



Increasing Public Acceptance of Direct Potable Reuse as a Drinking Water Source in Ventura, California

A Group Project submitted in partial satisfaction of the requirements for the degree of Master of Environmental Science and Management for the Bren School of Environmental Science & Management

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The Group Project is required of all students in the Masters of Environmental Science and Management (MESM) Program. It is a three-quarter activity in which small groups of students conduct focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Final Group Project Report is authored by MESM students and has been reviewed and approved by:

Naomi Tague, May 2016

Jeff Dozier, May 2016

Acknowledgements

We would like to thank the followings individuals for the time and knowledge they contributed to our project.

We would especially like to thank our project advisors, Drs. Naomi Tague, Jeff Dozier, and external advisors Dr. Lisa Leombruni (Bren School) and Eleanor Torres (Orange County Water District) for the countless hours they spent providing advice and feedback on this project.

Ventura Water: Gina Dorrington (Wastewater Utility Manager), and Craig Jones (Management Analyst II)

City of Ventura: Ryan Kintz (Management Analyst)

Bren School: Alex DeGolia (PhD Candidate), Dr. Allison Horst (Visiting Faculty), Dr. Sarah Anderson (Faculty), and Casey Hankey (Academic Programs & Group Project Coordinator)

City of San Diego: Alma Rife (Senior Public Information Officer)

Orange County Water District: Eleanor Torres (Director of Public Affairs)

Northeastern University: Matthew Nisbet (Associate Professor of Communications, Policy & Urban Affairs)

California Lutheran University: Matt Fienup (Economist, Center for Economic Research & Forecasting) and Dr. Andrew Pattison (Department of Policy Studies, MPPA Program)

New Water ReSources: Linda MacPherson (Managing Member)

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Abstract

California's record-breaking drought highlights the vulnerability of the state's scarce water resources. Climate change, increased demand, and the likelihood of more frequent droughts will continue to place enormous pressure on unreliable water supplies. Ventura's primary water sources - Lake Casitas, the Ventura River, and local groundwater supplies - are not sufficient to meet the city's long-term demands. Environmental regulations have further limited Ventura's water supply options. Given these challenges, the city is evaluating the feasibility of implementing Direct Potable Reuse (DPR) to augment the city's drinking water supplies in a sustainable and reliable way. DPR is the process of purifying treated wastewater through several steps, including ultrafiltration and reverse osmosis, to drinking water standards or higher before adding it directly back into the water system. While DPR comes with economic and environmental benefits compared to other alternative water supplies, it typically faces low public acceptance rates due to skepticism and concerns around the source and treatment process. In some cases, public opposition has been strong enough to shut down potable reuse projects altogether.

In order for potable reuse water schemes to be successfully implemented, public concerns and perceived risks must be addressed early in the planning process. This project lays out a foundation for a comprehensive public outreach strategy, synthesizing best practices from the available literature on outreach and communications of potable reuse projects, and applying them to address specific concerns in Ventura. Recommendations are designed across four themes, which were reoccurring in both literature and survey responses: communicating water quality and safety, building trust in the water provider, responding to emotional reactions to DPR (the "yuck factor"), and disseminating information about the DPR process. Although applied to Ventura, the strategy could be adapted to other locations in California that are considering potable reuse projects. By identifying underlying concerns and developing communications strategies to address concerns, this project aims to increase awareness and acceptance of DPR as a viable and secure drinking water source for Ventura.

