CHAPTER 2

BASIC PLANNING DATA

TABLE OF CONTENTS

CHAPTER 2

TABLES

FIGURES

CHAPTER 2

BASIC PLANNING DATA

OBJECTIVE

The objective of this chapter is to present basic planning data and water demand forecasts needed to assess the current and future capabilities of the water system to provide service. This chapter provides existing and projected population, service connections, and water use data, and develops the water demand associated with the planning element known as an Equivalent Residential Unit (ERU). The chapter also includes projected land use and water demands for 6- and 20-year planning periods.

The water use data and water demand forecasts found in this chapter comprise two of the three elements required for the development of a water use efficiency (conservation) program. The third required element is implementation of the water use efficiency (conservation) program and its component parts, which is addressed in Chapter 4.

HISTORIC SYSTEM DEMANDS

In this section historic system demands are examined in terms of production per capita and per connection for the North Beach Water District. This information is later used to project future water system demands and evaluate water use efficiency.

WATER PRODUCTION

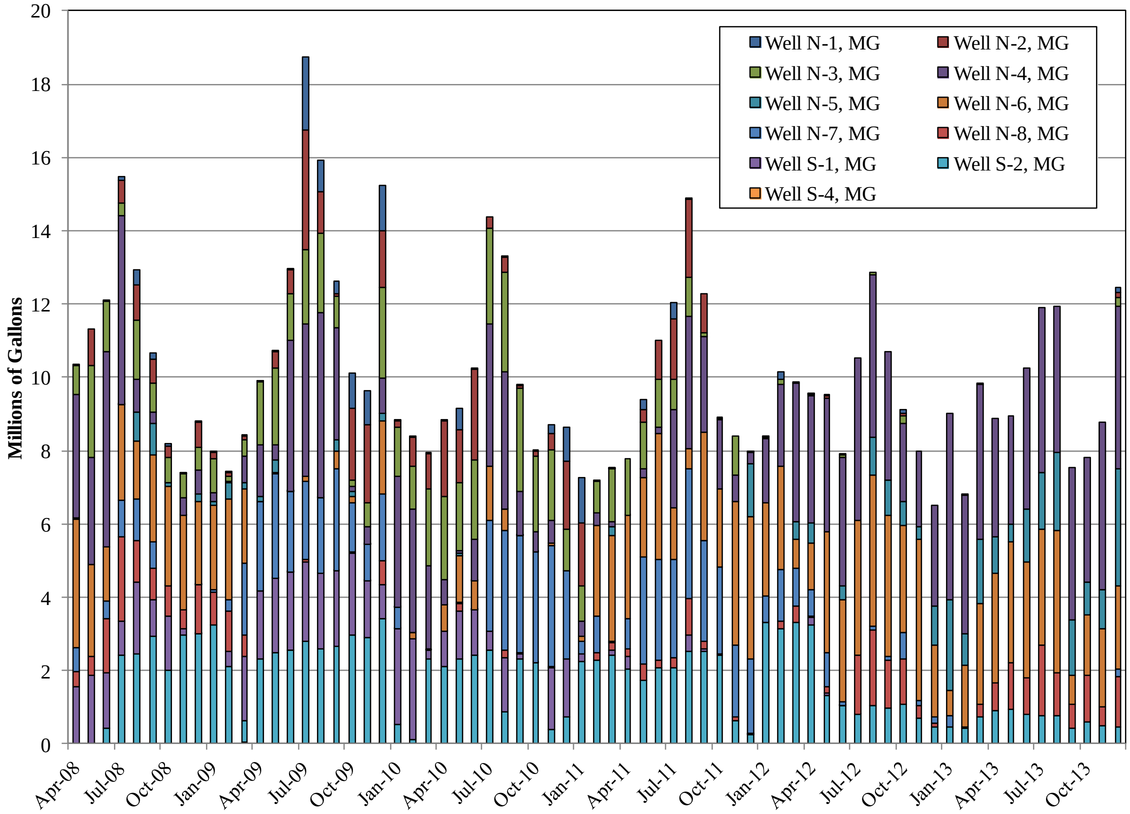
Monthly Production by Source

As shown in Table 1-3 NBWD has eleven water sources, one of which (DOH Source S-12, NBWD Well No. S-4) is currently inactive. Production rates for these wells range from 30 gpm to 135 gpm, with a total installed production capacity of 915 gpm. Metered water production data has been obtained and evaluated for the period from April 2008 through December 2013. Monthly production by source is summarized in Figure 2-1.

From the chart it can be seen that the distribution of water production has shifted over the years. For example Well N-6 was a significant contributor to total source capacity between April 2008 and March 2009, but contributed relatively little between April 2009 and January 2011, then became a significant contributor to overall production from February 2011 through December 2013. Well S-1 was a significant contributor prior to January 2011, but has contributed little or nothing since that time. Wells N-1, N-2 and N-3 were regular and sometimes significant contributors to overall production prior to September 2011, but have contributed little or nothing since then. These variations in production distribution reflect both changing well conditions and operator preferences. It should be noted, however, that total production shows a distinct downward trend, both in average production and in maximum month production.

FIGURE 2-1

Monthly Water Production by Source



Total Annual Production

Total annual production for each well and for all wells is summarized in Table 2-1. Maximum annual production for the data period was 2009, as is also visually evident from Figure 2-1. Annual production generally declined after that.

