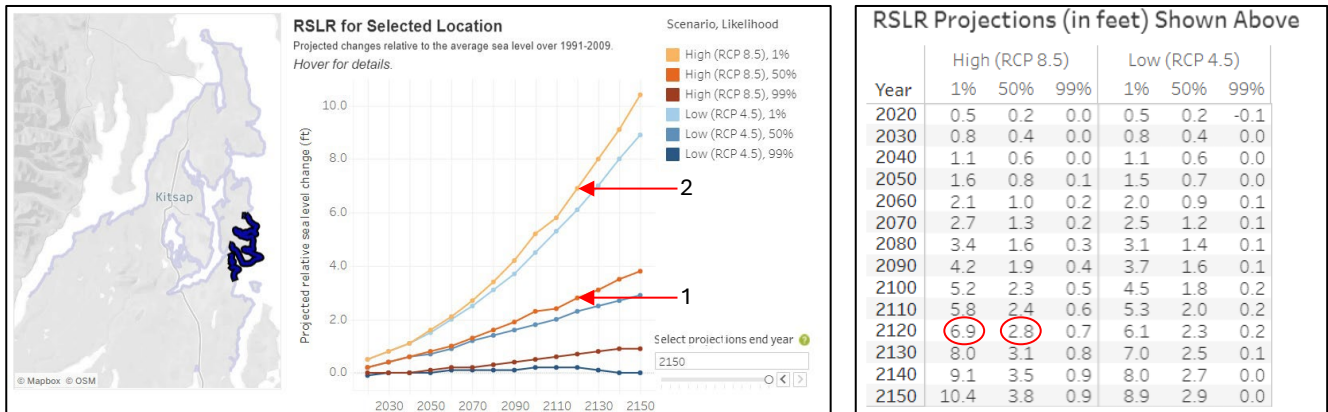


# Summary of Groundwater Modeling Stresses

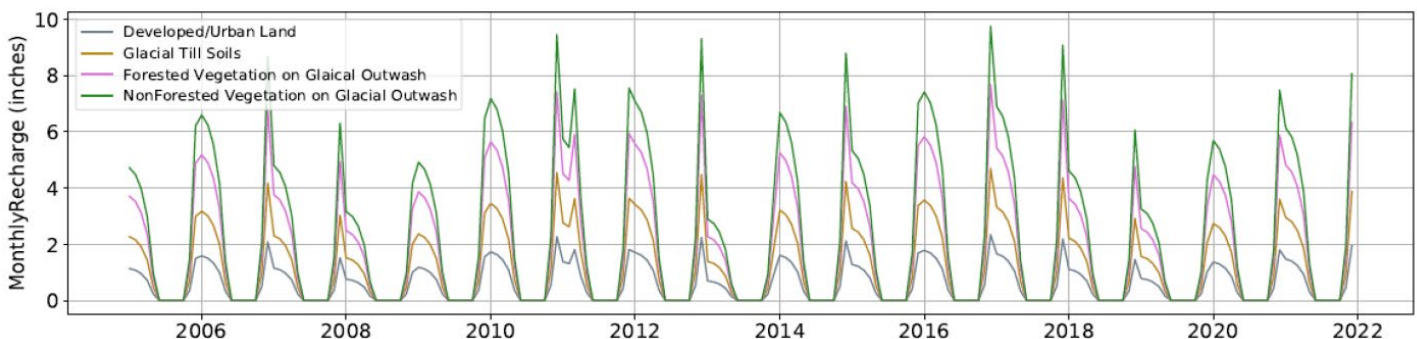
## Sea Level Rise

1. High Emissions (RCP 8.5) 50% Probability of Occurring
  - Corresponds to a high emission scenario (minimal climate actions implemented) and the 50% most likely outcome, corresponding to a 2.8-foot rise in sea levels over 100 years.
  - Gradually increased based on Graph and Table below.
2. High Emissions (RCP 8.5) 1% Probability of Occurring
  - Corresponds to a high emission scenario (minimal climate actions implemented) and the 1% most likely outcome, corresponding to a 6.9-foot rise in sea levels over 100 years.
  - Gradually increased based on Graph and Table below.



