environmental Protection Agency (EPA) Office of Water, from its "Statement on Principles of Efficient Water Use" (December 2002), is especially poignant in this regard:

> *In order to meet the needs of existing and future populations and ensure the habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful efficient use of water, is essential in order to achieve these objectives.*
>
> *Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources.*

The following subsections are intended to provide the City of Newport with sufficient information and direction to develop an active and effective water conservation program that will result in lower water demands by consumers and more efficient utilization of water resources.

9.3.2 Water Conservation Progress Report

The most recent studies of the Newport water system consisted of a water system master plan update (1988) and a long-range water supply plan (1997). Since the City has not undertaken a comprehensive assessment of its water system (for planning purposes) in over a decade, no previously-approved water conservation plan exists. Therefore, an assessment of the success of conservation measures cannot be performed. However, certain activities associated with the water system which may be regarded as conservation measures are described later in this section.

After a conservation plan has been developed and approved, the City should regularly review and assess the effectiveness of its conservation measures, update these measures as appropriate, and chronicle the results within a progress report, which should be submitted to the Oregon WRD at least every five years.

9.3.3 Water Usage Measurement and Reporting Program

In order to understand the approach adopted by the City of Newport for recording and reporting monthly diversions of raw water, it is necessary to review the unique hydrologic characteristics of the sources that supply the Newport water system.

The upper and lower Big Creek reservoirs are actually artificial impoundments on Big Creek. Water in the upper reservoir can flow into the lower reservoir via a spillway over the dam structure that separates them. Together, the two reservoirs form an open system, into which Blattner Creek and Big Creek flow (as well as runoff from precipitation deposited over the surrounding land). Water can leave the lower reservoir by either flowing into the downstream portion of Big Creek, by evaporation, or withdrawal (via the intake) to the water treatment plant.

When water is diverted from the Siletz River, it is pumped a distance of approximately six miles from the intake structure to a point where it empties into a culvert and subsequently drains into Blattner Creek above the upper Big Creek dam. Thus, water from all usable sources is diverted into the Big Creek reservoirs.

The water pumped from the lower Big Creek reservoir to the treatment plant represents the total amount of water which is actually extracted from the environment (and obtained from permitted sources). Thus, it is possible to assess whether or not the City is in compliance with limits imposed by the water rights which can be practicably exercised by means of just two measurements in lieu of individual measurements of the diversions from all the usable sources:

- monthly volume diverted from the Siletz River
- monthly volume diverted from the lower Big Creek reservoir

The City has instrumentation to measure the monthly volumes of water diverted from these sources.

The City also maintains a record of plant internal usages, including backwash of filters and filter-to-waste operations, along with total finish water transmitted from the plant to the distribution system. The water delivered to all service connections is measured via usage meters. The City utilizes a spreadsheet to perform an overall system audit on a monthly basis. This audit can prove useful for recognition of irregular usage patterns and may serve to identify leaks, malfunctions, or other system problems.

9.3.4 Current Water Conservation Practices

The City currently utilizes several conservation measures within its regular operating strategy, including:

- **Source Water Metering** – The City currently meters the amount of water diverted from the Big Creek reservoirs and the Siletz River (the dominant sources within the system).
- **Distribution System Metering –** In order to promote water conservation and to ensure fair billing practices, the existing distribution system to all service connections is fully metered, also enabling the City to perform an overall system audit on a monthly basis.
- **Public Awareness/Education** – In conjunction with other public agencies, the City supports programs aimed at educating community members on the benefits of water conservation. In addition, technical staff of the Lincoln Soil and Water Conservation District, with assistance from the USDA Natural Resources Conservation Service, are available to provide education programs, publications, and one-on-one consultations.

9.3.5 Water Conservation Planning Strategy

In the context of this study, a conservation measure is understood to be an action or procedure intended to reduce unnecessary water consumption. A number of specific conservation measures are available to encourage wise utilization of water resources in the Newport water system. Some of these measures are directed at the management efforts of the water supplier, while others are intended to affect the usage habits and tendencies of water consumers. Appropriate conservation measures should be selected on the basis of their potential to achieve a reduction in consumption yet be reasonable to implement without placing undue hardship on the supplier or the consumers.

In their evaluation of various conservation measure alternatives, water system managers should take into consideration the following issues or concerns:

- Program Costs
- Ease of Implementation
- Staff Resources
- Consumer Impacts
- Water Rights Issues
- Cost Effectiveness
- Budgetary Constraints
- Environmental Impacts/Justice
- Socio-Economic Issues
- Legal Issues or Constraints
- Permit Requirements
- Regulatory Approvals
- Timeliness of Savings
- Public Acceptance
- Consistency with Other Programs

Not all conservation measures are suitable or effective for every water system. In order to assist water system managers in selecting appropriate measures, the EPA has assembled several guidelines, which include varying levels of activity.

The EPA guidelines suggest that water suppliers develop conservation programs whose activities are in proportion to the size of their individual water system. Alternatively stated, the larger the water system, the more measures should be implemented to conserve water resources. The categories and guidelines established by the EPA are presented below.

Table 9.3.5-1 – System-Size Category and Guideline Classifications

System-Size Category (SDWA)	Applicable Guidelines
Serves fewer than 3,300 people	Basic Guidelines or Capacity-Development Approach
Serves between 3,300 and 10,000 people	Basic Guidelines (up to 10,000 people served)
Serves more than 10,000 people	Intermediate Guidelines (up to 100,000 people) or Advanced Guidelines (more than 100,000 people)

Source: U.S. EPA Water Conservation Plan Guidelines (1998)

The Basic Guidelines provide water suppliers with simple tools for gathering information in order to conduct planning efforts. The intention of these guidelines is to avoid burdening suppliers (especially, those with very small or resource-constrained systems) with unnecessary steps or details yet provide a straightforward approach to planning and implementing widely-accepted conservation practices.

The Intermediate and Advanced Guidelines introduce additional evaluative tools and conservation measures to enhance water conservation planning efforts. The Intermediate approach is substantially based upon the Basic approach but introduces more comprehensive planning concepts and conservation measures. The Advanced approach moves further in this direction and implicitly depends upon sufficient resources and support personnel (as are characteristic of much larger water suppliers). The guidelines associated with this approach recognize the need and allow for the development of models and methods which are more appropriate for water suppliers suited for this approach. The conservation measures recommended by the EPA for all three guideline classifications are summarized together in Table 9.3.5-2.

The EPA guidelines are further divided into three levels of activity. Each water supplier, regardless of the size of its water system, should consider the fundamental conservation principles outlined under Level 1. The measures displayed under Levels 2 and 3 are appropriate for systems with greater conservation needs along with the ability to provide sufficient resources and support personnel required in a more vigorous conservation program.

It should be acknowledged that the recommended conservation measures do not explicitly guarantee a reduction in unaccounted water for a system. Although the implementation of some measures usually will result in this effect, conservation measures are generally intended to produce long-term changes in consumption and management practices. The City of Newport is interested in developing conservation measures in its community and is committed to increasing its efforts toward more efficient utilization of water resources in the future.

As revealed in Table 9.3.5-2, a wide variety of conservation measures are available to water suppliers for the promotion of conservation practices. Which measures are actually adopted can depend upon a number of issues unique to a particular water system. In most systems, though, prudent conservation begins on the supply side. However, effectual conservation must invariably involve the consumers as well. Typically, a combination of efforts by the supplier and consumers is required for a successful conservation program.