Annual Water Production Records, MG [(1)]

Well	2008 [(2)]	2009	2010	2011	2012	2013
N-1	0.78	6.34	1.82	1.98	0.30	0.15
N-2	4.50	11.57	11.09	8.06	0.15	0.15
N-3	10.87	14.93	24.21	10.42	0.59	0.23
N-4	20.13	20.80	21.03	13.15	37.60	48.21
N-5	2.73	1.91	0.10	1.70	5.49	18.31
N-6	28.71	9.87	5.12	28.74	34.48	28.44
N-7	6.34	20.90	18.87	23.16	6.13	0.48
N-8	11.86	3.33	0.48	2.91	7.64	10.36
S-1	12.65	19.24	14.52	1.25	0.28	0.00
S-2	22.14	30.59	18.89	23.20	20.36	7.80
S-4	0.08	0.07	0.00	0.00	0.00	0.00
Totals	120.81	139.55	116.13	114.57	113.02	114.13

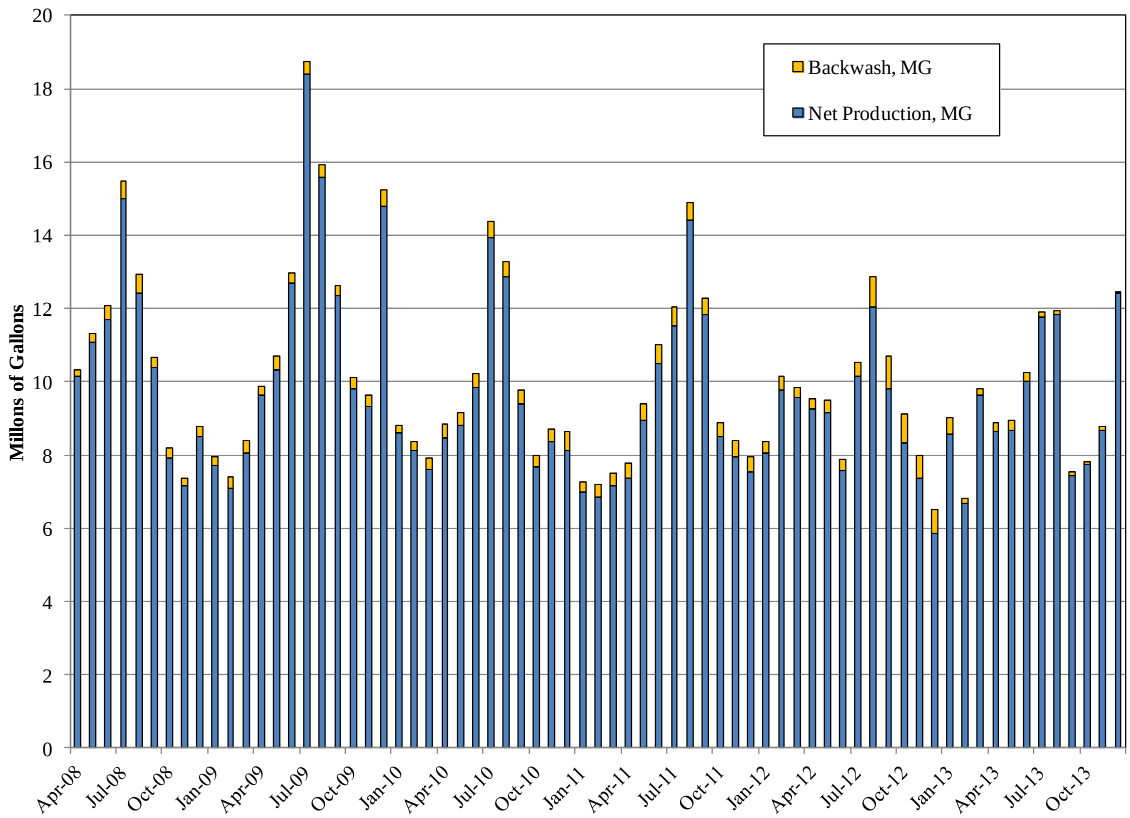
(1) MG is million gallons produced for the indicated year.
(2) Production data for 2008 is based on data from April 1, 2008 through March 31, 2009, because data for January through March 2008 is not available.

Filter Backwash and Net Production

As describe in Chapter 1, both well fields have filtration system that require regular backwashing. Backwash water is discharged to ground, so total well production minus backwash water is the net production available to the water distribution system. Total monthly water production, monthly backwash, and net monthly production are shown in Figure 2-2.

FIGURE 2-2

Total Monthly Production, Backwash and Net Production



Annual water production, annual backwash and net annual production are summarized in Table 2-2. Backwash ranges from 1.6 percent to 4.3 percent of total water production, with an overall average of 3.1 percent.

I

Total Annual Production, Backwash and Net Annual Production

Parameter	2008	2009	2010	2011	2012	2013
Total Annual Production, MG	120.81	139.55	116.13	114.57	113.02	114.13
Total Annual Backwash, MG	3.60	3.78	4.41	5.00	3.61	2.16
Net Annual Production, MG	**117.21**	**135.78**	**111.73**	**109.57**	**109.41**	**111.97**
Percent Backwash	3.0%	2.7%	3.8%	4.4%	3.2%	1.9%

Maximum Day Net Production

Daily net production values (total production minus backwash) for 2008 through 2012 were reviewed, and the first, second and third maximum days and the average day values were determined for each year. (2013 was not used because daily meter reads are not available for 2013) Table 2-3 summarizes these values in gallons per day (gpd).

Maximum Day to Average Day Ratio

Year	First Maximum, gpd	Second Maximum, gpd	Third Maximum, gpd	Average, gpd	Maximum to Average Ratio
2008	818,959	719,526	708,060	321,136	2.55
2009	1,013,566	874,517	865,540	371,994	2.72
2010	665,015	659,387	632,984	306,096	2.17
2011	666,456	661,188	656,133	300,202	2.22
2012	763,075	594,448	574,149	298,948	2.55
				Average	2.44

The highest single day of net water production over the data period was December 15, 2009, creating a maximum day to average day ratio of 2.72. The second and third highest production days over the data period were also in December 2009. If we take the second highest day in 2009 we get a second-maximum day to average day ratio of 2.35. From Figures 2-1 and 2-2 it can be seen that December 2009 was an unusually high water production month, particularly for the time of year. This occurred due to an unusual freeze in December 2009 which caused numerous water pipe breaks. The subsequent thaw resulted in catastrophic water loss to many customers. The District declared an emergency and, without notice, turned off water to meters running unchecked to keep from running out of water. A similar incident happened in February 2012 but the District was better prepared for the event.

