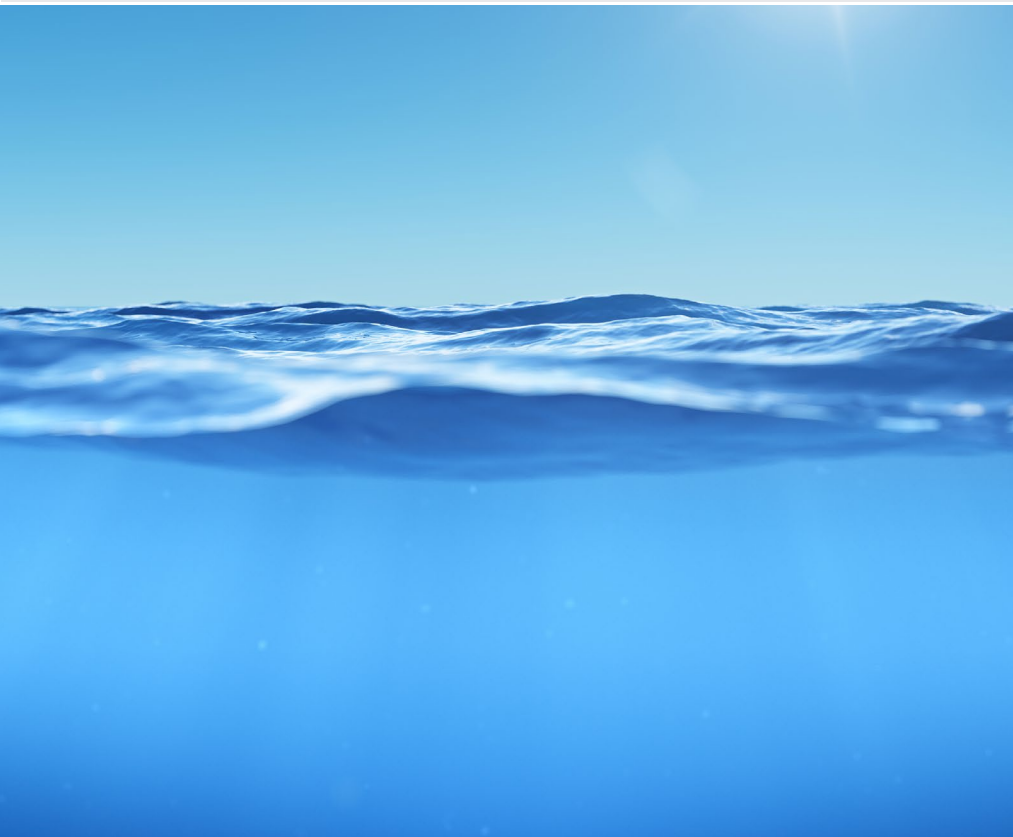




Water Management and Conservation Plan



#135-13914-16001-02
May 2024



City of Carlton Water Management and Conservation Plan

#135-13914-16001-02

May 2024

PREPARED FOR

City of Carlton

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TABLE OF CONTENTS

1.0 INTRODUCTION AND WATER MANAGEMENT AND CONSERVATION PLAN ELEMENTS	1
1.1 Introduction	1
1.2 Plan Requirement	1
1.3 Plan Organization.....	1
1.4 Affected Local Governments.....	3
1.5 Update Schedule.....	3
1.6 Time Extension	3
2.0 WATER SUPPLIER DESCRIPTION.....	4
2.1 Water Sources	4
2.2 Interconnections with Other Systems	4
2.3 Intergovernmental Agreements.....	4
2.4 Current Service Area and Population Served	5
2.5 Record of Water Use.....	8
2.5.1 Methodology	8
2.6 Historical Water Demands	8
2.6.1 Annual Demands	8
2.6.2 Peaking Factors.....	10
2.6.3 Monthly Demand	10
2.6.4 Seasonal Demands	10
2.6.5 Authorized Consumption	12
2.7 Customer Characteristics and Use Patterns.....	12
2.7.1 Largest Water Users.....	15
2.8 Water Losses and Non-Revenue Water	15
2.9 Water Rights	16
2.9.1 Aquatic Resource Concerns.....	16
2.10 Evaluation of Water Rights/Supply	18
2.11 System Description	20
3.0 WATER CONSERVATION ELEMENT	23
3.1 Current Conservation Measures	23
3.1.1 Progress Report	23
3.1.2 Background.....	23
3.2 Use and Reporting Program	23

3.3 Required Conservation Programs.....	23
3.3.1 Five-Year Benchmarks for Required Conservation Measures.....	24
3.4 Expanded Use under Extended Permits.....	25
3.5 Additional Conservation Measures	26
3.5.1 Leak Repair or Line Replacement Program.....	26
3.5.2 Technical and Financial Assistance Programs.....	26
3.5.3 Supplier Financed Retrofit or Replacement of Inefficient Fixtures.....	27
3.5.4 Rate Structure and Billing Practices that Encourage Conservation.....	27
3.5.5 Water Reuse, Recycling, and Non-potable Opportunities.....	27
3.5.6 Landscape Irrigation Measures	27
3.5.7 Other Conservation Measures.....	27
4.0 WATER CURTAILMENT ELEMENT	29
4.1 Introduction	29
4.2 History of System Curtailment Episodes.....	29
4.3 Curtailment Event Triggers and Stages.....	30
4.4 Authority & Enforcement.....	31
4.5 Curtailment Plan Implementation.....	31
4.5.1 Stage 1: Limited Water Shortage Alert.....	31
4.5.2 Stage 2: Moderate Water Shortage Alert	31
4.5.3 Stage 3: Serious Water Shortage Alert	32
4.5.4 Stage 4: Severe Water Shortage Alert.....	32
4.5.5 Stage 5: Emergency Water Shortage Alert	32
5.0 WATER SUPPLY	33
5.1 Delineation of Service Areas.....	33
5.2 Population Projections	33
5.3 Demand Forecast.....	34
5.4 Schedule to Exercise Permits and Comparison of Projected Need to Available Sources	34
5.5 Alternative Sources	36
5.5.1 Conservation Measures.....	36
5.5.2 Interconnections	36
5.5.3 Cost effectiveness	36
5.6 Quantification of Projected Maximum Rate and Monthly Volume	37
5.7 Mitigation Actions under State and Federal Law	37
5.8 New Water Rights	37

LIST OF TABLES

Table 1-1. WMCP Organization.....	1
Table 1-2. OAR Compliance Checklist.....	2
Table 2-1. Historical and Projected Population Growth.....	5
Table 2-2. Historical Annual Water Demand, ADD, MDD, MMD, and Peaking Factors, 2010-2012.....	9
Table 2-3. Water User Classifications (Rate codes) Inside and Outside City Limits/UGB.....	12
Table 2-4. Top 10 Water Consumers, 2019 through 2023.....	15
Table 2-5. Water Losses, 2018 through 2023.....	16
Table 2-6. City of Carlton Water Rights.....	17
Table 2-7. Federal- or State-Listed Fish Species Potentially Found in North Yamhill Watershed and Found in the Willamette River Near the City’s Point of Diversion.....	18
Table 2-8. Required Fish Flow Targets in the Willamette River at Salem, Oregon (USGS Gage 14191000).....	20
Table 2-9. Summary of system storage tanks.....	22
Table 2-10. Summary of distribution pipes.....	22
Table 2-11. Summary of transmission pipes.....	22
Table 3-1. Monthly water service charges, effective July 1, 2012.....	25
Table 4-1. Curtailment Stages 1 through 5.....	30
Table 5-1. Projected Population.....	33
Table 5-2. Projected Raw Water Demand.....	34
Table 5-3. City of Carlton Water Treatment Plant Capacity Meter Readings, July 1, 2009.....	35

LIST OF FIGURES

Figure 2-1. City of Carlton Regional Location.....	6
Figure 2-2. Current Service Area and Urban Growth Boundary Map.....	7
Figure 2-3. Average Daily Demand (ADD) and Maximum Day Demand (MDD), 2015-2023.....	10
Figure 2-4. Monthly Average Day Demand (mgd), 2015-2023.....	11
Figure 2-5. Historical Seasonal Demand (mgd), 2015-2023.....	11
Figure 2-6. Annual Metered Water Consumption (MG), 2018-2023.....	13
Figure 2-7. Monthly Metered Water Consumption (MG), 2018-2023.....	14
Figure 2-8. Average Monthly Water Consumption by Season and Year (MG), 2018-2023.....	14
Figure 2-9. Schematic of the City’s Existing Water Distribution System.....	21

APPENDICES

- Appendix A: Letters to Local Governments and Responses
- Appendix B: Population Forecasts for Yamhill County, its Cities and Unincorporated Area

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ADD	average-day demand
AMR	automated meter reading
cf	cubic feet
cfs	cubic feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
IGA	intergovernmental agreement
MDD	maximum-day demand
MG	million gallons
mgd	million gallons per day
MMD	maximum-month demand
MW&L	McMinnville Water & Light
OAR	Oregon Administrative Rules
OWRD	Oregon Water Resources Department
TMDL	total maximum daily load
WMCP	Water Management and Conservation Plan

1.0 INTRODUCTION AND WATER MANAGEMENT AND CONSERVATION PLAN ELEMENTS

This section satisfies the requirements of OAR 690-086-0125.

This rule requires a list of affected local government to whom the plan was made available, and a proposed date for submittal of an updated plan.

1.1 INTRODUCTION

The purpose of this Water Management and Conservation Plan (WMCP) is to guide development, financing and implementation of water management and conservation programs in order to manage sustainable water use, project the City's future water needs, evaluate the adequacy source-of-supply, and identifies potential, alternative and additional sources-of-supply. This WMCP has been developed to be consistent with the City's adopted water system master plan and in accordance with Oregon Administrative Rules (OAR) OAR Chapter 690, Division 86 regarding WMCPs.

This WMCP is an update to the 2014 WMCP. Much of the information and material is the same as the 2014 plan. Modification were made only where required based upon updated data.

1.2 PLAN REQUIREMENT

A WMCP is required to be revised on a 10-year interval and a progress report completed and submitted at the 5-year midpoint between revisions. In 2014 the City of Carlton completed its initial WMCP and submitted a progress report in 2019. This 2024 WMCP fulfills the requirement for the 10-year update as stipulated by OAR Chapter 690, Division 86.

1.3 PLAN ORGANIZATION

The WMCP is organized into sections as listed in Table 1-1, each addressing specific sections of OAR Chapter 690, Division 86:

Table 1-1. WMCP Organization

WMCP	Section Title	OAR Requirement
Section 1	Water Supplier Plan	OAR 690-086-0125
Section 2	Water Supplier Description	OAR 690-086-0140
Section 3	Water Conservation Element	OAR 690-086-0150
Section 4	Water Curtailment Element	OAR 690-086-0160
Section 5	Water Supply Element	OAR 690-086-0170

Section 2 is a self-evaluation of the City's water supply, water use, water rights and water system. The information developed for Section 2 is the foundation for the sections that follow. The later sections use this information to

consider how the City can improve its water conservation and water supply planning efforts. The WMCP includes the following appendices providing supporting information:

- Appendix A—Letters to Local Governments and Responses
- Appendix B—Population Forecasts for Yamhill county, its Cities and Unincorporated Area

The checklist in Table 1-2 identifies each required WMCP element, the OAR reference, and WMCP section.

Table 1-2. OAR Compliance Checklist

WMCP Required Element	OAR Reference	WMCP Section and Page
Municipal Water Supplier Plan Elements	690-086-0125	Section 1
Affected Local Governments	OAR 690-086-0125(5)	Section 1, page 3
Plan Update Schedule	OAR 690-086-0125(6)	Section 1, page 3__
Time Extension	OAR 690-086-0125(7)	Section 1, page 3
Water Supplier Description	690-086-0140.	Section 2
Water Sources	OAR 690-086-0140(1)	Section 2, page 4
Interconnections with Other Systems	OAR 690-086-0140(7)	Section 2, page 4
Intergovernmental Agreements	OAR 690-086-0140 (1)	Section 2, page 4
Current Service Area & Population Served	OAR 690-086-0140(2)	Section 2, page 5
Record of Water Use	OAR 690-086-0140 (4) & (9)	Section 2, page 8
Customer Characteristics & Use Patterns	OAR 690-086-0140(6)	Section 2, page 12
Water Loss & Non-Revenue Water	OAR 690-086-0140 (9)	Section 2, page 15
Water Rights	OAR 690-086-0140(5)	Section 2, page 16
Evaluation of Water Rights/Supply	OAR 690-086-0140 (3)	Section 2, page 18
System Description	OAR 690-086-0140(8)	Section 2, page 20
Water Conservation Elements	690-086-0150	Section 3
Current Conservation Measures	OAR 690-086-0150 (1) & (3)	Section 3, page 23
Use & Reporting Program	OAR 690-086-0150 (2)	Section 3, page 23
Required Conservation Programs	OAR 690-086-0150 (4)	Section 3, page 23
Expanded Use Under Extended Permits	OAR 690-086-0150 (5)	Section 3, page 25
Additional Conservation Measures	OAR 690-086-0150 (6)	Section 3, page 26
Water Curtailment Element	690-086-0160	Section 4
History of System Curtailment Episodes	OAR 690-086-0160 (1)	Section 4, Page 29
Curtailment Event Triggers and Stages	OAR 690-086-0160 (2) & (3)	Section 4, page 30
Curtailment Plan Implementation	OAR 690-086-0160 (4)	Section 4, Page 31
Water Supply	690-086-0170	Section 5
Delineation of Service Area	OAR 690-086-170 (1)	Section 5, page 33
Population Projections	OAR 690-086-0170 (1)	Section 5, page 33
Demand Forecast	OAR 690-086-0170 (3)	Section 5, page 34
Schedule to Exercise Permits	OAR 690-086-0170 (2) & (4)	Section 5, page 34
Alternative Sources	OAR 690-086-0170 (5)	Section 5, page 36

WMCP Required Element	OAR Reference	WMCP Section and Page
Quantification of Projected Maximum Rate	OAR 690-086-0170 (6)	Section 5, page 37
Mitigation Actions	OAR 690-086-0170 (7)	Section 5, page 37
New Water Rights	OAR 690-086-0170 (8)	Section 5, page 37

1.4 AFFECTED LOCAL GOVERNMENTS

OAR 690-086-0125(5)

The following local governmental agencies may be affected by this WMCP:

- City of Carlton
- Yamhill County
- McMinnville Water & Light (MW&L)

Thirty days before submitting this WMCP to the Oregon Water Resources Department (OWRD), the City made the draft WMCP available for review by each affected local government listed above along with a request for comments relating to consistency with the local government's comprehensive land use plan. The letters requesting comment and responses are included in Appendix A. Responses were received from the City of Carlton and McMinnville Water & Light. No response was received from Yamhill County.

As a courtesy the City provided the Yamhill Regional Water Authority with notice of the draft plan.

1.5 UPDATE SCHEDULE

OAR 690-086-0125(6)

The City anticipates submitting an update of this WMCP in within 10 years of the final order approving this WMCP or approximately 2034. Additionally, as required by OAR Chapter 690, Division 86, a progress report will be submitted within 5 years of the final order, or approximately 2029.

1.6 TIME EXTENSION

OAR 690-086-0125(7)

This is the City's second WMCP and first update. The City is not requesting additional time to implement any previous benchmark.

2.0 WATER SUPPLIER DESCRIPTION

This section satisfies the requirements of OAR 690-086-0140.

This rule requires descriptions of the City's water sources, water delivery area and population, water rights, and adequacy and reliability of the existing water supply. The rule also requires descriptions of the City's customers and their water use, the water system, interconnections with other water suppliers, and quantification of system leakage.

2.1 WATER SOURCES

OAR 690-086-0140(1))

The City's primary source of water is Panther Creek, which flows eastward out of the Oregon Coast Range. The City uses flow from Panther Creek and stored water from Panther Creek Reservoir. The City holds a water right permit for the development of a source from Fall Creek, which also flows out of the Coast Range.

In 2019 the City completed an intertie with MW&L near the Carlton water treatment plant on Panther Creek Road. The meter vault, backflow preventer, control valve and 6- inch pipeline is designed to provide a supply of 520 gallons per minute (gpm) to the City. A temporary IGA was put in place during upgrades to the Carlton source and treatment system, which has now lapsed. The City of Carlton and MW&L are in negotiations for a future permanent IGA. Therefore, currently this water source is not authorized.

In 2012 the City obtained authorization to access Willamette River water for municipal use through its membership in the Yamhill Regional Water Authority. However, it will likely be several years before the needed infrastructure is in place to use this source.

2.2 INTERCONNECTIONS WITH OTHER SYSTEMS

OAR 690-086-0140(7)

The City has three interconnections to other water systems:

- Valley View Water District to provide water service to approximately 42 customer connections on a wholesale basis.
- East Carlton Water Company to provide water to approximately 15 customer connections.
- A six-inch emergency intertie with MW&L that can provide the City water in an emergency situation.

2.3 INTERGOVERNMENTAL AGREEMENTS

OAR 690-086-0140(1))

The City has intergovernmental agreements (IGAs) with each of the systems with whom it has an established connection or agreement to serve water.

- Valley View Water Company—Signed, amended agreement dated February 2007
- East Carlton Water Company—Unsigned agreement dated 1997. The agreement remains unsigned.
- Yamhill Regional Water Authority—In December 2012, the City entered into an IGA with the cities of McMinnville (via MW&L Commission), Dayton, and Lafayette to jointly seek, acquire, hold, and maintain a water permit for appropriation of water from the Willamette River. The IGA states that upon issuance of the Final Order for Application S-87762, permitted 44.18 cubic feet per second (cfs) of Willamette River water to be allocated as follows: 2.98 cfs for Carlton, 3.10 cfs for Dayton, 5.00 cfs for Lafayette, and 33.10 cfs for MWL. Permit S-54792 was issued on January 17, 2013. The IGA also covers items related to governance, operations and management, and financing.
- MW&L—The City is currently negotiating an agreement for emergency and permanent water through the intertie.

2.4 CURRENT SERVICE AREA AND POPULATION SERVED

OAR 690-086-0140(2)

The City of Carlton is located in Yamhill County in the northwest portion of the Willamette Valley, approximately 6 miles north of the City of McMinnville and 12 miles west of the City of Newberg. Figure 2-1 shows the City's relative location.

The current water service area includes areas within and outside the existing City limits. The city limits and the Urban Growth Boundary are the same. Figure 2-2 shows the city limits/urban growth boundary and water service area.

As of 2023, the City provides water to 1,117 accounts. The majority of those accounts are direct customer accounts within the city limits (1,008). Outside the city limits water service is provided to the following direct and wholesale customers:

- Wholesale customer Valley View Water District to serve 41 connections
- Wholesale customer East Carlton Water Company 16 connections,
- Modafari Road 7 connections,
- Direct customers on the transmission line between the reservoir and the City Limits, 65 connections
- Miscellaneous direct customers located east of the City Limits, 12 connections.

Table 2-1 documents the City's population since the year 2000 to the present based upon the latest 2022 US census.