Table 9.3.5-2 – Guidelines and Associated Water Conservation Measures

Measures	▼Basic Guidelines▼	▼Intermediate Guidelines▼	▼Advanced Guidelines▼
Level 1 Measures			
Universal Metering	• Source-Water Metering • Service-Connection Metering and Reading • Meter Public-Use Water	• Fixed-Interval Meter Reading • Meter-Accuracy Analysis	• Test, Calibrate, Repair, or Replace Meters
Water Accounting and Loss Control	• Account for Water • Repair Known Leaks	• Analyze Unaccounted Water • Water System Audit • Leak Detection and Repair Strategy • Automated Sensors and/or Telemetry	• Loss-Prevention Program
Costing and Pricing	• Cost-of-Service Accounting • Consumer Charges • Metered Rates	• Cost Analysis • Non-Promotional Rates	• Advanced Pricing Methods
Information and Education	• Understandable Water Bill • Information Availability and/or Accessibility	• Informative Water Bill • Water-Bill Inserts • Public School and Education Programs	• Workshops • Advisory Committee
Level 2 Measures			
Water-Use Audits		• Audits of Large-Volume Consumers • Large-Landscape Audits	• Selective End-Use Audits
Retrofits		• Retrofit-Kit Availability	• Distribution of Retrofit Kits • Targeted Programs
Pressure Management		• System-Wide Pressure Management	• Selective Use of Pressure-Reducing Valves
Landscape Efficiency		• Promotion of Landscape Efficiency • Selective Irrigation Submetering	• Landscape Planning and Renovation • Irrigation Management
Level 3 Measures			
Replacements and Promotions			• Rebates and Incentives (Non-Residential) • Rebates and Incentives (Residential) • Promotion of New Technologies
Reuse and Recycling			• Industrial Applications • Large-Volume Irrigation Applications • Selective Residential Applications
Water-Use Regulation			• Water-Use Standards and Regulations • Requirements for New Developments
Integrated Resource Management			• Supply-Side Technologies • Demand-Side Technologies

Source: U.S. EPA Water Conservation Plan Guidelines (1998)

9.4 <u>Mandatory Conservation Measures</u> (OAR 690-086-0150.4)

9.4.1 Introduction

As summarized in subsection 9.03, many different kinds of conservation measures are available for the promotion of efficient utilization of water resources within a water system. Each of these measures will vary in complexity, feasibility, appropriateness, and effectiveness. However, in order to achieve success in water conservation it will be necessary to incorporate some of these measures (and perhaps others not listed) into any responsible conservation plan.

While the water supplier has the freedom to create a conservation plan that fits the unique characteristics of its system, OAR 690-086-0150 does require the supplier to undertake certain mandatory conservation activities. The following subsections provide a description of each such measure, how each measure is currently being implemented, a schedule and budget for each measure, and other details if necessary.

9.4.2 Annual Water Audit

The purpose of an annual water audit is to determine the overall input-output efficiency of the system, monitor the usage levels of qualitatively different consumers, gauge the effectiveness of conservation measures already being implemented, and gather other system performance data. Also, the OAR requires an assessment of the extent of water loss as systems seek to achieve an efficiency objective of 85 percent or greater. If a system reaches or exceeds the 85-percent goal, then the community should strive to achieve an efficiency objective of 90 percent or greater. The City of Newport has an audit system in place and selected results from the past four years are provided in subsection 6.01 of this study.

Monthly water audits are not required but are conducted to maintain efficiency levels. These audits are especially useful for the recognition of irregular usage patterns and may serve to identify leaks, malfunctions, or other system problems. By conducting such audits, the City receives relatively fast feedback concerning the performance of its supply system and is kept apprised of supply issues in a timely manner. These audits also provide the data underlying the annual water audits.

9.4.3 System Metering Program

The Newport water system is fully metered for all paying consumers. It is the intent of the City to replace older water meters as they become inoperable. The raw water intake meters within the lower Big Creek reservoir should be replaced as improvements are implemented over the planning period for this study. The meters for the intake on the Siletz River should be calibrated or replaced as well.

A number of companies that produce water meters offer equipment that is capable of extremely accurate measurement over a long service life. In addition to improved accuracy, newer meters can be supplemented with automatic meter reading (AMR) technology, which improves the efficiency and reliability of acquiring usage data from meters.

A number of communities in Oregon have undertaken complete meter replacement initiatives, installing new meters with AMR technology and updating the billing process system as well. Considering the revenue lost due to the inaccuracies of older meters, many such initiatives realize a payback period that ranges from just a few years to ten years, depending upon the amount of additional revenue captured by means of the newer meters.

9.4.4 Meter Testing and Maintenance Program

Older or poor-quality water meters are often found to be inaccurate. Typically, these inaccuracies are on the order of ten to fifty percent of the actual volume of water that flows through the meters. The amount of water that passes undetected through the meter directly contributes to the overall amount of unaccounted water. In a larger water system, inaccurate meters can lead to hundreds of thousands of dollars in lost revenue for that system.

Many meter manufacturers offer programs for the testing and calibration of existing meters. A variety of communities have shown significant benefits by replacing the meters within an entire system with one style/make of meter. The additional revenue generated by more accurate metering and subsequent billing usually will cover the cost of such a replacement endeavor.

Unless it decides to pursue the complete meter-replacement option, the City of Newport should consider implementing a meter testing and maintenance program for the purpose of promoting water conservation as well as capturing potentially lost revenue.

All meters which have not been recently replaced should be scheduled for testing within a five-year period after initiation of the program. However, if it is planned to completely replace all meters within the system, such meters should not require testing for the first five years of their service life. After this time interval has elapsed, a program of testing the entire complement of meters should be initiated by randomly inspecting five meters every month. These meters then would be excluded from inspection in subsequent years until all meters have been tested, or they could be reconsidered for testing when some time interval has elapsed after their initial inspection (e.g., ten years). Of course, faulty meters needing immediate attention would be identified by irregular performance as noticed by the consumer or meter reader.

9.4.5 Leak Detection and Repair Program

A leak detection and repair program may include periodic on-site testing by means of computer-assisted leak detection equipment, sonic leak-detection surveys, or other accepted methods for detecting leaks along water transmission and distribution lines ("mains"), valves, connections, and meters. The program should also include occasional inspections of water tanks and supply reservoirs.

Water leakage affects not only the amount of unaccounted water assessed but also impacts costs required to treat, store, and distribute water to consumers; "lost" water generates no revenue for the supplier and wastes an increasingly precious resource. Repairing leaks can result in significant savings of operational costs and creation of additional revenue for the water system. Even when (what could be argued to be) acceptable levels of system leakage are achieved, on-going leak-detection activities are evidence of a vigilant and conscientious approach to water system management.

The initial goal of a system-wide leak detection program should be to reduce the amount of unaccounted water to 15% of the total amount of treated water produced. If the reduction to 15% is determined to be feasible and appropriate, then the water supplier should endeavor to achieve a reduction to 10% or less. It should be understood that system leakage differs from unaccounted water, in that system leakage does not include unmetered or inaccurately metered water. The objective of a leak detection and repair program is to reduce the amount of water that leaves the system conduits and appurtenances via exit points that do not correspond to a designated connection point for the system.

As of 2007, the production efficiency of the Newport water system was about 84 percent. This level of performance suggests that action should be taken to investigate and mitigate sources or causes of unaccounted water — in particular, system leakage. The City possesses equipment and personnel to repair or replace system conduits and appurtenances within the system. About one-third of the distribution system consists of 6-inch pipe which is utilized for grid loops and was installed long ago.

9.4.6 Public Education Program

Surprisingly, most consumers have almost no knowledge of their water source, supply capacity and/or availability, and the necessary costs associated with treatment and distribution of water. The diligent efforts that occur behind the scenes are (for the most part) unnoticed and unappreciated by consumers. However, this situation can be changed by an engaging and informative public education program.

The goal of a public education program is to cultivate an awareness of limitations on water resources and to develop a conservation ethic concerning water consumption. Such a program directly influences both usage practices and patterns. An informed community also will be more likely to support changes in the water system rate structure and management policies if they feel included. Public education can occur in the form of mailers/pamphlets, community seminars, school programs, or dedicated webpages.

