

City of Benicia

2020 Annual Water Quality Report



Flocculation Process



The City of Benicia (City) is proud to report that in calendar year 2020, your drinking water quality met or surpassed all federal and state drinking water health standards. To ensure tap water is safe to drink, the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board (State Water Board) prescribe limits that regulate the amount of certain contaminants in water provided by public water systems. This drinking water quality report is provided to our water customers and contains information about the quality and sources of water treated from January 1, 2020 through December 31, 2020. This report and other information can be found on the City's website at www.ci.benicia.ca.us/publicworks.

PUBLIC PARTICIPATION

Este informe contiene información es muy importante sobre su agua para beber.

Favor de comunicarse City of Benicia 707-746-4394 para asistirlo en español.

The City encourages customers to participate in City Council meetings which take place every first and third Tuesday of the month. For more information, please visit the City's website:

<https://www.ci.benicia.ca.us/citycouncil>

If you have questions or comments regarding this report or have questions relating to your drinking water, please contact Marc Bautista, Water Quality Supervisor, at 707-746-4295.



**Benicia, Keep
Saving Water**

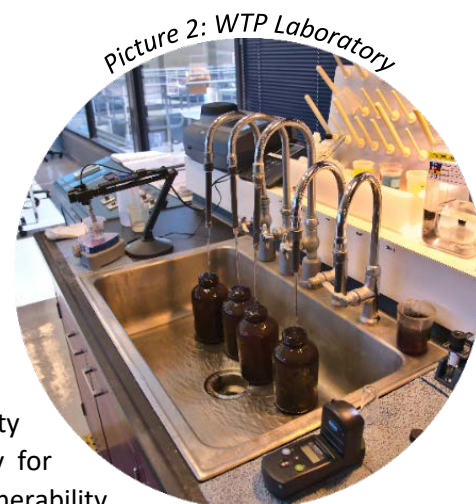
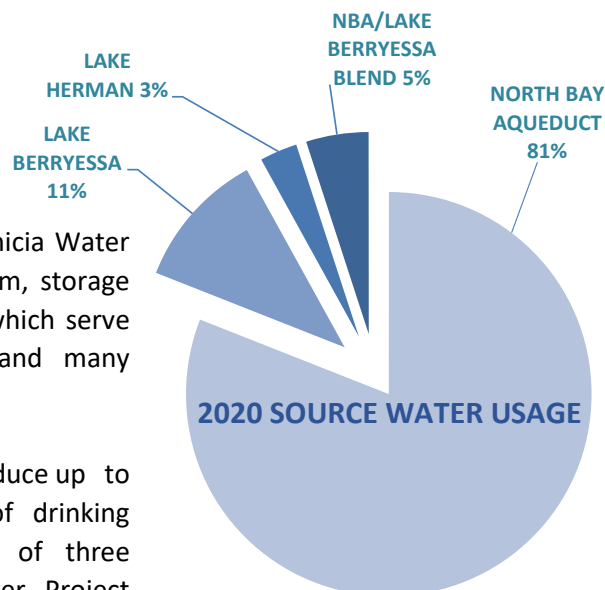
FROM SOURCE TO TAP

The City owns and operates the Benicia Water Treatment Plant, transmission system, storage reservoirs and distribution system which serve approximately 30,000 customers and many visitors to our City.

The Water Treatment Plant can produce up to 12 million gallons a day (MGD) of drinking water. Our water supply consists of three surface water sources: State Water Project water via the North Bay Aqueduct (NBA), Lake Berryessa transported through the Putah South Canal (PSC), and our local source, Sulphur Springs Creek diverted at Lake Herman. Each source provides clean and safe water for drinking, fire protection, irrigation, and industry. The City maintains the ability to treat and deliver from any of its sources based on season, operational needs, and contractual obligations.

Source Water Assessments evaluate the quality of the water used as a drinking water supply for local communities and examine the water's vulnerability to possible contamination from activities within the watershed.

A copy of each assessment is available at: State Water Resources Control Board, Division of Drinking Water, San Francisco District Office, 850 Marina Bay Parkway Bldg. P, Second Floor Richmond CA 94804-6403, (510)620-3474.



| Source | Last Assessment | Identified Vulnerabilities |
|----------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------|
| State Water Project via the North Bay Aqueduct (NBA) | 2016 | Cattle and sheep grazing activities |
| Lake Berryessa transported through the Putah South Canal | 2012 | Illegal activities/unauthorized dumping and herbicide application |
| Sulphur Springs Creek/Lake Herman | 2002 | Urban runoff, herbicides and pesticides application, cattle grazing operations, and historic mining operations |

JOIN THE BENICIA WATERSMART PROGRAM

The City of Benicia partnered with WaterSmart to offer customers FREE detailed information about your water use. It is part of our commitment to provide customers with the best tools to manage water use and your water bill. If you haven't already signed up, get started today by logging onto the WaterSmart web portal at www.benicia.watersight.com.