The second highest maximum day to average day ratio is 2.55 in 2008. The maximum day of 818,959 gpd occurred on September 22, 2008. The day prior to this and the day after this were relatively low production days at 118,520 and 187,178 gallons, respectively. The second- and third-highest days in 2008 were July 20 and August 31, which are more typically representative times for maximum days. These days represent maximum day to average day ratios of 2.24 and 2.20, respectively. The maximum day of 763,075 gallons in 2012 was on February 10, the day referred to above regarding freezing. If we take the second highest day in 2012 we get a second-maximum day to average day ratio of 1.95.

Based on the above, it is apparent that the most extreme maximum days represent emergency situations or unusual circumstances that may not be reasonable design points.

Therefore, some kind of averaging of maximum day demand may be appropriate. If we take second maximum days for each year we get a range from 1.95 to 2.35. If we take the average of the top three maximum days to the annual averages, we get a range of values from 2.12 to 2.47. If we average the annual maximum day to average day ratios we get an average maximum day to average day ratio of 2.44. **For the purposes of this plan, a maximum day to average peaking factor of 2.44 will be used to estimate maximum day demands.**

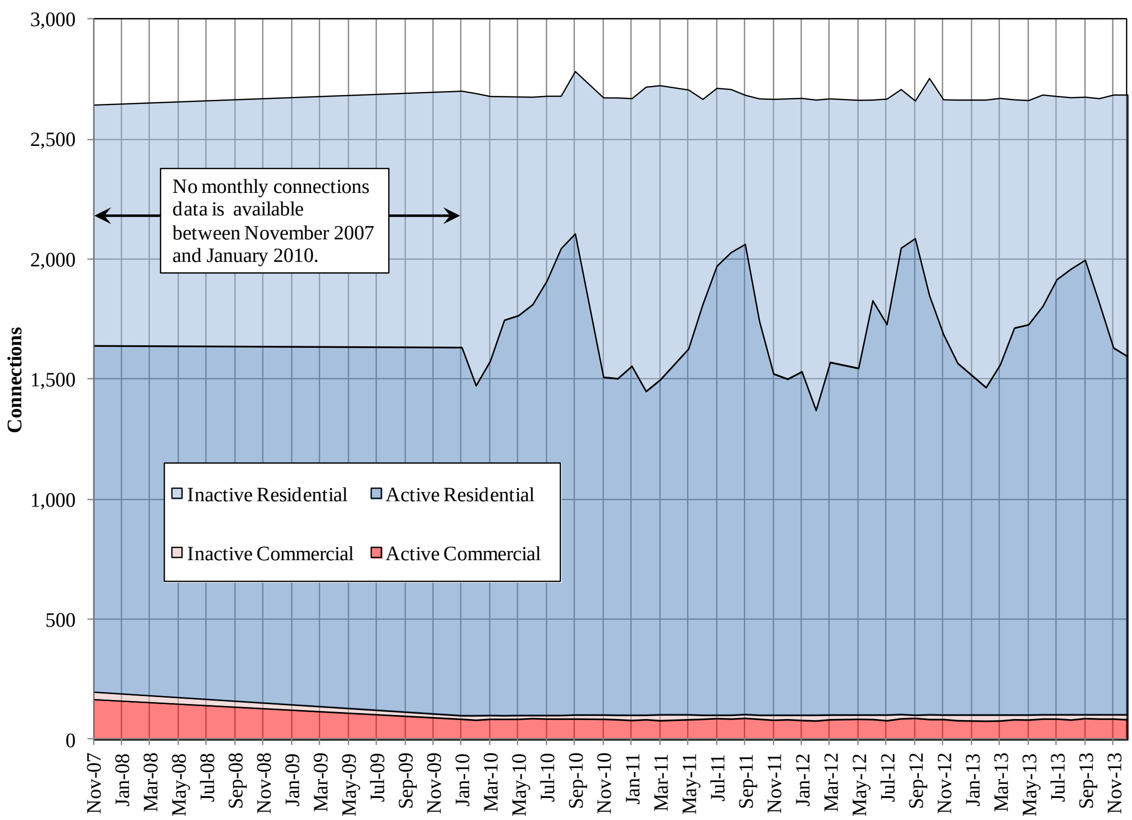
CONNECTIONS HISTORY

The Water Facilities Inventory (WFI) dated 11/08/2007 reported 2,444 full time and part time occupied single family residential connections, no multi-family connections, 131 recreational connections, and 69 commercial connections, for a total of 2,644 connections. The current WFI updated 5/5/2014 reports 1,510 full time and 1,090 part time occupied single family residential connections, 519 full and part-time residential units in 14 multi-family units, no recreational connections and 75 commercial connections, for a total of 3,194 connections. Billing data from January 2010 through December 2013 has residential connections varying from a high of 2,584 to a low of 2,540, and commercial connections varying from a high of 106 to a low of 101, for a total varying from a high of 2,690 to a low of 2,643 total connections. The 2010 through 2013 billing data is a difference of approximately 500 connections from the current WFI numbers because the two systems count connections differently. The billing system does not count individual living units in multi-unit buildings because they are generally served by a single service meter and have a single billing account. Therefore, the current billing number of service connections is approximately the same as it was in 2007.