Public education programs can inform consumers regarding such issues as:

- efficient bathroom, kitchen, and laundry fixtures/appliances
- availability/installation of retrofit kits
- maintenance of bathroom, kitchen, and laundry fixtures/appliances
- consequences of excessive/unattended operation of faucets
- best practices for washing equipment, vehicles, pavement, or other facilities
- efficient landscape design and irrigation practices
- discounts, credits, rebates, or other conservation incentives
- potential curtailment advisories/activities
- reporting suspected or observed system leaks

A significant amount of educational materials concerning water conservation have been developed and are available to water suppliers at little to no cost. Information is available on a variety of topics and materials can be obtained for practically any purpose or demographic group.

The success of public education programs in terms of the extent of conservation realized is difficult to predict. During periods of shortage or drought, when public awareness and participation is typically high, a significant reduction in consumption usually occurs. During periods of adequate supply, such a reduction greatly depends upon how well the program engages and convinces the consumers. Studies have suggested that a reduction in consumption of four to five percent occurs with a comprehensive and informative public education program.

9.4.7 Rate Structure Adopted for Water Consumption

As a water supplier, the City of Newport charges its customers for their water consumption based upon a minimum usage charge plus a regressive block rate for further usage. The existing rate structure, which was adopted in July 2008, is summarized below in Tables 9.4.7-1 and 9.4.7-2. Some explanation of the terms utilized in these tables is in order.

As determined by the connection (meter) size, a minimum usage charge is specified for each consumer which covers the cost for any amount of water up to but not exceeding a threshold usage value. When usage exceeds the threshold value, the consumer is additionally charged for the usage beyond that value by means of a two-tier regressive block rate.

The Tier 1 rate covers the usage amount beyond the threshold value but less than or equal to 41,000 gal. The Tier 2 rate covers the usage amount beyond 41,000 gal. Sample calculations are illustrated below, based upon the average monthly water consumption for a typical household as well as a hypothetical water consumption case that involves both tiered rates.

Table 9.4.7-1 – Rate Structure for Water Service Within City Limits (Monthly Costs)

Connection (Meter) Size	Threshold Usage Value	Minimum Usage Charge	Cost Per 1,000 Gallons (Tier 1)	Cost Per 1,000 Gallons (Tier 2)
⅝" × ¾"	1,000 gal	$12.85	$2.30	$1.90
1"	3,000 gal	$17.65		
1¼" × 1½"	6,000 gal	$25.90		
2"	14,000 gal	$44.40		
3"	23,000 gal	$66.40		
4" or over	41,000 gal	$110.25		

Source: City of Newport Resolution No. 3445 (July 2008)

Table 9.4.7-2 – Rate Structure for Water Service Outside City Limits (Monthly Costs)

Connection (Meter) Size	Threshold Usage Value	Minimum Usage Charge	Cost Per 1,000 Gallons (Tier 1)	Cost Per 1,000 Gallons (Tier 2)
⅝" × ¾"	1,000 gal	$24.45	$4.40	$2.95
1"	3,000 gal	$33.35		
1¼" × 1½"	6,000 gal	$46.40		
2"	14,000 gal	$81.80		
3"	23,000 gal	$120.80		
4" or over	41,000 gal	$200.20		

Source: City of Newport Resolution No. 3445 (July 2008)

Note: There are actually two sets of rate structures. The set above (Tables 9.4.7-1 and 9.4.7-2) applies to water service for the "City Service Area", which corresponds to the area historically served by the Newport water system. In November 2007, the City of Newport and the Seal Rock Water District entered into an agreement, transferring service territory from the Seal Rock service area to the Newport service area. In city documents, this relatively-small territory is referred to as the "Former Seal Rock Area". The rates for this service area are comparable to the rates for the "City Service Area" but somewhat higher, especially for the larger connection (meter) sizes. These rates have not been included in this study but are available from the Newport records office.

Sample Calculation #1 (Average Household Water Consumption)

As presented in Table 6.1.3-2, the average water consumption is 7,084 gal per month for households within the City limits. Thus, the monthly water bill for an average household is calculated as follows:

Expense Category	Expense Amount	Description
Minimum Usage Charge	$12.85	Specified Basic Charge
Tier 1 Charge	$13.99	(7,084 − 1,000) / 1,000 × $2.30
Tier 2 Charge	$0.00	Not Applicable (in this case)
Total Charges	$26.84	

Sample Calculation #2 (Hypothetical Water Consumption Case)

Consider the following billing scenario (for a one-month period):

- commercial consumer
- outside city limits
- 2-in service connection
- 63,000 gal of water

Thus, the monthly water bill for such a consumer can be calculated as follows:

Expense Category	Expense Amount	Description
Minimum Usage Charge	$81.80	Specified Basic Charge
Tier 1 Charge	$118.80	(41,000 − 14,000) / 1,000 × $4.40
Tier 2 Charge	$64.90	(63,000 − 41,000) / 1,000 × $2.95
Total Charges	$265.50	

Water suppliers should develop a rate structure that supports and encourages water conservation. Often, such a rate structure includes an inverted block rate for further usage (i.e., the price per unit volume of water consumed increases for consumption beyond certain threshold usage values), and it may involve seasonal price differentials. The rates should depend (in part) upon on the quantity of water metered at the service connections.

An effective conservation rate structure should be developed so as to encourage maximum participation in conservation efforts. The most effective means of ensuring this participation is to develop a multi-step rate structure. Each step in the rate structure should be thoughtfully established in order to accomplish the desired conservation effect with the majority of consumers.

The City of Newport might consider implementing an inverted block rate for further usage, perhaps in effect for only a portion of the year, in order to promote conservation among its water consumers.

9.4.8 Water Reuse and Recycling Opportunities

Supply-side water reuse typically includes utilization of process water from community treatment plants. Non-potable water reuse at a wastewater treatment plant can significantly reduce the amount of treated water consumed during operations of the facility. The reuse of filter-backwash or filter-to-waste water at a conventional water treatment plant also can result in a decrease of treated water required by this kind of facility. However, this practice is controversial, since particulates and organisms removed during the filtering process can potentially lead to a buildup of these materials within the treatment system from the on-going recycling process.

Demand-side water reuse (for residences) usually involves the reclamation of "gray water" which can consist of any household wastewater not containing human waste such as water from sink, bathtub, shower, or roof drains. The Department of Environmental Quality (DEQ) of Oregon does not currently permit reclamation of gray water for consumption in residential systems. Oregon Administrative Rules (OAR) 340-055 govern the limitations on recycled water use in the State.

Larger commercial or industrial facilities often can benefit from water reuse practices. Depending upon the kind of facilities and the processes involved, a significant savings of water resources can be achieved. One application in which such savings have been realized is in facilities with cooling towers. Ordinarily in the past, evaporated water removed in cooling tower operations has been drained to the sanitary sewer. Today, many of these facilities have found effective ways to further utilize this water for other purposes within their processes.

It is the policy of the Oregon Environmental Quality Commission to encourage the use of recycled water for domestic, agricultural, industrial, recreational, and other beneficial purposes in a manner that protects public health and the environment of the State. The use of recycled water for beneficial purposes will improve water quality by reducing discharge of treated effluent to surface waters, reduce the demand on drinking water sources for uses not requiring potable water, and may conserve stream flows by reducing withdrawal for out-of-stream use.

9.4.9 EPA WaterSense® Program

In the early 1990s, the Water Alliances for Voluntary Efficiency (WAVE) program was created by the EPA to promote efficient utilization of water resources and to encourage reduced water consumption. Initially, the program was focused on the lodging (motel/hotel) industry but later included commercial businesses and educational institutions. This program is no longer officially supported by the EPA.