Table 2-1. Historical and Projected Population Growth

Year	Population
2000	1,510
2010	2,007
2020	2,225
2023	2,234

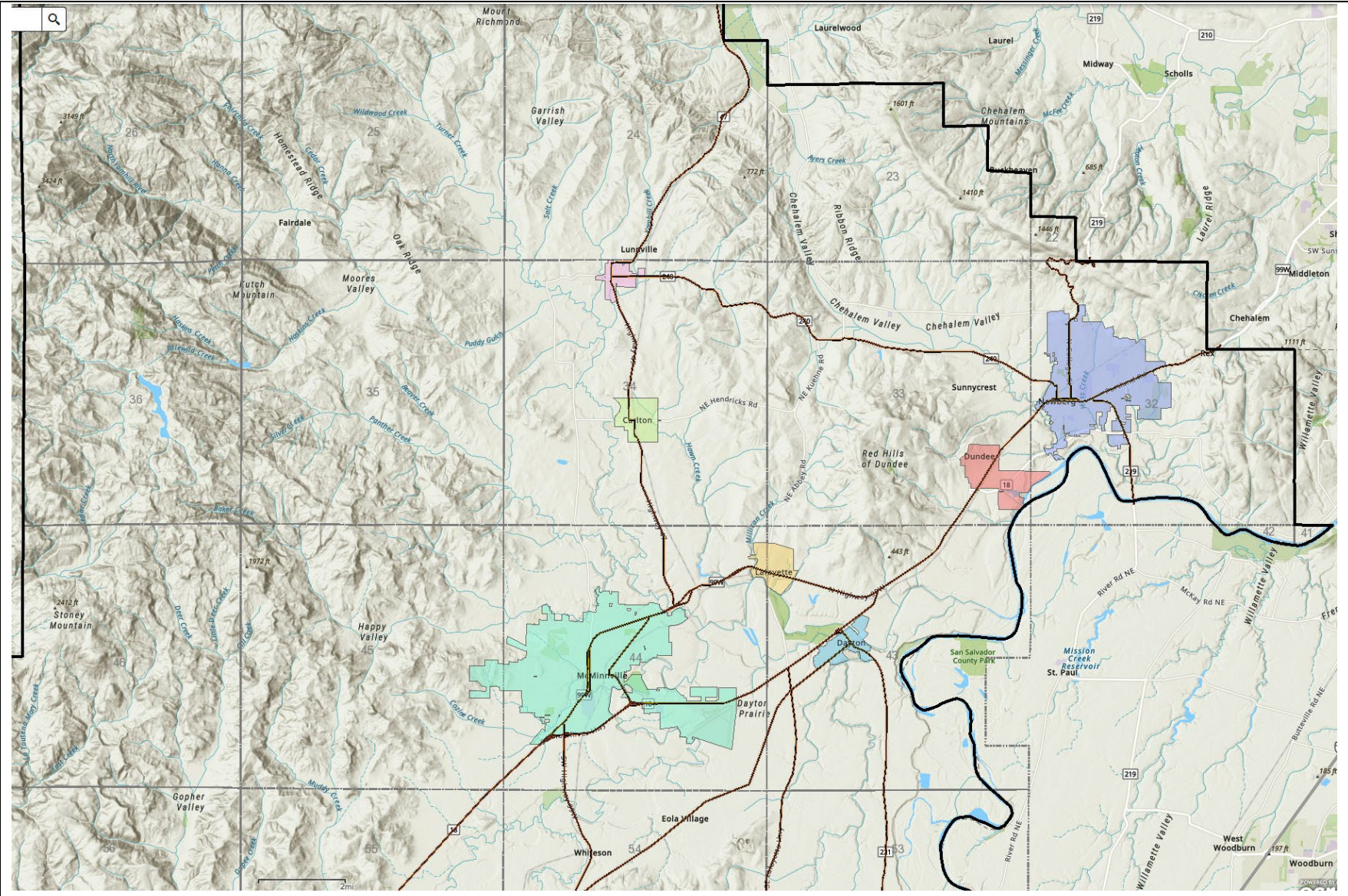


Figure 2-1. City of Carlton Regional Location

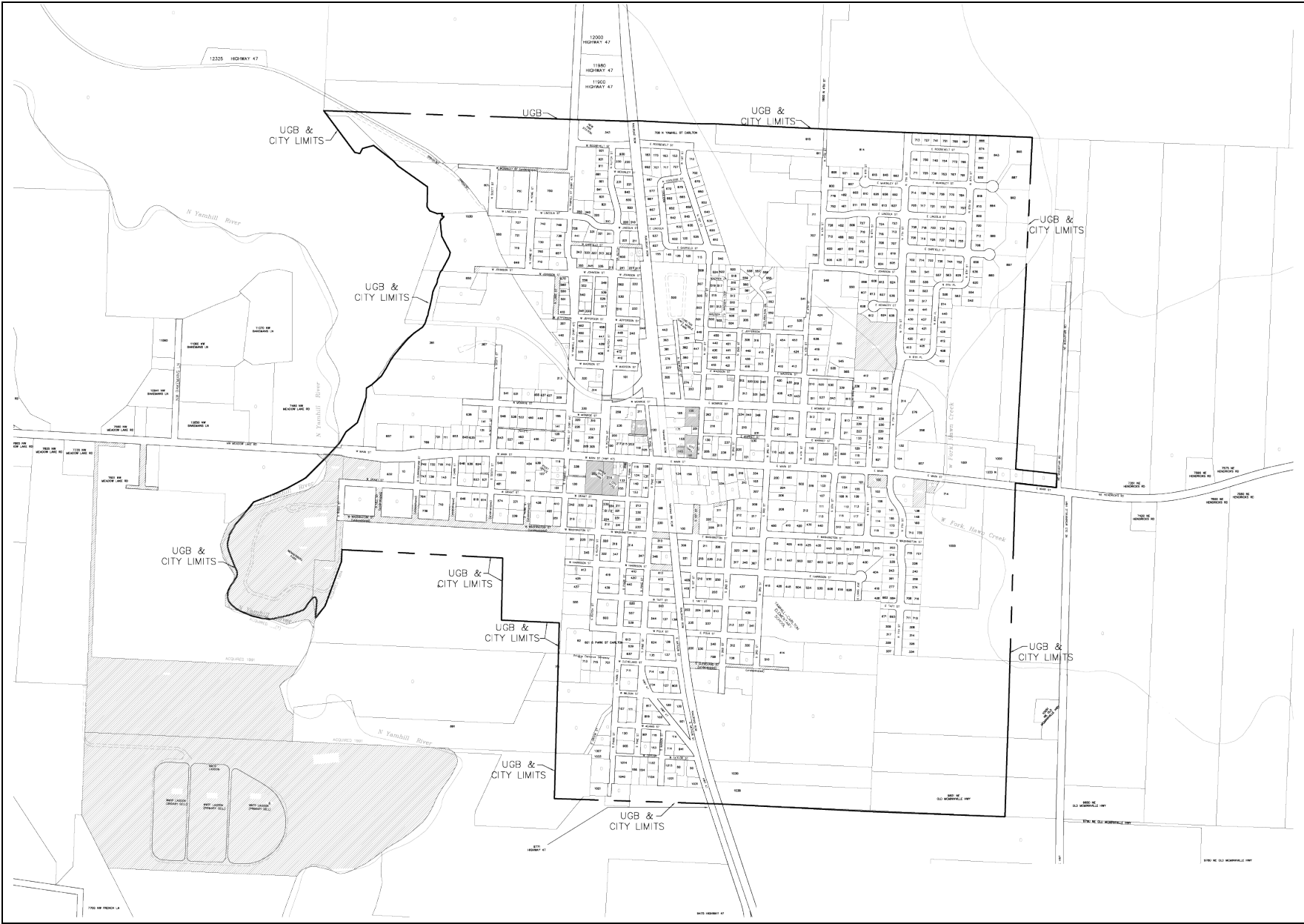


Figure 2-2. Current Service Area and Urban Growth Boundary Map

2.5 RECORD OF WATER USE

OAR 690-086-0140(4) & (9)

2.5.1 Methodology

Generally, demand and consumption in municipal systems are expressed in units of million gallons per day (mgd). They may also be expressed in cubic feet per second (cfs) or gallons per minute (gpm). One mgd is equivalent to 1.55 cfs or 694 gpm. For annual or monthly values, a quantity of water is typically reported in million gallons (MG). Water use per person (per capita use) is expressed in gallons per person (per capita) per day (gpcd).

This report distinguishes between “raw water” and “finished water” demand. “Raw water” demand refers to water diverted from the source and “finished water” demand refers to treated water entering the City’s distribution system. For the purposes of this report, the following terms are used to describe specific values of demands:

- Average-day demand (ADD) equals the total annual input (demand) divided by 365 days.
- Maximum-day demand (MDD) equals the highest demand that occurs on any single day during a calendar year. It is also called the one-day MDD.
- Maximum-month demand (MMD) in MG equals the highest total monthly demand of the 12 months of a calendar year. MMD in mgd equals the average day demand of the one month with the highest total demand of the 12 months of a calendar year.
- Peaking factors are the ratios of one demand value to another. The most common and important peaking factor is the ratio of the MDD to the ADD.

MDD is an important value for water system planning. The supply facilities (treatment plants, pipelines, reservoirs) and water rights must be capable of meeting the MDD. If the MDD exceeds the combined supply capacity on any given day, finished water storage levels will be reduced. Consecutive days at or near the MDD may result in a water shortage.

2.6 HISTORICAL WATER DEMANDS

2.6.1 Annual Demands

Historical records of water production (referred to as demand) provided by the City were evaluated to determine water usage rates and demand fluctuations. It is important to highlight that between June 2021 and March 2023, the city purchased its water from MW&L. This was attributable to the raw water reservoir project going on at that time. Data from 2015 through 2023 were used in this study and was provided by the City of Carlton. Table 2-2 summarizes the City’s annual water demand in ADD, MDD, MMD and peaking factor. The demand is displayed as “raw water,” which is the water diverted from the source, and “finished water,” which is the treated water entering the City’s distribution system. The difference between raw water and finished water is the water used in the treatment process. For the purposes of this WMCP, the raw water value is used for historical demand analyses and the finished water value is used for evaluating unaccounted for water.

As depicted in Table 2-2, annual raw water demand averaged 139.8 MG and annual finished water demand averaged 121.5 MG. The City's raw water average ADD was 0.38 mgd and average MDD was 0.68 mgd. An increase in ADD, MDD and annual water usage was observed during years 2019-2021. This trend is reflective of the impact due to the Covid-19 pandemic. From June 2021 through March of 2023 the City was taking treated water from MW&L. Therefore, the volume of water was reduced as there was no need for backwash water.

Table 2-2. Historical Annual Water Demand, ADD, MDD, MMD, and Peaking Factors, 2010-2012

Year	Raw Water					Finished Water		
	Annual Volume (MG)	ADD (mgd)	MDD (mgd)	MMD (MG)	MMD (mgd)	Peaking Factor (MDD:ADD)	Annual Volume (MG)	ADD (mgd)
2015	141.3	0.39	0.70	18.0	0.59	1.8	126.0	0.35
2016	137.9	0.38	0.68	17.7	0.58	1.8	113.6	0.31
2017	136.2	0.37	0.67	17.3	0.57	1.8	112.9	0.31
2018	147.8	0.40	0.73	18.0	0.59	1.8	122	0.33
2019	155.1	0.42	0.76	18.2	0.60	1.8	129.4	0.35
2020	167.6	0.46	0.83	20.4	0.67	1.8	140.0	0.38
2021	146.0	0.40	0.72	18.7	0.62	1.8	136.4	0.37
2022	104.2	0.29	0.51	15.9	0.52	1.8	104.2	0.29
2023	122.3	0.34	0.60	16.9	0.56	1.8	109.2	0.30
Average	139.8	0.38	0.69	17.9	0.59	1.8	121.5	0.33
Max	167.6	0.46	0.83	20.4	0.67	1.8	140.0	0.38

Figure 2-3 illustrates the City's ADD and MDD for 2015 through 2023. MDD and ADD have been variable over the past nine years. It is speculated that the effect of COVID was more people staying home and using more water. The decrease starting in 2021 and going into 2023 is due to the use of MW&L water, which eliminated the need for backwash water. The MDDs occurred in the months of July and August.

It is notable that after the raw water dredging project was completed, the ADD and MDD of raw water decreased. The dredging of the raw water reservoir has increased the raw water quality to the extent that significantly less backwash water is required. On average the decrease has been approximately 97,000 gallons per month, which is significant for Carlton.

MDD can be strongly influenced by weather patterns and the economy. Weather patterns often cause fluctuations in MDD from year to year. Weather patterns that influence MDD include maximum temperatures, the number of consecutive days with high temperatures, when high temperatures occur in the summer, overall rainfall levels during the summer, and consecutive days without rainfall. Unusually hot and/or dry weather results in more outdoor irrigation, which increases the MDD. The economy can affect MDD, as well. Customers may choose to irrigate less to save in an economic downturn. The economy also influences the number of new homes with landscapes needing intense irrigation for plant establishment.

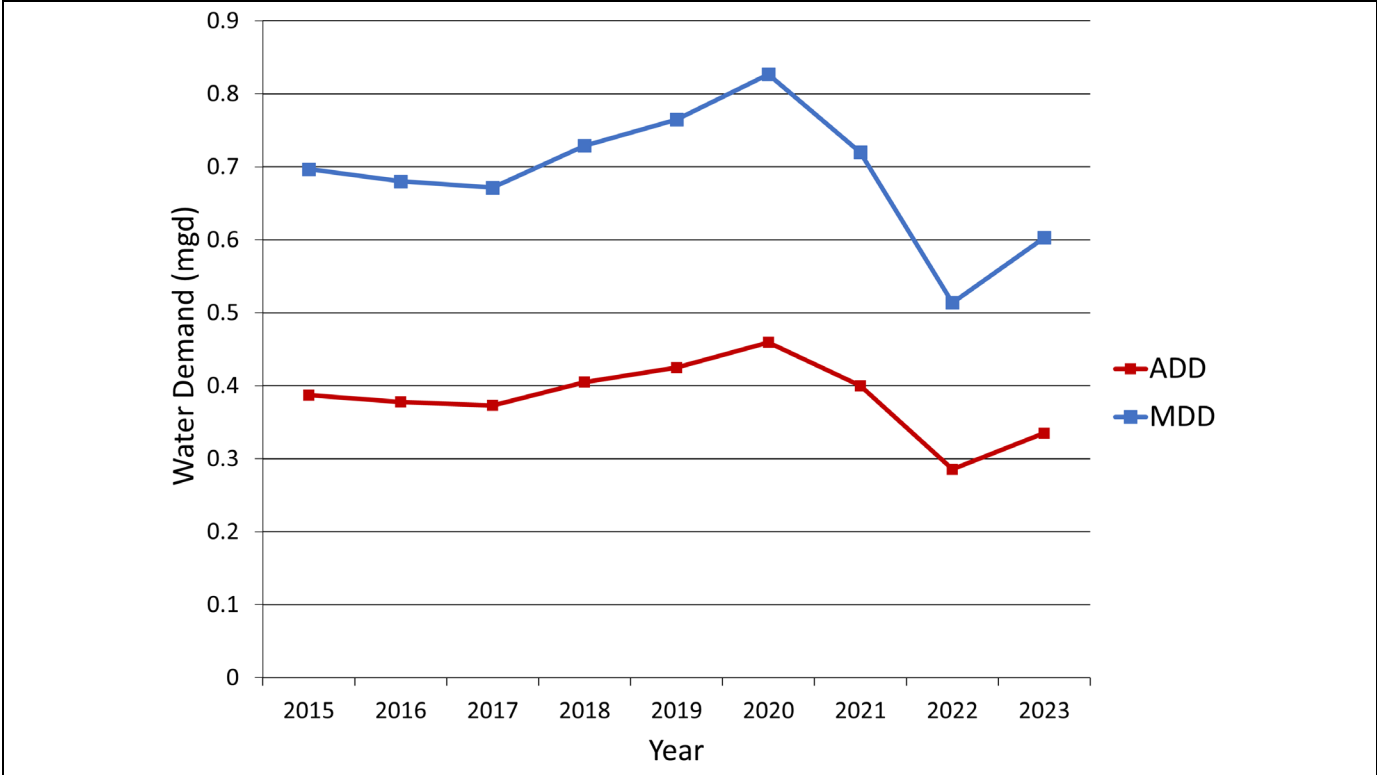


Figure 2-3. Average Daily Demand (ADD) and Maximum Day Demand (MDD), 2015-2023

2.6.2 Peaking Factors

Peaking factors are the ratios of one demand value to another, and the most common and important peaking factor is the ratio of the MDD to the ADD. This ratio often is used for estimating peak demands when only ADDs are known or measured, as well as for hydraulic modeling of the system and for demand forecasting. The City’s MDD data came from actual recorded values of demand. From 2015 through 2023, the City’s average peaking factor was 1.8. This value is slightly lower than the typical value found in the Willamette Valley, which ranges from 1.9 to 2.2.

2.6.3 Monthly Demand

Figure 2-4 shows monthly demand data from 2015 through 2023 expressed as an average daily demand for the month, with the peak season months of June through September in red. During this period, the highest monthly ADD recorded was 0.67 mgd in August 2020. This figure highlights the seasonal change in demand that the City experiences and the months with the greatest demand, July and August. Consequently, these months should be the focus of water conservation efforts.

2.6.4 Seasonal Demands

Figure 2-5 shows historical monthly ADD for summer and winter seasons from 2015 through 2023. During this period, monthly ADD during the 4 summer months (June-September) ranged from 0.38 mgd to 0.59 mgd and monthly ADD during the winter months (December-March) ranged from 0.21 mgd through 0.40 mgd.