As indicated above, many of the residential connections are not full time occupied. That number changes continuously. However, there is no system for tracking full time and part time services. For the purpose of this analysis, any residential or commercial connection that has no water use for any given billing cycle will be considered an inactive connection for that billing cycle. For 2007 through 2009 we have only the numbers on the November 2007 WFI. Since January 2010 monthly water use data per connection data is available. Connections history since November 2007 is shown in Figure 2-3. Active and inactive residential and commercial connections are indicated by different shades of color. It can be seen that every month has a significant number of inactive service connections, and that the number of active connections increases in the summer and decreases in the winter. The specific connections that are inactive may change from month to month, and some connections may be active for only part of the month, but with only monthly water meter reads it is not possible to differentiate between residences that are occupied for only part of a month and those that just use very little water.

FIGURE 2-3

Historic Water Connections



It can be seen that the total number of connections has remained fairly constant from November 2007 through the present. The chart shows that the number of commercial connections decreased as the number of residential connections increased, but it is not clear that this a real change in commercial and residential connections. The billing system does not have a category for recreational connections, so the recreational connections reported in the 2007 WFI were assigned as commercial for the purpose of this analysis, although many of these may have actually been seasonal residential connections. The increase in total system connections from 2,644 in November 1997 to 2,686 in December 2013 represents an annual growth rate of 0.26 percent.

CONNECTIONS BY CUSTOMER CLASS

As discussed above, 131 recreational connections were identified in the 2007 WFI, while no recreational connections are identified in the 2013 WFI. It is probable that the nature of the connections did not change significantly, but rather the way that connections are counted most likely changed. There was a change in system management between 2007 and 2013 that may account for this change. The NBWD billing system only actually identifies two customer classes: Residential and Commercial. The recreational services identified in the 2007 WFI most likely consisted of some residential and some commercial connections.

Historic Year-End Water Services by Customer Class

End of Year [1]	Residential Connections	Recreational Connections [2]	Commercial Connections [3]	Total Connections
2007	2,444	131	69	2,644
2010	2,571	-	103	2,674
2011	2,567	-	103	2,670
2012	2,561	-	104	2,665
2013	2,581	-	105	2,686

(1) Year end connections data is not available for 2008 and 2009.

(2) The 2007 WFI form identified 131 recreational connections, while the 2013 WFI form does not identify any recreational connections. It is most likely that this only represents a change in the way that connections are counted. The NBWD billing system only identifies two categories of customer: Residential and Commercial.

(3) The 2007 WFI form identified 69 commercial connections, while the 2010-2013 billing records identify 103 to 105 commercial connections. The NBWD billing system does not have a billing category for recreational service. While it is not certain how connections were counted for the 2007 WFI form, it is probable that some commercial connections were counted as recreational and some residential connections were also counted as recreational. Note that the commercial connections includes a school.

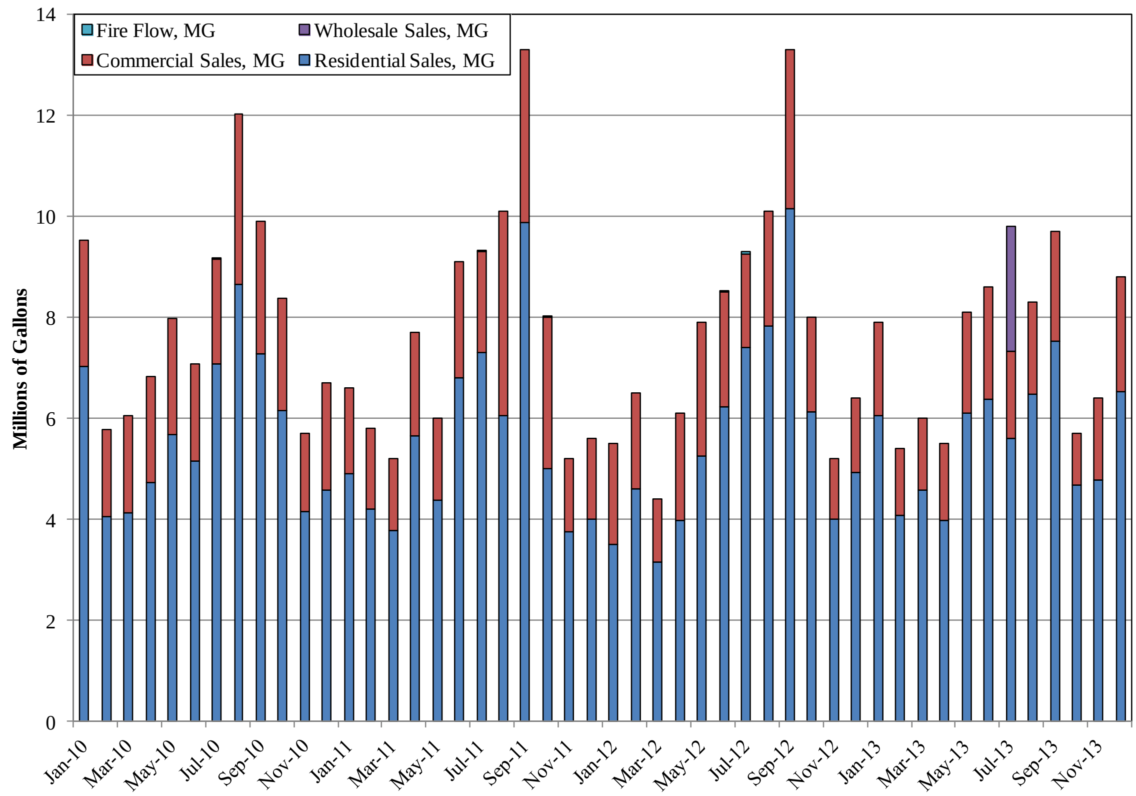
WATER SALES

Water sales data has been derived from water billing records from January 2010 through December 2013. Monthly water sales data is shown in Figure 2-4.

It should be noted that in July 2013, a significant volume of water (2.84 MG) went to wholesale water use. Wholesale water use is water used for filling tank trucks, generally for construction purposes. The large wholesale water usage in July 2013 was due to a major cell phone tower construction project for which NBWD supplied water. Small amounts also went to construction projects in July 2011 (0.004 MG) and October 2011 (0.009 MG). Small amounts of water were also used for fire flow in July 2010 and June and July 2012, but these amount were small enough that they are barely discernible in the chart.

