Tap into Water: Bottle or Faucet?

A comparison guide to tap and bottled water in New Mexico, through quality, cleanliness, availability, and taste.

Image Source: Albuquerque Bernalillo County Water Utility Authority, Your Drinking Water, accessed December 17, 2020, https://www.abcwua.org/your-drinking-water/.



About EFLA:

The Environment-Focused Learning Academy (EFLA) was created by the <u>Southwest Environmental Finance Center</u> (SW EFC), which is part of the <u>Center</u> for Water and the Environment at the <u>University of New Mexico</u>. EFLA's overarching goal is increasing public understanding of basic water issues. The organization grounds itself in non-partisan, fact-based information about water issues and seeks to provide water education in a variety of formats to both members of the community and their elected leaders. The SW EFC is currently partnering with three other departments at UNM in developing multimedia learning resources with a focus on water issues, including but not limited to drinking water, wastewater, and stormwater. This white paper is just one resource of many available to the public through the <u>EFLA website</u>.

About this paper:

All communities require the availability of clean, safe water in order to survive. As such, it is important that members of these communities maintain a basic understanding of water issues that may affect them and their quality of life. In New Mexico, many citizens have options when it comes to drinking water. Because there are choices, it is important for people to have the necessary information to make informed decisions. Information will be presented to help address the following questions:

- What goes into the choice of drinking tap water or purchasing bottled water?
- What factors are there to consider when making this decision?
- Who can community members go to when they have questions about their drinking water?

This white paper will compare tap water and bottled water in New Mexico through four lenses: quality, availability, cleanliness, and taste.

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Introduction and Glossary

Brief Introduction:

The topic of drinking water is a complex issue everywhere, and New Mexico is no different. Here, drinking water comes in many forms from several different sources, and is regulated by multiple governmental bodies and pieces of legislation. As drinking water is a vital resource to all communities, it is important for community members to have a base understanding of who regulates it, where it comes from, and why.

Therefore, this white paper attempts to lay out a foundation of knowledge about drinking water for New Mexicans. The underlying question that drives this research is: What are the critical differences between tap and bottled water in New Mexico?

This paper is further broken up into four areas of focus: water quality, water availability, water taste, and water cleanliness. Following are definitions of each term as it pertains to drinking water in New Mexico.

Glossary:

<u>Water Quality</u>: "the standards of drinking water as measured against other kinds of water"

• This section will delineate the standards and legislation by which water is regulated, the governmental bodies that control and enforce the regulation of water, and how this information may be accessed by community members.

<u>Water Cleanliness</u>: "the degree to which water is clean, and whether it is suitable for drinking"

• This section will explore perceptions of water cleanliness, the various methods taken to make tap and bottled water clean, and the different types of drinkable water available to community members

<u>Water Taste</u>: "the sensation perceived in the mouth and throat upon drinking water"

• This section will discuss the role of taste in community members' decisions about drinking water sources, factors affecting the taste of tap and bottled water, and ways of describing the taste of water.

<u>Water Availability</u>: "the degree to which water is able to be used and/or obtained"

• This section will examine sources of drinking water for New Mexicans, a general overview of water usage in New Mexico, and the relationship between cost and accessibility for both tap and bottled water.

Section 1: Water Quality in NM

Though some of us might think "water regulation" should be a relatively straightforward topic, appearances can be deceiving. In actuality, regulating water quality becomes very complex quickly – we must consider questions such as: is water a food or a natural resource? Did the water come from the ground or from a lake or reservoir? Is it distributed through a tap or sold in bottles?

The answers to all of these questions (and many others) determine who regulates the water and in what capacity, what standards the water is held to, and even what it is allowed to be called. Keeping this complexity in mind, this section will answer the question: who can community members go to for answers about the quality of their water?

1.1 TAP WATER: Legislation, Regulation, and Communication

What is considered "tap water?"

Tap water, to put it literally, is the water that comes out of your tap, such as a sink, shower, or tub. It is provided to homes and buildings from a public water system and is also sometimes referred to as public drinking water, municipal water, or city water.

What are "public water systems?"

To be considered "public," a water system must either serve 25 or more people per day for 60 days out of a year or have 15 or more service connections. Public water systems are further divided into the following categories:

- <u>Community Water Systems</u> serve the same people year-round. This includes most homes, apartments, condominiums, and mobile home parks.
- <u>Non-Community Water Systems</u> may or may not serve the same people, but the people are not residents and may not be year-round. The Non-Community Water Systems are further subdivided into two categories depending on whether the same people or different people are served:
 - <u>Non-Transient Non-Community Water Systems</u> serve the same people more than six months per year, for example, a school with its

own water supply or a business with its own water supply and more than 25 employees.

 Transient Non-Community Water Systems do not serve the same people for more than six months. These systems serve a varying population, such as a rest area or campground.