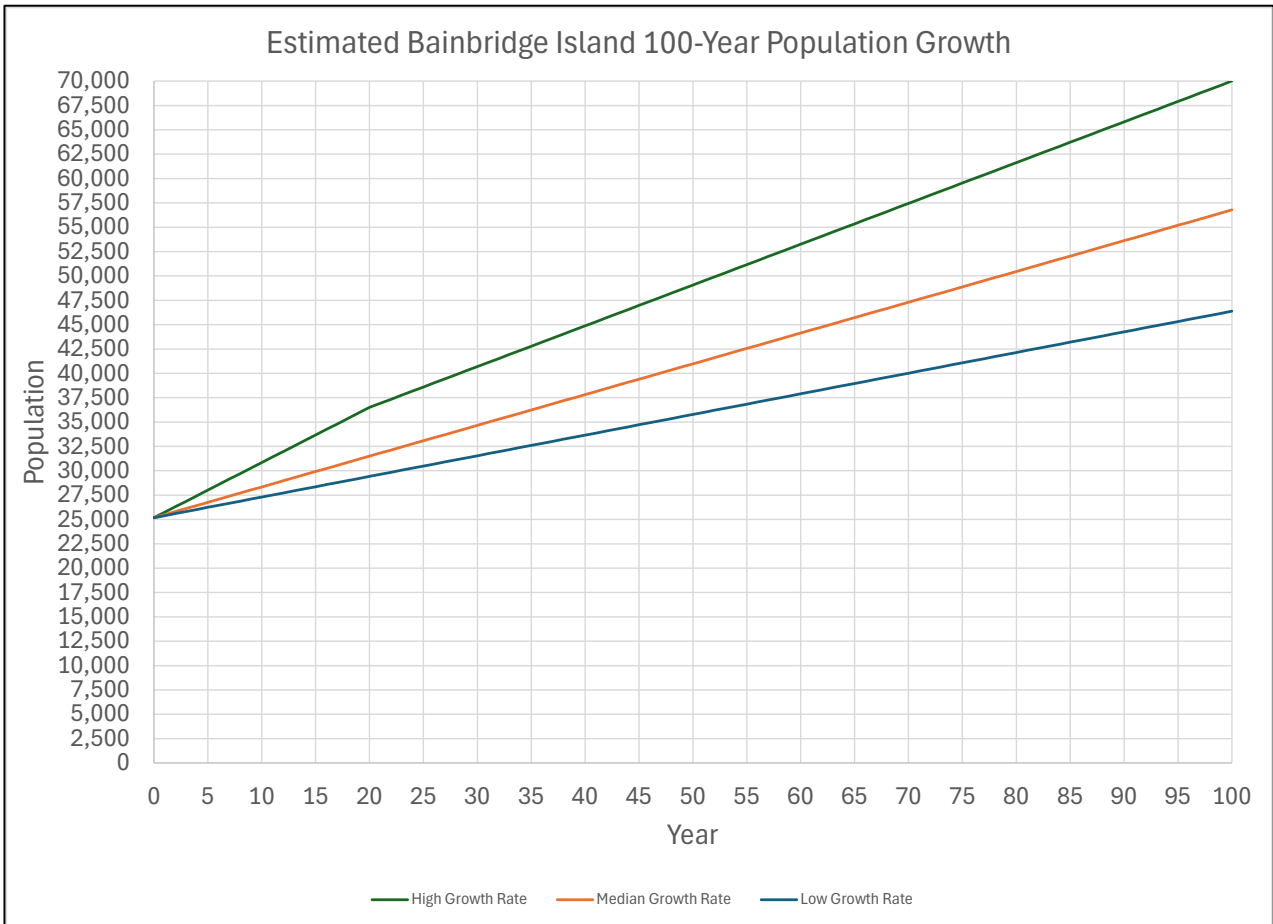
## Change in Groundwater Recharge

1. 15 % Reduction
  - To address landuse changes, increase in high-intensity storms
  - Use average of previous 10 years of model applied recharge and apply decrease.
  - No changes to spatial distribution (same recharge to precipitation factor used in current model, increase/decreases in greenspace not simulated).
  - Gradually decreased over 100-year modeling run.
2. No Change
  - Will use average of previous 10 years of model applied recharge.
  - No changes to spatial distribution.
3. 15 % Increase
  - Will use average of previous 10 years of model applied recharge and apply these changes.
  - No changes to spatial distribution (same recharge to precipitation factor used in current model, increase/decreases in greenspace not simulated).
  - Gradually increased over 100-year modeling run.