Questions can be emailed to winsight@ci.benicia.ca.us

SOURCES OF DRINKING WATER AND CONTAMINANTS
THAT MAY BE PRESENT IN SOURCE WATER

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances deriving from the presence of animals, or from human activity. Contaminants that may be present in source water include:



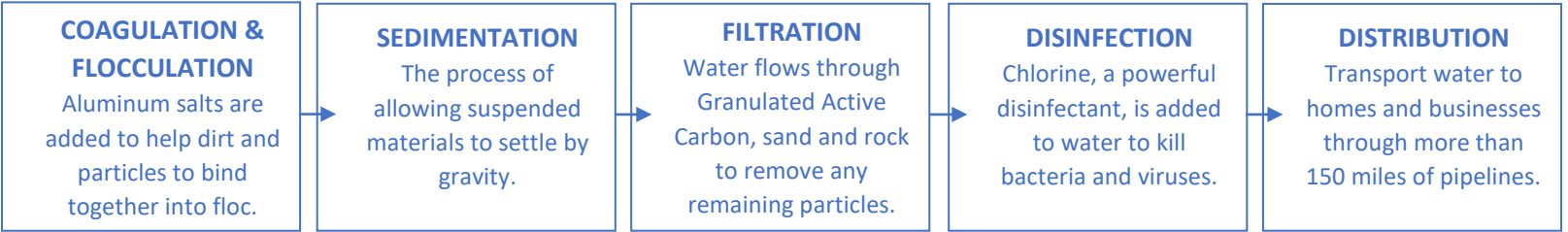
- Microbial contaminants such as viruses and bacteria that may come from wastewater treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants such as salts and minerals that can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- Radioactive contaminants that can be naturally occurring or be the result of oil and gas production, and mining activities.

SPECIAL INFORMATION

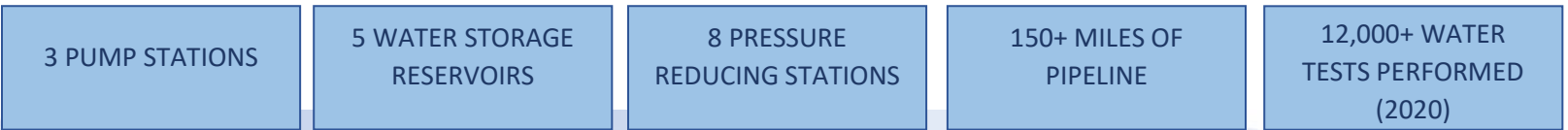
Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA’s Safe Drinking Water Hotline (800)426-4791.

Some persons may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised people such as those with cancer undergoing chemotherapy, those who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the EPA’s Safe Drinking Water Hotline (800)426-4791.

BENICIA WATER TREATMENT PLANT PROCESS



DISTRIBUTION SYSTEM



WATER QUALITY

HARDNESS is measured in milligrams per liter (mg/L). Calcium and magnesium are naturally occurring materials in our water and can cause water to be “hard”. The City’s water is generally “moderately hard” to “very hard”, in the range of 65 to 183 mg/L. Water that is too “soft” (<30 mg/L) can be corrosive to plumbing pipes and water that is too “hard” (>300 mg/L) can cause scale to form on appliances and reduce laundry efficiency.



Lake Herman

NITRATE in drinking water at levels above 10 mg/L (as nitrogen) is a health risk for infants less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant’s blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider. Nitrate was not detected in any of the City’s water sources or treated water in 2020.

TURBIDITY is a measure of the cloudiness of the water, and it is measured in Nephelometric Turbidity Units (NTU). Turbidity is a good indicator of the effectiveness of the filtration system for surface water treatment. The filtered water turbidity is analyzed continuously and sampled by an operator at a minimum of every four hours throughout the day at the Water Treatment Plant. Throughout 2020, the City was able to keep its treated water turbidity under 0.1 NTU; the regulatory limit is less than 0.3 NTUs in 95% of the samples taken.