Public Water Jurisdictions & Regulation in NM

Fig 1. Public drinking water jurisdictions and regulation.

Legislation:

Federal – US Government

- The <u>Safe Drinking Water Act of 1974 (SDWA)</u>, adopted by the EPA, sets national health-based standards for drinking water and public water systems, and takes actions to protect water quality from source to tap. This act regulates over 90 separate contaminants and sets a Maximum Contaminant Level (MCL) for each.
- The <u>Clean Water Act of 1972 (CWA)</u>, adopted by the EPA, regulates 1) the discharge of pollutants into US waters, and 2) the quality standards of surface water. While this Act is primarily related to wastewater discharges, rather than drinking water, it regulates discharges of wastewater into receiving water bodies that can serve as drinking water sources.

State – New Mexico

- States can apply to the EPA for "primacy" in the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as EPA's and make sure water systems meet these standards. With the exception of Wyoming and the District of Columbia, every US state/territory has received primacy, including New Mexico. Receiving primacy means that the state has the authority to implement and enforce the primary SDWA regulations.
- <u>New Mexico's Water Quality Act</u> (1967) establishes the Water Quality Control Commission (WQCC) as the "state water pollution control agency" per the CWA. However, unlike the SDWA, New Mexico has not yet obtained primacy to implement the CWA.
- <u>New Mexico's Water Quality Standards</u> define water quality goals by designating uses for rivers, streams, lakes, and other surface waters, setting criteria to protect those uses and establishing antidegradation provisions to preserve water quality. The Standards are adopted by the WQCC, then approved by the EPA.

Regulatory Bodies:

The different laws and regulations applied to water are *enacted* and *overseen* by various entities within federal, state, and tribal governments. Below are the primary actors when it comes to public drinking water in New Mexico, and their respective duties:

- <u>Environmental Protection Agency (EPA)</u> is a federal agency which manages and carries out actions designated by the Safe Drinking Water Act and the Clean Water Act.
 - New Mexico is part of <u>EPA Region 6 (South Central)</u>, which also serves Arkansas, Louisiana, Oklahoma, Texas, and 66 federallyrecognized Tribal Nations.
- <u>New Mexico Environment Department (NMED)</u> oversees, among other environmental issues, water infrastructure systems and water quality issues throughout New Mexico. NMED has primacy for the SDWA.
 - Within the NMED, there are groups with duties specific to drinking water quality, such as:
 - The <u>Water Quality Control Commission (WQCC)</u> is the state water pollution control agency for purposes of the Federal Clean Water Act and portions of the Safe Drinking Water Act (wellhead protection and sole source aquifer programs).
 - The <u>Drinking Water Bureau (DWB)</u> ensures public water systems provide drinking water that meets all regulations by overseeing water system compliance with the SDWA and providing technical, managerial, and financial assistance to water systems. This is also the agency that issues Boil Water Advisories when contamination is detected.
 - The <u>Environmental Improvement Board (EIB)</u> is responsible for rules relating to water supply and capacity development (a water system's ability to operate effectively and maintain compliance with the Safe Drinking Water Act).
 - The NMED also has groups devoted to pollution containment and remediation of New Mexico's water resources before they enter municipal water supplies:
 - The <u>Surface Water Quality Bureau (SWQB)</u> implements the CWA in New Mexico. It performs regular reassessments of water quality standards, develops Total Maximum Daily Load

(TMDL) regulations to meet those standards, and completes periodic monitoring of water contaminant levels.

- The <u>Ground Water Quality Bureau (GWQB)</u> protects New Mexico's groundwater resources. They identify, investigate, and remediate contaminated groundwater sites, issue Groundwater Discharge Permits, and educate members of industry and the public about the importance of safe groundwater supplies as well as strategies for pollution prevention.
- <u>Native American Tribes and Pueblos</u> are treated as separate, sovereign states under the CWA, which means that the Tribes and Pueblos themselves have the authority to adopt their own water quality standards and methods of regulation. They are also treated as sovereign states under the SDWA which means that tribal drinking water systems are regulated by the EPA, not the state. Native American tribes and pueblos may apply for and receive primacy in the SDWA. Thus far, the Navajo Nation is the only such entity in New Mexico to have done so.
 - EPA Region 6 consults with Tribes and Pueblos under the <u>Region 6</u> <u>Tribal Program</u>

Communication with the Public: Water Quality Reports

- Water utilities are required by federal law to provide a yearly Water Quality Report (also called Consumer Confidence Reports) to every customer of a Community Water System.
 - The Water Quality Report must contain the following information:
 - The source of the drinking water;
 - A brief summary of the state's source water assessment, which measures how susceptible the source water is to contamination, (and instructions on how to access the full assessment);
 - EPA regulations and health goals for drinking water contaminants;
 - A list of all detected regulated contaminants and their levels;
 - The potential health effects of contaminants which were found to be in violation of EPA's health standards;
 - Information for people with weakened immune systems about cryptosporidium and other microbial contaminants;

- Contact information for the water system and the EPA's Safe Drinking Water Hotline.
- The EPA has created a useful<u>guide on their website</u> to help community members understand their Water Quality Reports.
- Community Water Systems that serve more than 100,000 people are required to post the report online. Community Water Systems that serve more than 10,000 people must either mail or email the report to customers.
- Community Water Systems must also make a "good faith effort" to reach renters, workers, and other consumers who use the water but do not receive water bills.