Recently, the EPA has launched the WaterSense® program, a partnership endeavor directed at utilities, state and local governments, and other organizations that desire to share information about the program and the water-efficient products and practices which it endorses. The program also seeks to stimulate innovation in and availability of such products in the marketplace, and it provides resources to water suppliers in order to enhance the overall promotion of water conservation. Furthermore, a number of informative external resources may be found by clicking the "Related Links" tab on the WaterSense® website (http://www.epa.gov/watersense/). These resources include:

- Everyday Water-Saving Tips (Consumer Reports®)
- The Environmentally-Preferable Purchasing Guide
- Water – Use It Wisely® (Conservation Information)
- WaterWiser® – The Water Efficiency Clearinghouse (AWWA)
- GreenScapes® Program for Environmentally-Beneficial Landscaping

The City of Newport should consider becoming a partner in the WaterSense® program in order to assist its efforts toward water conservation and to take advantage of the resources which the program can offer (http://www.epa.gov/watersense/partners/join/index.htm).

9.5 <u>Recommended Plan and Schedule</u> (OAR 690-086-0150.4)

It is common for a water supplier to develop a WMCP, submit that plan to the Oregon WRD for review and approval, implement the plan over a certain period of time, evaluate the effectiveness of the plan at the end of this period of time, and then resubmit an updated plan to the Oregon WRD for further review and feedback. Typically, the time period between plan submittals is at least five years.

Optimally, a WMCP should be developed in coordination with city public works officials and council members, along with appropriate input from stakeholders (e.g., residential, commercial, and industrial consumers). Since the supply issues, consumer characteristics, budgetary constraints, and operational practices of each water system are unique, an effective WMCP must be designed especially for that particular system. And because of the assessment approach chosen for this study, this WMCP must be consistent with the objectives and concerns of the WSMP in which it is embedded.

As mentioned above, the City of Newport is already engaged in operational practices that contribute to water conversation efforts, and it should be commended for the careful oversight of its water system. However, further progress can be accomplished to support and promote water conservation within the Newport water system.

The plan and schedule outlined in Table 9.5 below is primarily intended to serve as a repository of ideas and a potential guide for the City of Newport as it continues to develop its water conservation program. From these suggestions, the City will, through its council and community members, need to formulate and adopt a precise plan and schedule for implementation.

Because of the tentative nature of the water conservation plan and schedule recommended in Table 9.5, no effort was given toward estimating either a budget for the conservation measures suggested or the savings which might result from implementation of the measures. Nevertheless, the measures indicated all support specific strategies/requirements mentioned in OAR 690-086-0150. As a result, their implementation should enable the City to achieve compliance with the regulations.

Table 9.5 – Recommended Water Conservation Plan and Schedule for City of Newport

Conservation Measure/Benchmark	Details Below	Implementation Years
Supply Source Meter Calibration	No	2010, 2015, 2020, 2025
Customer Meter Testing/Replacement	Yes	every year, through 2030
System Leak Detection/Repair	Yes	every year, through 2030
Annual Water System Audit	No	every year, through 2030
Rate Structure and Billing Practices	Yes	every month, through 2030
Public Education Program	Yes	every year, through 2030
Technical/Financial Assistance	Yes	2010, 2015, 2020, 2025
Reuse/Recycling Efforts	Yes	when feasible and appropriate, through 2030
WMCP Progress Report	No	2015, 2020, 2025, 2030 (included in WSMP)
WSMP Update	No	2015, 2020, 2025, 2030 (new study in 2030)

Further details for selected conservation measures/benchmarks are provided below:

Customer Meter Testing/Replacement

- Inspect/Test ⅝" × ¾" customer meters at the rate of five meters per month.
- Inspect/Test all meters of size 3" or larger every year.
- Replace "dead" meters or those with less than 70% accuracy.

- Replace old meters (i.e., those of age 20 years or older).
- Investigate "radio read" (AMR) technology for future meters.

System Leak Detection/Repair

- Inspect water mains, valves, connections, and meters for leaks in an on-going effort.
- Utilize non-invasive technology for inspection/identification of suspected leaks.
- Arrange inspections to coincide with roadway or other utility repairs when possible.
- Conduct periodic system-flushing efforts and actuation of system appurtenances.
- Allocate reserve funds via usage charges for rehabilitation of system infrastructure.

Rate Structure and Billing Practices

- Employ a usage-based rate structure for all metered service connections.
- Migrate from a regressive-block-rate to an inverted-block-rate structure.
- Provide a record of consumption history on all billing statements.
- Combine AMR technology with billing software for accuracy/efficiency.

Public Education Program

- Publish two articles per year on water conservation strategies in the local newspaper.
- Provide a biennial workshop on local water resources, treatment, and conservation.
- Create either a web page or hyperlink dedicated to conservation on the city website.
- Distribute brochures on conservation with billing statements or at public offices/events.
- Join the EPA WaterSense® Program at the level of a promotional (municipal) partner.

Technical/Financial Assistance

- Offer leak detection tests free of charge to residential and institutional consumers.
- Provide assistance for retrofit and/or replacement of inefficient fixtures/appliances.
- Distribute conservation kits (flow-restriction or volume-reduction devices, irrigation gauges).
- Create a demonstration garden on city property with low-water-use landscaping.
- Offer subsidies to commercial or industrial consumers for novel conservation efforts.

Reuse/Recycling Efforts

- Perform feasibility study for reusing/recycling process water from community treatment plants.
- Offer rebates to commercial or industrial consumers for investigating and/or implementing (in coordination with Oregon DEQ) methods of reusing/recycling water from their operations.
- Explore possible use of gray water for irrigation of landscapes of selected consumers.

9.6 Water Curtailment Plan (OAR 690-086-0160)

A water curtailment plan consists of an "interim" mandatory program intended to substantially (or even drastically) reduce water consumption, usually the consequence of a water supply/service emergency or interruption. In accordance with OAR 690-086-0160, each water supplier must develop a curtailment plan with specific event triggers, operating guidelines for various event stages, and measures to reduce consumption which would be enforced under such circumstances.

Most water systems have critical elements that, if damaged or destroyed, would restrict or prevent the delivery of treated water to consumers. In such a situation, the supply/service interruption could last from a few hours to several days. As part of a complete WMCP, a curtailment plan would provide the City of Newport with a "roadmap" for navigating and managing such an event.

The following subsections provide information for the development of a water curtailment plan. The City of Newport was required to complete a Vulnerability Analysis (VA) and Emergency Response Plan (ERP) in 2005. Much of the information contained in these documents is relevant and could be useful in completing a curtailment plan.

9.6.1 Historical Deficiencies

A water supplier should be prepared for supply-deficiency events. The formation and adoption of policies, ordinances, and other measures should occur well before an actual reduction or interruption in the water supply. Knowledge of past events, along with information about both the causes and indicators of potential supply crises, will assist the water supplier in providing a consistent and reliable product to its customers.

The City of Newport has experienced some reductions in water supply in the past (most notably the drought of 1992 during which restrictions on water consumption were in effect from late June until early November of that year).

Of further concern is the production capacity of the treatment plant itself. Again, during the period of highest demand for a typical year, it has been observed over the past several years that the plant must be operated virtually 24 hours per day for nearly a month. Even then, it is found from inspection of water system records that treated water supplies are being continually depleted, meaning that the plant is not able to meet total demand. When properly designed and operated, the plant should be capable of meeting the maximum daily demand while maintaining a full storage system, with only demands due to peak hourly usage or fire suppression efforts causing storage system levels to temporarily drop.

9.6.2 Source Water Supply Evaluation

From an examination of the projected supply needs for the community over the planning period, it is found that the water supply rights available for diversion are sufficient provided that the primary supply sources (Big Creek and Siletz River) maintain their normal stream flows. Also, as discussed elsewhere in this section, it likely will be necessary to begin diverting water from the Siletz River earlier in the year in order to store it within the Big Creek reservoirs for subsequent withdrawal during the summer months.