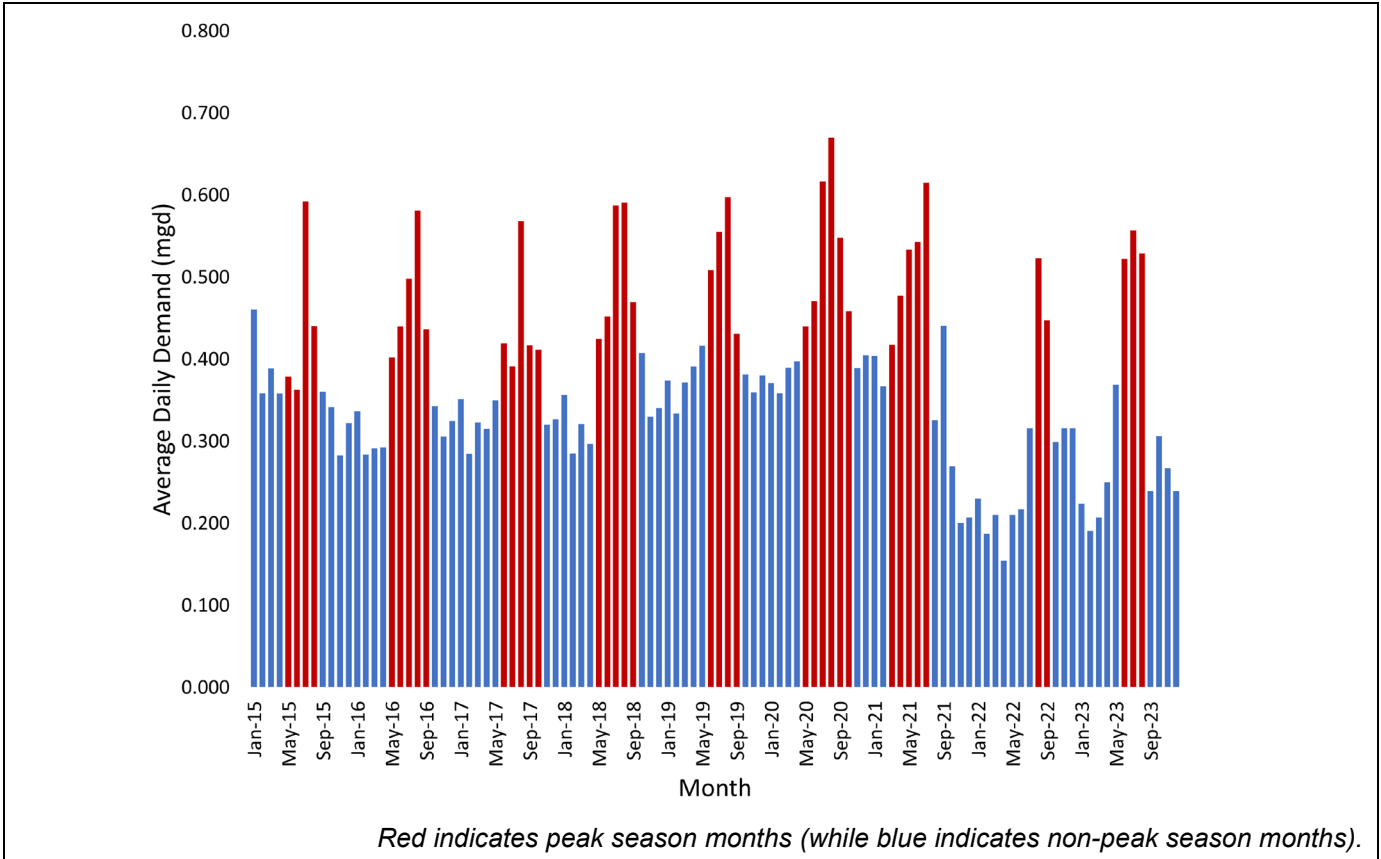


Figure 2-4. Monthly Average Day Demand (mgd), 2015-2023

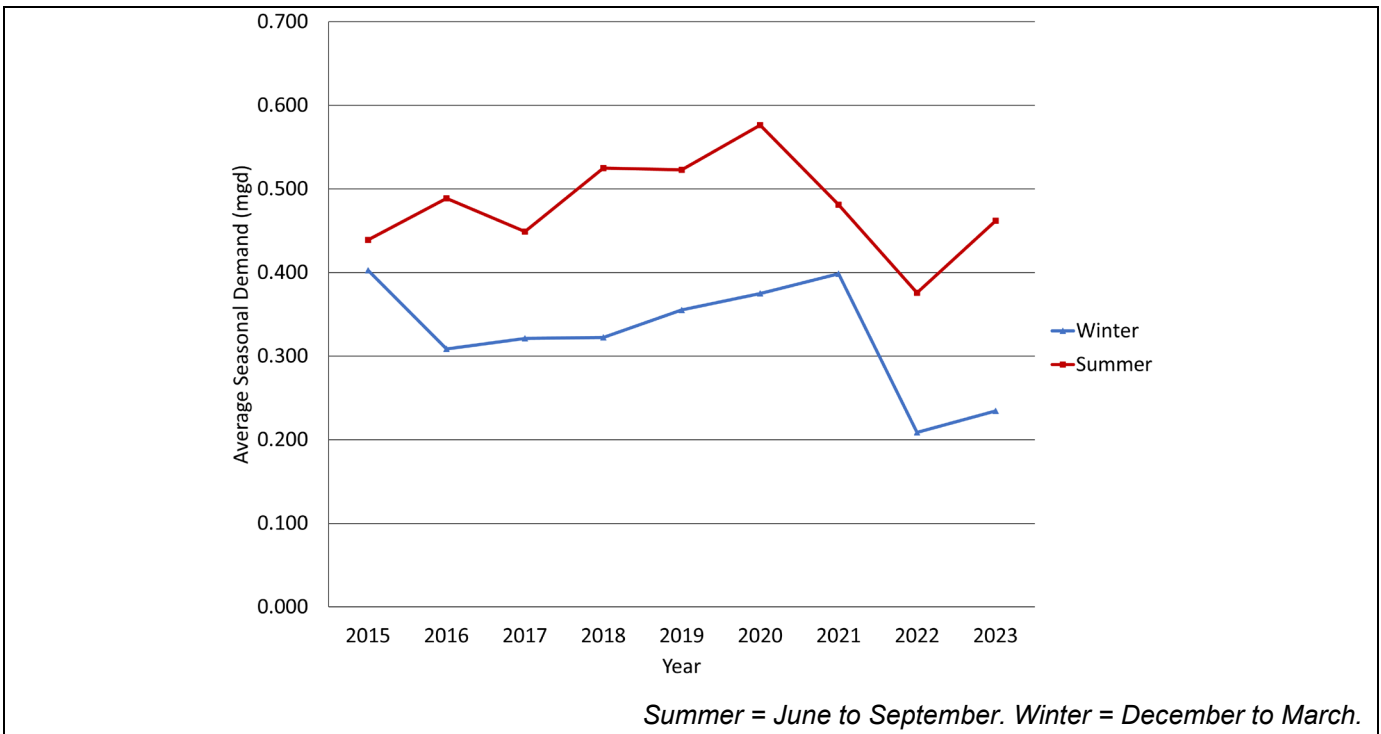


Figure 2-5. Historical Seasonal Demand (mgd), 2015-2023

Summer production accounted for an average of approximately 42 percent of the City's annual demand and winter demand (December-March) accounted for an average of 28 percent of the annual demand. The shoulder seasons (April through May and October through November) accounted for the remaining 30 percent of the annual demand. The City's water demand increases substantially during the summer months as a result of outdoor water use, largely irrigation, which is typical for western Oregon utilities.

2.6.5 Authorized Consumption

Authorized consumption is equal to the metered and certain unmetered water uses. All customers served by the City are metered and all known authorized water consumption is metered except for the City's periodic use of hydrants to flush the system and the Fire Department's use of hydrants for training or emergencies.

2.7 CUSTOMER CHARACTERISTICS AND USE PATTERNS

OAR 690-086-0140(6)

The City's billing system classifies water users by rate codes. Table 2-3 provides a summary of water users by rate code inside and outside of the City Limits/UGB in 2023.

Table 2-3. Water User Classifications (Rate codes) Inside and Outside City Limits/UGB

User Classification	Rate Code	# of Accounts
Inside City Limits/UGB		
Single	Rate Code 1	1,620
Single	Rate Code 2	120
Double	Rate Code 4	10
Triple	Rate Code 5	1
Quad	Rate Code 6	1
	Rate Code 7	1
	Rate Code 8, Carlton Apartments	1
	Rate Code 9	1
	Rate Code 11	1
	Rate Code 15	12
	Rate Code 17	1
	Rate Code 18	1
	Rate Code 20	10
	Rate Code 22	2
	Rate Code 23	1
	Rate Code 23	1,648
	Rate Code 25	1
	Rate Code 26	2
	Rate Code 27	9
	Rate Code 18	1
	Rate Code 29	1
	Rate Code 30	1
	Rate Code 31	1
	Total	1,789

The City’s new billing system does not provide a simple method of updating customer class information when changes occur. Some customers have multiple classifications such that the total number of accounts does not equal the total number of customers in each classification. Further, some of these accounts are multiple users such as the valley View Water district.

The City had approximately 1,008 accounts in city limits, 109 outside city accounts for a total of 1,117 accounts in 2023. Of these there are 108 business accounts, 9 public accounts and the rest are residential.

Figure 2-6 shows the annual metered consumption from 2018 through 2023. Figure 2-7 shows the City’s monthly metered consumption from 2018 through 2023. Consumption increases in the summer months every year, which is typical and likely the result of outdoor irrigation. The highest monthly consumption was 12.5 MG in August 2022. Figure 2-8 shows the average monthly metered consumption from 2018 through 2023 for the year and for each season, with summer representing June through September, and winter representing December through March. The ratio of the average summer to winter consumption is 1.9.

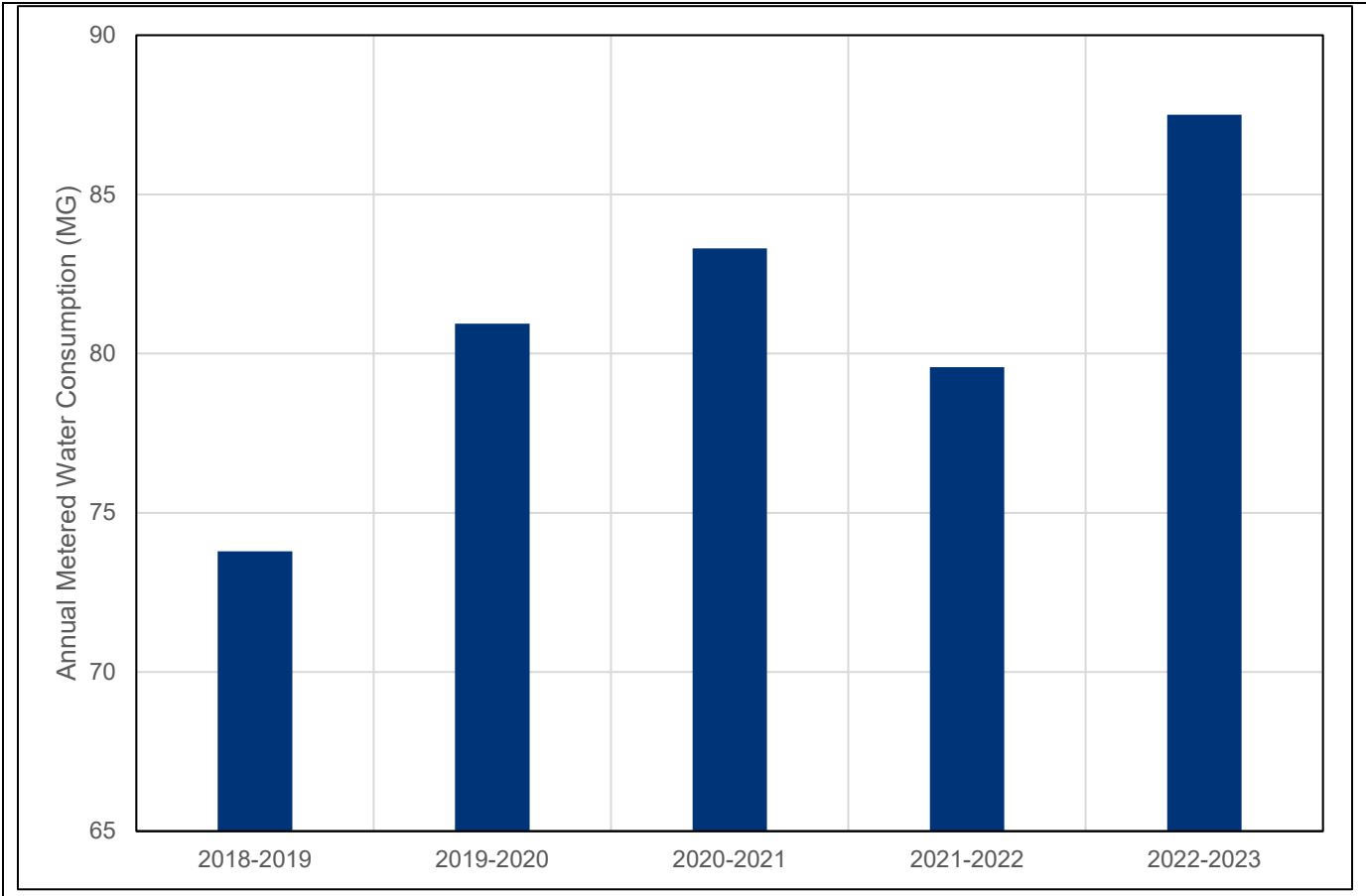


Figure 2-6. Annual Metered Water Consumption (MG), 2018-2023

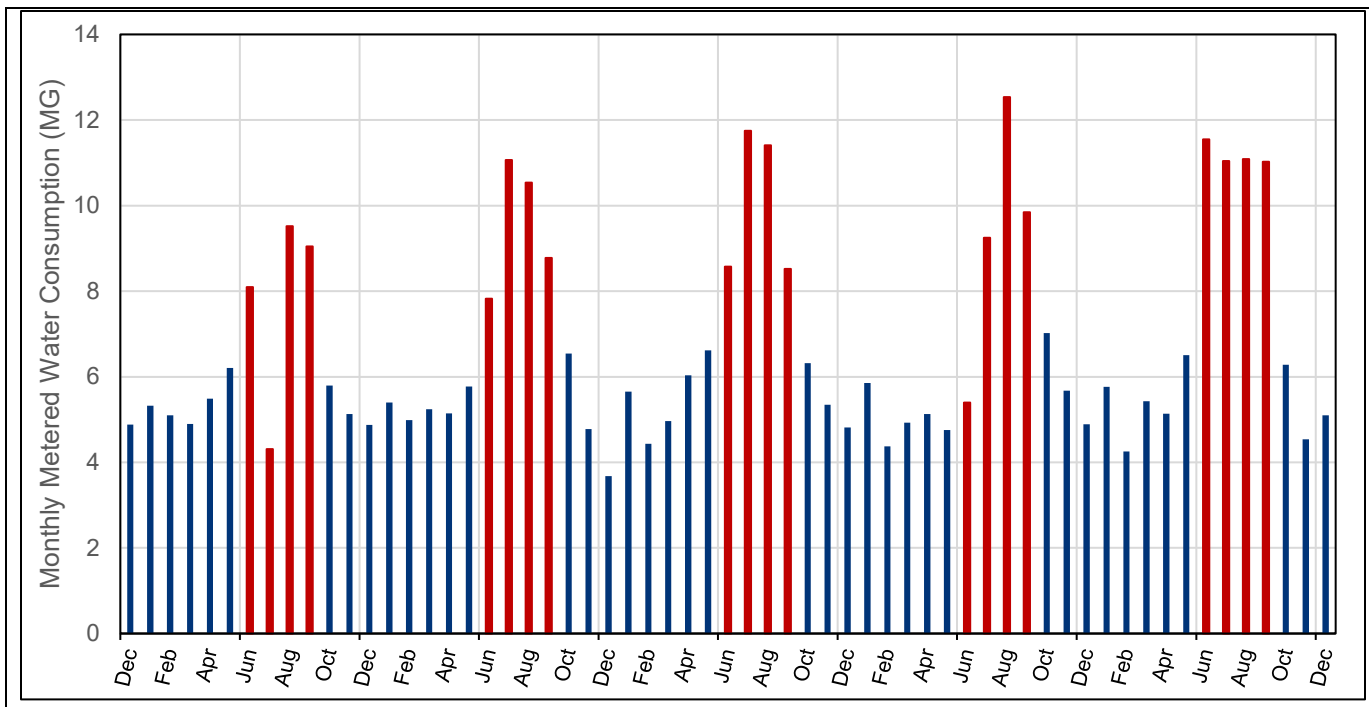


Figure 2-7. Monthly Metered Water Consumption (MG), 2018-2023

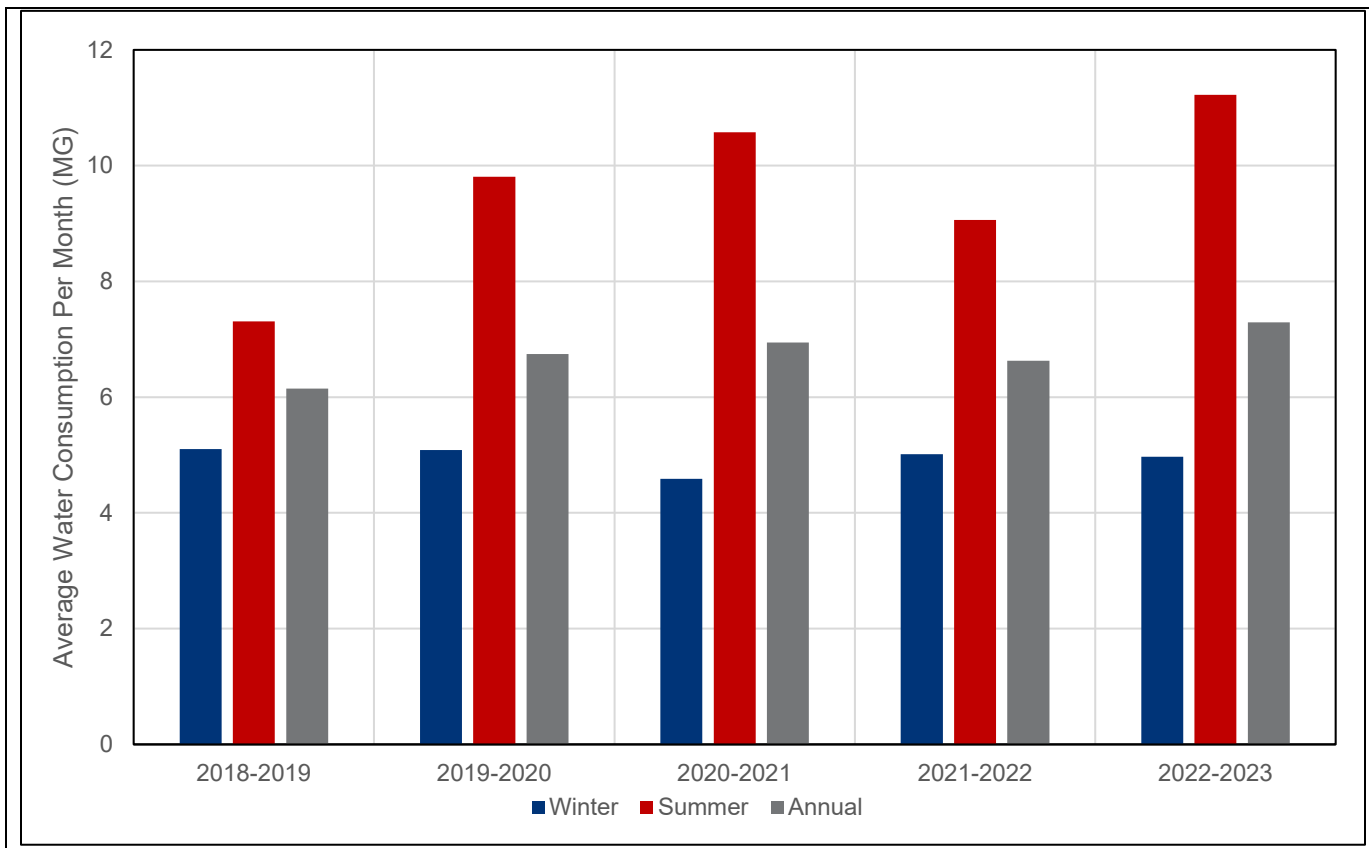


Figure 2-8. Average Monthly Water Consumption by Season and Year (MG), 2018-2023

2.7.1 Largest Water Users

Table 2-4 lists the City's top 10 water consumers. These customers used 18.2 MG per year, which represents 9.5 percent of the City's total yearly water consumption for the last five years.

While an annual volume is shown, the City records are for the last 5 years as a total. The annual amount is the five-year total divided by five.

Table 2-4. Top 10 Water Consumers, 2019 through 2023

Facility	Average Yearly Volume Used (MG)
Carlton Farms Processing	9.44
Valley View WD	4.06
Carlton Oaks	1.42
Yamhill elementary School	0.79
Uchi Apartments	0.66
Tabula Rasa Farms	0.58
Winemakers Studio	0.33
Ken Wright Cellars	0.31
Carlton Corners	0.29
Dan Durret Apartments	0.29
Total	18.2

2.8 WATER LOSSES AND NON-REVENUE WATER

OAR 690-086-0140(9)

Water loss, or unaccounted-for water, is comprised of the difference between the finished water produced and the water consumed, consisting of all unmetered uses and system leakage. It is important to differentiate these two categories of water loss.

Unmetered use is commonly the result of incomplete or inaccurate metering of consumer demand, including the following typical categories that may be applicable to the City.

- Unmetered or unauthorized connections
- Inaccurate or unrecorded flows for hydrant and main flushing
- Unmetered water for construction activities
- Unmetered water for operations & maintenance uses (street cleaning)
- Unmetered water for fire fighting
- Reservoir overflows
- Data collection errors

System leakage, as the name implies, is water lost due to deteriorating pipe, compromised pipe joints, service connections, valves, etc. Table 2-5 presents annual produced water, consumed water, unaccounted for water and the water loss from 2018 through 2023.

Table 2-5. Water Losses, 2018 through 2023

Year (Dec-Dec)	Produced Water (MG)	Consumed Water (MG)	Unaccounted Water (MG)	Water Loss (%)
2018-2019	127.9	73.8	54.1	42.3
2019-2020	139.5	80.9	58.6	42.0
2020-2021	140.5	83.3	57.2	40.7
2021-2022	100.9	79.6	21.3	21.1
2022-2023	112.1	87.5	24.6	21.9

The most telling indication of the water loss reduction in the system is the comparison of the water loss before and after the transmission line was replaced and the concrete reservoir lined. The water loss dropped from 41.6 percent to 21.5 percent. The water savings is approximately 110,000 gpd, which is significant for Carlton.

2.9 WATER RIGHTS

OAR 690-086-0140(5)

The City holds a number of water rights for the use of surface water for municipal purposes. The sources include natural stream flow from Panther Creek, stored water in Panther Reservoir, Fall Creek, and the Willamette River. To date, the City holds certificated water rights to store and use 75 AF from Panther Creek Reservoir and 0.789 cfs of natural stream flow from Panther Creek. The City has partially perfected (partially certificated) two permits, Permits S-34661 and S-50218, and has 0.229 cfs and 0.052 cfs, respectively, remaining in permit status. The City holds two additional permits in the Panther Creek drainage: Permit S-32489 for up to 2.5 cfs from Panther Creek natural stream flow and Permit S-32488 for use of up to 2.0 cfs from Fall Creek.

All of the above mentioned permits currently need an extension of time.

Finally, as a member of the Yamhill Regional Water Authority, 2.98 cfs of the 44.18 cfs allowed under Permit S-54792 for Willamette River water is allocated to the City.

Table 2-6 provides detailed information about these municipal water rights that supply potable water through the City's municipal distribution system. These water rights also are described in more detail below.