1.2 BOTTLED WATER: Legislation, Regulation, and Communication

What is considered "bottled water"?

Products labeled "Bottled water, Drinking water, Artesian water, Mineral water, Sparkling bottled water, Spring water, Purified water, distilled, demineralized, deionized, or reverse osmosis water" are regulated as bottled water by the Food and Drug Administration (FDA).



Bottled Water Jurisdictions & Regulation in NM

Fig 2. Bottled water regulations and jurisdictions.

Legislation: Federal Food, Drug, and Cosmetics Act (FD&C Act) (1938)

- The FDA treats bottled water as a packaged food item, which means its quality regulations come from the FD&C Act.
- This act establishes quality standards for food, drugs, medical devices, and cosmetics manufactured and sold in the United States and holds manufacturers responsible for producing "safe, wholesome and truthfully labeled food products."
- The FDA bases its standards for contaminants on the guidelines established by the EPA under the SDWA. Under section 410 of FD&C Act, when the EPA establishes new MCLs or contaminant treatment

techniques for public drinking water, the FDA must either establish a Standard of Quality regulation for the same contaminant in bottled water, or prove that FDA regulation of the contaminant is unnecessary because the contaminant is not present in bottled water products.

Regulatory Agency: Food and Drug Administration (FDA)

The FDA has set specific regulations for bottled water: Current Good Manufacturing Practices (CGMPs), "standard of identity" regulations, and "standard of quality" regulations.

- <u>CGMPs</u> require bottled water producers to:
 - Process, bottle, hold and transport bottled water under sanitary conditions,
 - Protect water sources from bacteria, chemicals, and other contaminants,
 - Use quality control processes to ensure the bacteriological and chemical safety of the water, and
 - Sample and test both source water and the final product for contaminants.
- <u>"Standard of Identity" Regulations</u> define different types of bottled water, regulate what can be written on labels, and how certain products can be marketed.
- <u>"Standard of Quality" Regulations</u> establish allowable levels of contaminants in bottled water.
 - The FDA bases its standards for contaminants on the guidelines established by the EPA under the SDWA. The FDA either applies the EPA standards to bottled water or finds that the standard isn't necessary for bottled water.
- The FDA's <u>Center for Food Safety and Applied Nutrition</u> regularly monitors and inspects bottled water products. However, unlike the EPA, the FDA does not require certified lab testing or reports of violations.

Communication with the Public: Labeling and Standard of Identity Regulations

• Overall, the FDA does not require bottled water companies to disclose specifically where the water came from, their method of treatment, or what contaminants the water may contain.

Though there is no standard label for bottled water products, Standard of Identity regulations classify what bottled water products may or may not be marketed as. Classifications by origin include:

- <u>Artesian well water</u>: Water collected from wells that tap into an aquifer which is under pressure from surrounding upper layers of rock or clay. Once tapped, the "artesian" pressure in the aquifer pushes the water above the level of the aquifer, where it is then collected.
- <u>Well water:</u> Water collected from a hole drilled into the ground, which taps into an aquifer. Unlike "artesian" well water, there is no natural pressure forcing the water to or near surface level, so regular well water is usually collected using electric pumps.
- <u>Mineral water</u>: Water from a below ground source which contains 250 or more parts per million (ppm) total dissolved solids. In order to be classified as mineral water, these minerals/trace elements cannot be added in later and must derive naturally from the source of the water.
- <u>Spring water:</u> Water collected from a spring (a collection of water which flowed naturally to the surface from an underground formation) or through a borehole that taps the formation feeding the spring.
- <u>Purified water</u>: Water collected from a municipal source (i.e., bottled tap water). It must be treated before it is bottled. Types of treatment include distillation, reverse osmosis, absolute 1-micron filtration, and ozonation.

Section 2: Water Cleanliness in NM

One would think that cleanliness of the water we drink would be constantly on our minds. Conventional wisdom dictates that each of us drink 8 glasses a day; making sure that it is clean is an important aspect of maintaining our health. Yet, for most of us living in the U.S. today, the cleanliness of water is something we largely leave up to water utility companies and bottled water manufacturers. As passive recipients of the water they provide, we often don't know where the water comes from, or how it has been treated. This is because we trust these entities to do their jobs: to provide clean, safe water to us and our communities.