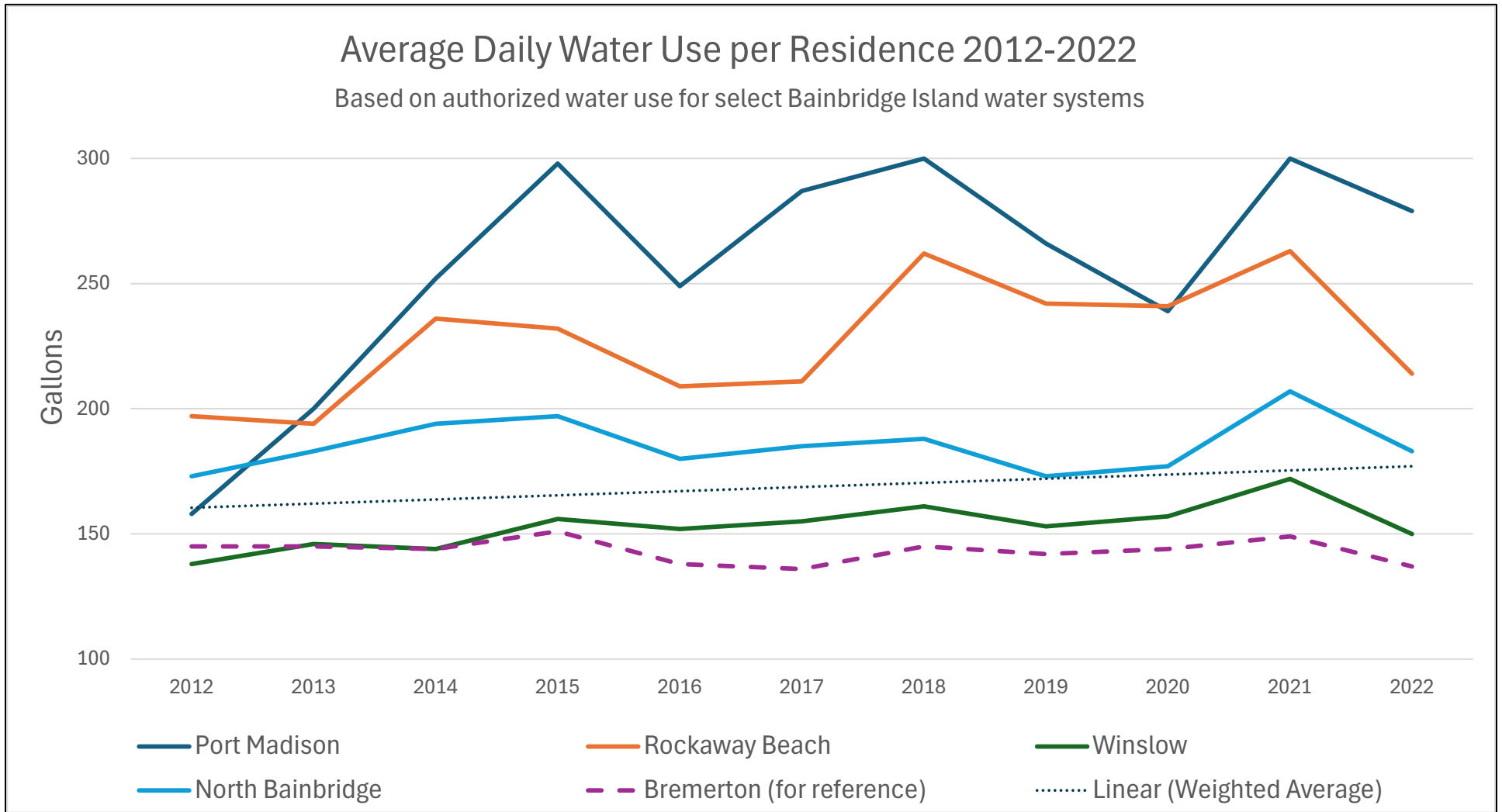
## Increase in Population/Water Use

1. Available water use and population data were obtained from each water system.
2. Low/Medium/High growth scenarios (Washington State OFM) for single domestic and three large on-island water systems. The estimated 2023 Bainbridge Island population is 25,108.
  - Low Growth Scenario - 100-year population = 46,380 (84% increase).
  - Medium Growth Rate - 100-year population = 56,780 (125% increase).
  - High Growth Rate - Includes an increased growth rate for Winslow during the first 20 years to account for Winslow high-growth planning rate. 100-year population = 70,010 (178% increase).



3. One medium growth scenario is used for off-island water systems within model domain using groundwater sources.
4. Existing off-island permit-exempt wells serving single, or Group B systems are included but not increased over time as most permit-exempt wells tap shallow aquifers that are not directly connected to on-island aquifers.
5. Assume 2.5 people per residence. One residence = 1 Equivalent Residential Unit (ERU).
6. Unless otherwise noted, total water use, including leakage, domestic, commercial and irrigation for each water system is allocated to ERUs served by each system.
7. Growth for each water system is based on increasing ERUs over time.
8. Outdoor water use is assumed to increase by 7% over the 100-year model run, based on estimates of increased water use in a high greenhouse gas scenario. (Mauger, et. al., 2015). Mauger, et. al., estimated water use increases over the year 2000 by 1% in 2025, 2% in 2050, and 5% in 2075. A fitted trend line indicates an increase over the year 2020 by 7% in the year 2120.
9. Water use data was obtained from each water system as illustrated in the figure and table below.