FIGURE 2-4

Monthly Water Use



Annual water usage by category is summarized in Table 2-5.

Annual Water Usage

Year	Residential, MG	Commercial, MG	Wholesale, MG	Fire Flow, MG	Total, MG
2010	68.689	26.435	0.000	0.007	95.131
2011	65.761	26.127	0.012	0.000	91.900
2012	67.243	23.900	0.000	0.057	91.200
2013	66.810	20.932	2.459	0.000	90.200
Average	67.126	24.348	0.618	0.016	92.108

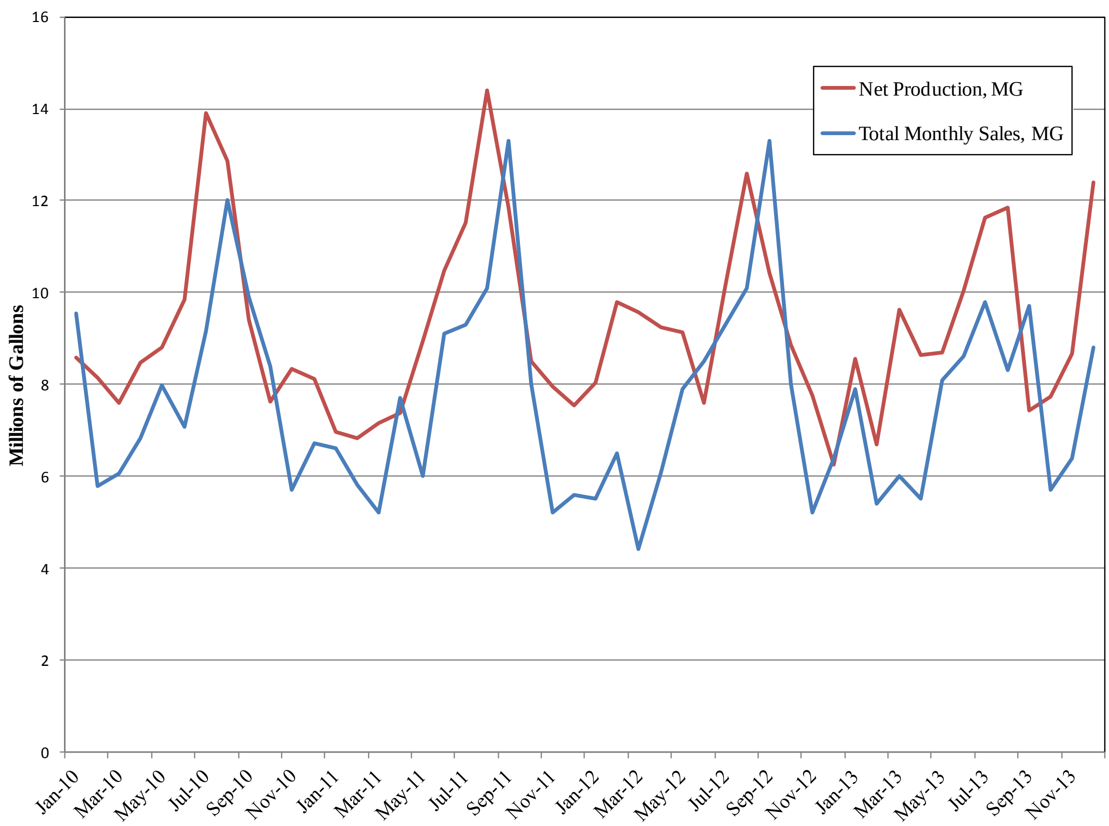
From Table 2-5, as well a Figure 2-4, it can be seen that the majority of usage is residential, and that annual usage has declined over the data period.

DISTRIBUTION SYSTEM LEAKAGE

Distribution System Leakage (DSL) is defined as the difference between water metered into the distribution system (net production) and water metered out of the distribution system (total usage). Monthly net water production and monthly water usage are shown graphically in Figure 2-5.

FIGURE 2-5

Monthly Net Production and Water Usage



It can be seen that net water production and total water usage generally closely follow each other. Over the data period, water service meters were read in weekly billing cycles such that all meters would be read within any given calendar month. What this means is that water usage periods actually overlap months, and do not exactly coordinate with metered water production periods. Some notable discrepancies are spring of 2012 and spring of 2013 when water production went up while water usage went down. It is not known if these discrepancies represent lost water usage data, or system leakage, or possibly inaccurate production data. There are also times when water usage exceeds production. These may be partially due to overlapping service meter reading periods and may also be partially due to service meter data errors and problems with source meters.

Annual net production, water usage and distribution system leakage are summarized in Table 2-6.

Distribution System Leakage

Year	Net Production, MG	Total Usage, MG	DSL MG	Percent DSL
2010	111.73	95.131	16.59	14.9%
2011	109.57	91.900	17.67	16.1%
2012	109.41	91.200	18.21	16.6%
2013	111.97	90.200	21.77	19.4%

Based on data available, water usage has decreased over the data period while net production has held more or less steady, resulting in increasing DSL. It is not known if this represents actual increase in system leakage or problems with water usage data, or possibly a combination of both. The district states that they have had very unreliable source meters, which will be replaced with new magnetic flow meters as part of the DWSRF project in 2015 and 2016. New service meters are being installed at the rate of 350 per year and will all be replaced by 2017. After that, service meters will be replaced every 10 years. Once all meters have been replaced and data collection is improved, it is expected that unaccounted for water will be less.

EQUIVALENT RESIDENTIAL UNITS

An Equivalent Residential Unit (ERU) is a way to estimate water usage and evaluate water system capacity based on the typical usage of a single family residence on the water system. The value of an ERU is the average daily usage of single family residential units served by the water system, expressed as gallons per day (gpd).