But what is this trust founded upon? This section explores the question of where our drinking water comes from, as well as the different ways in which water is treated for our consumption.

2.1 TAP WATER: Sources and Methods of Treatment

Where does New Mexico's tap water come from?

Local Groundwater

- The greater part of New Mexico's water resources is underground, stored in aquifers. Aquifers are bodies of rock or sediment that are saturated with water. Water utilities can access this water through the use of pumps and wells.
- 81% of New Mexicans are served by public systems with water derived from ground water sources. An additional 170,000+ obtain groundwater from private wells.¹

Local Surface Water

- Local surface water refers to all of the water located aboveground in New Mexico—water in rivers, lakes, and streams
- Surface water begins as rain or melting snow, and either evaporates back into the atmosphere (est. 97%) or flows into one of New Mexico's major river basins: Lower Colorado, Pecos, Rio Grande, Southern High Plains/Ogallala, and San Juan (Colorado)

¹ NMED, "Water Resources & Management," accessed December 5, 2020, <u>https://www.env.nm.gov/water/</u>.

Imported Surface Water

- New Mexico's local supplies are overallocated; this means additional surface water must be imported from other areas through a transbasin diversion.
- The <u>San Juan-Chama Drinking Water Project</u>, completed in 2008, is New Mexico's transbasin diversion, bringing water from the Colorado River Basin to the Rio Grande river basin.





How is New Mexico's tap water treated?

Groundwater in New Mexico requires little treatment other than disinfection (generally through chlorination) although in some cases, it will go through additional treatment in order to remove naturally occurring arsenic or other constituents that may effect the aesthetic quality of the water, such as iron and manganese.

In contrast, surface water requires extensive decontamination before being distributed. Common methods of water treatment include:

- <u>Coagulation & Flocculation</u>: This is the first step in treating public water supplies. Positively charged chemicals (for example, ABCWUA uses ferric chloride) are added to the water, which counteracts the negative charge of contaminants. Contaminants then bind with the chemicals to form "floc".
- <u>Sedimentation</u>: As floc is larger and heavier than its surroundings, it settles to the bottom of the treatment tank, separating it from the rest of the water.
- <u>Filtration</u>: Water above the floc passes through several filters. These filters vary by composition (sand, gravel, charcoal) and pore size in order to remove particles such as particulates, unwanted chemicals, bacteria, and viruses.
- <u>Disinfection</u>: a disinfectant such as chlorine or chloramine is often added after filtration, inactivating any parasites, bacteria, or viruses that may remain in the water supply. This also provides additional protection from contamination as the water is distributed to homes and businesses. In some areas, fluoride is also added to prevent tooth decay.

A third category of drinking water is classified as groundwater under the direct influence (GUDI) of surface water. This category is between groundwater that requires little treatment and surface water that requires extensive treatment. GUDI systems generally have some form of filtration as well as disinfection.

Not every water utility uses the exact same process of water treatment. For more specific information, community members can read the Water Quality Report issued by their water utility or visit <u>Drinking Water Watch</u>, a free public service.

2.2 BOTTLED WATER: Sources and Methods of Treatment

Where does bottled water come from?

- As briefly described in "Section 1: Water Quality in New Mexico," bottled water comes from a variety of sources, including wells, artesian wells, natural springs, and municipal sources.
- Bottled water companies may indicate on the label from where the water originates; however, they are not required to do so. If the information is not directly written on the label, there may be a company phone number or email address that consumers may contact to learn more.

How is bottled water treated?

- Bottled water companies are not required to tell customers about the way the water is treated, although it may be mentioned on certain labels.
- In general, spring water (such as Evian, Mountain Valley Water) and water from artesian wells (such as Voss) is not substantially treated in order to preserve the natural taste.
- For purified water from municipal sources, exact treatment varies by manufacturer. Examples of common treatments include:
 - <u>Distillation</u>: Water is turned into a vapor, which leaves minerals behind, then condensed back into water.
 - <u>Reverse osmosis</u>: Water is forced through a series of semi-permeable membranes to remove contaminants.
 - <u>Absolute 1-micron filtration</u>: Water passes through filters which remove particles larger than one micron.
 - <u>Ozonation</u>: Ozone gas, an antimicrobial agent, is used to disinfect the water.
 - <u>UV Light Disinfection</u>: Water is exposed to ultraviolet rays, which kills bacteria and other microorganisms.
- Additionally, many bottled water companies have more detailed information about their water treatment process on their respective websites. Following are links to the water treatment processes of several large bottled water manufacturers:
 - <u>Nestlé Waters</u>
 - o <u>Aquafina</u>
 - o <u>Evian</u>
 - o <u>Dasani</u>
 - o <u>smartwater</u>

- o <u>Voss</u> o <u>Fiji</u>

Section 3: Water Availability in NM

Although water is a precious resource everywhere, it is especially so in high desert climates such as New Mexico, which receives a meager average of 14 inches of precipitation per year. The right to use water has predictably been a source of conflict and negotiation over the years –the decision of who has the right to what water and why is often settled in court. Another common point of contention is the fact that although water is a natural resource, it is bottled and sold as a commodity. This section will explore water rights and usage in New Mexico, with the aim of helping community members navigate these issues.