TOTAL ORGANIC CARBON (TOC) has no health effects. However, TOC provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the maximum contaminant levels (MCL) may lead to adverse health effects, including liver or kidney problems, nervous-system effects, and increased cancer risk. In 2020, the average TOC in Benicia drinking water was 1.6 mg/L with an average TOC removal of more than 50% compared to source water TOC.

CRYPTOSPORIDIUM AND GIARDIA are naturally occurring microbial contaminants found in surface water throughout the world. The City’s water treatment plant provides a multi-barrier treatment process which includes filtration and disinfection with chlorine. Although filtration removes over 99.9% of these contaminants, even the most commonly used filtration methods cannot guarantee 100% removal. Cryptosporidium and Giardia must be ingested to cause disease and may be spread through means other than drinking water. Ingestion of Cryptosporidium can cause Cryptosporidiosis and Giardia can cause Giardiasis; both are gastrointestinal infections. Symptoms include nausea, diarrhea, and abdominal cramps.



LEAD AND COPPER

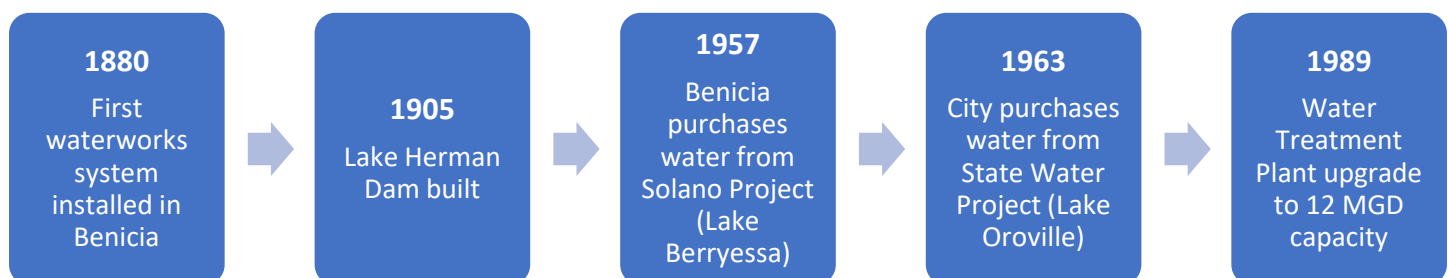
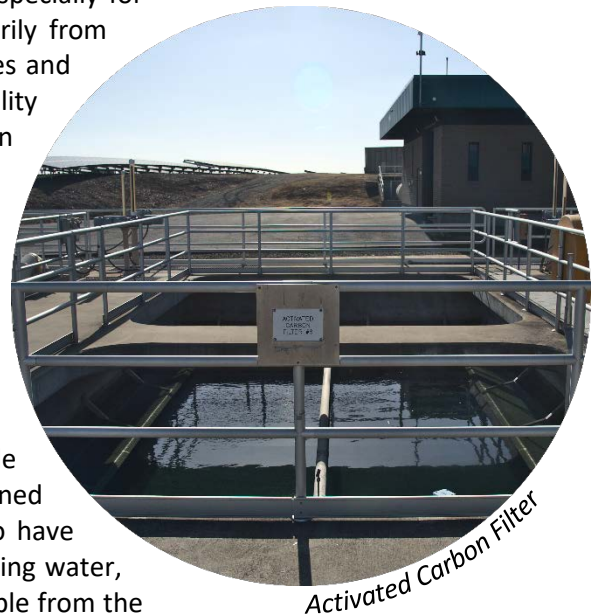
The Lead and Copper Rule was introduced by USEPA in 1991 to limit the concentration of lead and copper allowed in drinking water at the customer's tap as well as to limit the corrosivity due to the water. The City proactively adjusts the pH of the water to form a calcium carbonate protective layer between the pipe material and the water supply to prevent lead and copper from leaching into the drinking water supply.

Every three years, the City is required to collect at least thirty drinking water samples directly from the customer's faucet. During the last sampling event in 2018, 45 customers' homes were tested, and lead and copper were not detected above the regulatory action level. USEPA requires that 90 percent of the samples be below the regulatory action level (AL) of 15 ppb for lead and 1300 ppb for copper. Results from the 2018 monitoring are below. The next lead and copper test is scheduled for fall 2021.

| Contaminant | Action Level (AL) | Public Health Goal (PHG) | Benicia's Water 90th Percentile | Number of Sites Above the AL | Contaminant Source |
|--------------|-------------------|--------------------------|---------------------------------|------------------------------|-----------------------------------------|
| Lead (ppb) | 15 | 2 | 1.6 | 0 | Corrosion of household plumbing systems |
| Copper (ppb) | 1,300 | 300 | 81 | 0 | |