WATER USE PER RESIDENTIAL CONNECTION

Annual residential water use is divided by the average active residential connections for each year, and by 365 days per year to obtain average day water use per residential connection. Table 2-7 summarizes average day residential water use from 2010 through 2013.

Water Use per Active Residential Connection

Year	Residential Water Use, MG(1)	Average Active Residential Connections(2)	Average Day Water Use per Active Residential Connection, gpd
2010	68.689	1,639	114.86
2011	65.761	1,591	113.25
2012	67.243	1,594	115.59
2013	66.810	1,621	112.93
		Average	114.16

(1) Residential Water User comes directly from Table 2-5.
(2) Average Active Residential Connections are used in Table 2-7 because average water use per active connection should be based on average number of active connections. The average number of active residential connections is taken from the same data use to create Figure 2-3.

Table 2-7 shows residential water use averaging about 114 gpd per connection. This is a very low water use rate, probably due to the relatively cool and damp weather, which means that outdoor irrigation is minimal in the service area, and partly due to the fact that some of the active connections are not active for the entire billing period. **For purposes of this water system plan, the value of an ERU will be 114 gpd per ERU.**

EQUIVALENT RESIDENTIAL UNIT VALUE FOR NON RESIDENTIAL USERS

Each active residential connection is by definition one ERU. Inactive residential and commercial connections by definition have no water use, so they are zero ERUs. Active non-residential connections, other non-residential water use, and DSL can all be expressed as ERUs. The total water use for the year for each water use category is divided by the ERU value of 114 gpd and by 365 days per year to get the number of ERUs represented by the water use category. The average of 83 active commercial connections in 2013 was equivalent to 503 ERUs. The wholesale water use in 2013 was equivalent to 59 ERUs. DSL in 2013 was equivalent to523 ERUs.

I

Equivalent Residential Units for 2013

Use Category	2013 Use, MG (1)	2013 Average Active Connections (2)	Average Day Use, gpd (3)	2013 ERUs (4)
Active Residential	66.810	1,621	112.93	1,621
Active Commercial	20.932	83	692	503
Wholesale	2.459	0	6,736	59
Fire Flow	0.000	0	0	0
Subtotal, Non-DSL	90.200	1,704	145	2,183
DSL	21.768	0	59,639	523
Total Including DSL	111.968	1,704	180	2,706

(1) Residential, commercial, wholesale, and fire flow use are from Table 2-5. DSL is from Table 2-6.
(2) 2013 Average Active Residential Connections are from Table 2-7. 2013 Average Active Commercial Connections is derived from the same data used to created Figure 2-3.
(3) Average Day Use for Residential, Commercial, Subtotal, Non-DSL, and Total Including DSL are calculated per connection by taking annual use and dividing by number of connections and by 365 days per year. Average Day Use for wholesale, fire flow and DSL are just annual use divided by 365 days per year because there are no connections.
(4) 2013 ERUs is 2013 Use divided by 114 gpd per ERU and 365 days per year, except that residential ERUs equals the total number of residential connections regardless of the actual residential use for that year.

MAXIMUM DAY DEMAND PER ERU

As discussed above under the heading, **Maximum Day Production**, the estimated maximum day to average day ratio for NBWD is 2.44. With an average day demand per ERU of 114 gpd, the **maximum day demand is estimated at 278 gpd per ERU.**

PEAK HOUR DEMAND

Peak Hour Demand (PHD) is a value that applies to the system as a whole, not to any individual service, and is estimated using Equation 5-3 from the Water System Design Manual. This formula estimates peak hour system demands, *not including fire flow*:

$$PHD = (MDD/1440)[(C)(N)+F]+18$$

Where

PHD	=	Peak Hour Demand, gallons per minute
C	=	Coefficient from Water System Design Manual Table 5-1
N	=	Number of ERUs served
F	=	Factor from Water System Design Manual Table 5-1
MDD	=	Maximum Day Demand per connection, gpd

For a system with more than 500 service connections, C and F are: 1.6 and 225, respectively. As derived above, MDD for the NBWD water system is 278 gpd. Inserting these numbers into the above equation yields the following:

$$PHD = (278/1440)[(1.6)(N)+225]+18$$

This equation simplifies to the following:

$$PHD = 0.309 \times N + 61$$

Using 2,706 estimated ERUs for 2013 from Table 2-8, the estimated peak hour demand for 2013 would be 897 gpm. The above formula will be used to estimate projected peak hour demands.

SUMMARY OF WATER DEMAND FACTORS

Table 2-9 summarizes water demand factors developed in the preceding sections of this Plan.

Summary of Per Connection Water Demand Statistics

Demand Factor	Value
Average Day Demand per ERU, gpd	114
Maximum Day Demand per ERU, gpd	278
Maximum Day to Average Day Factor	2.44
Peak Hour Demand, gpm	0.309 x N + 61 (1)

(1) N is the number of ERUs served by the system.

FUTURE SYSTEM DEMANDS

To project future NBWD water demands it will be assumed that water use will be proportional to the total number of connections and/or area population. Historic water use factors developed above will be applied to projected full-time equivalent residential connections to estimate future water demands.

PROJECTED LAND USE

The service area has a mixture of different zoning classifications. The largest portion of the land in the service area is zoned Rural Residential (RR). Other zoning in the service area includes Agricultural (AG), Restricted Residential (R1), General Residential (R2), Conservation (CD), Community Commercial (CC), Resort (R3), Mixed Use (MU), and Industrial (IND). The distribution of zoning is roughly proportional to existing customer category distribution.