3.1 TAP WATER: Rights and Supply

Who owns New Mexico's water?

New Mexico's water law establishes a few basic rules:

- All the water in New Mexico belongs to the public. Only those with water rights may legally use water, and those rights are considered private property.
- Along with several other Western states, New Mexico uses the doctrine of prior appropriation: older water rights take priority over newer ones.
- Water-right holders must put their water to "beneficial use." This usually means agricultural, domestic, commercial, or industrial uses.
- Water rights can be forfeited in some circumstances for not using or wasting the water.

New Mexico's water code at present has been used since 1907². Once New Mexico became a state in 1912, the state constitution formally adopted pre-1907 surface water rights, including tribal uses and acequias, but did not specify who had the right to use how much water from where. Because of this, water rights in New Mexico still often require adjudication to formally determine these specificities. New Mexico is the only western state that has yet to complete adjudication of its water rights.

An example of rights still in adjudication are Native American water rights, which currently fall into two categories:

² Sherry Robinson, "New Mexico Water Basics and An Introduction to Water Markets" (Business Water Task Force, 2010).

- <u>Federal Reserved Rights:</u> These rights are unaffected by interstate compacts and cannot be forfeited because of non-use. Beneficial use is determined by the tribe instead of the state, and a tribe can legally claim water from a water system for its "practicably irrigable land."
- <u>Pueblo Water Rights:</u> These rights were originally given to New Mexico's tribes and pueblos by Spanish and Mexican governments. Although the United States confirmed these rights upon the acquisition of New Mexico in 1848, they have yet to be quantified.

Since New Mexico shares river systems with several other states and Mexico, disputes over water allocation have led to the negotiation of eight river compacts. These compacts specify how much water belongs to New Mexico, and how much must be allowed to continue downstream.

One issue that has surfaced in regard to river compacts is that they were often calculated based on flow rates from the years in which they were negotiated, not accounting for the fact that rivers experience wet and dry cycles. Compacts calculated based off wet/dry cycles tend to over or underestimate the amount of water allotted to each state.

Listed below are the eight river compacts, in chronological order:

- Colorado River Compact of 1922 (Colorado, New Mexico, Utah, Wyoming, Arizona, California and Nevada)
- La Plata River Compact of 1922 (Colorado and New Mexico)
- Rio Grande Compact of 1938 (Colorado, New Mexico and Texas)
- Costilla Creek Compact of 1944 (New Mexico and Colorado)
- Upper Colorado River Basin Compact of 1948 (Colorado, Utah, New Mexico, Wyoming and Arizona)
- Pecos River Compact of 1948 (New Mexico and Texas)
- Canadian River Compact of 1950 (New Mexico, Oklahoma and Texas)
- Animas-La Plata Project Compact of 1968 (Colorado and New Mexico)

Who handles water rights and supply issues?

- The <u>NM Office of the State Engineer (OSE)</u> is the overarching agency which handles issues regarding water quantity, appropriation, and distribution. Within the OSE, are several organizations dedicated to specific issues that have to do with water availability:
 - The Interstate Stream Commission (ISC) negotiates with other states to settle interstate stream controversies, many of which arise because

New Mexico is allocated water from eight interstate stream basins. The ISC analyzes streamflow, reservoirs, and other data on stream systems in New Mexico to ensure basin compliance.

- The <u>Litigation and Adjudication Program (LAP)</u> provides legal support to the OSE. LAP attorneys prosecute water right settlements on behalf of the state in court, represent the Water Resources Allocation Program in water right administrative hearings, and seek injunctions on behalf of the OSE against over-diversions or other such illegal water usage.
- The <u>Water Resource Allocation Program (WRAP</u>) is tasked with processing applications for water rights, backing up those water rights decisions with the appropriate scientific research, keeping records of water rights, and enforcing the regulations on water use.
- Community members may look up digitized version of the OSE's water rights files on their online <u>Water Rights Database</u>.

How much tap water do New Mexicans use?

Every five years, the NM Office of the State Engineer creates a Water Use by Categories report³ in order to provide community members with current and comprehensive data about water usage in New Mexico.

According to the 2015 report, New Mexico used a total of 3,114,255 acre-feet (AF) of water. One acre-foot of water is equal to 326,000 gallons – or, the amount of water it would take to cover one acre of land, one foot deep. The lion's share of these withdrawals (about 76% went towards irrigated agriculture. Public water supply (about 9%) and reservoir evaporation (about 8%) accounted for the next largest categories. "Public Water Supply" refers to community water systems with multiple service connections, which would include the tap water used by homes and businesses.