2.9.1 Aquatic Resource Concerns

The City has water rights authorizing the use of surface water from Panther Creek, Fall Creek, and the Willamette River. Spring chinook salmon and winter steelhead are federally listed as threatened in the Upper Willamette Evolutionarily Significant Unit (ESU), which includes the North Yamhill Watershed. Coho salmon is federally listed as threatened in the Oregon Coast ESU and the Oregon chub is federally listed as threatened in multiple ESUs. The state listing for Spring Chinook and Oregon chub is sensitive-critical, for winter steelhead is sensitive-vulnerable, and for coho salmon is endangered. Pacific lamprey and western brook lamprey are currently state listed as sensitive-vulnerable. Table 2-7 shows the listed fish species in Panther Creek and Fall Creek, and in some cases, the Willamette River within the reach of the City's point of diversion (RM 59.5)

Table 2-6. City of Carlton Water Rights

	Application	Permit	Certificate	Priority Date	Type of	Authorized Rate (cfs) /Volume (AF)	Authorized	Maximum Rate of Withdrawal to Date		2012 Average Withdrawal		Three-Year (2010 – 2012) Average Withdrawal	
					Beneficial Use		Date for Completion	Instantaneous (cfs)	Annually (MG)	Daily (mgd)	Monthly (MG)	Daily (mgd)	Monthly (MG)
Panther Creek	R-46504	R-5527	85744	10/22/69	Municipal	66 AF	N/A	N/A	24.4 (75	N/A	N/A	N/A	N/A
Panther Creek	R-69512	R-10900	85747	11/30/87	Municipal	9 AF	N/A	N/A	AF)	N/A	N/A	N/A	N/A
Panther Creek	S-1609	S-914	1868	8/12/1911	Municipal	0.50 cfs	N/A	0.50					
Panther Creek and Panther Creek Reservoir	S-46505	S-34661	86064	10/22/1969	Municipal	0.271 cfs from Panther Creek/ 66 AF from Panther Creek Reservoir	N/A	0.271	146.6	0.39	11.8	0.39	12.0
Panther Creek and Panther Creek Reservoir	S-69513	S-50218	86065	11/30/1987	Municipal	0.018 cfs from Panther Creek/ 9 AF from Panther Creek Reservoir	N/A	0.018					
Panther Creek and Panther Creek Reservoir ^a	S-46505	S-34661		10/22/1969	Municipal	0.229 cfs from Panther Creek	10/1/1998	-					
Panther Creek and Panther Creek Reservoir ^b	S-69513	S-50218		11/30/1987	Municipal	0.052 cfs from Panther Creek	10/1/2000	-					
Panther Creek ^c	S-44208	S-32489		10/27/67	Municipal	2.5 cfs	10/1/1997						
Fall Creek ^d	S-44207	S-32488		10/27/1967	Municipal	2.0 cfs	10/1/2000						
Willamette River ^e	S-87762	S-54792		11/2/2011	Municipal	44.18 cfs	1/17/2033						

- a. Extension of time pending at OWRD. Fish persistence advice from ODFW and extension conditions will likely limit the amount of natural stream flow available for use
- b. Extension of time to be developed and submitted.
- c. Extension of time application pending. OWRD proposed to approve extension of time on 11/2/2010. Protest filed by WaterWatch on 12/17/2011
- d. Extension of time pending at OWRD. Fish persistence advice from ODFW and extension conditions will likely limit the amount of natural stream flow available for use.
- e. Up to 2.98 cfs for meeting City's demands

Table 2-7. Federal- or State-Listed Fish Species Potentially Found in North Yamhill Watershed and Found in the Willamette River Near the City's Point of Diversion

Species	Evolutionarily Significant Unit (ESU) (if applicable)	Federal Listing	State Listing
Spring Chinook	Upper Willamette River	Threatened	Sensitive - Critical
Winter Steelhead	Upper Willamette River	Threatened	Sensitive - Vulnerable
Coho salmon	Oregon Coast	Threatened	Endangered
Oregon Chub	All	Threatened	Sensitive - Critical
Pacific Lamprey		Petitioned for Listing	Sensitive - Vulnerable
Western Brook Lamprey			Sensitive - Vulnerable

Sources:

North Yamhill Watershed Assessment, 2001:

<https://nrimp.dfw.state.or.us/DataClearinghouse/default.aspx?pn=viewrecord&XMLname=687.xml> Federal ESA listed species, from NOAA Fisheries Office of Protected Resources: <http://www.nmfs.noaa.gov/pr/species/esa/fish.htm>

Federal Sensitive species, from the Interagency Special Status/Sensitive Species Program for Oregon and Washington State:

<http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/>

Oregon State ESA listed species, from the Oregon Department of Fish & Wildlife:

http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp Oregon State Sensitive Species, from the Oregon Department of Fish & Wildlife: http://www.dfw.state.or.us/wildlife/diversity/species/sensitive_species.asp

Federal Species of Concern, from the U.S. Fish & Wildlife Service, Oregon Fish & Wildlife Office:

<http://www.fws.gov/oregonfwo/Species/Data/PacificLamprey/default.asp>

ODFW's advice on fish persistence conditions for Permits S-32488 and S-34661

The point of diversion on Panther Creek is located at approximately river mile (RM) 12.9. At the authorized diversion, Panther Creek is on DEQ's 303(d) list of water quality limited streams for the following parameters: biological criteria, dissolved oxygen, and E. coli (Summer), temperature, and turbidity. No water quality assessment has occurred on Fall Creek.

The point of diversion on the Willamette River for Permit S-54792 is currently authorized at RM 59.5 (the Yamhill River intersects the mainstem Willamette River at RM 54.5). At the authorized diversion, the Willamette River is on DEQ's 303(d) list of water quality limited streams for the following parameters: aldrin, biological criteria, DDT Metabolite (DDE), DDT, dieldrin, dioxin (2,3,7,8-TCDD) (total maximum daily load (TMDL) approved), E. coli (Fall/Winter/Spring) (TMDL approved), fecal coliform (Fall/Winter/Spring) (TMDL approved), flow modification (TMDL not required), iron, mercury (TMDL approved), PCBs, dissolved oxygen, and temperature (TMDL approved).

The 303(d) listing information was obtained from: <http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp>

2.10 EVALUATION OF WATER RIGHTS/SUPPLY

OAR 690-086-0140(3)

The City's water rights and water supply reliability are influenced by priority date, stream flows in Panther Creek, potential permit extension conditions on the City's Panther Creek and Fall Creek water right permits, water system capacity, and access to redundant water supplies.

The City's primary water source is Panther Creek, tributary to the North Yamhill River. The City's natural stream flow water rights on Panther Creek are generally senior in priority date and have not been subject to regulation for senior users. There is an instream water right in the lower portion of Panther Creek held by the State of Oregon, but this water right (Certificate 72585) is junior in priority date to all of the City's Panther Creek water rights.

The main limitation with the City's Panther Creek water supply is the amount of natural stream flow available in summer (peak season demand) months. When stream flows are sufficient, the City can meet its demand largely from natural stream flows. When natural stream flows are not sufficient, the City can meet its demand with the 75 acre-feet of stored water in Panther Creek Reservoir or a combination of stored water and natural stream flow. In other words, even though the City has up to 3.57 cfs of water rights for use of Panther Creek natural stream flow, this amount of natural stream flow is generally not available during peak season demand months. For example, in July 2013 a measurement of Panther Creek (above Panther Creek Reservoir) calculated a stream flow of approximately 1.5 cfs. Over time, the City's stored water may be insufficient to meet projected demands; hence the need for alternative/redundant water supplies.

The City intends to establish a program to measure stream flows on a regular basis in Panther Creek above Panther Creek reservoir. Panther Creek stream flow data will enable the City to understand natural stream flow availability compared to water rights in Panther Creek, to inform the City of when it must rely on stored water, to inform the City how much "stored water" is being used, and to assist the City in developing a timeframe for developing other sources of supply (Fall Creek and the Willamette River via the Yamhill Regional Water Authority).

As previously described, the City has four water right permits that require additional effort to complete. The City has three permit extensions currently pending at OWRD and one that will be submitted. In February 2012, as part of the permit extension process, ODFW provided its fish persistence advice and proposed conditions for Permit S-34661, a water right permit for use of 0.229 cfs from Panther Creek, and Permit S-32488, a water right permit for use of 2.0 cfs from Fall Creek. Permit extension conditions currently proposed for permits S-34661 and S-32488 will likely restrict water diversion when stream flow falls below a particular level in Panther Creek. As a result, a portion of the water from these two sources could become unavailable earlier in the summer even though natural stream flow may be available.

A constraint on certification of the remaining Panther Creek natural stream flow permits held by the City is the City's system capacity. On July 1, 2009, a peak day in early summer with additional operational water needs, the City collected information demonstrating the beneficial use of 2.979 cfs over a 4 hour period. Thus, of the 3.57 cfs of Panther Creek water rights, 0.591 cfs remain to be used for beneficial use, a demonstration of beneficial use in addition to all the existing water rights at the same point of diversion. When system capacity is increased, the City could demonstrate beneficial use of the unperfected portions of Permits S-32489, S-34661, and S-50218.

The City's Fall Creek water right (Permit S-32488) and Willamette River water right via the Yamhill Regional Water Authority (Permit S-54792) are intended to provide water supply redundancy when Panther Creek and Panther Creek Reservoir are unable to meet City demand or are not usable, such as due to contamination, landslides, etc. The diversion and conveyance infrastructure for both permits have not been constructed yet. The amount of water available and the quality of the water in Fall Creek and the Willamette River will need to be understood prior to development. The future adequacy and reliability of Permit S-54792 will depend on whether permit conditions related to "flow targets" are met in the Willamette River. Permit S- 54792 is conditioned so that water can only be diverted under the permit when flows fish flow targets are met or exceeded on a 7-day rolling average at the Willamette River at Salem, OR (USGS gage 14191000) as shown in Table 2-8.

Table 2-8. Required Fish Flow Targets in the Willamette River at Salem, Oregon (USGS Gage 14191000)

Month	Flow Target (cfs)
January 1 – March 31	6,000
April 1 – April 15	15,000
April 16 – April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500
July 1 – October 31	5,630
November 1 – December 31	6,000

Since the early 2000s, as part of its effort to implement the Biological Opinion for the Willamette Basin Projects, (13 federal storage reservoirs in the Willamette Basin), the U.S. Army Corps of Engineers (USACE) has managed the Project reservoirs to try to meet the fish flow targets at Salem and has been largely successful. Based on analysis of stream flow records from the USGS Gage 14191000 in Salem, fish flow targets on the Willamette River were met from 2006 to 2010, with the exception of approximately 23 days in May and June of 2007, or 99 percent of the time. Fish flow targets were met 100 percent of the time in 2012. However, in 2013, fish flow targets were missed 8 days in May and 5 days in June. Although fish flow targets are typically met, the inability to access water under Permit S-54792 when fish flow targets are not met presents a limitation on use of the Willamette River. As a result, in the long-term the City's Panther Creek and Fall Creek sources will continue to be important sources of water supply.

The City has an intertie with MW&L that is intended for emergencies. The City of Carlton and MW&L are in negotiation for an IGA for the emergencies water supply. Once this is in place, discussions for long term water supply might begin. At this time, it is not clear when or if that might occur.

2.11 SYSTEM DESCRIPTION

OAR 690-086-0140(8)

The City operates a public drinking water system (Public Water System Identification Number is 4100171). Figure 2-9 is a schematic of the City's existing water distribution system. The City of Carlton WTP was expanded in 2002 and is a direct filtration plant with a capacity of 1.2 mgd. The City has a total of 1.38 MG of storage in two storage tanks that are approximately 1 mile west of the City, which are described in Table 2-9. The City has 62,694 feet of distribution pipes that are composed primarily of cast iron, ductile iron, and PVC. The City has 46,592 feet of transmission pipes that are composed primarily of PVC. Table 2-10 and Table 2-11 summarize the distribution and transmission pipes, respectively.

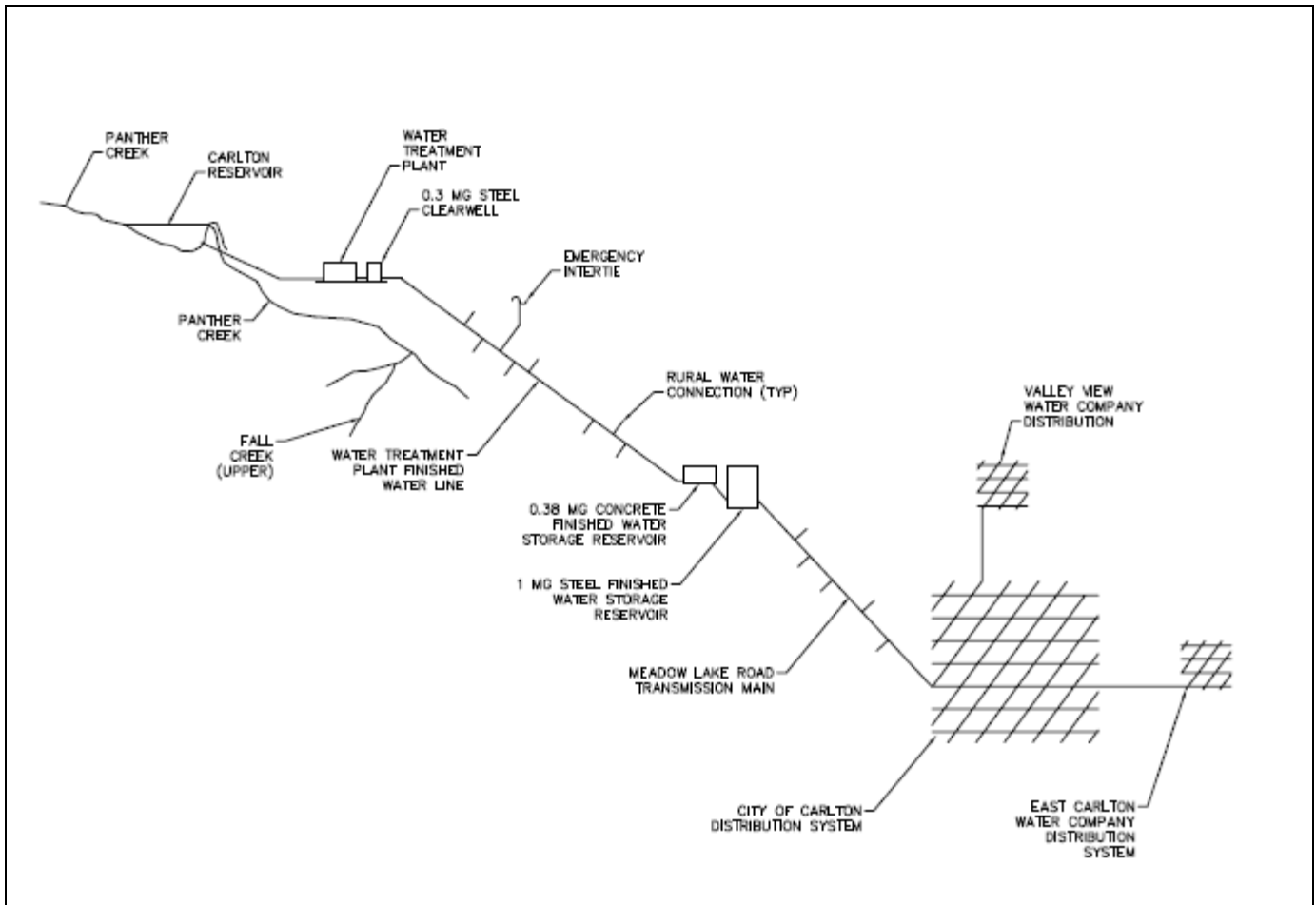


Figure 2-9. Schematic of the City's Existing Water Distribution System

Table 2-9. Summary of system storage tanks

Storage Tank	Volume (MG)	Overflow Elevation (feet)	Completion Date
Steel	1	371.4	2003
Concrete	0.38	371.4	1918
Total	1.38		

Table 2-10. Summary of distribution pipes

Pipe Material	Pipe Length (feet)							Total
	2-inch	3-inch	4-inch	6-inch	8-inch	10-inch	12-inch	
PVC	2,757	-	713	4,496	13,155	-	-	21,121
Ductile Iron	-	-	-	1,218	7,307	5,593	1,725	15,843
Cast Iron	-	-	9,493	9,936	737	1,620	-	21,786
Galvanized Iron	1,337	-	-	-	-	-	-	1,337
Steel	-	269	580	514	-	-	-	1,363
Unknown	1,547	-	3,510	2,967	-	-	-	8,024
Total	5,641	269	14,296	19,131	21,199	7,213	1,725	69,474

Table 2-11. Summary of transmission pipes

Pipe Material	Pipe Length (feet)			Total
	10-Inch Diameter	16-Inch Diameter	18-Inch Diameter	
PVC	27,668	—	8,050	35,718
DI	2,902	500	1,435	4,837
Total	30,570	500	9,485	40,555

3.0 WATER CONSERVATION ELEMENT

This section addresses the requirements of OAR 690-086-0150(1) – (6).

This rule requires a description of specific required conservation measures and benchmarks, and additional conservation measures implemented by the City.

3.1 CURRENT CONSERVATION MEASURES

OAR 690-086-0150(1) AND (3)

3.1.1 Progress Report

This is the City's second WMCP.

3.1.2 Background

The City has been implementing water conservation measures despite staff and resource limitations. The City's water system is fully metered. The City has a monthly consumption charge based on the quantity of water metered at the service connections over 500 cubic feet. The City conducts leak detection surveys of its water system, the most recent occurring in 2013. In addition, the City provides water conservation tips and free showerheads to customers at an annual community event.

3.2 USE AND REPORTING PROGRAM

OAR 690-086-0150(2)

The City records its water use and has compiled and submitted these measurements to OWRD consistent with the requirements of OAR Chapter 690, Division 85.

The City measures, records and reports the amount of raw water entering the City's WTP, which has four filter cells. WTP Filter 3 and 4 each have their own propeller meter and Filter 1 and 2 have a common propeller meter. The City has an electromagnetic meter that measures finished water entering the water distribution system. The City estimates the volume of water stored in Panther Creek Reservoir.

3.3 REQUIRED CONSERVATION PROGRAMS

OAR 690-086-0150(4)

OAR 690-086-150(4) requires that all water suppliers establish 5-year benchmarks for implementing the following water management and conservation measures:

- Annual water audit
- System-wide metering

- Meter testing and maintenance
- Unit-based billing
- Leak detection and repair (if system leakage exceeds 10 percent)
- Public education

3.3.1 Five-Year Benchmarks for Required Conservation Measures

During the next 5 years, the City plans to initiate, continue, or expand the following conservation measures that are required of all municipalities.

3.3.1.1 Annual Water Audit

OWRD defines a water audit as an analysis of the water system that includes a thorough accounting of all water entering and leaving the system to identify leaks in the system and authorized and unauthorized water uses, metered or estimated. The water audit also includes analysis of the water supplier's own water use.

The City does not currently conduct an annual water audit, but the City does collect daily water production and monthly metered consumption data. The city does use the Neptune radio read system and software to identify and address water leaks. In 2014, the City began installation of automated meter reading (AMR) technology, which aids the City's water auditing efforts. The City is approximately 75 percent complete with this transition.

The City's goal is to maintain water loss to 15 percent or below.

Five-Year Benchmarks: Continue to transfer accounts to the AMR system and perform annual water audits in January of each year.

3.3.1.2 System-wide Metering

The City's water system is fully metered.

Five-Year Benchmarks: The City will continue to require that all new connections are metered.

3.3.1.3 Meter Testing and Maintenance

The City replaces residential meters as needed. With the AMR, the City is able to detect unusual monthly use and identify the meters that need to be checked and replaced. The meters of the City's three largest commercial customers, the elementary school, Valley View WD and Carlton Farms, are tested every year. The City's master meters are tested only periodically due to lengthy process involved.

Five-Year Benchmarks: Over the next 5 years, the City will continue to annually test the elementary school, Valley View WD and Carlton Farms meters. The City will continue to install AMR until the entire system is completed.

3.3.1.4 Water Rate Structure

The City has a monthly water service charge (base rate) that includes use of up to 500 cubic feet (cu ft), which depends on the customer's location inside or outside of city limits. In addition, the City has a monthly consumption charge based on the quantity of water metered at the service connection beyond 500 cu ft. Table 3-1 shows the monthly service charges including water use up to 500 cu ft and consumption charges per cubic feet beyond 500 cu ft for customers located inside and outside of city limits.

Table 3-1. Monthly water service charges, effective July 1, 2012

Location	Base rate	Consumption Rate (0 – 500 cf)	Consumption Rate (over 500 cf)
Inside City Limits	\$60.87	\$3.91/100 cf	\$5.67/100cf
Outside City Limits	\$91.30/EDU	\$5.86/100 cf	\$8.50/100cf

cf = cubic feet

Five-Year Benchmarks: The City will continue to bill customers based, in part, on the quantity of water metered at the service connection.