PROJECTED CONNECTIONS ERUS

County and City Growth Rates

Historic populations for Pacific County and cities within Pacific County were obtained from the Washington State Office of Financial Management. County population since 1960 and the population of cities within Pacific County since 1968 are shown in Figure 2-6. It can be seen that most of the population of Pacific County lies outside of the incorporated areas of the cities. In fact, less than one third of the Pacific County population lives in cities, while greater than two thirds of the Pacific County population lives in unincorporated areas. Also, over the data period, the populations of the cities have remained relatively flat, while the population of the County has increased. Between 1968 and 2013 the population of incorporated Pacific County areas increased by 12 percent, while the population of unincorporated Pacific County increased by 42 percent. All of the incorporated area population increase took place in the cities of Long Beach and Ilwaco, while the cities of Raymond and South Bend decreased in population.

Since 1968 Pacific County as a whole has grown at an average annual rate of 0.78 percent. From 1994 through 2013 the County average annual growth rate was 0.29 percent. OFM data shows that the population in 2004 and 2013 were both 21,000, so the net growth rate over the past ten years has been zero percent, although the data show that the County population grew to 22,100 in 2010 then declined back to 21,000 by 2013. Unincorporated Pacific County grew at an average annual rate of 1.09 percent between 1968 and 2013, at an average annual rate of 0.35 percent between 1994 and 2013 and at an average annual rate of 0.13 percent between 2004 and 2013.

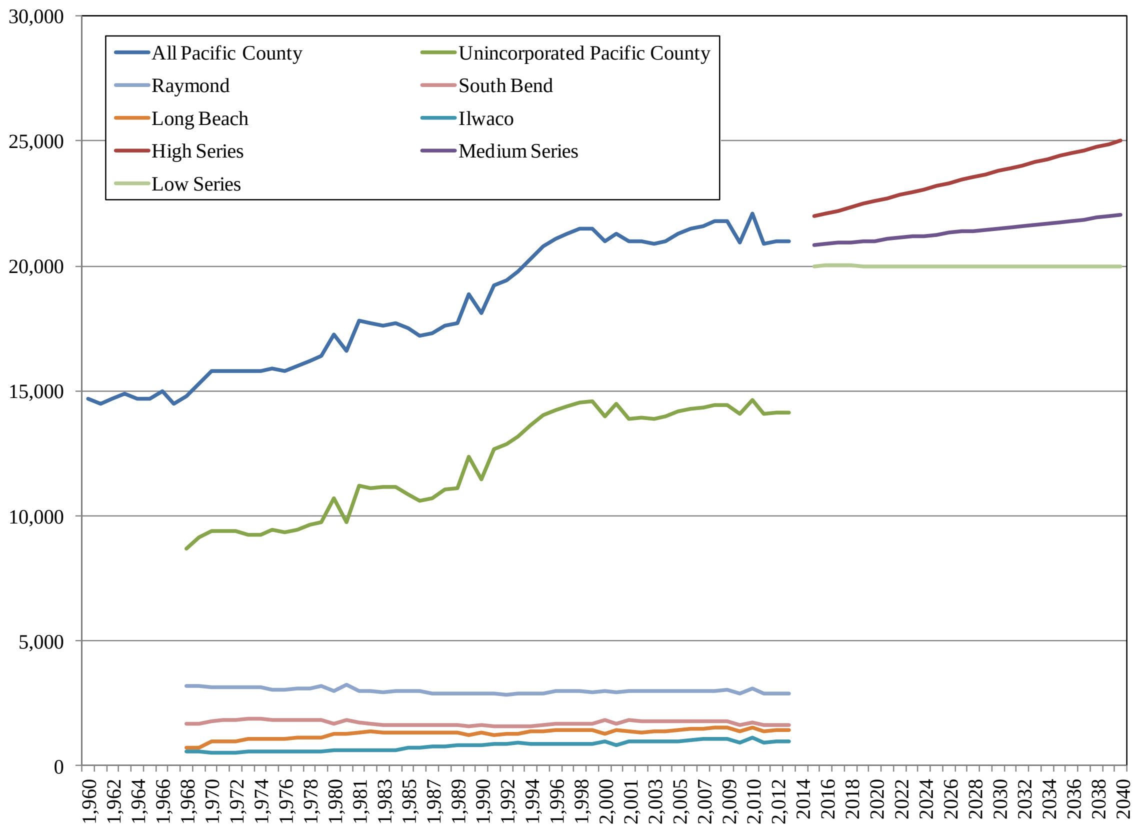
OFM also provides projections of county populations, including low, medium and high series growth projections. The high series projection for Pacific County has population rising from 20,920 in 2010 to 22,000 in 2015, and average annual rate of 1.01 percent, then continuing to rise at a rate of approximately 0.5 percent per year through 2040. The medium series projection for Pacific County has population decreasing from 20,920 in 2010 to 20,860 in 2015, an annual growth rate of -0.06 percent, then growing through 2040 at a rate of 0.1 to 0.3 percent per year. The low series projection for Pacific County has population decreasing from 20,920 in 2010 to 19,999 in 2015, an annual growth rate of -0.90 percent, then remaining more or less constant through 2040. Figure 2-6 shows the high, medium and low Pacific County growth rate projections together with the historic populations discussed above.

Pacific County Comprehensive Plan

The Pacific County 2010 Comprehensive Plan includes population history and growth projections for Ocean Park. Table 2-6 shows that Ocean Park population declined from 827 in 1996 to 679 in 2009, an average annual growth rate of -1.51 percent. The plan further projects growth in Ocean Park to 834 by 2030, an average annual growth of 0.98 percent from 2009.

FIGURE 2-6

Historic Pacific County and City Populations



NBWD Growth Projections

Given the various historic growth rates discussed above, plus the connections history discussed previously, there is a range of possible growth rates that could be considered for NBWD. The average annual growth rate in water system connections between November 2007 and December 2013 was 0.26 percent. The average annual growth in unincorporated Pacific County population was 0.35 percent between 1994 and 2013, and was 0.13 percent between 2004 and 2013. The most directly applicable of these growth rates is the historic NBWD connections, because connections data is specific to NBWD. It is also uncertain how good past growth rates are as predictors of future growth rates. On the one hand, as the population ages there may be more people looking to retire in communities like the Ocean Park area, thereby increasing growth rates. On the other hand, remoteness of the location and a lack of employment opportunities may suppress population growth rates.