³ Molly L Magnuson et al., "New Mexico Water Use By Categories 2015" (Santa Fe, NM: New Mexico Office of the State Engineer, 2019).

NM Water Usage by Category, 2015 (AF)



Fig 4. Water usage distribution in New Mexico in 2015.

Data Source: Molly L Magnuson et al., "New Mexico Water Use By Categories 2015" (Santa Fe, NM: New Mexico Office of the State Engineer, 2019).

3.2 BOTTLED WATER: Rights and Supply

Who owns bottled water?

- Local governments can sell or lease water rights to bottled water companies. Bottled water companies may seek out local governments whose water jurisdictions contain high-quality water sources, such as natural springs or artesian wells.
- Lawmakers in other states are making efforts at the state and local level to reduce the capacity of bottled water companies to use their water:
 - Residents of Hood River County, Oregon, passed a ballot measure in 2016 to ban commercial water bottling after Nestle announced

plans to build a plant that would extract more than 100 million gallons a year⁴.

- In Washington state, the senate passed a bill in early 2020 that bans new permits for water bottling operations in the state⁵.
- As of 2020, New Mexico has not passed any legislation restricting the water rights of bottled water companies.
- Although water is generally considered a natural resource, bottled water is considered a good. This means, once water is bottled and sold as a packaged food item, whoever buys the bottled water technically "owns" it in a way that it could never be owned in a river or aquifer.
- Bottled water companies with operations in New Mexico include:
 - o <u>Crystal Springs Bottled Water</u>
 - o Cascade Bottled Water
 - o <u>Niagara Water</u>

How much bottled water do New Mexicans use?

While there is little research on the amount bottled water usage in New Mexico, studies have shown that Hispanic communities tend to drink more bottled water than average.⁶ According to the <u>International Bottled Water Association</u> (IBWA)'s most recent Market Report⁷, the average American drank an estimated 44 gallons of bottled water in 2019, about the size of a typical bathtub filled to the brim. The volume of bottled water sold in the United States increased 3.6%, from 13.8 billion gallons in 2018 to 14.4 billion gallons in 2019. This earned bottled water the ranking of the largest beverage category by volume in the United States for the fourth year in a row.

⁴ Alex Brown, "Lawmakers Open Groundwater Fight Against Bottled Water Companies," *Pew Trusts*, February 12, 2020, <u>https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2020/02/12/lawmakers-open-groundwater-fight-against-bottled-water-companies</u>.

 ⁵ Susie Cagle, "Washington State Takes Bold Step to Restrict Companies from Bottling Local Water," *The Guardian*, February 18, 2020, <u>https://www.theguardian.com/us-news/2020/feb/18/bottled-water-ban-washington-state</u>.
⁶ Manny Teodoro, "Race, Ethnicity, and Water Service Experiences," Manny Teodoro, March 18, 2019,

http://mannyteodoro.com/?m=201903.

⁷ John G Rodwan, "BOTTLED WATER 2019: SLOWER BUT NOTABLE GROWTH: U.S. and International Developments and Statistics "(Beverage Marketing Corporation (BMC), 2020).

Section 4: The Taste of Water in NM

Although not inherently related to quality or cleanliness, taste is one of the primary standards by which we judge our water. However, unlike other foods or beverages, water is unique in that "good tasting" water is determined more by a lack of taste, rather than the presence of it. The taste of all water, bottled or tap, has to do with the way it is treated and its natural mineral content. Below are common criteria used to judge the taste of water:

	CATEGORY	DESCRIPTORS	REFERENCE STANDARDS
TASTE	SOUR	SOUR/ACIDIC	CITRIC ACID
	SWEET	SWEET	SUGAR
	SALTY	SALTY	SODIUM CHLORIDE
	BITTER	BITTER	CAFFEINE, QUININE HYDROCHLORIDE
	MOUTHFEEL, NOSEFEEL	PUNGENT, OILY, CHALKY, TINGLING, DRYING, ASTRINGENT, METALLIC	ALUMINUM SULFATE MENTHOL. FERROUS SULFATE
ODOR	EARTHY, MUSTY, MOLDY	EARTHY, POTATO BIN MUSTY, CORK	GEOSMIN, 2-ISOPROPYL 3-METHOXYPRYRAZINE 2-METHYLISOBORNEOL, HALOGENATED ANISOLES
	CHLORINOUS, OZONOUS	CHLORINOUS, SWIMMING POOL	FREE CHLORINE, MONOCHLORAMINE. DICHLORAMINE
	GRASSY, HAY, STRAW, WOODY	GRASSY (FRESH, SWEET), GRASSY (GREEN, SHARP), DRIED GRASS	CIS-3-HEXENYL ACETATE, CIS-30HEXEN-1-0L, UNKNOWN
	MOLDY, SWAMPY, SEPTIC, SULFUROUS	DECAYING VEGETATION, SEPTIC, SWAMPY, RUBBERY, ROTTEN EGGS	DIMETHYL DISULFIDE, UNKNOWN, DIMETHYL TRISULFIDE, UNKNOWN, HYDROGEN SULFIDE
	FRAGRANT, VEGETABLE, FRUITY, FLOWERY	FRUITY, ORANGE-LIKE	DECANAL
	RANCID, FISHY	RANCID/SWEATY SOCKS	OCTANAL, METHYL BUTANAL
	MEDICINAL, PHENOTIC	MEDICINAL	CHLOROPHENOLS, BROMOPHENOLS, IODOMETHANES
	CHEMICAL, HYROCARBON MISCELLANEOUS	CAT URINE, PLASTIC, MODEL AIRPLANE GLUE, SWEET ORGANIC CHEMICAL, SHOE POLISH, PETROLEUM, PAINT, SOLVENT, VARNISH, GASOLINE	METHYL METHACRYLATE, STYRENE, M-XYLENE, 1,3-PENTADIENE, ALKYL BENZENES, BHT