## Increase in Population/Water Use (continued)



**Average Daily Water Use per Residence for Select Water Systems (2012 – 2022)**

# Increase in Population/Water Use (continued)

## Summary of Population/Water Use Increases for Groundwater Modeling Scenarios

Location	Water System	Growth Scenario	Usage Growth (ERU/Year)-	Usage Growth (Connections/Year)-	Average Total Water Use (Gallons/Day/ERU or Connection)*	Average Outdoor Water Use (Gallons/Day/ERU or Connection)-	Annual Increase in Outdoor Water Use (Gallons/Day/ERU or Connection)-	Current ERUs	Approved Connections*	Source of Information	Period of Record	Notes
Bainbridge Island Water Systems	North Bainbridge	Low	10	na	206	44	0.0308	1,948	Unspecified	Kitsap PUD	2012 - 2023	The Usage Growth rate includes population increases of 25, 39, and 50 people per year plus an additional 2% for nonresidential water use.
		Medium	16	na								
		High	20	na								
	South Bainbridge	Low	30	na	269	107	0.0749	1,690	Unspecified	Kitsap PUD	2016 - 2023	The Usage Growth rate includes population increases of 68, 101, and 134 people per year plus an additional 12% for nonresidential water use. Includes Island Utility and Bill Point usage statistics.
		Medium	45	na								
		High	60	na								
	City of Bainbridge Island	Low	69	na	163	1	0.0007	4,972	Unspecified	City of Bainbridge Island	1991 - 2023	For the high growth scenario, Winslow is estimated to have a growth rate of 361 people/year for the first 20 years, then reduced to 214 people/year for the last 80 years.
		Medium	104	na								
		High	230; 137	na								
	Single Domestic	Low	4	na	196	31	0.0217	Unspecified	Not Applicable	Washington State Office of Financial Management Census Data	1990 - 2023	Average water use (GPD/ERU) based on average consumptive use from North Bainbridge WS because service area represents mostly residential users.
Medium		6	na									
High		8	na									
Harbor Crest	Medium	0	na	189	27	0.0189	21	23	Kitsap PUD	2012 - 2023		
Port Madison	Medium	0	na	283	121	0.0847	105	144	Kitsap PUD	2012 - 2022	Northwest Water Systems, Inc. is now managing this water system.	
Meadowmeer	Medium	0	na	245	83	0.0581	314	335	Kitsap PUD	2021 - 2023		
Off Island Water Systems	North Perry	Medium	na	27	209	47	0.0329	6,593	Unspecified	North Perry Water District	2012 - 2023	
	Silverdale	Medium	na	104	325	163	0.1141	6,453	Unspecified	City of Silverdale	2012 - 2023	
	Bremerton	Medium	379	na	144	-	-	>29,000	Unspecified	City of Bremerton	2012 - 2023	Average water use is based on single family residence meter readings. On average, 46% of Bremerton's water supply is from groundwater sources. For modeling purposes, increased groundwater withdrawals will be based on 46% of total water use.
	Poulsbo	Medium	na	81	255	93	0.0651	4,272	Unspecified	City of Poulsbo	2014 - 2023	Average water use is based on authorized use and doesn't include system loss
	Indianola	Medium	7	na	174	12	0.0084	682	Unspecified	Kitsap PUD	2018 - 2023	
	Miller Bay	Medium	1	na	141	-	-	429	460	Kitsap PUD	2015 - 2023	
	Suquamish	Medium	8	na	152	-	-	1,551	Unspecified	Kitsap PUD	2012 - 2023	
	Keyport	Medium	0	na	396	234	0.1638	434	798	Kitsap PUD	2012 - 2023	Water System began serving Keyport Base as one connection in 2021, which added the equivalent of approximately 430 ERUs

**Notes:** \* With the exception of Bremerton and Poulsbo, water use per ERU is based on total production which includes system loss and other uses such as commercial, industrial and irrigation. ^ Source of information is the Washington Department of Health SENTRY Database. ~ 1 ERU is assumed to be equivalent to 2.5 people. ^ Average outdoor is equal to total water use - indoor use, assumed to be 65 gallons per day per capita x 2.5 people = 162 gallons per day. ^ Outdoor water use is assumed to increase by 7% between 2020 and 2120 due to climate change.