3.3.1.5 Leak Detection and Repair

The City had a leak detection survey of its water system in 2010, 2011, 2012, 2013 and 2014. Leaks identified in the survey were repaired. With the repairs done on the transmission main from the WTP to the community, sealing of the concrete tank and with the AMR system the City has not needed to perform additional leak detection tests. The system from the WTP to the community is new, and the data from the AMR system allows the City to find leaks quickly. The city checks the AMR system for excess use (leaks) monthly.

With the recent transmission pipe upgrade, reservoir sealing and AMR system, the City estimates that water loss in the last year has dropped to approximately 5 percent.

Five-Year Benchmarks: The City will continue to install the AMR system, which will allow the City to more effectively monitor what is occurring in the city limits. The City is also actively searching for funding to replace the older pipes in the distribution system.

3.3.1.6 Public Education

The City provides customers with water conservation information in its annual Consumer Confidence Report, posts it on the city web site and in a brochure at City hall. Water conservation tips are provided on the web site and are also sent out in a community Update that is sent out to a list-serve.

Five-Year Benchmarks: Over the next 5 years the City will continue its current practice and will be searching for additional ways to educate the public.

3.4 EXPANDED USE UNDER EXTENDED PERMITS

OAR 690-086-0150(5)

Under OAR 690-086-0150(5), any municipal water supplier that proposes to expand or initiate the diversion of water under an extended permit for which resource issues have been identified shall include a description of

activities and five-year implementation schedule for a system- wide leak repair or line replacement program to reduce system leakage to no more than 15 percent.

As previously described, the City holds four water right permits that require additional effort to complete. The City has three permit extensions currently pending at OWRD and one that will be submitted. The City does not currently have any “extended permits.” Although the City is not seeking access to an extended permit. The City’s goal is to reduce water loss to 15 percent or below, and currently the City meets that goal estimating that in the last year the water loss has been approximately 5 percent. The City has been proactively implementing system-wide leak repair or line replacement program measures to reduce system leakage. The City also replaced the 7-mile transmission line from the WTP to the treated water reservoirs, and sealed the concrete reservoir. In the next five years, the city will continue to monitor leaks through the AMR system monthly, will seek funding to continue upgrades to the distribution system, repair large leaks as they are identified and will conduct annual water audits. In addition, the City will seek to allocate \$50,000 of its annual budget over the next five years to address its unaccounted for water.

3.5 ADDITIONAL CONSERVATION MEASURES

OAR 690-086-0150(6)

OAR 690-086-0150(6) requires municipal water suppliers that serve a population greater than 1,000 and propose to expand or initiate the diversion of water under an extended permit for which resource issues have been identified, or if the population served is greater than 7,500, to provide a description of the specific activities, along with a five-year schedule to implement several additional conservation measures.

The City does not currently have any “extended permits”; therefore, OAR 690-086-0150(6) does not apply. However, the City has additional conservation measures it is currently implementing or plans to implement in the next five years, which are detailed below.

3.5.1 Leak Repair or Line Replacement Program

As described above, the City monitors leaks on a monthly basis through the AMR system. The City’s also addresses leaks that come to the surface that are found by City staff or people calling in. The City assesses the identified leak, develops a work order, and then repairs or replaces the pipeline.

Five-Year Benchmarks: Over the next five years, the City will continue to address its unaccounted for water. Assuming resources are available, the City will dedicate \$50,000 from its annual budget towards its effort to reduce its unaccounted for water.

3.5.2 Technical and Financial Assistance Programs

Upon request by a customer, City staff provides a water use audit.

City Ordinance 13.04.130 states that if a leak between the meter and a building/residence is repaired within 10 days after receiving notification from the City of the leak, the customer’s bill spanning the period of time with the leak will be reduced by 50 percent.

Five-Year Benchmarks: Over the next five years, the City will continue its water audit and bill reduction programs and will initiate a program to provide toilet leak detection tablets at City Hall.

3.5.3 Supplier Financed Retrofit or Replacement of Inefficient Fixtures

For the many years, the City has provided customers with water saving showerheads at Fun Days, a community event. The practice has been halted as no additional customers were requesting the service.

Five-Year Benchmarks: Over the next 5 years, the City will seek out additional measures that could be made available to the citizens.

3.5.4 Rate Structure and Billing Practices that Encourage Conservation

As described in the Water Rate Structure discussion in the section responsive to OAR 690-086-0150(4), the City has a monthly water service charge (base rate) that includes use of up to 500 cubic feet (cu ft), which depends on the customer's location inside or outside of city limits. The City also has a monthly consumption charge based on the quantity of water metered at the service connection beyond 500 cu ft.

The City bills its customers on a monthly basis, which aids water conservation efforts by providing quick feedback on water usage. The City's installation of AMR will provide even quicker feedback on water usage, greatly improving the identification and response to leaks.

Five-Year Benchmarks: In the next 5 years, the City will continue to use the consumption based rate.

3.5.5 Water Reuse, Recycling, and Non-potable Opportunities

The City currently has no water reuse, recycling, and non-potable initiatives.

Five-Year Benchmarks: In the next 5 years, the City will investigate water reuse opportunities at the Wennerberg Park.

3.5.6 Landscape Irrigation Measures

In the past the stage 1 curtailment has included even/odd days landscape irrigation (lawns, gardens), which has the effect of lowering the daily peak flows. This is a prudent conservation measure, whether there is a curtailment event or not, and is a step that the city is considering.

Five-year Benchmark: In the next 5 years the City will consider enacting a standing even/odd day landscape irrigation as a standard measure during the summer months.

3.5.7 Other Conservation Measures

The City has the following ordinance that prohibits the wasteful use of water:

Municipal code 13.04.580 states that the City may immediately discontinue water service to a customer that violates mandatory curtailment orders or to a customer whose wasteful or negligent water use seriously affects general water service if that water use is not corrected within five days after receiving a written notice from the City.

Five-Year Benchmarks: In the next 5 years, the City will review City codes and the building permit review process to find opportunities to encourage water conservation practices.

4.0 WATER CURTAILMENT ELEMENT

This section satisfies the requirements of OAR 690-086-0160.

This rule requires a description of past supply deficiencies and current capacity limitation. It also requires inclusion of stages of alert and the associated triggers and curtailment actions for each stage.

4.1 INTRODUCTION

Water curtailment plans outline proactive measures that water suppliers may take to reduce demand and to find alternative supply during short-term water supply shortages. The intent of water curtailment plans is to minimize the impacts of water supply shortages, which may result from incidents such as: prolonged drought, mechanical or electrical equipment failure in the system, unanticipated catastrophic events (flooding, landslides, earthquakes and contamination), or events not under control of the water supplier (e.g., localized or area-wide power outages and intentional malevolent acts).

4.2 HISTORY OF SYSTEM CURTAILMENT EPISODES

OAR-690-086-0160(1)

The City originally approved water curtailment measures in 1999 and it has needed to implement curtailment measures in the past 10 years. Prior to 2002, the City implemented periodic odd/even water schedules (curtailment) due to a lack of finished water storage. However, in 2002 the City constructed a new 1 MG finished water reservoir and a 300,000 gallon finished water clear well at the City's WTP. This additional in-system storage has decreased the frequency of curtailment, nevertheless it has been required.

In 2003, the City declared a Stage 4 Alert due to the combination of a power surge that caused the water treatment plan to backwash the filters continually and community water usage, which together produced a water supply shortage.

In the summers of 2008 and 2009, the City also needed to implement curtailment measures to address a water shortage stemming from the dry conditions that year and the reduced stream flow into Panther Creek Reservoir (believed to be due to the lowering of McGuire Reservoir during dam modification construction). During this curtailment episode, the City used flyers and the newspaper to inform customers of the odd/even outdoor watering schedule.

In the summer of 2016, the City needed to implement curtailment measures to address a water shortage stemming from the dry conditions that year and the reduced stream flow into Panther Creek Reservoir. In the summer of 2017, the City was on the verge of implementing curtailment measures to address a water shortage stemming from the dry conditions that year and the reduced stream flow into Panther Creek Reservoir; however, an early rain filled the raw water reservoir days before the action was going to be taken.

4.3 CURTAILMENT EVENT TRIGGERS AND STAGES

OAR-690-086-0160(2) AND (3)

The City has developed this updated curtailment plan to describe the standards and procedures that will be employed in the event of a water shortage that requires the City to invoke water curtailment. Scenarios that could trigger curtailment could include droughts, natural disasters, source water contamination, fire, lower than normal reservoir levels, or a system or facility failure.

The City has developed a five-stage curtailment plan to be invoked in the event of a water supply shortage. These stages are designed to be initiated and implemented in progressive steps. Table 4-1 presents the five curtailment stages, as well as their potential initiating conditions (i.e., triggers).

Table 4-1. Curtailment Stages 1 through 5

Curtailment Stages	Potential Initiating Conditions
Stage 1: Limited Water Shortage Alert	<ul style="list-style-type: none"> • Minor maintenance work or damage repair is required at water mains or reservoirs • A prolonged period of hot dry weather is forecasted • The elevation in the raw water reservoir stops going over the top of the wood weir in June or July.
Stage 2: Moderate Water Shortage Alert	<ul style="list-style-type: none"> • Moderate maintenance work or damage repair is required at water pumps, mains, or reservoirs • A prolonged period of hot dry weather has begun • The elevation in the raw water reservoir stops going over the top of the concrete weir in June, July or August.
Stage 3: Serious Water Shortage Alert	<ul style="list-style-type: none"> • Minor damage to the water system has resulted from a natural disaster or criminal act • Prolonged period of hot dry weather is ongoing • Failure of minor parts of the water system • Source water flow is much lower than normal • The elevation in the raw water reservoir is at the bottom of the concrete structure (approximately 2-feet below the concrete weir). • Finished water reservoir levels are much lower than normal
Stage 4: Severe Water Shortage Alert	<ul style="list-style-type: none"> • Serious damage to the water system has resulted from a natural disaster or criminal act • Failure of a significant part of the water system • Serious drought • Source water flow is critically low • The elevation in the raw water reservoir is approximately 2-feet below the bottom of the concrete structure (approximately 4-feet below the concrete weir). • Finished water reservoir levels are critically low • Isolated contamination of the water supply
Stage 5: Emergency Water Shortage Alert	<ul style="list-style-type: none"> • Extensive damage to the water system resulting from a natural disaster or criminal act • Failure of a critical water system component • Source water flow is unavailable • Raw water reservoir levels are insufficient • Finished water reservoir levels are insufficient • Potentially harmful contamination of the entire water supply • The elevation in the raw water reservoir is more than 2-feet below the bottom of the concrete structure (approximately 4-feet below the concrete weir).

4.4 AUTHORITY & ENFORCEMENT

The City's Public Works Superintendent has the authority to implement Stage 1 and Stage 2 alerts. The City's Manager has the authority to implement a Stage 3 alert and to determine and enforce reduced hours of usage for watering of lawns. By joint declaration, the City Council and City Manager have the authority to implement a Stage 4 or Stage 5 alert.

Municipal ordinance 608 "Rules for Water System (13.04)" authorizes citations and fines for customers violating curtailment restrictions. The first conviction is punishable by a fine up to

\$150. The second conviction is punishable by a fine up to \$300. The third conviction is punishable by a fine of up to \$300 or by imprisonment for up to 30 days, or both.

Municipal code 13.04.580 states that the City may immediately discontinue water service to a customer that violates mandatory curtailment orders or to a customer whose wasteful or negligent water use seriously affects general water service if that water use is not corrected within five days after receiving a written notice from the City.

4.5 CURTAILMENT PLAN IMPLEMENTATION

OAR-690-086-0160(4)

4.5.1 Stage 1: Limited Water Shortage Alert

Stage 1 is activated when the City's Public Works Superintendent determines that the potential for a water shortage exists based on the presence of one or more of the previously described triggers. In Stage 1, the City will inform customers of a growing water shortage and of mandatory odd-even day restriction by address for watering of lawns. Notification of the curtailment stage will be distributed through monthly invoices, notices delivered to the customers and on the City web site.

4.5.2 Stage 2: Moderate Water Shortage Alert

Stage 2 is activated when the City's Public Works Superintendent determines that a moderate water shortage exists based on the presence of one or more of the previously described triggers. In Stage 2, the City will inform customers of the water shortage and of the following mandatory restrictions:

- No outside lawn watering
- No car washing
- No filling outside swimming pools except for the City Pool, if approved by the City Council
- No filling decorative water features, except in limited amounts necessary for maintaining aquatic animal life
- No wetting down impervious surfaces, such as sidewalks, driveways, parking lots, or other hard surfaces except to meet public health or safety requirements

The City will prohibit washing of City-owned vehicles.

4.5.3 Stage 3: Serious Water Shortage Alert

Stage 3 is activated when the City Manager determines that a serious water shortage exists based on the presence of one or more of the previously described triggers. In Stage 3, the City will inform customers of the water shortage and of the following additional mandatory restrictions:

- Odd-even day restriction by address for watering of gardens

The City will reduce water use for irrigation, discontinue fire system flushing activities, and cease washing down impervious surfaced areas except where necessary for public health and safety.

4.5.4 Stage 4: Severe Water Shortage Alert

Stage 4 is activated when the City Council and City Manager jointly determines that a severe water shortage exists based on the presence of one or more of the previously described triggers. In Stage 4, the City will inform customers of the water shortage and of the following additional mandatory restrictions:

- No watering of gardens
- Reduced hours for commercial uses of water

The City will stop issuing permits for hydrant use and establishing new residential and commercial water connections. Method(s) of public notification of the curtailment stage may also include phone/text messages, other print media, and signs.

4.5.5 Stage 5: Emergency Water Shortage Alert

Stage 5 is activated when the City Council and City Manager jointly determines that a severe water shortage exists based on the presence of one or more of the previously described triggers. In Stage 5, the City will inform customers of the emergency water shortage and that water use is only authorized for life support and basic household use. Public notification of the curtailment stage will be distributed using several of the methods described in earlier curtailment stages.

The water emergency will be in effect until the City Council and City Manager jointly determine that the water shortage is over and an emergency situation no longer exists.

5.0 WATER SUPPLY

This section satisfies the requirements of OAR 690-086-0170.

This rule requires descriptions of the City's current and future water delivery areas and population projections, demand projections for 10 and 20 years, and the schedule for when the City expects to fully exercise their water rights. The rule also requires comparison of the City's projected water needs and the available sources of supply, an analysis of alternative sources of water, and a description of required mitigation actions.

5.1 DELINEATION OF SERVICE AREAS

OAR 690-086-0170(1)

The City is expected to experience continued moderate growth in the future, generally due to its proximity to the Newberg and McMinnville areas, both of which have a comparatively larger employment base but less affordable housing than Carlton. During the 20-year planning period of this WMCP, the City anticipates future residential development to continue as both new subdivisions and as infill development (i.e., partitions and redevelopment). Major commercial or industrial developments that would dramatically increase the employment opportunities in Carlton are not anticipated over the next 20 years. Anticipated future development is not expected to require an expansion of the current water delivery area over the next 20 years. The City's current and future water service area is shown in Figure 2-2.

5.2 POPULATION PROJECTIONS

OAR 690-086-0170(1)

The City's population projections only take into account population within the city limits and urban growth boundary, which are the same boundary. Population outside the city limits served by the City's water system serve is not explicitly known. This population is connected on the basis of long-term historical circumstances and the City expects extremely limited future connections to its water system outside the city limits. This WMCP assumes that water demand outside the city limits will not increase in proportion to population growth.

The City's population projection is based on the population growth rates from the PSU Population Center report for the current cycle (2022 – 2026). The forecasts for Yamhill County's smaller cities, including the City of Carlton, are based on housing growth that incorporates current population composition and recent demographic trends. The projected population of the Carlton UGB is shown in Table 5-1.

Table 5-1. Projected Population

Year	Projected Population
2025	2,497
2035	2,970
2045	3,313

Based on the report "Population Forecasts for Yamhill County, its Cities and Unincorporated Area 2011-2035"

5.3 DEMAND FORECAST

OAR 690-086-0170(3)

This WMCP uses the demand forecast developed by the City's most current Water Master Plan, which uses finished water demand data to develop finished water and raw water demand projections. The City's projected water demands are based on the following assumptions:

- The ratio of residential to non-residential use (commercial, industrial and public uses) will remain constant. In other words, future commercial and industrial developments will track population growth.
- The long-term per capita water demands presented below will not exceed the City's historical averages. Since the long term efficacy of planned water conservation programs is unknown at this time, these water demand projections exclude conservation measures beyond those already implemented by the City.
- New commercial and industrial developments will not be large water users given that no provision has been made for new industries with heavy water demands, such as food processing or beverage production.
- Population projections are reasonable estimates of the City's future populations and the forecasted peaking factors are reasonable estimates of future demand variations.
- Future water loss will not exceed the City's historical averages.

Historical per capita finished water demand is based upon the Water Master Plan. The average day demand is 160 gpcd. Per the Water Master Plan, 72 gpcd (45 percent of current values) will be adjusted for population growth inside city limits and 88 gpcd (55 percent of current values) will be held steady over time when calculating future finished water demands as growth is not anticipated to increase outside of city limits. As shown in Table 2-2 the ADD to MDD peaking factor for the last five years has been 1.8. For the purposes of the demand forecast the historical peaking factor calculated in the Water Master Plan will be used, which is 2.06. The projected raw water MDD was calculated by multiplying the projected finished water demand by 1.22, given that approximately 18 percent of the raw water entering the City's WTP goes to WTP operations (backwashing, system flushing, etc.). The projected raw water demand is shown in Table 5-2.

Table 5-2. Projected Raw Water Demand

Year	Finished Water (mgd)	Raw water (mgd)	Raw Water (cfs)
2025*	0.592	0.722	1.12
2035	0.748	0.912	1.41
2045	0.861	1.050	1.62

* From the 2014 Water Master Plan

5.4 SCHEDULE TO EXERCISE PERMITS AND COMPARISON OF PROJECTED NEED TO AVAILABLE SOURCES

OAR 690-086-0170(2) AND (4)

As described in Section 2, the City has 0.789 cfs in certificated water rights being 0.5 cfs (Certificate 1868), 0.271 cfs (Certificate 86064), and 0.018 cfs (Certificate 86065). In combination with its Panther Creek water rights permits, the City has authorization for up to 3.57 cfs of natural flow from Panther Creek.

While projections based on metered demand may suggest a MDD in 2033 of 1.09 to 1.21 cfs, these projections do not account for typical municipal operational requirements. These operational requirements can include but are not limited to maintaining full levels in finished water reservoirs and distribution lines to replenish water supply for fire protection and meeting anticipated and unanticipated demand. On July 1, 2009, in meeting municipal demands, the City documented the diversion and beneficial use of its 0.789 cfs of certificated water rights and 2.19 cfs of permit S-32489, for a total of 2.979 cfs. Table 5-3 presents the July 1, 2009, meter readings.

Table 5-3. City of Carlton Water Treatment Plant Capacity Meter Readings, July 1, 2009

	Filter Unit 1 & 2		Filter Unit 3		Filter Unit 4		Totals
	Totalizer	Rate	Totalizer	Rate	Totalizer	Rate	
Time	× 1000 gal	gpm	× 100 gal	gpm	× 100 gal	gpm	
9:30 AM	222702	414	3370472	524	3501413	518	
10:30 AM	222727	390	3370807	489	3501756	512	
11:30 AM	222746	386	3371070	461	3502038	505	
12:30 PM	222768	366	3371346	433	3502350	501	
1:30 PM	222787	371	3371598	415	3502646	498	
Production Rate (gpm)	354.2	469.2	513.8	1337.1			
Production Rate (cfs)	0.7891	1.0453	1.1446	2.979			

Therefore, upon approval of its extension of time for Permit S-32489 the City will seek a certificate for the 2.19 cfs portion of Permit S-32489 beneficially used to date. Upon perfecting

Although projected (metered) demand for these remaining Panther Creek permits is theoretically many years out, similar to permit S-32489, the City estimates that operational needs will likely require their full beneficial use much sooner. Interest in developing wineries and other development such as hotels has been expressed to the City. In addition, the City will need a new finished reservoir in 10 to 20 years based on current demand projections. The reservoir would likely be a 1 MG storage tank. The City will need to occasionally maintain that reservoir on a peak day and will need to replenish fire flow storage. Finally, the City's WTP will need to be upgraded in approximately 20 to 30 years, at which point system capacity will be available and operational needs will be increased, requiring the use of additional Panther Creek water right permits for meeting municipal demands.