Definitions

- **Advanced Water Treatment:** Water treatment processes including microfiltration or ultrafiltration, reverse osmosis, UV disinfection, and advanced oxidation that remove nearly all non-H₂O chemicals and biota.
- **Advanced Purified Water (APW):** The end product of the potable reuse process, which meets or exceeds drinking water quality standards.
- **Direct Potable Reuse (DPR):** The process by which treated wastewater effluent undergoes advanced treatment processes usually including but not limited to micro and/or ultrafiltration, reverse osmosis, and UV light disinfection with advanced oxidation. The end result is advanced purified water, often cleaner than most municipal sources, which is then placed directly into a public drinking water system or into a water supply immediately upstream of a water treatment plant.
- **Indirect Potable Reuse (IPR):** The process by which treated wastewater effluent undergoes the same advanced treatment as Direct Potable Reuse (see definition above) and is then injected into a groundwater or above-ground storage system where it is retained and later treated for public drinking water supplies.
- **Ultrafiltration:** A membrane processes where raw water is filtered by passing through a plastic or polymeric material which contains millions of small pores. Filtering occurs because the membrane pores are large enough to allow water to pass through, yet small enough to restrict the passage of undesirable materials such as particulate matter and pathogenic organisms (Muilenberg, 2000).
- **Primary Water Treatment:** Treatment process that physically separates wastes from water.
- **Secondary water treatment:** Process following primary treatment, which uses microbes to break down, remove, and/or neutralize unwanted biological elements from water.
- **Tertiary Water Treatment:** Employs filters and/or disinfection to remove additional unwanted biological material.
- **Recycled Water (Purple Pipe):** Water that has gone through primary, secondary, and tertiary wastewater treatments, but not advanced processes such as ultrafiltration or reverse osmosis. Often used to irrigate crops or landscaping, recycled water is pumped through purple pipes so as to be recognized as non-potable water. This term is interchangeable with the term “reclaimed water”
- **Reverse Osmosis:** A treatment method that purifies water by forcing non-potable water through a semipermeable membrane or filter. The membrane blocks contaminants, pharmaceuticals, dissolved chemicals, and other impurities, producing nearly distilled-quality water

- **Ultraviolet Light Disinfection with Advanced Oxidation:** The use of ultraviolet light to alter the DNA of cells of bacteria and microorganisms so that reproduction is impeded. UV light treatment does not remove organisms from the water, but renders them inactive (Water Research Center, 2014). Advanced oxidation uses highly reactive oxygen to destroy organic compounds that may have passed through the reverse osmosis process.
- **Wastewater:** Water collected in a municipal sewer system, including water from homes and businesses
- **CECs:** Constituents of emerging concern; a term used to include a broad range of unregulated chemical components, including pharmaceuticals, found at trace levels in water supplies such as recycled water

Executive Summary

The severity of California's drought has increased pressure around the state to make scarce water resources go further. Driven by dwindling water supplies, many cities are looking for innovative methods to produce safe and reliable drinking water. Rather than turning to desalination or importing water from across the state, some cities are beginning to focus on recycling water already in use as an option for increasing drinking water supplies.

The City of Ventura is at the forefront of this transition, and is looking to implement an advanced water reuse system within the next ten years. Known as direct potable reuse (DPR), this process pumps treated wastewater through several purification steps to produce high quality drinking water, before adding it directly back into the water system. Ventura has partnered with the WaterReuse Foundation and Carollo Engineers to construct a DPR demonstration facility. Known as VenturaWaterPure, the facility aims to educate the public about DPR and water treatment, while providing critical water quality data to demonstrate that the process is reliable and resilient.

Signed in 2010, Senate Bill 918 is an important political driver of this transition. The bill mandates researching the feasibility of implementing DPR, which has been identified as an important part of California's established water recycling goal. While the technology comes with several economic and environmental benefits, public opposition to drinking purified wastewater has historically been a major deterrent to successful project implementation. Often perceived as a risky, last-resort water supply option that is less acceptable than desalination or imported water, DPR projects have been derailed in the past by outspoken public opposition groups. Addressing these concerns and perceived risks early in the planning process is a critical component for successful implementation.

To address public concerns and perceived risks, this project recommends a series of outreach strategies aimed at increasing public awareness and acceptance of DPR as a drinking water source in Ventura. This project examines ongoing research in the sciences, psychology, communications, and existing potable reuse case studies in the U.S. and abroad to investigate perceived risks and barriers to implementing DPR. We developed and distributed a resident survey in order to identify Ventura-specific concerns across four categories: water quality and safety concerns, trust levels in the community, emotional reactions to drinking potable reuse water (the "yuck factor"), and the availability and transparency of potable reuse information. Backed by an extensive literature review, we developed a series of tailored recommendations

that built upon effective framing and messaging techniques around water quality safety, environmental co-benefits, and economic benefits of potable reuse water.