However, should another cause of an unexpected supply reduction or interruption occur, a curtailment plan will be an essential tool for the City to properly respond to such an event.

9.7 Alert Stages for Water Curtailment

A water curtailment plan should contain at least three stages of alert for potential events associated with a reduction in or an interruption of water service. These stages would range from a mild level of concern to a serious level of concern to a critical level of concern. Each stage involves predetermined indicators that identify when that stage has been reached along with an associated set of actions and measures.

The following alert stages are recommended for the City of Newport water curtailment plan:

Alert Stage No. 1 – Water System Advisory Status

- Prudent to inform community of potential water supply or service difficulties.
- Difficulties do not require mandatory conservation but suggest voluntary conservation.
- Prepare community mindset for possible reduction in or interruption of water service.

Alert Stage No. 2 – Water System Warning Status

- Necessary to inform community of actual (typically, gradual) water supply or service problem.
- Necessary to impose initial levels of mandatory conservation in a temporary time frame.
- Supplier response would likely involve maintenance/repair activities, construction activities, or preparations to avert a potentially sustained supply or service problem.

Alert Stage No. 3 – Water System Emergency Status

- Necessary to inform community of actual (typically, sudden) water supply or service problem.
- Necessary to impose escalated levels of mandatory conservation in a protracted time frame.
- Supplier response would certainly involve maintenance/repair activities, construction activities, or other efforts to avert a potentially-sustained supply or service problem.

Alert Stage No. 4 – Critical Water-Availability Status

- Necessary to inform community of threatened or nonexistent water availability.
- Possibility exists to impose periodic or sustained termination of water service.
- Conditions warrant possible water rationing at emergency distribution centers.

9.8 Indicators for Alert Stages

As mentioned above, each stage of alert involves predetermined indicators, or event triggers, that identify when that stage has been reached along with an associated set of actions and measures.

9.8.1 Planned Maintenance/Repair or Sudden Failure of Components

On occasion, it is likely to be necessary to suspend or shutdown the operation of a water system for such reasons as maintenance, repair, or upgrade. Whenever possible, such activities should be carefully planned and scheduled in order to minimize impact upon water consumers. However, though relatively rare, it is usually unavoidable for a water system to prevent all unplanned events that severely limit or terminate the delivery of water to certain consumers within the service area. A list of possible events that could lead to such conditions and would constitute entering a stage of alert is provided below:

- Indefinite interruption of electric-power supply
- Severe contamination of source-water supply
- Compromise/Destruction of intake structure or system piping
- Failure/Collapse of storage reservoir or tank
- Failure/Breakdown of crucial pumps, valves, or connectors

Typically, these events would be precipitated by natural disasters, environmental catastrophes, or other emergency conditions which are generally beyond the control of water system managers.

9.8.2 Reduced Reservoir Levels or Stream Flows

In the Newport water system, water is diverted from two primary sources: the Big Creek reservoirs and the Siletz River. Along with water quality measures, city public works personnel continually monitor the levels and flows associated with these sources, especially during summer months. These levels and flows serve as direct indicators of possible drought conditions that would jeopardize the supply for this water system. Although recent data has not been provided by the water supplier, historical data on these levels and flows could be analyzed to determine threshold values that would trigger certain alert stages.

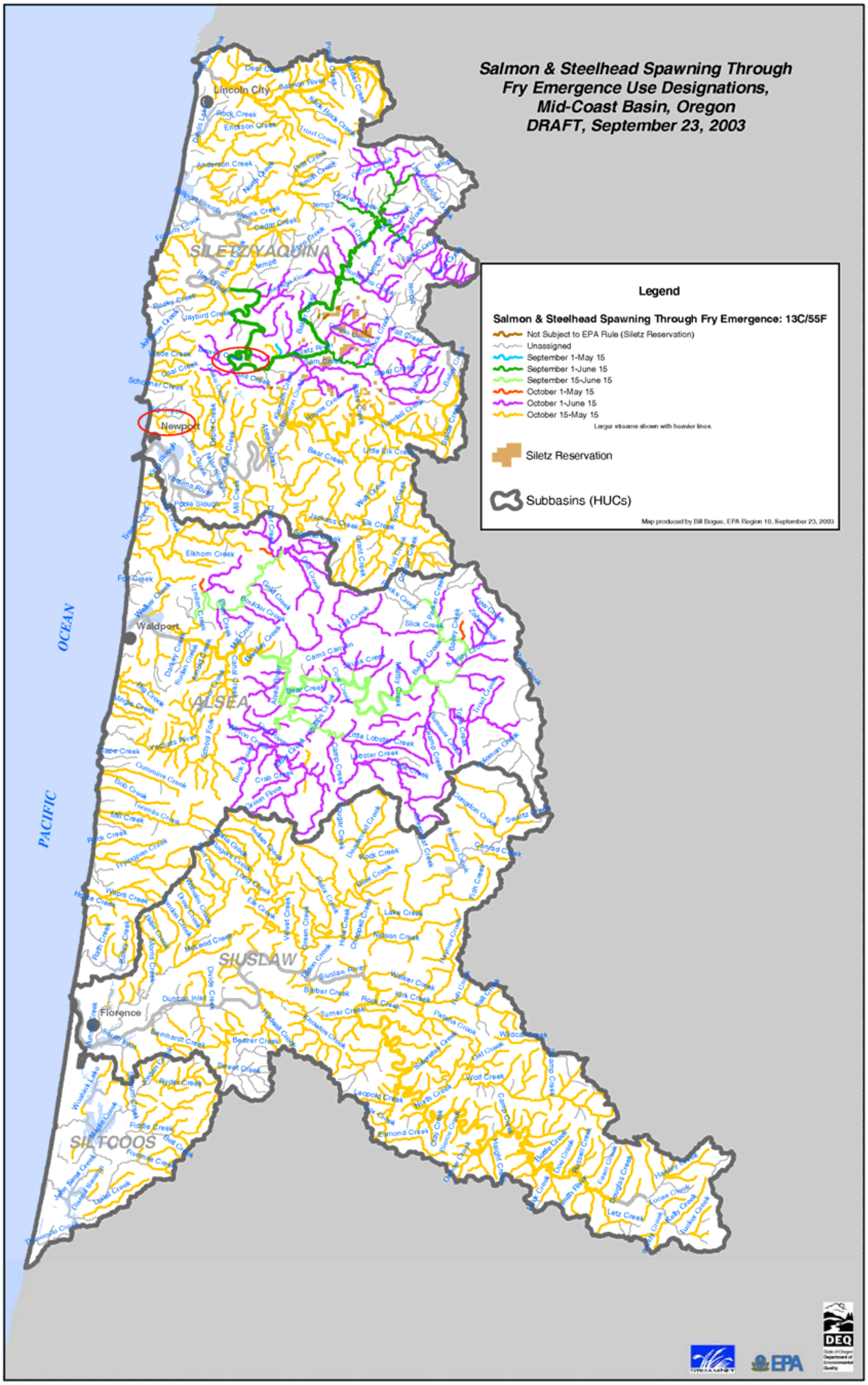

Figure 9.8.2 – Salmon and Steelhead Spawning through Fry Emergence

Figure 9.8.2 shows the various streams and rivers in the nearby drainage basins and illustrates the sensitive fish (anadramous and other) habitat that can be found in the vicinity. Salmon and steelhead spawning streams are located throughout the local drainage basins. These sensitive fish habitats created the need for in-stream water rights and, in turn, make it difficult for municipalities to obtain new water rights on these streams during periods of below-normal flow. When water levels are low, in-stream rights and human water needs must be carefully managed and coordinated.