Consequently, assuming there is adequate stream flow in Panther Creek, the City estimates it will fully beneficially use the undeveloped portions of Permits S-32489, S-34661, and S-50218 by 2043.

The City also has water right permits on Fall Creek and on the Willamette River that can provide water supply redundancy when Panther Creek has insufficient flows to meet City demand or is not usable. The City intends to fully beneficially use the 2.0 cfs authorized under Permit S-32488 as a redundant supply upon completing the required construction of infrastructure. The City is currently considering whether construction is financially feasible; however, it is unlikely this redundant supply will be developed during the 20-year planning period of this WMCP.

As a member of the Yamhill Regional Water Authority, 2.98 cfs of the 44.18 cfs allowed under Permit S-54792 for use of the Willamette River is allocated to the City. The diversion, regional WTP, and other necessary infrastructure for Permit S-54792 remain to be built, which will take many years and makes access to the City's 2.98 cfs under the permit uncertain during a considerable portion of the 20-year planning period of this WMCP. To the extent this supply becomes available, it will likely be used as a redundant supply source and a source to meet peak season demands when Panther Creek stream flows are inadequate.

5.5 ALTERNATIVE SOURCES

OAR 690-086-0170(5)

OAR 690-086-0170(5) requires an analysis of alternative sources of water if any expansion or initial diversion of water allocated under existing permits is necessary to meet future water demand. As described above, upon receiving an extension of time for permit S-32489, the City intends to seek a certificate for 2.19 cfs. The following subsections analyze the extent to which the projected water needs can be met through other alternatives.

5.5.1 Conservation Measures

As described in Section 3, the City has been implementing water conservation measures to increase water conservation by its customers and it plans to continue its conservation program

activities and to monitor water use by customers. The largest conservation opportunity for the City is the reduction in water loss due to leaks. The 20-year demand projection in this WMCP assumes water loss will be cut in half. While this water conservation measure and others proposed by the City may delay the need for future additional surface water under permits S- 32489, S-34661, and S-50218, the City has demonstrated the beneficial use of 2.19 cfs under permit S-32489 for municipal use. Therefore, increased water use under Permit S-32489, in addition to conservation, will be required to provide the water needed to meet the City's municipal water demands during the next 20 years.

5.5.2 Interconnections

As described in Section 2, the City has interconnections with Valley View Water District and East Carlton Water Company to serve their customers water, as well as an interconnection with MWL for emergency purposes. In addition, the City has an IGA with neighboring water providers to manage a water right for use of Willamette River water to meet their respective future water supply needs. If Carlton and MWL sign an IGA for permanent or emergency water, then coordination of the curtailment plans will be addressed in the IGA.

The need for Willamette River water by neighboring water suppliers is primarily based on the need for additional supplies by those communities. These communities do not have sufficient water supplies to meet the City's long-term future water demands through interconnections not related to the Willamette River. Consequently, additional interconnections with other water suppliers do not meet the City's need to develop all of its water rights to meet future water demands and to increase its system redundancy in the long term.

5.5.3 Cost effectiveness

OAR 690-086-170(c) requires an assessment of whether the projected water needs can be satisfied through other conservation measures that would provide water at a cost that is equal or less than the cost of other identified sources.

As described above, conservation and interconnections cannot prevent the City's need to use Permit S-32489 and cannot prevent the need to provide system redundancy in the long-term. Given that the City's WTP has sufficient capacity to meet the City's demands over the next 20 years, and the City has demonstrated the use of 2.19 cfs under permit S-32489 to meet municipal demands, use of Permit S-32489 is the most cost effective option for helping the City meet its future water demands.

5.6 QUANTIFICATION OF PROJECTED MAXIMUM RATE AND MONTHLY VOLUME

OAR 690-086-0170(6)

OAR 690-086-0170(6) requires a quantification of the maximum rate of withdrawal and maximum monthly use if any expansion or initial diversion of water allocated under an existing permit is necessary to meet demands in the 20-year planning horizon. Within the next 20 years, the City is planning to beneficially use up to 2.19 cfs under Permit S-32489 to help meet its projected water demands and municipal water system operational needs. Assuming that the water right is used at its 2.19 cfs (1.42 mgd), 24 hours per day for 31 days during the maximum month (likely July, assuming adequate stream flow is available) the maximum monthly volume for the water right would be approximately 44.0 MG.

5.7 MITIGATION ACTIONS UNDER STATE AND FEDERAL LAW

OAR 690-086-0170(7)

Under OAR 690-086-0170(7), for expanded or initial diversion of water under an existing permit, the water supplier is to describe mitigation actions it is taking to comply with legal requirements of the Endangered Species Act, Clean Water Act, and other applicable state or federal environmental regulations. The City currently is not required to take any mitigation actions under state or federal law related to the City's water rights permits.

5.8 NEW WATER RIGHTS

OAR 690-086-0170(8)

Under OAR 690-086-0170(8), if a municipal water supplier finds it necessary to acquire new water rights within the next 20 years in order to meet its projected demand, an analysis of alternative sources of the additional water is required. The analysis must consider availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water. As shown above, the City's Panther Creek natural flow water rights are sufficient to meet projected demands during the next 20 years, assuming adequate stream flow is available for appropriation. However, it is likely, in the future, that during peak demand months (when natural stream flows are typically inadequate) the City will fully utilize its stored water and the City will need additional/redundant supply. This future additional/redundant supply is anticipated to come from existing City permit S-32488 for use of Fall Creek and Permit S-54792 for use of the Willamette River. Consequently, the City currently has no plans to acquire additional water rights during the 20-year planning period for this WMCP.

APPENDIX A: LETTERS TO LOCAL GOVERNMENTS AND RESPONSES



May 21, 2024

Scott Whyte
Mid-Willamette Valley Council of Government
100 High St. SE, Ste. 200
Salem, OR 97301

Subject: Water Management and Conservation Plan for the City of Carlton

Dear Scott:

The City of Carlton has developed a draft updated Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments comprehensive land use plans. Attached to the email is the City's draft WMCP for your review.

We understand that the City of Carlton contracts with the Mid-Willamette Valley Council of Governments for planning services, such as interpretation of comprehensive plans, which is why we are contacting you about the City of Carlton's draft Water Management and Conservation Plan.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or email them to me directly at Gordon.munro@tetrattech.com.

If you have any questions, please feel free to contact me at 971-330-5168. Thank you for your interest and your time.

Sincerely,
Tetra Tech

A handwritten signature in blue ink, appearing to read 'Gordon A. Munro', with a stylized flourish at the end.

Gordon Munro, PE

Cc: Shannon Beaucaire, City Manager for Carlton



May 21, 2024

Lance Woods
Department of Planning and Development
Yamhill County
525 NW 4th Street
McMinnville, OR 97128

Subject: Water Management and Conservation Plan for the City of Carlton

Dear Lance:

The City of Carlton has developed a draft updated Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments comprehensive land use plans. Attached to the email is the City's draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or email them to me directly at Gordon.munro@tetrattech.com.

If you have any questions, please feel free to contact me at 971-330-5168. Thank you for your interest and your time.

Sincerely,
Tetra Tech

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Gordon Munro, PE

Cc: Shannon Beaucaire, City Manager for Carlton



May 21, 2024

John Dietz
Yamhill Regional Water Authority
McMinnville Water & Light
P.O. Box 638
McMinnville, OR 97128

Subject: Water Management and Conservation Plan for the City of Carlton

Dear John:

The City of Carlton has developed a draft updated Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments comprehensive land use plans. Attached to the email is the City's draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comments to me at the address on this letterhead or email them to me directly at Gordon.munro@tetrattech.com.

If you have any questions, please feel free to contact me at 971-330-5168. Thank you for your interest and your time.

Sincerely,
Tetra Tech

A handwritten signature in blue ink, appearing to read 'Gordon A. Munro'.

Gordon Munro, PE

Cc: Shannon Beaucaire, City Manager for Carlton

Agency Responses to the Carlton draft WMCP

All responses were received through email.

City of Carlton – Land Use through the Mid-Willamette Valley COG

I have no comments.

MW&L

MW&L - McMinnville Water and Light(MWL) has completed their internal review of the City of Carlton's WMCP. MWL would like to see something included in the WMCP that says, if Carlton decides to sign a permanent or emergency agreement with MWL for surplus water, they would be required to follow our Water Curtailment Plan if we had to declare a water shortage.

City - Thank you for your comment, I will chat with the City concerning this. Would a statement such as the following suffice? "If Carlton and MW&L sign an IGA for permanent or emergency water, then coordination of the curtailment plans will be addressed in the IGA".

This would provide time for both agencies to review the curtailment plans and figure out the differences. I am pretty sure the City would like time to compare them to see what the differences are before making a definitive statement.

MW&L - Good morning. Yes, that statement works.

Yamhill County

No response received.

**APPENDIX B: POPULATION FORECASTS FOR YAMHILL COUNTY, ITS
CITIES AND UNINCORPORATED AREA**

Year of Last Update	County	UGB	City or Part FIPS Code	2010	2017	2018	2019	2020	2021	2022	2025	2030	2035
2022	Coos County		41011	63,043				64,929	65,154	65,215	65,296	65,267	65,137
2022	Coos County	Bandon UGB	4101103800	3,175				3,529	3,646	3,678	3,748	3,867	4,005
2022	Coos County	CoosBay UGB	4101115250	15,967				15,972	16,005	16,044	16,140	16,256	16,333
2022	Coos County	Coquille UGB	4101115350	3,963				4,080	4,382	4,376	4,354	4,305	4,252
2022	Coos County	Lakeside UGB	4101140650	1,699				1,904	1,906	1,918	1,952	2,005	2,047
2022	Coos County	MyrtlePoint UGB	4101151050	2,553				2,532	3,558	3,548	3,515	3,449	3,383
2022	Coos County	NorthBend UGB	4101153000	9,717				10,338	10,396	10,439	10,555	10,720	10,851
2022	Coos County	Powers UGB	4101159600	707				722	720	718	711	697	687
2022	Coos County	Outside UGB Area	4101199999	25,262				25,852	24,541	24,494	24,321	23,967	23,577
2022	Crook County		41013	20,978				24,738	25,482	25,931	27,065	28,633	30,033
2022	Crook County	Prineville UGB	4101359850	11,213				12,921	13,269	13,447	13,972	14,622	15,274
2022	Crook County	Outside UGB Area	4101399999	9,765				11,817	12,213	12,484	13,093	14,011	14,759
2022	Curry County		41015	22,364				23,446	23,662	23,790	24,066	24,429	24,698
2022	Curry County	Brookings UGB	4101508650	11,199				11,706	11,780	11,861	12,051	12,322	12,589
2022	Curry County	Gold Beach UGB	4101529900	3,141				3,310	3,349	3,361	3,382	3,403	3,436
2022	Curry County	Port Orford UGB	4101559250	1,807				1,797	1,811	1,811	1,803	1,782	1,770
2022	Curry County	Outside UGB Area	4101599999	6,217				6,633	6,722	6,757	6,829	6,923	6,903
2022	Deschutes County		41017	157,733				198,253	203,390	207,921	220,678	240,446	258,698
2022	Deschutes County	Bend UGB	4101705800	77,122				99,598	101,354	103,976	111,062	122,391	133,339
2022	Deschutes County	La Pine UGB	4101741050	1,653				2,512	2,654	2,736	3,014	3,475	3,948
2022	Deschutes County	Redmond UGB	4101761200	26,508				33,608	36,462	37,342	40,503	45,399	50,056
2022	Deschutes County	Sisters UGB	4101767950	2,038				3,064	3,286	3,437	3,890	4,721	5,616
2022	Deschutes County	Outside UGB Area	4101799999	50,412				59,471	59,634	60,430	62,210	64,460	65,738
2022	Douglas County		41019	107,667				111,201	111,694	112,076	113,076	114,291	115,080
2022	Douglas County	Canyonville UGB	4101911000	2,005				1,744	1,780	1,775	1,734	1,669	1,605
2022	Douglas County	Drain UGB	4101920500	1,352				1,316	1,312	1,315	1,303	1,285	1,254
2022	Douglas County	Elkton UGB	4101922800	195				183	192	192	188	182	176
2022	Douglas County	Glendale UGB	4101929350	979				942	939	938	923	899	871
2022	Douglas County	MyrtleCreek UGB	4101950950	7,478				7,584	7,600	7,631	7,612	7,589	7,558
2022	Douglas County	Oakland UGB	4101954000	1,097				1,088	1,085	1,087	1,079	1,066	1,050
2022	Douglas County	Reedsport UGB	4101961300	4,244				4,422	4,476	4,480	4,518	4,548	4,551
2022	Douglas County	Riddle UGB	4101961850	1,182				1,186	1,214	1,223	1,233	1,250	1,263
2022	Douglas County	Roseburg UGB	4101963650	28,344				29,498	29,557	29,631	30,503	31,570	32,476
2022	Douglas County	Sutherlin UGB	4101971650	8,170				8,845	9,387	9,436	9,457	9,498	9,546
2022	Douglas County	Winston UGB	4101983400	5,571				5,893	5,953	5,984	6,237	6,579	6,904
2022	Douglas County	Yoncalla UGB	4101984600	1,087				1,051	1,065	1,064	1,046	1,018	990
2022	Douglas County	Outside UGB Area	4101999999	45,963				47,449	47,134	47,321	47,242	47,137	46,837
2022	Harney County		41025	7,422				7,495	7,537	7,555	7,584	7,587	7,555
2022	Harney County	Burns UGB	4102509800	2,929				2,796	2,811	2,811	2,842	2,859	2,859
2022	Harney County	Hines UGB	4102534250	1,707				1,781	1,798	1,804	1,848	1,898	1,940
2022	Harney County	Outside UGB Area	4102599999	2,786				2,918	2,929	2,939	2,895	2,831	2,756
2022	Jackson County		41029	203,206				223,259	223,827	228,380	237,060	247,461	256,658
2022	Jackson County	Ashland UGB	4102903050	20,626				21,897	22,280	22,553	22,847	23,306	23,817
2022	Jackson County	Butte Falls UGB	4102910050	423				443	451	454	446	434	428

2022	Jackson County	Central Point UGB	4102912400	17,736	19,565	20,560	20,876	21,335	22,087	22,846
2022	Jackson County	Eagle Point UGB	4102921550	8,508	9,760	9,929	10,080	10,385	10,857	11,334
2022	Jackson County	Gold Hill UGB	4102929950	1,228	1,344	1,379	1,395	1,388	1,384	1,385
2022	Jackson County	Jacksonville UGB	4102937000	2,785	3,043	3,103	3,148	3,157	3,188	3,230
2022	Jackson County	Medford UGB	4102947000	76,733	87,881	89,592	91,116	96,440	104,530	112,636
2022	Jackson County	Phoenix UGB	4102957500	4,774	4,689	4,345	4,676	5,311	5,651	5,686
2022	Jackson County	Rogue River UGB	4102963450	2,714	3,080	3,117	3,154	3,246	3,376	3,502
2022	Jackson County	Shady Cove UGB	4102966550	3,050	3,263	3,278	3,313	3,306	3,303	3,325
2022	Jackson County	Talent UGB	4102972500	6,123	6,379	5,834	6,330	7,169	7,657	7,751
2022	Jackson County	Outside UGB Area	4102999999	58,506	61,915	59,958	61,282	62,029	61,688	60,719
2022	Jefferson County		41031	21,720	24,502	24,889	25,068	25,589	26,481	27,377
2022	Jefferson County	Culver UGB	4103117300	1,361	1,602	1,636	1,664	1,716	1,818	1,915
2022	Jefferson County	Madras UGB	4103145250	7,000	7,964	9,009	9,069	9,575	10,316	11,047
2022	Jefferson County	Metolius UGB	4103147750	732	1,015	1,028	1,050	1,095	1,184	1,273
2022	Jefferson County	Outside UGB Area	41031	12,627	13,921	13,216	13,284	13,203	13,163	13,141
2022	Josephine County		41033	82,713	88,090	88,728	89,276	90,810	93,247	95,598
2022	Josephine County	Cave Junction UGB	4103311850	2,199	2,440	2,510	2,533	2,550	2,592	2,643
2022	Josephine County	Grants Pass UGB	4103330550	38,297	42,233	42,728	43,073	44,972	47,776	50,653
2022	Josephine County	Outside UGB Area	4103399999	42,217	43,417	43,490	43,670	43,287	42,879	42,303
2022	Klamath County		41035	66,380	69,413	69,822	70,074	70,620	71,147	71,401
2022	Klamath County	Bonanza UGB	4103507300	401	382	404	407	415	425	433
2022	Klamath County	Chiloquin UGB	4103513050	766	808	856	860	868	878	882
2022	Klamath County	Klamath Falls UGB	4103539700	42,567	44,484	44,902	45,164	45,818	46,662	47,258
2022	Klamath County	Malin UGB	4103545400	836	756	756	757	759	757	753
2022	Klamath County	Merrill UGB	4103547700	939	899	917	919	941	964	979
2022	Klamath County	Outside UGB Area	4103599999	20,871	22,084	21,987	21,968	21,820	21,461	21,094
2022	Lake County		41037	7,895	8,160	8,177	8,170	8,157	8,180	8,280
2022	Lake County	Lakeview UGB	4103740700	3,263	3,352	3,314	3,322	3,341	3,394	3,471
2022	Lake County	Paisley UGB	4103756250	243	250	244	242	248	254	262
2022	Lake County	Outside UGB Area	4103799999	4,389	4,558	4,619	4,607	4,568	4,532	4,547
2021	Benton County		41003		94,665			101,261	108,881	115,347
2021	Benton County	Adair Village UGB	4100300275		1,370			1,846	2,068	2,279
2021	Benton County	Albany UGB (Benton)	4100301000		8,300			8,566	9,826	11,116
2021	Benton County	Corvallis UGB	4100315800		62,254			67,082	71,532	75,107
2021	Benton County	Monroe UGB	4100349600		651			710	796	878
2021	Benton County	Philomath UGB	4100357450		5,881			6,324	6,972	7,568
2021	Benton County	Outside UGB Area	4100399999		16,209			16,734	17,687	18,401
2021	Lane County		41039		381,365			397,742	412,045	424,423
2021	Lane County	Coburg UGB	4103914400		1,375			1,559	1,689	1,818
2021	Lane County	Cottage Grove UGB	4103915950		10,660			10,605	10,921	11,177
2021	Lane County	Creswell UGB	4103916950		5,913			5,983	6,642	7,328
2021	Lane County	Dunes City UGB	4103921150		1,365			1,359	1,423	1,481
2021	Lane County	Eugene UGB	4103923850		193,768			206,740	215,637	223,575
2021	Lane County	Florence UGB	4103926050		11,182			11,145	11,904	12,641
2021	Lane County	Junction City UGB	4103938000		6,954			7,444	7,895	8,323
2021	Lane County	Lowell UGB	4103944050		1,090			1,171	1,249	1,324