Our hope is that, upon completion of this project, our outreach strategy will help Ventura Water highlight the benefits of DPR as a sustainable, secure source of drinking water for Ventura - a strategy that could easily be applied to other areas of Southern California that are considering similar water reuse technologies. Ultimately, our goal is to raise awareness and acceptance rates of DPR as a drinking water source so that it can be successfully implemented in Ventura within the next 10-15 years.

Introduction & Purpose

The City of Ventura, California relies exclusively on local river, reservoir, and groundwater supplies to meet its drinking water needs. These natural water sources are quickly dwindling as a result of years of intense drought. Ventura's major supplies are facing capacity and water quality issues that have put a strain on the water system. Given the pressure on these local water resources, Ventura is exploring alternative water technologies that would maximize reuse of existing water supplies, providing a sustainable and secure water source for years to come.

Ventura Water, Ventura's water resources department, is exploring Direct Potable Reuse (DPR) as one option for increasing the city's local water supply. DPR is the process of purifying treated wastewater through multiple treatment steps to stringent water quality standards before pumping it directly back into the drinking water system (Carollo Engineers). At the current DPR Pilot Project and Demonstration Facility being conducted by Ventura Water (VenturaWaterPure), wastewater is treated via pasteurization, ultrafiltration, reverse osmosis, and UV light disinfection with advanced oxidation. All of these processes disinfect and purify the water, removing even the smallest of particles - such as pharmaceuticals - before adding it back to drinking water supplies.

Ventura has determined that DPR is the most efficient and cost-effective option for increasing its water supplies. DPR also comes with several advantages compared to other water supply alternatives like desalination, imported water, or Indirect Potable Reuse (IPR). It is less expensive than IPR, which requires additional energy to pump water in and out of a groundwater aquifer or surface reservoir. It is also less expensive and less energy intensive than desalination (1.5 times the cost of DPR) (Martin, 2013), due to the lower concentration of salts and contaminants in the water.

However, low public acceptance rates, due to skepticism and concerns around the water source and treatment process, are a major barrier to the implementation of DPR. Communities often perceive DPR as a risky, last-resort water supply option that is less acceptable than desalination or imported water. As a result, past water reuse projects in California have been derailed early in the planning process, often by outspoken opposition groups. Ventura has identified increasing public awareness and acceptance rates as a critical component to the successful implementation of DPR. Ventura seeks to implement an outreach strategy for DPR to increase public acceptance of potable reuse projects. If carried out proactively and early in the planning

process, the strategies outlined here will increase the chances of successfully implementing DPR further down the road. Our primary project objectives include:

1. Conduct a comprehensive literature review to distill common concerns around the potable reuse process, and best practices for addressing them
2. Identify community-specific concerns in Ventura around the use of direct potable reuse as a drinking water source through the use of surveys
3. Develop a set of recommendations and outreach criteria to address Ventura's key public concerns, building upon best practices from literature and common concerns among Ventura residents

This outreach strategy will provide Ventura Water with information and tools for increasing acceptance of Direct Potable Reuse in Ventura. The strategy will analyze public opinion trends around DPR as reported by Ventura residents, incorporate methods and best practices from an extensive literature review on potable reuse implementation, and recommend tactics to address common concerns such as modifying the information source or messaging format. By implementing these strategies early on, Ventura can proactively respond to resident concerns around DPR safety and reliability before they become major barriers. Taking steps to ensure this information is available in a transparent and trustworthy manner will lay the foundation for the successful implementation of DPR in the next 10-15 years.

Data Collection Methods

Overview

The field of DPR communications and outreach is already well-explored, leaving us with an extensive set of literature and case studies from which to distill best practices. We began by conducting a literature review of over 36 academic papers and case studies on potable reuse outreach to uncover common community concerns around water reuse projects, as well as best practices on how these concerns were addressed in outreach campaigns. Key themes from the literature were foundational to our outreach strategy.

In our next step, we surveyed over 250 Ventura residents to identify specific community concerns around potable reuse, in order to determine applicable best practices from our literature synthesis (for full survey, see Appendix 1). Respondents answered questions regarding levels of trust in community members, confidence in the reliability of the DPR treatment process and water quality, knowledge of water conservation efforts, and preference of potable reuse over alternatives. Primary data was collected from both Ventura residents and Demonstration Facility surveys, and was supplemented by the literature review to create an extensive and tailored outreach strategy for Ventura.