MINIMIZING EXPOSURE TO LEAD

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from material and components associated with water distribution service lines and home plumbing. The City of Benicia is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. As of January 1, 2016, all brass plumbing fixtures must be lead-free. The City replaced all lead service lines; the remaining potential sources of lead are from older brass fixtures or solder joints in private structures. According to USEPA, homes build before 1986 are more likely to have lead pipes or fixtures and solder that contain lead. However, due to the City's effective corrosion control program, very little lead is leached from these plumbing materials. If a customer is concerned about risk of lead exposure from drinking water, we encourage you to have your water tested by a certified laboratory. Information on lead in drinking water, testing methods and steps you can take to minimize exposure are available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.



| Parameters | Untreated Water | | | | | | Treated Water | | | | |
|----------------------------------------------------------------------------------|-------------------------|---------|----------------|---------|-------------|---------|-------------------------|---------|-------------|-------|-------------------------------------------------------------------------------------|
| | North Bay Aqueduct | | Lake Berryessa | | Lake Herman | | Benicia's Treated Water | | | | |
| PRIMARY DRINKING WATER STANDARDS <i>Contaminants that may affect your health</i> | | | | | | | | | | | |
| Inorganic | Range | Average | Range | Average | Range | Average | Range | Average | MCL | MCLG | Major Source in Drinking Water |
| Aluminum (ppm) | 0.1-0.3 | 0.2 | NA | 0.16 | NA | 0.16 | NA | ND | 1 | 0.6 | Erosion of natural deposits; residue from surface water treatment process |
| Arsenic (ppb) | 2.3-5.4 | 4.1 | NA | ND | NA | 6.7 | NA | ND | 10 | 0.004 | Erosion of natural deposits; runoff from orchards; glass and electronics production |
| Barium (ppm) | 24-43 | 33 | NA | ND | NA | 0.07 | NA | ND | 1 | 2 | Erosion of natural deposits; industrial discharges |
| Total Chromium (ppb) | ND-33 | 8.3 | NA | ND | NA | ND | NA | ND | 50 | 100 | Erosion of natural deposits; discharge from steel and pulp mills and chrome plating |
| Hexavalent Chromium (ppb) | NA | 0.05 | NA | ND | NA | 0.03 | NA | ND | 10 | 0.02 | Erosion of natural deposits; industrial discharges |
| Fluoride (ppm) | ND-0.16 | 0.06 | NA | ND | NA | 0.25 | 0.02-0.97 | 0.82 | 2 | 1 | Erosion of natural deposits; water additive to promote strong teeth |
| Nickel (ppb) | ND-28 | 7 | NA | ND | NA | ND | NA | ND | 100 | 12 | Erosion of natural deposits; discharge from metal factories |
| Nitrate (ppm) | NA | ND | NA | ND | NA | ND | NA | ND | 10 | 10 | Runoff and leaching from septic tanks and sewage; erosion |
| Nitrate + Nitrite (ppm) | NA | ND | NA | NS | NA | ND | NA | ND | 10 | NA | Runoff and leaching from septic tanks and sewage; erosion |
| Lead (ppb) | ND-13.6 | 4.7 | NA | ND | NA | ND | NA | ND | 15 | 0.2 | Erosion of natural deposits; corrosion |
| Copper (ppm) | ND-3.8 | | NA | ND | NA | ND | NA | ND | 1.3 | 0.3 | Erosion of natural deposits; industrial discharges |
| Total Coliform | Present in source water | | | | | | NA | ND | 5% positive | 0 | Naturally present in the environment |
| Disinfection Byproducts | Range | Average | Range | Average | Range | Average | Range | RAA | MCL | MCLG | Major Source in Drinking Water |
| Total Trihalomethanes (ppb) | NA | ND | NA | NA | NA | NA | 32-77 | 62 | 80 | NA | By-product of drinking water chlorination |
| Total Haloacetic Acids (ppb) | NA | NA | NA | NA | NA | NA | 7.4-17 | 15 | 60 | NA | By-product of drinking water chlorination |