Given the uncertainties of projected growth rates, the best predictor available for future growth is probably the records of recent historic growth. And the most applicable historic growth rate is the 0.26 percent annual growth rate in system connections. Therefore we will project the annual growth rate for NBWD for the coming six year planning period at 0.26 percent.

EFFECTS OF WATER CONSERVATION

It is anticipated that the value of an ERU will change as the system grows. With promotion of water conservation, the water usage represented by an ERU may go down. However, for projection of water system needs it is safer not to assume that water usage per ERU will decrease.

PROJECTED NON-REVENUE WATER DEMANDS

Non-revenue water demands include DSL as well as other water uses such as fire protection and line flushing. As the system upgrades it is reasonable to assume that DSL rates will decrease. On the other hand, as the area grows it is reasonable to assume that fire protection and line flushing water use may increase. For water demand projection purposes it will be assumed that line flushing and fire protection water use will be proportional to system connections, while DSL will decrease over ten years to ten percent of production.

WATER RATES AND RATE IMPACTS ON WATER DEMAND

If the NBWD water rate structure is adjusted in the future, that adjustment may have an impact on water usage. The most likely impact of future rate adjustments would be to promote water conservation. However, water usage within NBWD is already very low, so it is not likely that future rate adjustments will have a great impact on water usage.

PROJECTED ERUS

Non-DSL ERUs are projected to increase at a rate of 0.26 percent per year, from the 2013 value of 2,183 shown in Table 2-8. DSL ERUs are projected as a percent of Total ERUs, beginning in 2015 as the 19.4 percent shown in Table 2-6, and declining to ten percent over ten years. Note that while non-DSL ERUs increase steadily in Table 2-10, total ERUs actually decrease due to the reduction in percent DSL through 2025, then increase at 0.26 percent per year after that.

I

Projected ERUs

Year	Non-DSL ERUs	Percent DSL	DSL ERUs	Total ERUs
2015	2,194	19.4%	528	2,722
2016	2,200	18.5%	499	2,699
2017	2,206	17.5%	468	2,674
2018	2,211	16.6%	440	2,651
2019	2,217	15.6%	410	2,627
2020	2,223	14.7%	383	2,606
2021	2,229	13.8%	357	2,586
2022	2,234	12.8%	328	2,562
2023	2,240	11.9%	303	2,543
2024	2,246	10.9%	275	2,521
2025	2,252	10.0%	250	2,502
2026	2,258	10.0%	251	2,509
2027	2,264	10.0%	252	2,516
2028	2,270	10.0%	252	2,522
2029	2,275	10.0%	253	2,528
2030	2,281	10.0%	253	2,534
2031	2,287	10.0%	254	2,541
2032	2,293	10.0%	255	2,548
2033	2,299	10.0%	255	2,554
2034	2,305	10.0%	256	2,561
2035	2,311	10.0%	257	2,568

(1) Non-DSL ERUs is the value from Table 2-8 for 2013 increased by 0.26 percent per year.
(2) Percent DSL begins at 19.4 percent of total production as shown in Table 2-6 for 2013, and is reduced linearly over ten years to ten percent of total production by 2025.
(3) DSL ERUs is the number of ERUS required such that DSL ERUs divided by Total ERUs yields the Percent DSL shown in the table.
(4) Total ERUs is Non-DSL ERUs plus DSL ERUs.

FUTURE WATER DEMAND FOR 6- AND 20-YEAR HORIZONS

Projected Average Day, Maximum Day, and Peak Hour Demands

Based on historic water use rates and projected ERUs, estimated future NBWD water demands are shown in Table 2-11. Average day demand is based on Total ERUs developed in Table 2-10, times the ADD value of 114 gpd per ERU from Table 2-9. Maximum Day Demand is projected ERUs times the MDD value of 278 gpd per ERU from Table 2-9. Peak Hour Demand is based on the Peak Hour Demand formula from Table 2-9 and the projected ERUs. As with ERUs, the projected average day, maximum day and peak hour demands decline initially due to projected decreases in DSL, then rise with projected growth.

I

Projected Water System Demands

Year	ERUs (1)	Average Day Demand, gpd (2)	Maximum Day Demand, gpd (3)	Peak Hour Demand, gpm (4)
2015	2,722	310,000	757,000	902
2016	2,699	308,000	750,000	895
2017	2,674	305,000	743,000	887
2018	2,651	302,000	737,000	880
2019	2,627	299,000	730,000	873
2020	2,606	297,000	724,000	866
2021	2,586	295,000	719,000	860
2022	2,562	292,000	712,000	853
2023	2,543	290,000	707,000	847
2024	2,521	287,000	701,000	840
2025	2,502	285,000	696,000	834
2026	2,509	286,000	698,000	836
2027	2,516	287,000	699,000	838
2028	2,522	288,000	701,000	840
2029	2,528	288,000	703,000	842
2030	2,534	289,000	704,000	844
2031	2,541	290,000	706,000	846
2032	2,548	290,000	708,000	848
2033	2,554	291,000	710,000	850
2034	2,561	292,000	712,000	852
2035	2,568	293,000	714,000	855

(1) ERUs come directly from Table 2-10.
(2) Average Day Demand is ERUs times the Average Day Demand value of 144 gpd per ERU from Table 2-9, rounded to the nearest 1,000 gpd.
(3) Maximum Day Demand is ERUs times the Maximum Day Demand value of 278 gpd per ERU from Table 2-9, rounded to the nearest 1,000 gpd.
(4) Peak Hour Demand is based on ERUs and the Peak Hour Demand formula in Table 2-9, rounded to the nearest gpm.