Structured Literature Review

The foundation of this outreach strategy is based on a thorough, structured literature review of academic journals and communication strategy publications. Academic papers and case studies focused on public perception, communications, and community outreach for U.S.-based water reuse and recycling projects (supplemented by a few studies on water reuse outreach abroad). Specific topics that were searched for included common misconceptions, perceived risks, and psychological barriers that decreased public acceptance rates; as well as key messages, delivery strategies, and frameworks that increased acceptance rates of potable reuse.

Information - both acceptance barriers and strategies for increasing acceptance - was then synthesized and categorized around four research themes: communicating water quality and safety, building trust in the water reuse authority, responding to emotional reactions to potable reuse (the “yuck factor”), and disseminating potable reuse information. We used keyword searches such as “safety”, “health”, “water quality”, “trust”, “psychology”, “emotion”, “information”, and “education” to track and categorize these four main themes across the literature. We tallied the number of times specific public perception themes or recommendations appeared in the literature in order to quantify the most prominent themes.

Surveys

Two surveys on potable reuse in Ventura were used to inform this outreach strategy:

1. A **Ventura Resident Survey** was distributed to Ventura community groups and the general public between September 2015 and February 2016. The Resident Survey was used to gauge the public's opinion of potable reuse. Surveys were targeted to influential community groups as well as the general public as a preliminary means of identifying segments of the Ventura community that may be in support of or opposed to the implementation of a potable reuse project in Ventura.
2. A **Demonstration Facility Survey** was distributed by Ventura Water to visitors during tours of the VenturaWaterPure Demonstration Facility between June 2015 and February 2016. This survey had two purposes: determining whether education on potable reuse led to increased levels of support, and gauging tour attendees' views on potable reuse.

Ventura Resident Survey

The purpose of surveying Ventura residents was to provide quantifiable data on Ventura-specific concerns and attitudes on potable reuse. While some research has been done on developing outreach strategies for potable reuse in California, it became clear that targeting our recommendations to Ventura's unique population would be important.

The survey consisted of 17 questions (some with multiple parts) in three different sections: general water questions to gauge baseline attitudes and water use of Ventura residents, advanced purified water (APW) questions to gauge trust levels, emotional response, and concerns around DPR, and demographic questions (Appendix 1). Short descriptions and definitions of technical water terms were included in order to ensure all respondents had the same baseline knowledge before answering questions about potable reuse.

A total of 260 survey responses were collected in Ventura. The sample of community members was collected as a convenience sample and was not intended to be a representative sample of Ventura's population but rather a snapshot of the views of segments of the Ventura community.

Survey Distribution

Surveys were distributed between September 2015 and March 2016. The survey was distributed in three ways: to members of Ventura community groups during group meetings, and to the general public in communal areas, as well as online when necessary. This targeted survey distribution was chosen as an efficient means of collecting data from specific segments of the Ventura population. Our literature review identified influential community groups important in the potable reuse development process (Dolnicar & Schäfer, 2009; Millan, Tennyson, & Snyder, 2015). These groups are considered more likely to mobilize in favor of or against public projects such as potable reuse. The identified groups included community/volunteer groups, science/environmental groups, educators (teachers/PTA), medical professionals, and local business owners. Future outreach should include all five important community segments. We were able to reach three of the five important community segments: community/volunteer groups, science/environmental groups, and educators (teachers/PTA). We attended community group meetings, gave a short introduction of the research project, and distributed the survey to participants. If time permitted, we led a brief Q&A segment after the survey. Survey results were used to compare and contrast opinions between segments.

Surveys were also distributed to the general public, who were assumed to be less engaged with water issues than the above-mentioned community groups. It was recommended that including more general public responses could increase how representative our sample was. General public survey distribution took place in public areas, such as in downtown Ventura and outside grocery stores, where we assumed a greater diversity of residents would be present. Surveys of the general public were compared to the community group surveys to test whether there was a significant difference between the views of the general public and the views of particular community groups (see Appendix 4 and 5).