| Parameters | Untreated Water | | | | | | Treated Water | | | | |
|---------------------------------------------------------------------------------------------------------------|--------------------|---------|----------------|---------|-------------|---------|-------------------------|---------|------|------|-------------------------------------------------------|
| | North Bay Aqueduct | | Lake Berryessa | | Lake Herman | | Benicia's Treated Water | | | | |
| SECONDARY DRINKING WATER STANDARDS <i>Contaminants that my affect the odor, taste, or appearance of water</i> | | | | | | | | | | | |
| | Range | Average | Range | Average | Range | Average | Range | Average | MCL | MCLG | Major Source in Drinking Water |
| Aluminum (ppb) | 130-320 | 228 | NA | 160 | NA | 160 | NA | ND | 200 | NA | Natural deposits; surface water treatment process |
| Color (units) | 11-111 | 62 | NA | ND | NA | 25 | NA | ND | 15 | NA | Naturally occurring organic materials |
| Iron (ppb) | 280-654 | 499 | NA | 300 | NA | 220 | NA | ND | 300 | NA | Leaching from natural deposits; industrial waste |
| Manganese (ppb) | 33-56 | 47 | NA | ND | NA | 21 | NA | ND | 50 | NA | Leaching from natural deposits |
| Odor (units) | 3-4 | 3.5 | NA | ND | NA | 4 | NA | 2 | 3 | NA | Naturally occurring organic materials |
| Silver (ppb) | ND-26 | 6.5 | NA | ND | NA | ND | NA | ND | 100 | NA | Industrial discharges |
| Turbidity (NTU) | 3-7 | 4 | NA | 3.9 | NA | 9.5 | 0.02-0.3 | 0.04 | 5 | NA | Soil runoff |
| Total Dissolved Solids (ppm) | 132-242 | 189 | NA | 190 | NA | 330 | 2-404 | 211 | 1000 | NA | Runoff/leaching of natural deposits |
| Conductivity (µS/cm) | 195-397 | 307 | NA | 330 | NA | 540 | 250-685 | 358 | 1600 | NA | Substances that form ions when in water |
| Chloride (ppm) | 13-38 | 25 | NA | 5.5 | NA | 37 | NA | 11 | 500 | NA | Runoff/leaching of natural deposits |
| Sulfate (ppm) | 7-38 | 23 | NA | 21 | NA | 36 | NA | 36 | 500 | NA | Runoff/leaching of natural deposits; industrial waste |
| GENERAL WATER QUALITY PARAMETERS <i>Non-regulated parameters of general interest to consumers</i> | | | | | | | | | | | |
| Boron (ppb) | 19-51 | 38 | NA | NS | NA | NS | NA | NS | 1000 | NA | |
| Calcium (mg/l) | 13- 20 | 17 | NA | 18 | NA | 35 | NA | 13 | NA | NA | |
| Chlorine (mg/l) | NA | NA | NA | NS | NA | NS | 0.3-1.5 | 1.2 | NA | NA | |
| Magnesium (mg/l) | 9-17 | 13 | NA | 29 | NA | 23 | NA | 8.4 | NA | NA | |
| Potassium (mg/l) | 1-2 | 1.7 | NA | 1.5 | NA | NS | NA | 1.7 | NA | NA | |
| Sodium (mg/l) | 14-35 | 27 | NA | 9.6 | NA | 50 | NA | 29 | NA | NA | |
| pH | 7.4-8.2 | 7.8 | NA | 8.5 | NA | NS | 7.7-8.5 | 8.2 | NA | NA | |
| Hardness (mg/l) | 66-151 | 83 | 110-176 | 162 | 165-192 | 179 | 65-183 | 98 | NA | NA | |
| Alkalinity (mg/l) | 72-138 | 92 | 113-185 | 153 | 160-218 | 199 | 76-188 | 103 | NA | NA | |

KEY WATER QUALITY TERMS

Some terms, abbreviation and symbols are unique to the water industry and might not be familiar to all customers. Terms used in the table are explained below:

AL Regulatory action level. The concentration which, if exceeded, triggers treatment or other requirements that the water treatment plant must follow.

MCL Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. Set by USEPA as close to the MCLGs as economically and technologically feasible.

MCLG Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. Set by USEPA.

MRDL Maximum Residual Disinfectant Level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG Maximum Residual Disinfectant Level Goal. The level of drinking water below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA Not Applicable or not available

ND Not Detected at testing limit

NS Not Sampled

PDWS Primary Drinking Water Standard. MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, water treatment requirements.

Public Health Goal (PHG) The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

RAA Running Annual Average

MG Million Gallons

MGD Million Gallons per Day

UNITS

ppb Parts per billion or micrograms per liter ($\mu\text{g/L}$)
Equivalent to one second in 32 years

ppm Parts per million or milligrams per liter (mg/L)
Equivalent to one second in 11.5 days

TON Threshold Odor Number, a measure of odor in water

NTU Nephelometric Turbidity Units, a measure of the relative clarity of water



Hills north of Lake Herman