9.8.3 Palmer Hydrological Drought Index

The Palmer Hydrological Drought Index (PHDI) is a widely-utilized measure for assessing the extent of drought conditions throughout the continental United States. The PHDI is based upon long-term records of temperature and precipitation, and it is tabulated by the NOAA Satellite and Information Service on a weekly basis. PHDI values are determined for about 350 climate divisions within the continental United States and are available on both the NOAA and National Weather Service websites.

Normal weather is assigned an index value of zero in all seasons in any region of climate; droughts will have negative index values, whereas wet periods will have positive index values. Negative index values occurring over several consecutive weeks can provide initial warning of an impending drought. Long-term negative index values can assist the City in judging the severity of a drought condition.

For the purposes of a water curtailment plan, the City would be interested in the negative PHDI regime, which is already conveniently divided into three drought-indicative intervals: a *moderate drought*, with values from −2 to −3; a *severe drought*, with values from −3 to −4; and an *extreme drought*, with values of −4 or less.

A map of the continental United States superimposed with PHDI values for various regions is displayed in Figure 9.8.3. As may be identified, Newport lies within the white band along the Oregon coast. The index value for this area (as of June 2008) corresponds to a mid-range, indicating neither drought nor wet-period conditions for this area. Eastern (especially, southeastern) portions of Oregon are seen to be experiencing moderate-to-severe drought conditions.

Although not directly supply-specific, the PHDI can serve as a valuable indicator for assessing potential source-water supply issues, and it can be tied to triggers for alert stages within a water curtailment plan. The PHDI format discussed herein is updated monthly and can be accessed at the following website:

http://lwf.ncdc.noaa.gov/oa/climate/research/prelim/drought/phdiimage.html

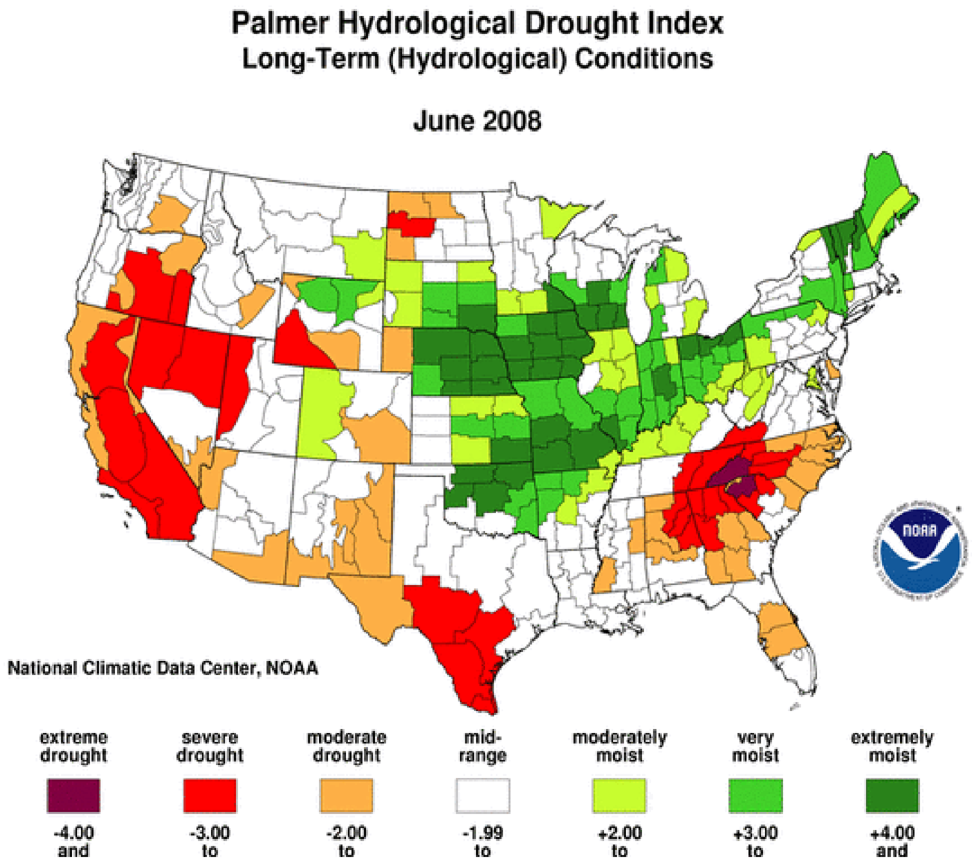

Figure 9.8.3 – Palmer Hydrological Drought Index, June 2008

9.8.4 Surface Water Supply Index

With similarities to the PHDI, the Surface Water Supply Index (SWSI) is another measure for assessing the extent of drought conditions, but it is directly correlated with availability of water resources within designated regions. Tabulated monthly by the USDA National Resource Conservation Service for the major drainage basins within each state, the SWSI can be utilized to identify which basins possess water supplies that are either above, at, or below normal levels.

A map of the State of Oregon superimposed with SWSI values for the major drainage basins is displayed in Figure 9.8.4-1. Newport lies within the yellow region that corresponds to the North and Mid-Coastal basins. The index value for this region (as of June 1, 2008) is −3, signifying an average amount of available surface water supply. The scale for the SWSI is comparable to that for the PHDI in terms of the extent of drought conditions (though the precise meanings of the two indices are different).

Like the PHDI, the SWSI can serve as a valuable indicator for assessing potential source-water supply issues, and it can be tied to triggers for alert stages within a water curtailment plan. The SWSI format discussed herein is updated monthly and can be accessed at the following website:

http://www.or.nrcs.usda.gov/snow/watersupply/swsi.html

In addition to monthly SWSI data, substantial historical data is available from this website to indicate both the frequency and intervals of reoccurrence of various levels of supply which might be expected. Figure 9.8.4-2 summarizes the SWSI data over the past three years. Data extending further back in time is also available from this website.