Survey Rationale

Each survey question was designed to help reveal specific public perceptions of DPR, corresponding with our four separate, but often overlapping research themes: emotional response, trust, safety/water quality concerns, and information and education (Table 1 and Appendix 1). Survey questions were designed to measure how levels of trust, safety, and knowledge of water treatment and water reuse impacted respondent approval levels for adding APW to Ventura's drinking water supply (Question 5; Appendix 1).

Table 1. Example survey questions by theoretical construct.

Theoretical Construct	Number of Questions in Survey	Example Survey Questions
Social Norm Perceptions	4	3. How often do you conserve water in your own home? (e.g. taking shorter showers, not watering your lawn, capturing the cool water while you shower heats up for other household uses).
Emotional Response	2	7d. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: The source of the water does not impact my comfort in drinking it.
Trust	20	4. How much would you say you trust Ventura Water to provide safe drinking water?
Safety	4	7c. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: I feel satisfied that there is reliable monitoring throughout the treatment process.
Information	12	9g. How helpful would each of the following be for improving your perceptions and your community’s perceptions of drinking advanced purified water in Ventura?: Economic benefits as compared to other water supply options.
Demographic	7	13. Are there children (under 18 years) in your household?

Social Norm Perceptions

Water use and conservation practices were examined to gauge baseline levels of water use awareness in Ventura. Additionally, respondents were asked to rank community's awareness and conservation efforts. This not only provides a method to gauge the community's water conservation level, but was something that Ventura Water expressed interest in understanding.

Emotional Response

Perceptions about water use can play a role in the negative emotional response residents tend to express about recycled water. Targeted outreach to address some of these specific, culturally-ingrained feelings around drinking recycled water will be an important component to increasing acceptance rates (Mankad and Tapsuwan, 2011; Rozin et al, 2004; Russell and Lux, 2009).

Trust

Respondent trust levels were examined in two different ways: trust in the water authorities to provide safe drinking water, and trust in various information sources to provide messages about DPR. Trust in water reuse authorities has been shown to greatly shape public perception of other aspects of water reuse - such as perception of water safety and system reliability (Nancarrow, Leviston, & Tucker, 2009). For this reason, techniques used to increase levels of trust in Ventura Water - with an emphasis on frequent distribution of transparent, accessible information on the reuse process and water quality results - are present in many of the questions. Questions gauging trust levels in various informational sources were adapted from assorted polling surveys (Probe Research Inc, 2014; Millan, Tennyson, & Snyder, 2015). These results were used to inform us about the preferred messengers of DPR-related information.

Safety

Concerns around the safety of APW were shown to be some of the most prevalent regarding perceptions of the DPR process (Dolnicar & Schäfer, 2009). Perceived safety of water sources was tested alongside factors such as trust in local water providers, to explore any possible relationships between the two. This was used to infer baseline safety perception levels of the current water system in Ventura, to help to refine the type of messaging needed for the outreach strategy (Hurlimann, 2007).

Information

The information construct explores both informational message content and message dissemination (format) around DPR. Questions identified both gaps in knowledge and potentially useful information tools, which could then be used to develop effective messaging channels and methods. These questions identified community opinions on persuasive

messaging and credible messengers of this information (Po et al., 2004; Marks, Martin, & Zadoroznyj, 2008).

Demographic Correlations

A set of common demographic questions such as income, education, and ethnicity were asked in order to explore possible correlations with levels of acceptance of advanced purified water (Fink, 2003).

Demonstration Facility Survey

The Demonstration Facility survey was used to determine the role of education in potable reuse acceptance. This survey was developed by Carollo Engineers, the consultant group who developed and engineered the demonstration facility for Ventura, and the WaterReuse Foundation. Information about tour dates and sign-ups were publicized through multiple local media channels.

Survey Distribution

VenturaWaterPure (potable reuse) tours began with a survey asking visitors about their knowledge of Ventura's water resources, drinking water preferences, and initial acceptance of adding recycled water to their drinking water supply. After the survey, visitors listened to a 15-minute presentation on the DPR process. A demonstration facility tour followed, where participants were provided with in-depth information and an opportunity to explore equipment for each of the four treatment processes used to purify recycled water. Tours ended with a short video explaining the benefits of potable reuse, along with a Q&A session. Following the tour, participants were surveyed again to determine whether perceptions of potable reuse and recycled water had changed.