2021	Lane County	Oakridge UGB	4103954100		3,458	3,727	3,904	4,062
2021	Lane County	Springfield UGB	4103969600		70,337	72,103	73,838	75,149
2021	Lane County	Veneta UGB	4103977050		4,845	4,915	5,337	5,759
2021	Lane County	Westfir UGB	4103979950		275	282	303	324
2021	Lane County	Outside UGBs	4103999999		70,144	70,709	71,304	71,460
2021	Lincoln County		41041		48,304	50,883	52,344	53,149
2021	Lincoln County	Depoe Bay UGB	4104118850		1,450	1,875	2,270	2,688
2021	Lincoln County	Lincoln City UGB	4104142600		9,671	10,123	10,473	10,685
2021	Lincoln County	Newport UGB	4104152450		11,882	12,429	12,589	12,577
2021	Lincoln County	Siletz UGB	4104167500		1,302	1,338	1,412	1,468
2021	Lincoln County	Toledo UGB	4104174000		3,782	3,929	3,972	3,959
2021	Lincoln County	Waldport UGB	4104178000		2,373	2,473	2,598	2,692
2021	Lincoln County	Yachats UGB	4104184200		780	836	894	943
2021	Lincoln County	Outside UGB Area	4104199999		17,064	17,879	18,135	18,137
2021	Linn County		41043		127,320	134,032	139,090	142,903
2021	Linn County	Albany UGB (Linn)	4104301000		47,654	50,861	53,444	55,552
2021	Linn County	Brownsville UGB	4104309050		1,746	1,928	2,058	2,171
2021	Linn County	Gates UGB (Linn)	4104328200		45	46	46	46
2021	Linn County	Halsey UGB	4104331750		950	1,039	1,112	1,176
2021	Linn County	Harrisburg UGB	4104332550		3,804	3,944	4,339	4,717
2021	Linn County	Idanha UGB (Linn)	4104335800		65	90	110	133
2021	Linn County	Lebanon UGB	4104341650		20,314	20,979	21,588	21,973
2021	Linn County	Lyons UGB (Linn)	4104344300		1,248	1,330	1,403	1,464
2021	Linn County	Mill City UGB (Linn)	4104348150		1,798	2,000	2,094	2,168
2021	Linn County	Millersburg UGB	4104348300		2,850	3,312	3,752	4,243
2021	Linn County	Scio UGB	4104365650		975	1,122	1,204	1,276
2021	Linn County	Sodaville UGB	4104368550		355	378	411	441
2021	Linn County	Sweet Home UGB	4104371950		9,461	10,046	10,455	10,759
2021	Linn County	Tangent UGB	4104372600		1,394	1,394	1,431	1,453
2021	Linn County	Waterloo UGB	4104379050		235	236	244	248
2021	Linn County	Outside UGB Area	4104399999		34,426	35,328	35,400	35,082
2021	Marion County		41047		349,121	369,983	385,366	397,723
2021	Marion County	Aumsville UGB	4104703250		4,376	4,581	5,007	5,423
2021	Marion County	Aurora UGB	4104703300		1,023	1,162	1,325	1,491
2021	Marion County	Detroit UGB	4104719100		205	201	219	237
2021	Marion County	Donald UGB	4104720100		995	1,389	1,607	1,839
2021	Marion County	Gates UGB (Marion)	4104728200		498	498	507	511
2021	Marion County	Gervais UGB	4104728650		2,624	2,782	2,961	3,120
2021	Marion County	Hubbard UGB	4104735450		3,454	3,596	3,768	3,910
2021	Marion County	Idanha UGB (Marion)	4104735800		90	91	97	104
2021	Marion County	Jefferson UGB	4104737250		3,335	3,644	4,073	4,502
2021	Marion County	Keizer UGB	4104738500		38,590	39,116	40,986	42,530
2021	Marion County	Mill City UGB (Marion)	4104748150		312	352	409	468
2021	Marion County	Mt. Angel UGB	4104750150		3,595	4,108	4,341	4,544
2021	Marion County	Salem UGB (Marion)	4104764900		177,362	192,862	201,272	208,061
2021	Marion County	Scotts Mills UGB	4104765800		387	422	463	502

2021	Marion County	Silverton UGB	4104767650		11,050	11,568	12,116	12,571
2021	Marion County	St. Paul UGB	4104764850		440	431	491	554
2021	Marion County	Stayton UGB	4104770200		8,159	8,451	8,798	9,069
2021	Marion County	Sublimity UGB	4104770700		3,050	3,319	3,405	3,461
2021	Marion County	Turner UGB	4104775150		2,410	2,738	2,974	3,203
2021	Marion County	Woodburn UGB	4104783750		25,882	26,370	27,809	29,050
2021	Marion County	Outside UGB Area	4104799999		61,285	62,302	62,735	62,574
2021	Polk County		41053		83,805	92,866	101,329	110,043
2021	Polk County	Dallas UGB	4105317700		17,201	18,564	20,611	22,773
2021	Polk County	Falls City UGB	4105324550		1,000	1,074	1,161	1,248
2021	Polk County	Independence UGB	4105336150		9,851	12,126	13,578	15,131
2021	Polk County	Monmouth UGB	4105349550		10,022	12,003	13,068	14,165
2021	Polk County	Salem UGB (Polk)	4105364900		29,768	32,132	34,819	37,536
2021	Polk County	Willamina UGB (Polk)	4105382350		905	927	1,020	1,116
2021	Polk County	Outside UGB Area	4105399999		15,057	16,041	17,073	18,076
2020	Clackamas County		41005	375,992	417,602	437,222	460,401	483,349
2020	Clackamas County	Barlow UGB	4100504000	137	141	143	149	152
2020	Clackamas County	Canby UGB	4100510750	17,097	18,347	19,468	20,796	22,234
2020	Clackamas County	Estacada UGB	4100523800	3,330	4,235	4,633	5,044	5,449
2020	Clackamas County	Molalla UGB	4100549450	8,561	10,237	11,290	12,515	13,814
2020	Clackamas County	Sandy UGB	4100565250	9,912	11,628	12,738	14,167	15,757
2020	Clackamas County	Outside UGB Area	4100599999	79,969	86,276	87,375	87,421	87,407
2020	Clatsop County		41007	37,039	38,254	38,807	39,261	39,632
2020	Clatsop County	Astoria UGB	4100703150	9,782	9,815	9,889	9,901	9,910
2020	Clatsop County	Cannon Beach UGB	4100710850	1,693	1,652	1,664	1,698	1,715
2020	Clatsop County	Gearhart UGB	4100728450	1,508	1,516	1,545	1,573	1,601
2020	Clatsop County	Seaside UGB	4100765950	6,657	6,716	6,874	7,050	7,177
2020	Clatsop County	Warrenton UGB	4100778900	5,022	5,586	5,924	6,322	6,689
2020	Clatsop County	Outside UGB Area	4100799999	12,377	12,969	12,911	12,716	12,539
2020	Columbia County		41009	49,351	51,623	52,981	54,701	56,476
2020	Columbia County	Clatskanie UGB	4100913750	1,867	1,822	1,817	1,875	1,934
2020	Columbia County	Columbia City UGB	4100914750	1,950	1,871	1,899	1,953	2,033
2020	Columbia County	Prescott UGB	4100959750	57	53	53	52	51
2020	Columbia County	Rainier UGB	4100960850	2,430	2,378	2,414	2,448	2,526
2020	Columbia County	Scappoose UGB	4100965500	7,269	8,025	8,511	9,146	9,758
2020	Columbia County	St. Helens UGB	4100964600	14,839	15,503	16,338	17,327	18,354
2020	Columbia County	Vernonia UGB	4100977250	2,191	2,039	2,037	2,054	2,089
2020	Columbia County	Outside UGB Area	4100999999	18,748	19,933	19,911	19,844	19,731
2020	Hood River County		41027	22,346	24,406	25,483	26,561	27,668
2020	Hood River County	Cascade Locks UGB	4102711600	1,147	1,324	1,347	1,390	1,440
2020	Hood River County	Hood River UGB	4102734900	8,800	10,177	10,938	11,693	12,469
2020	Hood River County	Outside UGB Area	4102799999	12,399	12,905	13,197	13,478	13,759
2020	Tillamook County		41057	25,250	26,076	26,423	26,810	27,184
2020	Tillamook County	Bay City UGB	4105704800	1,358	1,425	1,467	1,551	1,617
2020	Tillamook County	Garibaldi UGB	4105728000	783	774	772	771	769
2020	Tillamook County	Manzanita UGB	4105745700	827	798	813	857	894

2020	Tillamook County	Nehalem UGB	4105751700	1,120		1,215	1,257	1,331	1,412
2020	Tillamook County	Rockaway Beach UGB	4105762900	1,510		1,469	1,516	1,579	1,641
2020	Tillamook County	Tillamook UGB	4105773700	5,605		5,603	5,666	5,822	5,972
2020	Tillamook County	Wheeler UGB	4105781300	420		423	434	451	470
2020	Tillamook County	Outside UGB Area	4105799999	13,627		14,369	14,498	14,448	14,409
2020	Wasco County		41065	25,213		26,483	27,146	27,772	28,454
2020	Wasco County	Antelope UGB	4106502250	46		42	41	40	40
2020	Wasco County	Dufur UGB	4106520900	610		621	628	631	634
2020	Wasco County	Maupin UGB	4106546500	421		403	406	418	430
2020	Wasco County	Mosier UGB	4106550050	441		464	475	502	527
2020	Wasco County	Shaniko UGB	4106566700	36		34	34	34	34
2020	Wasco County	The Dalles UGB	4106572950	15,792		16,148	16,589	17,092	17,668
2020	Wasco County	Outside UGB Area	4106599999	7,867		8,770	8,974	9,056	9,123
2020	Washington County		41067	529,710		608,124	647,148	694,830	741,170
2020	Washington County	Banks UGB	4106703850	1,876		1,855	2,043	2,232	2,420
2020	Washington County	Gaston UGB (Washington)	4106728100	646		628	645	675	708
2020	Washington County	North Plains UGB	4106753150	1,964		3,410	4,497	5,936	6,580
2020	Washington County	Outside UGB Area	4106799999	25,429		25,175	25,184	25,102	24,973
2020	Yamhill County		41071	99,193		105,911	110,781	116,657	122,857
2020	Yamhill County	Amity UGB	4107102000	1,623		1,733	1,783	1,871	1,958
2020	Yamhill County	Carlton UGB	4107111150	2,007		2,329	2,497	2,757	2,970
2020	Yamhill County	Dayton UGB	4107118250	2,708		2,778	2,861	3,049	3,223
2020	Yamhill County	Dundee UGB	4107121050	3,162		3,139	3,322	3,556	3,782
2020	Yamhill County	Gaston UGB (Yamhill)	4107128100	154		154	161	167	174
2020	Yamhill County	Lafayette UGB	4107140300	3,742		4,146	4,606	5,190	5,682
2020	Yamhill County	McMinnville UGB	4107145000	32,527		34,564	36,268	38,195	40,339
2020	Yamhill County	Newberg UGB	4107152100	22,572		24,877	26,557	28,432	30,576
2020	Yamhill County	Sheridan UGB	4107167050	6,210		6,102	6,268	6,530	6,774
2020	Yamhill County	Willamina UGB (Yamhill)	4107182350	1,180		1,247	1,255	1,295	1,344
2020	Yamhill County	Yamhill UGB	4107184250	1,024		1,090	1,173	1,229	1,297
2020	Yamhill County	Outside UGB Area	4107199999	22,284		23,752	24,031	24,386	24,740
2019	Baker County		41001	16,134	15,790	15,758	15,562	15,404	15,274
2019	Baker County	Baker City UGB	4100103650	9,871	9,858	9,855	9,855	9,852	9,850
2019	Baker County	Greenhorn UGB	4100131050	0	2	2	2	2	2
2019	Baker County	Haines UGB	4100131600	416	407	407	402	401	402
2019	Baker County	Halfway UGB	4100131650	319	310	308	303	300	299
2019	Baker County	Huntington UGB	4100135700	440	382	376	365	356	352
2019	Baker County	Richland UGB	4100161700	187	189	189	190	195	199
2019	Baker County	Sumpter UGB	4100171000	204	213	214	217	221	223
2019	Baker County	Unity UGB	4100176250	71	62	62	60	59	59
2019	Baker County	Outside UGB Area	4100199999	4,626	4,367	4,345	4,168	4,018	3,888
2019	Gilliam County		41021	1,871	1,808	1,800	1,771	1,763	1,763
2019	Gilliam County	Arlington UGB	4102102800	645	673	676	686	710	734
2019	Gilliam County	Condon UGB	4102115000	683	631	631	618	614	616
2019	Gilliam County	Lonerock UGB	4102143400	21	19	19	18	16	16
2019	Gilliam County	Outside UGB Area	4102199999	522	484	475	449	422	397

2019	Grant County		41023	7,445	7,102	7,067	6,907	6,771	6,662
2019	Grant County	Canyon City UGB	4102310950	739	709	709	698	701	712
2019	Grant County	Dayville UGB	4102318300	149	145	146	145	146	146
2019	Grant County	Granite UGB	4102330500	38	37	37	36	36	36
2019	Grant County	John Day UGB	4102337550	2,081	1,987	1,986	1,958	1,947	1,958
2019	Grant County	Long Creek UGB	4102343550	197	190	190	186	182	179
2019	Grant County	Monument UGB	4102349750	128	121	121	118	115	113
2019	Grant County	Mt. Vernon UGB	4102350250	535	499	499	490	484	476
2019	Grant County	Prairie City UGB	4102359650	909	859	859	834	809	790
2019	Grant County	Seneca UGB	4102366200	199	194	194	191	191	189
2019	Grant County	Outside UGB Area	4102399999	2,470	2,361	2,328	2,251	2,161	2,063
2019	Malheur County		41045	31,313	31,011	30,981	30,890	30,799	30,675
2019	Malheur County	Adrian UGB	4104500500	177	179	179	180	181	182
2019	Malheur County	Jordan Valley UGB	4104537850	181	160	160	152	143	144
2019	Malheur County	Nyssa UGB	4104553750	3,455	3,463	3,443	3,478	3,494	3,512
2019	Malheur County	Ontario UGB	4104554900	12,296	12,207	12,211	12,222	12,228	12,240
2019	Malheur County	Vale UGB	4104576600	2,141	2,159	2,164	2,171	2,186	2,192
2019	Malheur County	Outside UGB Area	4104599999	13,063	12,843	12,825	12,687	12,566	12,405
2019	Morrow County		41049	11,173	12,143	12,329	12,615	12,960	13,345
2019	Morrow County	Boardman UGB	4104907200	3,555	4,201	4,574	4,797	5,068	5,348
2019	Morrow County	Heppner UGB	4104933550	1,343	1,303	1,295	1,267	1,255	1,249
2019	Morrow County	Ione UGB	4104936400	335	332	331	333	337	341
2019	Morrow County	Irrigon UGB	4104936500	2,081	2,268	2,269	2,394	2,572	2,718
2019	Morrow County	Lexington UGB	4104942200	243	255	254	249	244	241
2019	Morrow County	Outside UGB Area	4104999999	3,616	3,784	3,607	3,575	3,483	3,448
2019	Sherman County		41055	1,765	1,709	1,703	1,679	1,653	1,636
2019	Sherman County	Grass Valley UGB	4105530650	164	162	162	160	158	156
2019	Sherman County	Moro UGB	4105550000	324	315	316	308	299	298
2019	Sherman County	Rufus UGB	4105564200	249	246	245	243	243	237
2019	Sherman County	Wasco UGB	4105578950	410	414	412	415	425	436
2019	Sherman County	Outside UGB Area	4105599999	619	572	567	553	527	509
2019	Umatilla County		41059	75,889	78,383	78,692	80,737	82,943	85,093
2019	Umatilla County	Adams UGB	4105900350	350	343	343	347	357	366
2019	Umatilla County	Athena UGB	4105903200	1,134	1,147	1,150	1,154	1,168	1,180
2019	Umatilla County	Echo UGB	4105922200	722	717	718	723	731	743
2019	Umatilla County	Helix UGB	4105933250	194	191	192	191	193	195
2019	Umatilla County	Hermiston UGB	4105933700	19,234	21,185	21,395	22,414	23,540	24,784
2019	Umatilla County	Milton-Freewater UGB	4105948600	7,213	7,278	7,285	7,441	7,633	7,824
2019	Umatilla County	Pendleton UGB	4105957150	17,015	17,209	17,230	17,808	18,254	18,537
2019	Umatilla County	Pilot Rock UGB	4105957650	1,576	1,558	1,560	1,557	1,558	1,559
2019	Umatilla County	Stanfield UGB	4105969900	2,061	2,199	2,224	2,290	2,384	2,468
2019	Umatilla County	Ukiah UGB	4105975550	193	270	271	243	247	251
2019	Umatilla County	Umatilla UGB	4105975650	7,623	8,104	8,205	8,735	9,300	9,835
2019	Umatilla County	Weston UGB	4105980350	679	694	696	695	704	713
2019	Umatilla County	Outside UGB Area	4105999999	17,895	17,487	17,421	17,140	16,873	16,639
2019	Union County		41061	25,748	26,343	26,413	26,700	26,981	27,260

2019	Union County	Cove UGB	4106116250	552	552	553	554	557	557
2019	Union County	Elgin UGB	4106122550	1,747	1,695	1,697	1,723	1,761	1,794
2019	Union County	Imbler UGB	4106136050	319	337	340	347	355	365
2019	Union County	Island City UGB	4106136750	1,056	1,165	1,171	1,180	1,230	1,276
2019	Union County	La Grande UGB	4106140350	13,645	13,960	13,998	14,148	14,271	14,380
2019	Union County	North Powder UGB	4106153300	435	423	424	422	419	420
2019	Union County	Summerville UGB	4106170850	135	131	132	134	136	137
2019	Union County	Union UGB	4106175850	2,107	2,141	2,150	2,192	2,240	2,279
2019	Union County	Outside UGB Area	4106199999	5,752	5,940	5,947	6,000	6,012	6,052
2019	Wallowa County		41063	7,008	6,906	6,885	6,772	6,695	6,612
2019	Wallowa County	Enterprise UGB	4106323500	1,954	1,954	1,968	1,968	1,976	1,987
2019	Wallowa County	Joseph UGB	4106337900	1,093	1,090	1,095	1,102	1,108	1,117
2019	Wallowa County	Lostine UGB	4106343900	241	235	236	232	230	231
2019	Wallowa County	Wallowa UGB	4106378150	914	885	887	863	856	853
2019	Wallowa County	Outside UGB Area	4106399999	2,806	2,743	2,700	2,607	2,524	2,424
2019	Wheeler County		41069	1,441	1,363	1,355	1,326	1,299	1,272
2019	Wheeler County	Fossil UGB	4106926650	473	462	462	461	458	458
2019	Wheeler County	Mitchell UGB	4106949150	130	124	124	118	111	109
2019	Wheeler County	Spray UGB	4106969450	167	161	161	162	162	162
2019	Wheeler County	Outside UGB Area	4106999999	671	615	608	585	567	543

2040	2045	2050	2055	2060	2065	2066	2067	2068	2069	2070	2071	2072
65,046	65,177	65,528	65,880	66,234	66,591					66,949		67,093
4,195	4,475	4,787	5,117	5,468	5,840					6,235		6,400
16,397	16,486	16,625	16,759	16,887	17,009					17,124		17,169
4,209	4,185	4,174	4,161	4,147	4,131					4,113		4,106
2,079	2,104	2,135	2,166	2,197	2,228					2,257		2,269
3,326	3,286	3,256	3,225	3,193	3,161					3,127		3,113
10,956	11,056	11,190	11,321	11,449	11,574					11,695		11,742
684	692	701	711	720	729					738		742
23,201	22,894	22,659	22,419	22,172	21,919					21,659		21,553
31,410	32,859	34,402	36,013	37,700	39,467					41,316		42,079
16,091	17,188	18,364	19,607	20,926	22,322					23,801		24,417
15,319	15,671	16,038	16,406	16,775	17,144					17,514		17,662
24,881	25,106	25,434	25,766	26,103	26,444					26,789		26,928
12,884	13,281	13,727	14,170	14,610	15,047					15,481		15,654
3,501	3,624	3,762	3,900	4,038	4,177					4,315		4,371
1,777	1,816	1,862	1,906	1,949	1,991					2,032		2,048
6,719	6,384	6,083	5,791	5,506	5,229					4,961		4,856
275,905	292,443	308,894	326,231	344,542	363,880					384,303		392,790
144,365	155,806	167,332	179,450	192,214	205,646					219,771		225,619
4,431	4,925	5,445	6,011	6,627	7,297					8,027		8,336
54,419	58,462	62,500	66,722	71,144	75,770					80,607		82,601
6,551	7,505	8,547	9,715	11,028	12,504					14,162		14,881
66,137	65,745	65,070	64,334	63,529	62,662					61,737		61,352
115,610	116,126	116,733	117,343	117,957	118,573					119,193		119,442
1,547	1,494	1,445	1,396	1,349	1,302					1,257		1,239
1,205	1,139	1,077	1,018	962	909					858		838
168	161	153	146	140	133					127		125
840	806	774	743	714	684					656		645
7,567	7,706	7,851	7,994	8,137	8,278					8,419		8,475
1,035	1,033	1,032	1,030	1,028	1,025					1,022		1,020
4,525	4,470	4,418	4,365	4,310	4,255					4,198		4,176
1,274	1,285	1,296	1,307	1,317	1,327					1,336		1,340
33,196	33,708	34,240	34,766	35,285	35,796					36,301		36,500
9,683	10,052	10,438	10,833	11,237	11,652					12,078		12,251
7,212	7,500	7,801	8,110	8,427	8,753					9,087		9,224
964	942	921	899	878	858					837		829
46,394	45,828	45,287	44,736	44,174	43,601					43,017		42,781
7,520	7,509	7,511	7,514	7,517	7,520					7,523		7,524
2,854	2,852	2,854	2,856	2,857	2,857					2,856		2,855
1,981	2,029	2,081	2,135	2,188	2,243					2,298		2,320
2,686	2,628	2,576	2,524	2,472	2,420					2,369		2,349
264,909	272,846	280,819	289,015	297,450	306,132					315,067		318,713
24,334	24,963	25,577	26,189	26,800	27,409					28,015		28,257
428	437	446	454	463	471					479		483