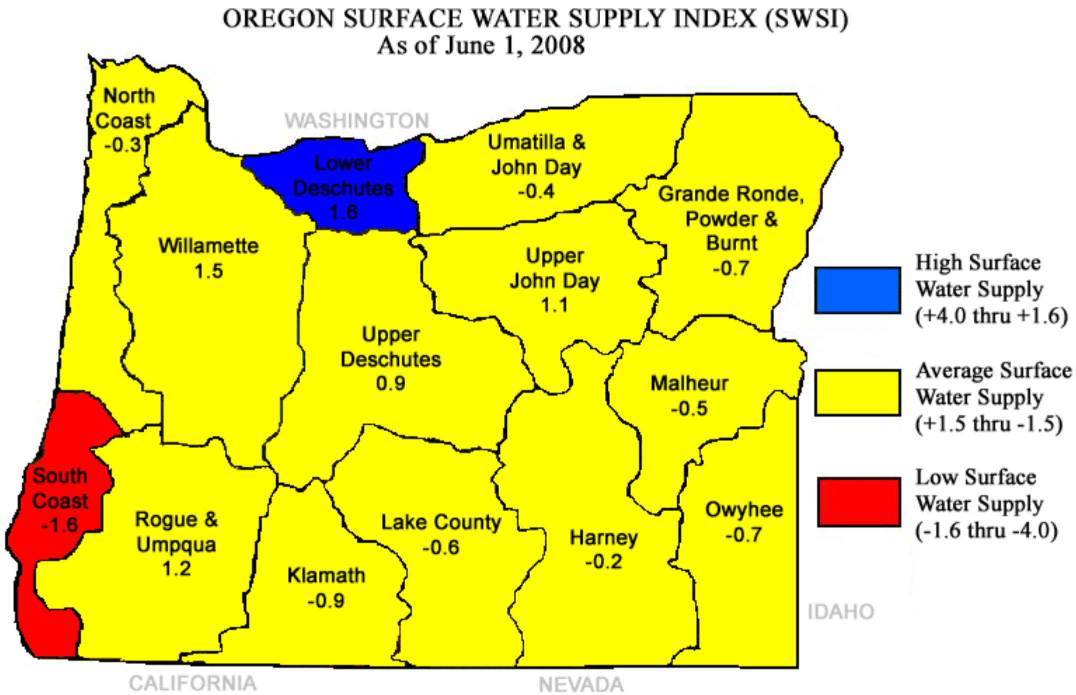

Figure 9.8.4-1 – Oregon Surface Water Supply Index, June 1, 2008

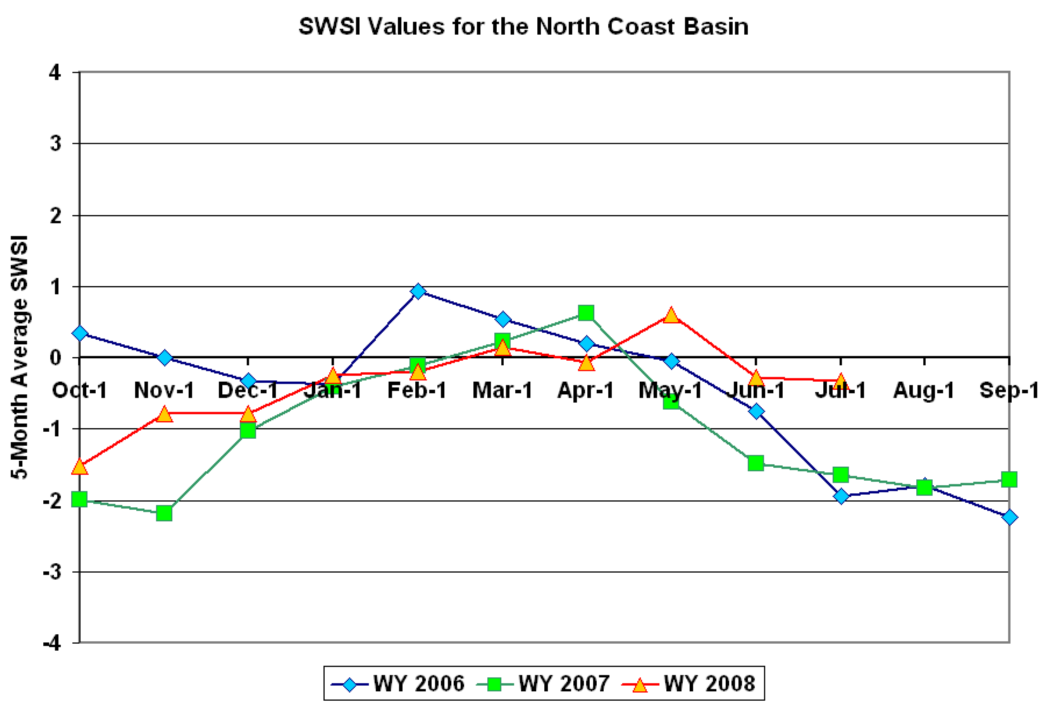

Figure 9.8.4-2 – SWSI Values for the North Coast Basin, Oct. 2006 – July 2008

9.8.5 Assessment by System Managers

As part of any informed and coordinated water curtailment plan, the participation of system managers will be crucial in order to accurately assess and effectively respond to potential or actual crisis situations that relate to water supply/service. Given their extensive knowledge and experience concerning the conditions and operations of the water system, these managers should have the latitude to invoke, in conjunction with other indicators, appropriate alert stages for water curtailment when deemed necessary. This trigger is especially important for planning the maintenance/repair of critical system components or responding to a sudden deterioration in source water quality.

9.9 Recommended Curtailment Triggers, Measures, and Actions

Besides the specific triggers required for their inception, each alert stage should include a description of the conservation measures and other necessary actions that would be appropriate for that stage during a water curtailment event. These measures and actions are provided below and are intended to serve as guidelines for the actual efforts and activities which would be implemented. The City of Newport should draft its own formal water curtailment plan along with appropriate ordinances to legally enforce that plan.

In certain instances of the recommended measures and actions for the various stages of alert, it would be necessary for the City to approve resolutions to support those measures and actions.

Alert Stage No. 1 – Water System Advisory Status

This alert stage is intended to provide preliminary and precautionary information to the community about potential water supply/service difficulties.

Objective: 5% Reduction in Overall Consumption

Triggers

- PHDI value in the range of −2 to −3
- SWSI value in the range of −1.50 to −2.50
- Levels/Flows of primary supply sources drop below specified levels (to be assessed)
- Scheduled maintenance/repairs or construction activities that significantly but temporarily affect the treatment plant or storage and distribution system operations
- Water-system-management discretionary decision

Measures and Actions

- Inform community via water system status signs, public announcements in communications media, and possibly water billing statements.
- Strongly encourage effective water conservation practices. Possibly distribute conservation kits.
- Request voluntary reduction in water consumption. Possibly restrict irrigation of lawns, gardens, and landscaping to the hours from 9:00 PM to 7:00 AM on each day.
- Discourage outdoor washing of equipment, vehicles, pavement, or other facilities.
- Discourage draining/filling pools and ponds.
- Reduce operation of public-display fountains and waterfalls, and irrigation of public lands.
- Reduce scheduled flushing of water lines and fire-fighting drills involving water consumption.

Alert Stage No. 2 – Water System Warning Status

This alert stage is intended to provide information to the community about actual water supply or service difficulties which are anticipated to be of a short-term nature.

Objective: 10% Reduction in Overall Consumption

Triggers

- PHDI value in the range of −3 to −4
- SWSI value in the range of −2.50 to −3.25
- Levels/Flows of primary supply sources drop further below specified levels (to be assessed)
- Unplanned maintenance/repairs or construction activities that significantly affect the treatment plant or storage and distribution system operations in a short-term manner
- Water-system-management discretionary decision

Measures and Actions

- Continue dissemination of information to community by means described for Alert Stage No. 1. The elevated level of concern over water availability should be emphasized.
- Provide assistance for retrofit and/or replacement of inefficient fixtures/appliances. Begin a campaign for such modifications, supported by rebates or other incentives (if appropriate).
- Implement (if necessary) water-curtailment usage rates or supply-shortage surcharges as financial incentives for achieving overall consumption objective.
- Report violations of mandatory conservation measures, to result in possible fines.
- Enforce mandatory reduction in water consumption. Restrict irrigation of lawns, gardens, and landscaping to selected hours on specified days (e.g., evening hours on even/odd days).
- Prohibit outdoor washing of equipment, vehicles, pavement, or other facilities (unless required for public health or safety).
- Prohibit draining/filling pools and ponds (except when aquatic life will be critically affected).
- Discontinue operation of public-display fountains and waterfalls, and irrigation of public lands.
- Discontinue scheduled flushing of water lines and fire-fighting drills involving water consumption.
- Require high-volume consumers (e.g., restaurants, hotels/motels, recreation centers) to post notices about mandatory conservation measures; drinking water served to customers only upon request.
- Suspend any planned expansions of water system, including the addition of new connections.

Alert Stage No. 3 – Water System Emergency Status

This alert stage is intended to provide information to the community about actual water supply or service difficulties which are anticipated to be of a longer-term nature.

Objective: 20% Reduction in Overall Consumption

Triggers

- PHDI value in the range of −4 or less
- SWSI value in the range of −3.25 to −4.00
- Levels/Flows of primary supply sources drop further below specified levels (to be assessed)
- Unplanned maintenance/repairs or construction activities that significantly affect the treatment plant or storage and distribution system operations in a longer-term manner
- Water-system-management discretionary decision

Measures and Actions

- Continue dissemination of information to community by means described for Alert Stage No. 1. The serious level of concern over water availability should be emphasized.
- Continue implementation of all mandatory conservation measures required in previous stages.
- Report violations of mandatory conservation measures, to result in possible disconnection.
- Impose usage limits for residential consumers, possibly based upon number of persons actually residing in household (e.g., 50 gpcd).
- Impose usage limits for commercial and industrial consumers, possibly based upon month of minimum usage (e.g., February) from the previous year.
- Prohibit water usage for all outdoor purposes (unless gray water is utilized).