The research team was not involved in the design of the Demonstration Facility survey. Major analyses done on the data included before and after effects of the tour on support rankings and synthesizing free response questions about the most persuasive aspects of the tour.

Limitations

Survey Limitations

The data collection process in Ventura presented several limitations. It quickly became evident that obtaining a survey sample representative of Ventura (population 107,231 as of 2010) (United States Census Bureau, 2015) would not be feasible, due to time and budget constraints.

In addition, survey length and the lack of participant compensation reduced respondents' willingness to participate in the survey.

Because of the limited number of surveys collected, it was difficult to obtain a survey sample size that was demographically representative of Ventura. Latinos and Hispanics comprise a large part of Ventura's population, estimated to make up 31.8% as of the 2010 Census (United States Census Bureau, 2015). Our own survey results included 17% Latino/Hispanic respondents (Appendix 7). This is a key limitation that should be addressed when sampling Ventura's population more broadly.

Self-report questionnaires, such as the one used for this project, are a popular methodology in the behavioral sciences because of their utility and ease of distribution. However, as with all self-reporting surveys, there is always the risk of error related to respondent honesty, introspective ability, interpretation of rating scales, and response bias (Hoskin, 2012). It is important to consider these potential self-report problems, as they may have an impact on the validity of conclusions.

Data Limitations

A four-month delay in the opening of the demonstration facility resulted in the delayed availability of water quality data. Water quality data from the VenturaWaterPure pilot project will play a fundamental role in communicating the safety and reliability of the water, and should be incorporated into outreach efforts as soon as it is available.

Analysis & Findings

The overall goal of the surveys was to gauge acceptance levels of DPR in Ventura as they relate to the four theoretical constructs of the project, described in detail below. These four themes were used to design the Ventura Resident Survey, and were used as an organizational framework in which to explain survey findings. Concerns around water safety and the lack of information about the process were prevalent results. Findings around trust levels and emotional responses also contributed to understanding the underlying drivers behind DPR skepticism. Results from both the Ventura Resident Survey and Demonstration Facility Survey helped to confirm key findings from the literature review as they apply to Ventura specifically.

The overarching question from the Ventura Resident Survey was used to establish initial acceptance levels of incorporating APW into city drinking water (Figure 1). Results indicated that 69% of respondents moderately to strongly support the addition of APW, 22% felt neutral or unsure, and 9% moderately to strongly opposed this addition (n = 249).

