Water and Environmental Research Center

Seward Peninsula Water Resources and Climate Change

Water Use and Vulnerability

Over the last century the Seward Peninsula has seen climatic and industrial changes, both of which potentially impact supply and demand of freshwater resources. Over the next century changes and temperature and precipitation may impact many water resources while changes in water infrastructure (storage, treatment, distribution) shape demand and determine which water resources can be used practically and safely.

Vulnerability, as it is used here, refers to change in volume due to a change in climate or to present biological quality (bacteria). Therefore a water source might be considered vulnerable if it is highly dependent on rainfall.

Current use (see table below) appears to be strongly influenced by distribution, as communities with piped water (gray) consume more water per person than those who haul water or have it delivered. Water shortages can occur because the source or storage capacity is insufficient.

Seward Peninsula Water Systems, Use, and Limitations.

Community	System	Use (gpcpd*)	Limitation (shortages)
Brevig Mission	piped	46	
Deering	haul	7.9	storage
Elim	piped	72	
Golovin	haul	25	storage
Nome	piped	105	
Shishmaref	haul	7.9	source + storage
Teller	haul	10	
Wales	haul	9.0	
White Mountain	piped	96	

*gallons per capita (person) per day

Questions?

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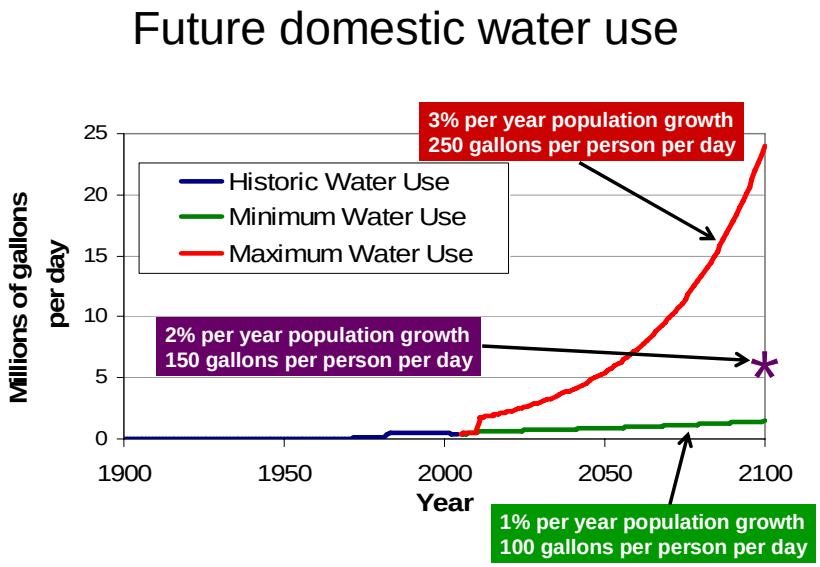

Water use is expected to increase on the Seward Peninsula as population increases and water infrastructure is improved. These estimates assume the installation of pipes in all communities by the end of the 21st century.

In other communities on the Seward Peninsula, such as Wales, sampling has included measurements of biological, chemical, and physical parameters in order to estimate water resource vulnerability. Flow can be limiting in streams with small watersheds. Also, streams that have little groundwater contribution may be at risk should precipitation become less predictable. In the table below, conductivity of the water (how much is dissolved in the water) is indicative of contact with rock, or groundwater contribution. If the conductivity of the baseflow (winter flow under ice when there is no runoff) is low, then the groundwater feeding the stream may be shallow, or not stored for long in the ground, and therefore susceptible to changes in precipitation on the scale of several years. The lack of winter flow further demonstrates dependence on precipitation. From multiple conductivity measurements, the contribution of groundwater during the summer can also be estimated. Although not related to volume, *E. coli* samples were taken. *E. coli* indicates the influence of feces of warm blooded animals (humans, other mammals, birds, etc.). Water sources may be very good presently, but vulnerable to changes in volume. Characteristics that suggest **high vulnerability** are highlighted in **red** while characteristics contributing to **low vulnerability** are highlighted in **green**.

Wales Water Resources.

Creek	**Village**	**Gilbert**
Baseflow conductivity	Medium	**No winter flow**
% Summer groundwater	25-54	--
Catchment area	--	**--**
E. coli (per 100 mL)	< 1	4.2
Vulnerability	**LOW**	**HIGH**

Shishmaref water resources were not sampled, but current limitations create awareness of vulnerability over the coming years.