Fig 5. Drinking water odor and taste spectrum. This image has been edited for graphic clarity. Image Source: Patrick Planton, 2015, What Does the "Best of the Best" Drinking Water Taste Like?, 2015

4.1 TAP WATER: Factors Influencing Taste

- Methods of Disinfection:
 - Tap water may be disinfected with chlorine, chloramine, ozone, or ultraviolet light to kill disease-causing germs.
 - Water systems use the disinfectants chlorine and chloramine because they are effective, inexpensive, and readily available.

They can be tasted in certain situations, such as when too much or too little chlorine is added to the water. Chlorine is typically added to public water supplies until there is a disinfection residual leftover. This remaining chlorine is intended to keep water safe as it travels through distribution pipes to customers.

- Customers who prefer their water to have no chlorine taste can take actions to remove the chlorine, such as pouring the water from one pitcher to another approximately 10 times, heating the water, or using an activated carbon filter.
- Consistency:
 - The taste of tap water varies from city to city, and even from region to region within a city. It can also vary based on the time of year, particularly surface water.
 - This variance in taste is one reason why many people have negative reactions to tap water in a new city or state.
- Water Sources:
 - New Mexico water is a mix of groundwater and surface water, which gives it a taste unique to each area.
 - Groundwater collected from wells near New Mexico's volcanoes tends to have higher mineral concentration, which affects the taste of tap water in nearby areas.
- EPA Regulations:
 - The EPA has set <u>National Secondary Drinking Water Regulations</u> (NSDWRs) which set non-mandatory "secondary maximum contaminant levels" for 15 secondary contaminants, in addition to the 90+ contaminants already regulated by the EPA's primary drinking water regulations.
 - Out of the 15 secondary contaminants, the following contaminants are regulated specifically for odor and taste: Chloride, Copper, Foaming Agents, Iron, Manganese pH, Sulfate, Threshold Odor Number (TON), Total Dissolved Solids, and Zinc.
 - NSDWRs are not enforced by the EPA. This is because these contaminants are not considered a danger to public health.
 However, they may cause the water to appear unappealing, or give it a bad taste or smell.
 - Contact your local water utility to see if they conform to the NSDWRs.
- General Public Perception:

- Water in New Mexico has won awards for taste: The City of Albuquerque's tap water won "Best of the Best" for taste in the Rocky Mountain region in 2014. It then went on to tie for 3rd in a 2015 nationwide taste test⁸, where water was ranked according to taste and smell.
- People may dislike the taste or smell of chlorine in their tap water; however, chlorine is a disinfectant which actually improves the quality of the water.
- One common mistake is conflating taste and quality. Many contaminants, some of which are quite harmful, cannot be detected by taste or odor. In fact, water that is of superior quality but poor taste due to the presence of non-harmful substances can be much healthier than water with a great taste but contains a harmful substance. Therefore, taste, odor, and quality, are distinct issues that should be considered separately.

4.2 BOTTLED WATER: Factors Influencing Taste

- Methods of Disinfection:
 - Bottled water from municipal sources is typically disinfected using ozone or other technologies such as ultraviolet light or chlorine dioxide.
 - Though chlorine is less expensive, other methods are preferred by bottlers, because they do not leave a taste and also because bottlers do not need to worry about maintaining disinfectant when the water is sealed in a container.
 - Bottled water from natural springs or artesian wells is usually not disinfected and has a taste characteristic of its source.
- Consistency:
 - Bottled water from a dedicated source or plant may have a more consistent taste than tap water, which must travel through pipes to reach homes.
 - Additionally, bottled water companies may employ treatment practices that remove most of the constituents in the water and

⁸ Ollie Reed, "ABQ Water Ties for Third in the Nation," *Albuquerque Journal*, June 11, 2015, <u>https://www.abgjournal.com/597167/abg-water-ties-for-third-in-the-nation.html</u>.

then add back in specific minerals at a given level.⁹ In this manner the water from one place can taste very similar to water in another place.