23,512	24,139	24,749	25,360	25,970	26,578	27,185	27,428
11,762	12,162	12,558	12,959	13,364	13,774	14,188	14,355
1,394	1,429	1,462	1,495	1,528	1,561	1,593	1,606
3,283	3,369	3,453	3,537	3,621	3,704	3,788	3,821
119,798	126,001	132,325	138,864	145,637	152,650	159,907	162,880
5,730	5,801	5,867	5,931	5,994	6,054	6,113	6,135
3,602	3,683	3,760	3,837	3,913	3,988	4,063	4,092
3,398	3,618	3,846	4,085	4,336	4,600	4,877	4,992
7,916	8,253	8,597	8,954	9,324	9,708	10,107	10,270
59,753	58,993	58,179	57,350	56,501	55,634	54,751	54,394
28,338	29,432	30,636	31,887	33,189	34,544	35,954	36,535
2,005	2,091	2,184	2,281	2,380	2,483	2,589	2,632
11,763	12,471	13,243	14,055	14,910	15,810	16,758	17,150
1,364	1,457	1,560	1,668	1,784	1,906	2,036	2,090
13,207	13,412	13,648	13,882	14,115	14,345	14,572	14,662
98,044	100,554	103,052	105,610	108,231	110,918	113,671	114,791
2,724	2,859	2,993	3,129	3,266	3,405	3,544	3,600
53,714	56,946	60,234	63,611	67,082	70,644	74,293	75,776
41,605	40,749	39,825	38,870	37,883	36,869	35,834	35,415
71,597	71,880	72,242	72,606	72,972	73,340	73,709	73,857
437	439	440	442	444	446	447	448
884	885	886	887	889	890	891	892
47,704	48,077	48,503	48,931	49,361	49,794	50,228	50,403
750	748	748	747	747	746	745	745
988	991	995	999	1,002	1,006	1,010	1,011
20,833	20,740	20,670	20,600	20,529	20,458	20,387	20,359
8,451	8,691	8,988	9,295	9,613	9,941	10,280	10,419
3,565	3,671	3,802	3,938	4,078	4,223	4,374	4,436
271	279	290	300	311	323	335	340
4,616	4,741	4,896	5,057	5,223	5,395	5,572	5,644
120,481	124,493	128,625	132,894	137,305	141,862	146,570	147,530
2,472	2,649	2,831	3,023	3,226	3,440	3,666	3,714
12,405	13,702	15,046	16,511	18,108	19,846	21,735	22,148
77,702	79,471	81,285	83,088	84,877	86,645	88,388	88,718
953	1,021	1,091	1,165	1,244	1,326	1,414	1,432
8,094	8,558	9,032	9,526	10,041	10,576	11,132	11,248
18,854	19,091	19,340	19,580	19,809	20,028	20,235	20,271
434,846	443,747	452,811	462,061	471,499	481,131	490,958	492,948
1,947	2,075	2,204	2,341	2,485	2,638	2,805	2,839
11,374	11,523	11,675	11,826	11,974	12,121	12,259	12,287
8,040	8,783	9,540	10,360	11,246	12,204	13,293	13,522
1,533	1,580	1,627	1,675	1,724	1,774	1,824	1,835
230,512	236,650	242,825	249,081	255,417	261,828	268,322	269,628
13,350	14,040	14,735	15,459	16,214	16,999	17,840	18,013
8,726	9,110	9,495	9,894	10,306	10,731	11,180	11,272
1,394	1,462	1,529	1,600	1,673	1,749	1,829	1,846

4,200	4,322	4,444	4,569	4,695	4,824	4,955	4,982
76,042	76,604	77,198	77,772	78,325	78,856	79,311	79,399
6,180	6,602	7,030	7,482	7,961	8,468	9,025	9,140
345	365	386	407	430	454	479	485
71,203	70,631	70,122	69,595	69,050	68,486	67,834	67,702
53,428	53,500	53,571	53,643	53,714	53,786	53,858	53,873
3,128	3,602	4,078	4,612	5,206	5,868	6,602	6,773
10,782	10,827	10,862	10,882	10,885	10,870	10,835	10,822
12,429	12,223	12,022	11,809	11,581	11,339	11,082	11,024
1,509	1,542	1,573	1,602	1,629	1,654	1,676	1,680
3,903	3,827	3,754	3,677	3,596	3,511	3,422	3,402
2,757	2,810	2,859	2,904	2,945	2,982	3,014	3,019
983	1,020	1,054	1,089	1,123	1,155	1,187	1,193
17,937	17,649	17,369	17,069	16,748	16,406	16,041	15,959
146,130	149,296	152,500	155,773	159,117	162,532	166,020	166,727
57,435	59,289	61,126	62,972	64,822	66,674	68,521	68,888
2,275	2,379	2,482	2,588	2,696	2,806	2,919	2,942
46	46	46	45	45	45	44	44
1,237	1,297	1,357	1,419	1,483	1,548	1,614	1,628
5,096	5,491	5,887	6,307	6,752	7,222	7,719	7,826
158	185	214	247	285	329	379	391
22,244	22,483	22,723	22,948	23,158	23,350	23,525	23,553
1,518	1,570	1,622	1,674	1,727	1,780	1,833	1,844
2,231	2,291	2,351	2,411	2,470	2,528	2,586	2,597
4,772	5,356	5,954	6,612	7,339	8,138	9,017	9,215
1,344	1,413	1,481	1,552	1,624	1,698	1,775	1,790
472	504	535	569	604	640	678	686
11,010	11,246	11,480	11,710	11,935	12,154	12,368	12,408
1,467	1,478	1,490	1,501	1,511	1,519	1,527	1,528
252	255	259	262	265	267	270	270
34,574	34,013	33,493	32,957	32,403	31,833	31,247	31,116
407,818	416,327	424,996	433,845	442,878	452,100	461,514	463,420
5,835	6,250	6,668	7,112	7,582	8,081	8,609	8,722
1,661	1,838	2,019	2,216	2,432	2,668	2,926	2,983
253	269	285	302	319	338	357	362
2,086	2,353	2,628	2,934	3,274	3,652	4,073	4,168
512	510	508	507	505	503	501	500
3,263	3,396	3,528	3,665	3,805	3,949	4,097	4,128
4,028	4,129	4,230	4,332	4,435	4,538	4,642	4,663
109	114	120	125	131	137	143	144
4,935	5,375	5,822	6,305	6,824	7,384	7,986	8,118
43,821	44,927	46,040	47,162	48,294	49,433	50,579	50,808
529	592	657	729	809	896	993	1,015
4,727	4,895	5,063	5,234	5,410	5,589	5,772	5,810
213,614	218,273	222,969	227,682	232,405	237,135	241,864	242,799
540	578	616	656	699	745	793	803

12,955	13,289	13,625	13,963	14,305	14,650					14,996	15,066
619	688	758	834	918	1,011					1,112	1,134
9,282	9,453	9,625	9,797	9,969	10,139					10,308	10,341
3,495	3,512	3,531	3,549	3,566	3,582					3,596	3,598
3,426	3,649	3,874	4,111	4,361	4,624					4,901	4,961
30,139	31,121	32,106	33,109	34,131	35,171					36,228	36,443
61,988	61,117	60,324	59,519	58,703	57,875					57,036	56,852
119,187	128,783	139,068	150,175	162,168	175,120					189,106	192,035
25,089	27,568	30,235	33,152	36,341	39,826					43,635	44,445
1,337	1,429	1,526	1,630	1,741	1,858					1,983	2,009
16,814	18,636	20,603	22,771	25,160	27,793					30,695	31,318
15,317	16,527	17,821	19,212	20,706	22,311					24,034	24,392
40,337	43,222	46,304	49,593	53,102	56,845					60,836	61,658
1,217	1,324	1,438	1,562	1,696	1,841					1,998	2,031
19,077	20,076	21,140	22,255	23,423	24,646					25,926	26,182
505,622	526,837	548,942	571,975	595,974	620,979	626,105	631,273	636,484	641,737	647,034	
156	158	160	161	164	168	169	170	170	171	172	
23,635	25,056	26,546	28,235	29,815	31,373	31,681	31,993	32,307	32,624	32,945	
5,827	6,196	6,657	7,201	7,684	8,147	8,237	8,328	8,420	8,513	8,607	
15,141	16,472	17,988	19,825	21,400	22,877	23,158	23,443	23,731	24,023	24,318	
17,514	19,416	21,307	23,613	25,573	27,400	27,747	28,097	28,453	28,813	29,177	
87,294	86,899	85,360	82,135	80,909	80,668	80,756	80,824	80,892	80,960	81,028	
40,010	40,419	40,832	41,249	41,670	42,095	42,181	42,266	42,352	42,439	42,525	
9,900	9,852	9,840	9,799	9,804	9,833	9,842	9,850	9,859	9,867	9,876	
1,714	1,715	1,728	1,740	1,754	1,770	1,773	1,776	1,780	1,783	1,786	
1,618	1,634	1,659	1,687	1,711	1,734	1,738	1,743	1,747	1,752	1,756	
7,283	7,435	7,587	7,761	7,905	8,035	8,059	8,083	8,107	8,132	8,156	
7,011	7,325	7,727	8,222	8,583	8,880	8,931	8,983	9,035	9,087	9,139	
12,484	12,459	12,291	12,039	11,911	11,844	11,838	11,831	11,825	11,818	11,812	
58,204	59,786	61,411	63,080	64,795	66,556	66,914	67,274	67,636	67,999	68,365	
1,993	2,044	2,085	2,124	2,170	2,219	2,230	2,240	2,251	2,261	2,272	
2,096	2,140	2,194	2,249	2,306	2,366	2,378	2,391	2,404	2,416	2,429	
51	51	50	48	47	47	47	47	46	46	46	
2,579	2,620	2,661	2,694	2,741	2,795	2,807	2,819	2,831	2,843	2,855	
10,406	11,009	11,704	12,534	13,221	13,846	13,963	14,081	14,199	14,319	14,440	
19,347	20,246	21,330	22,600	23,682	24,684	24,874	25,066	25,259	25,453	25,649	
2,113	2,126	2,130	2,120	2,131	2,153	2,159	2,165	2,170	2,176	2,182	
19,619	19,551	19,257	18,712	18,498	18,446	18,455	18,464	18,474	18,483	18,492	
28,723	29,702	30,715	31,763	32,846	33,966	34,195	34,425	34,656	34,889	35,124	
1,487	1,534	1,569	1,599	1,638	1,681	1,690	1,700	1,710	1,719	1,729	
13,216	13,924	14,757	15,725	16,579	17,389	17,545	17,703	17,862	18,023	18,185	
14,020	14,244	14,390	14,438	14,629	14,895	14,958	15,021	15,084	15,147	15,211	
27,570	27,987	28,412	28,842	29,279	29,723	29,812	29,902	29,992	30,082	30,173	
1,673	1,728	1,802	1,890	1,960	2,020	2,031	2,042	2,053	2,065	2,076	
767	767	764	757	756	758	759	760	760	761	762	
924	949	986	1,031	1,066	1,097	1,103	1,109	1,114	1,120	1,126	

1,493	1,585	1,672	1,778	1,859	1,928	1,940	1,953	1,966	1,978	1,991
1,702	1,759	1,828	1,910	1,975	2,033	2,043	2,054	2,065	2,075	2,086
6,097	6,224	6,371	6,535	6,679	6,814	6,840	6,866	6,892	6,919	6,945
487	508	528	551	570	587	590	593	596	599	602
14,425	14,467	14,459	14,389	14,413	14,485	14,505	14,525	14,545	14,565	14,585
29,097	29,728	30,372	31,031	31,703	32,391	32,530	32,670	32,810	32,951	33,093
40	40	40	39	38	38	38	38	38	38	38
637	639	640	636	639	644	645	646	648	649	650
439	446	455	463	473	482	484	486	488	490	492
553	574	600	629	654	677	681	685	690	694	698
34	34	33	32	32	32	32	32	32	32	32
18,243	18,823	19,387	20,008	20,577	21,126	21,233	21,341	21,450	21,558	21,668
9,152	9,172	9,218	9,223	9,291	9,392	9,416	9,440	9,464	9,489	9,513
786,487	828,985	873,780	920,995	970,762	1,023,218	1,034,044	1,044,985	1,056,042	1,067,216	1,078,508
2,608	2,797	3,009	3,253	3,486	3,718	3,765	3,812	3,860	3,908	3,957
741	772	793	809	835	865	872	879	886	893	900
7,076	7,573	8,725	10,183	11,419	12,575	12,794	13,017	13,243	13,474	13,708
24,783	24,564	23,553	21,720	20,738	20,161	20,093	20,025	19,957	19,889	19,822
128,931	134,702	140,732	147,031	153,613	160,488	161,900	163,324	164,761	166,210	167,672
2,029	2,083	2,152	2,215	2,292	2,377	2,395	2,413	2,431	2,450	2,468
3,152	3,313	3,551	3,830	4,083	4,330	4,378	4,427	4,477	4,526	4,577
3,364	3,488	3,641	3,799	3,966	4,141	4,177	4,214	4,250	4,288	4,325
4,003	4,195	4,433	4,699	4,956	5,214	5,266	5,318	5,370	5,423	5,477
182	189	196	203	210	218	220	222	223	225	227
6,131	6,554	7,159	7,890	8,526	9,128	9,244	9,361	9,479	9,599	9,721
42,457	44,539	46,653	48,901	51,200	53,577	54,062	54,552	55,046	55,544	56,047
32,780	34,929	37,247	39,907	42,377	44,807	45,287	45,772	46,262	46,757	47,258
7,008	7,232	7,433	7,605	7,835	8,099	8,156	8,214	8,272	8,330	8,389
1,387	1,425	1,452	1,469	1,502	1,543	1,552	1,562	1,571	1,580	1,590
1,364	1,430	1,502	1,581	1,659	1,740	1,756	1,773	1,789	1,806	1,823
25,073	25,326	25,311	24,932	25,008	25,315	25,406	25,496	25,588	25,679	25,771
15,156	15,063	14,971	14,880	14,789	14,699	14,681	14,663	14,645	14,627	
9,849	9,847	9,883	9,943	9,961	9,959	9,958	9,958	9,957	9,957	
2	2	2	2	2	2	2	2	2	2	
402	403	403	404	404	404	404	404	403	403	
300	302	302	302	301	300	300	300	300	299	
349	345	340	334	329	325	325	324	323	322	
202	204	209	214	218	220	220	220	221	221	
224	224	227	231	233	235	235	235	235	236	
59	59	58	58	57	57	57	56	56	56	
3,769	3,678	3,548	3,392	3,283	3,198	3,181	3,164	3,147	3,130	
1,761	1,759	1,757	1,755	1,754	1,752	1,751	1,751	1,751	1,750	
752	772	797	827	847	862	865	868	871	874	
609	602	599	595	592	590	589	589	589	588	
16	16	15	14	14	13	13	13	13	13	
384	369	347	319	300	286	284	281	278	275	

6,566	6,477	6,389	6,303	6,217	6,133	6,116	6,100	6,083	6,067
721	728	735	747	751	751	751	751	751	751
146	146	147	148	148	148	148	148	148	148
35	34	34	33	33	32	32	32	32	32
1,962	1,961	1,966	1,979	1,978	1,970	1,968	1,967	1,965	1,963
175	172	169	166	164	161	161	160	160	159
111	109	107	106	104	102	102	102	101	101
467	460	455	450	445	439	438	437	436	435
769	750	731	712	696	681	679	676	673	670
187	184	183	182	181	180	179	179	179	179
1,993	1,934	1,862	1,779	1,718	1,668	1,658	1,648	1,638	1,628
30,514	30,317	30,122	29,928	29,735	29,544	29,506	29,468	29,430	29,392
183	184	184	185	186	186	186	186	186	186
145	145	141	137	134	131	131	130	130	129
3,518	3,524	3,535	3,555	3,560	3,557	3,557	3,556	3,556	3,555
12,256	12,256	12,242	12,245	12,219	12,180	12,172	12,165	12,157	12,149
2,198	2,199	2,204	2,212	2,213	2,210	2,210	2,209	2,208	2,208
12,214	12,009	11,815	11,593	11,424	11,279	11,251	11,222	11,194	11,165
13,698	14,041	14,392	14,752	15,121	15,499	15,576	15,653	15,731	15,809
5,631	5,912	6,221	6,583	6,888	7,167	7,224	7,281	7,339	7,397
1,247	1,244	1,222	1,184	1,167	1,160	1,159	1,157	1,156	1,154
344	346	348	348	350	354	355	356	356	357
2,850	2,992	3,163	3,365	3,533	3,685	3,716	3,747	3,779	3,811
239	238	232	222	217	214	214	213	213	212
3,387	3,308	3,208	3,051	2,967	2,919	2,908	2,898	2,888	2,877
1,626	1,617	1,609	1,600	1,592	1,583	1,581	1,580	1,578	1,576
155	153	153	152	151	150	150	150	149	149
297	296	294	291	289	286	286	286	285	285
234	232	231	229	228	226	226	226	226	225
443	448	459	474	482	488	489	490	491	492
496	488	473	455	443	433	431	429	427	425
87,075	88,899	90,762	92,663	94,605	96,587	96,988	97,391	97,796	98,203
373	376	382	387	393	400	402	403	404	406
1,184	1,183	1,183	1,175	1,177	1,185	1,187	1,188	1,190	1,191
752	761	765	766	772	781	783	784	786	788
196	197	197	195	195	196	197	197	197	197
26,045	27,257	28,522	30,013	31,242	32,354	32,580	32,808	33,037	33,267
8,032	8,218	8,385	8,555	8,730	8,910	8,946	8,983	9,020	9,056
18,718	18,879	19,147	19,385	19,681	20,009	20,075	20,142	20,209	20,276
1,560	1,560	1,546	1,519	1,511	1,511	1,512	1,512	1,512	1,512
2,526	2,582	2,654	2,733	2,806	2,877	2,891	2,906	2,920	2,935
255	258	254	246	242	241	240	240	240	239
10,340	10,824	11,407	12,105	12,668	13,168	13,270	13,373	13,476	13,580
720	725	726	724	727	733	735	736	737	738
16,376	16,079	15,593	14,861	14,460	14,220	14,169	14,118	14,067	14,017
27,482	27,674	27,866	28,060	28,255	28,452	28,491	28,531	28,571	28,610

559	559	558	556	556	557	557	557	557	558
1,825	1,850	1,879	1,914	1,941	1,965	1,970	1,975	1,980	1,984
376	387	396	408	416	423	425	426	428	429
1,319	1,357	1,396	1,445	1,480	1,510	1,516	1,522	1,528	1,534
14,491	14,590	14,671	14,746	14,832	14,922	14,940	14,958	14,976	14,994
421	421	419	415	414	413	413	413	413	413
138	140	141	142	143	144	145	145	145	145
2,318	2,355	2,394	2,439	2,475	2,507	2,513	2,520	2,526	2,533
6,035	6,016	6,012	5,995	5,998	6,011	6,013	6,016	6,018	6,021
6,545	6,521	6,497	6,474	6,450	6,427	6,423	6,418	6,413	6,409
1,996	2,006	2,031	2,065	2,085	2,097	2,100	2,102	2,105	2,107
1,124	1,128	1,145	1,167	1,180	1,189	1,190	1,192	1,194	1,196
230	229	230	231	231	232	232	232	232	232
850	847	846	846	844	843	842	842	842	841
2,345	2,312	2,246	2,165	2,110	2,067	2,058	2,050	2,041	2,033
1,250	1,235	1,219	1,203	1,188	1,173	1,170	1,167	1,164	1,161
459	461	464	469	470	469	469	469	469	468
106	103	100	96	93	91	90	90	89	89
162	163	165	167	168	168	168	168	168	168
523	507	490	472	457	445	443	441	438	436