Alert Stage No. 4 – Critical Water-Availability Status

This exceedingly-rare alert stage is intended to inform the community of threatened or nonexistent water availability via the normal delivery means. It would coincide with the most dire circumstances, usually associated with natural disasters, environmental catastrophes, or other extreme-emergency conditions.

Objective: Meet Consumption Needs of Community for Life Sustenance

Triggers

- Shutdown of treatment plant and/or inability to deliver water to storage and distribution system
- Delivery disruption anticipated to exceed a three-day duration, while storage reserves constitute a supply for less than three days of typical consumption
- Supply disruption/compromise of primary sources of raw water
- Water-system-management discretionary decision

Measures and Actions

- Continue dissemination of information to community by means described for Alert Stage No. 1. The critical level of concern over water availability should be emphasized.
- Continue implementation of all mandatory conservation measures required in previous stages.
- Eliminate all non-essential consumption of water until further notice.
- If available and deliverable, treated water may be rationed to consumers by periodic operation of the distribution system during designated hours on specified days.
- Otherwise, another supply of treated water would be arranged, most likely requiring water to be shipped to the community by vehicles and made available at emergency distribution centers.
- Seek immediate state and/or federal assistance for a rapid restoration of the normal water supply and delivery system for the community.

9.10 Water Curtailment Ordinance

At present, the City of Newport has neither a water curtailment ordinance nor plan. It is presumed that the development of this plan will be largely based upon the results of this study.

A summary of the recommended curtailment plan is provided in subsection 9.09.

9.11 <u>Long-Range Water Supply Plan</u> (OAR 690-086-0170)

9.11.1 Introduction

The service area for the Newport water system is encompassed by the current urban growth boundary (UGB). While an expanded UGB may be under consideration for the future, the anticipated potential growth within the system for the planning period will occur within the existing UGB. As previously mentioned, the largest additions to the system will be the "Former Seal Rock Area" and the new central campus of the Oregon Coast Community College.

As part of any water system master plan, it is necessary to establish that the available sources of water (diversions from which are allowed by existing water rights) for a community supply system can adequately meet the demands anticipated over the planning period.

9.11.2 Long-Range Water Demand

The capacity and sizing of a water supply system are based upon the levels of water demand predicted to be realized over the planning period. Water demand is the actual amount of water transferred from the supply source and delivered into the distribution system over a designated interval of time (e.g., hourly, daily, monthly). Projections of future water demand are utilized to judge the adequacy of the existing facilities and to determine the capabilities necessary for the proposed improvements. These projections are also utilized to evaluate the sufficiency of existing water rights and the capability and reliability of sources that supply those rights.

The existing water demand in Newport was reported (by several measures) in subsection 9.02.

Similar to the projections for population and EDU-values presented in Section 2 of this study (see Table 2.2.2-1), the water demand measures are projected in Table 6.2.2-1 and are based upon the selected design values appearing in Table 6.2.1-1. The objective of projecting demands into the future is not to necessarily construct larger facilities to support excessive water consumption, but rather to:

- Assess existing facility capabilities
- Identify any immediate deficiencies
- Recommend performance improvements
- "Size" new or upgraded facilities for anticipated (but reasonable) future water demands

The design values for the normalized water demand measures (gpcd and gpd/EDU) are reasonable in comparison to the values indicated for per capita water usage in Oregon, as assessed by the U.S. Department of the Interior and documented in the 2000 U.S. Geological Survey Circular 1268, entitled "Estimated Usage of Water in the United States in 2000". By projecting the residential population, total system EDU-value, and system water demand measures at the same average annual growth rate (AAGR), these normalized water demand measures are preserved.

Assuming a 1.25% AAGR for the planning period, the 2007 population of 10,455 people is estimated to reach 14,092 people by the year 2030. If the proportions of total water usage for the residential and various non-residential consumer groups remain constant over this period of time, then the EDU values will increase at the same growth rate. It is possible that EDU values could grow faster than the population if significant commercial/industrial development occurs. It is also possible that population growth will not maintain a 1.25% AAGR over this time period. For these reasons, the total system EDU value at any time is always the best indicator of water needs at that time.

9.11.3 Projected Demand vs. System Capacity

The estimated maximum day demand (MDD) at the end of the planning period is 5.81 MGD. This value of the MDD is equivalent to 8.99 cfs (4,035 gpm).

As previously mentioned, many of the water rights held by the City of Newport are impractical to exercise, and the water right with the largest capacity (Big Creek) cannot be exercised during the period of highest demand for a typical year because of seasonal declines in the stream flow associated with this source. However, additional supply capacity is available from the Siletz River, but water from this source must be pumped from a distance of over six miles into the drainage basin for the Big Creek reservoirs.

As revealed from the water diversion rights in Table 9.2.2-1 for the primary supply sources (Big Creek and Siletz River), the legally available raw water flow rate into the Newport water system is 16.00 cfs. While it appears that the City has an ample supply of raw water to meet its needs, the hydrologically-available raw water flow rate at certain times of the year may be sharply less than what is needed. However, if it is assumed that efforts are made during the off-peak-demand season to adequately fill the Big Creek reservoir system with a sufficient supply of water, then the needs of the City should be satisfied. A discussion of the proposed means by which this supply strategy can be accomplished is provided in Section 8 (Capital Improvement Plan) of this study.

9.11.4 Development of New Sources – Long Term Planning

Although the Newport water rights seem adequate to supply the projected MDD over the planning period, it will be necessary to develop the Big Creek reservoir system in order to ensure availability of necessary water, especially during the drier periods of the year when stream flows are diminished. Preliminary analysis has shown that, with water being pumped from the Siletz River into the drainage basin for the Big Creek reservoirs, it should be possible to adequately supply the Newport water system during the drier periods of the year and still nearly maintain the Big Creek reservoir levels. However, this ability to maintain these levels may deteriorate toward the end of the planning period. But given the enormity of the capacity of these reservoirs (65 and 316 MG for the lower and upper reservoirs, respectively, which overshadow even the consumption for an entire month; see the MMD), it seems that an adequate supply of raw water is fairly assured for the current planning period.

Thus, assuming that consumer demand remains bounded by the projections determined in this study, it should not be necessary to acquire new sources over the current 20-year planning period.

However, long-range planning beyond the current planning period will require the City to develop new water reserves. The current master plan considered various alternatives including:

1. Development of the Rocky Creek dam and reservoir
2. Increasing the storage volume (raising the dam) in the Big Creek basin
3. Development of desalination and utilizing estuary or ocean water for potable water treatment

Of these alternatives, the planning effort suggests that the Rocky Creek dam and reservoir have the lowest likely cost. This alternative, however, requires cooperation from several water providers in the region to join together in developing and sharing the Rocky Creek water supply.

Several studies were undertaken in the past decade to investigate the feasibility of the Rocky Creek system. A watershed council was established that included in its membership several of the water suppliers in the region. While the watershed council has been inactive for several years, recent interests in planning for long-term water reserves has increased the importance of this issue for the affected water systems in the region. Some meetings and discussion of the watershed council have once again started.

Recommendations within this master plan include the following points with regard to water resource planning:

1. Carefully manage the current water reserves and maximize existing storage reservoir volumes in order to ensure adequate water suppliers through much of the current planning period.
2. Immediately begin working toward planning and development of additional reserves for water needs beyond the current planning period. This may include planning to development the Rocky Creek facilities or expanding the Big Creek facilities.
3. Develop and maintain an active conservation plan that will seek to help the City make the most effective use of the water they have.