- Water Sources:
 - Bottled water companies which use natural springs or artesian wells usually emphasize taste in their marketing materials. For example, Mountain Valley Spring Water's website states: "Our spring water is naturally mineral-rich, pure, crisp, healthy and delicious. We never mess with it or add anything to it. We simply bottle in our handblown glass to preserve its quality and taste."
 - Of the five "People's Choice" winners in the 2020 Berkeley Springs International Water Tasting Competition¹⁰, two were from artesian wells, one was from a natural spring, one was small batch rainwater, and one was melted polar iceberg water.
- General Public Perception:
 - In 2019, bottled water was the most popular packaged beverage in the US.¹¹
 - Chicago-based Information Resources Inc. (IRI) said "The water segment has picked up steam in recent years, driven by trends around flavoring, fortification and carbonation, creating a healthy beverage with an indulgent feel," in its April 2018 New Product Pacesetters report¹².
 - Though many people claim to prefer bottled water because of its taste, blind taste tests¹³ ¹⁴ consistently find that most people cannot differentiate between the two, unless the tap water is chlorinated.

⁹ Becca Stanek, "Why Your Bottled Water Contains Four Different Ingredients," *TIME*, July 24, 2014, https://time.com/3029191/bottled-water-ingredients-nutrition-health/.

¹⁰ Berkeley Springs International Water Tasting, "Berkeley Springs International Water Tasting 2020 Winners," February 22, 2020, <u>https://berkeleyspringswatertasting.com/winners/</u>.

¹¹ Beverage Industry, "2019 State of the Beverage Industry: Bottled Water Remains No. 1," July 15, 2019,

https://www.bevindustry.com/articles/92234-2019-state-of-the-beverage-industry-bottled-water-remains-no-1. ¹² Larry Levin and Susan Viamari, "New Product Pacesetters: Blazing a Trail for the Next Generation" (Chicago, IL: 8 Information Resources, Inc. (IRI), 2018), pp. 9-9.

¹³ Luka Joanna Debbeler et al., "Polarized but Illusory Beliefs about Tap and Bottled Water: A Product- and Consumer-Oriented Survey and Blind Tasting Experiment," *Sci Total Environ*, 2018, <u>https://doi.org/10.1016/j.scitotenv.2018.06.190</u>.

¹⁴ Eric Teillet et al., "Consumer Perception And Preference Of Bottled And Tap Water," *Journal of Sensory Studies* 25, no. 3 (2010): pp. 463-480, <u>https://doi.org/10.1111/j.1745-459x.2010.00280.x</u>.

Final Thoughts

Water is a source of life for all communities, and especially important in New Mexico, whose water resources are relatively scarce. In our modern day and age, we have water available to us from our tap, as well as from a bottle. This white paper has summarized the differences between the two, in terms of quality, cleanliness, availability, and taste.

Quality wise, tap water is regulated by the EPA through the Safe Drinking Water Act and the Clean Water Act. There are regulatory bodies at the federal, tribal, and state levels that oversee this regulation. On the other hand, bottled water is regulated by the FDA through the Food, Drug, & Cosmetics Act, with considerably less jurisdictional complexity and slightly less stringent standards.

As for cleanliness, treatment methods for both bottled water and tap water vary depending on the source – groundwater is usually untreated or receives very minimal treatment, while surface water often requires several methods of treatment before it is ready for distribution. Unlike bottled water, tap water is often chlorinated for long term disinfection as it travels through pipes to community members. Tap water in New Mexico is a mixture of groundwater and surface water, while bottled water can come a variety of sources, including natural springs, artesian wells, and even municipal water.

The issue of water rights affects both tap and bottled water. The state of New Mexico is still adjudicating its water rights, while also sharing water allocations in eight river compacts. Water rights are overseen by the Office of the State Engineer. Bottled water companies must enter the fray when they buy water rights in jurisdictions where they wish to bottle. Despite the legal complications, the bottle and the tap are both enduringly popular sources of drinking water.

Finally, taste is perhaps the most prominent characteristic that community members experience when drinking water. A common misconception is that taste is indicative of quality; however, this is usually not the case. Chlorinated tap water can sometimes be tasted, while bottled water and unchlorinated tap water has a taste indicative of its source.

In comparing the two drinking water sources, neither is inherently 'better' or 'worse' – bottled water may better serve the needs of some community members, while others may find tap water more convenient. Whichever you prefer, we hope that compiling this information into a white paper will help you to make educated decisions about where you choose to get your drinking water. Ultimately, the choice is yours.

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