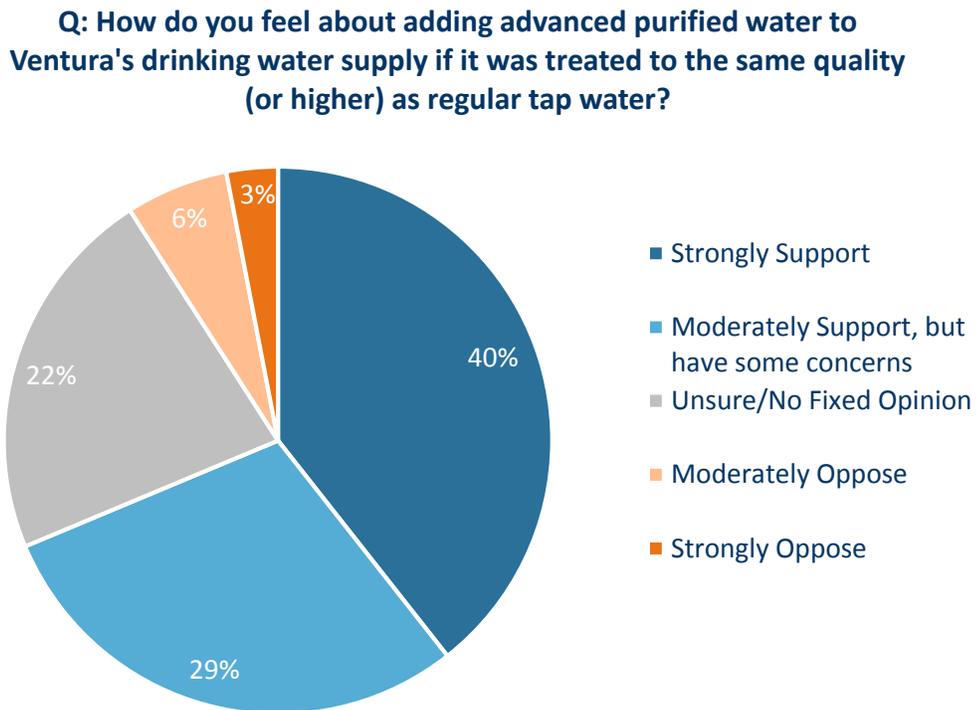


Figure 1. Support for adding APW to Ventura’s drinking water supply. 69% of respondents support the addition of APW to Ventura’s drinking water supply (blue), 22% were unsure (gray) and 9% were opposed (orange) (n = 249).

While it is encouraging to see such high levels of support, the one third of respondents who felt neutral or unsupportive of APW could pose a significant barrier to implementation. It is important to get to know the concerns of these potentially affected interests in order to best address them moving forward. Our analysis focuses on concerns related to the four main themes: emotional response, trust, safety and water quality, and information and education.



Emotional Response

A strong negative emotional response to recycled water, also known as the “yuck factor,” is based on gut reactions rather than on rational thinking. As one Ventura Resident Survey respondent put it, “Just the idea of drinking wastewater scares me.” Though commonly attributed to the gap between scientific knowledge and public understanding, the visceral reaction stems from culturally-learned perceptions of clean and safe drinking water (Stenekes, Colebatch, Waite & Ashbolt, 2006; Russell & Lux, 2009; Hartley, 2006; Mankad & Tapsuwan, 2011). Americans, in particular, have a strong preference for “natural” foods, which can be applied to notions of consuming clean and safe drinking water (Rozin et al, 2004). This leads to an instinctive aversion to drinking water that is not considered “natural” (i.e. processed wastewater). Rozin et al. (2015) showed that increasing the storage time and distance traveled between purification process completion and the drinking water system helped to restore the idea of “naturalness” and increase willingness to drink advanced purified water. This may be the reason why IPR (which uses the same treatment process, but introduces water into an environmental buffer, such as a groundwater aquifer, for several months of storage before drinking water use) could be seen as a more acceptable option by skeptics.

Naturalness of the source of water affects its acceptability as drinking water. One study determined that dissociating water from its source played a role in increasing support for water reuse (Russell & Hampton, 2006). This is consistent with our survey findings, where 42% of respondents indicated that the source of advanced purified water impacts their comfort in drinking it (Figure 2). One respondent stated, “APW needs to be of a higher quality due to the enormous amounts of human waste metabolites that will be found.” This response demonstrates that as a result of its source, advanced purified water is often perceived as dirtier than other “natural” drinking water sources.

Q: The source of advanced purified water does not impact my comfort in drinking it.

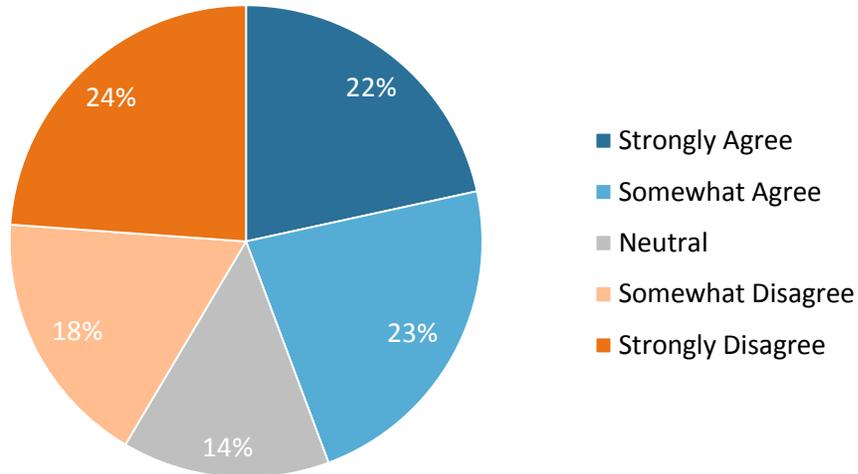


Figure 2. Comfort with the source of advanced purified water. 42% of respondents indicated that the source of advanced purified water impacts their comfort in drinking it. (n = 215)

Q: What water source do you consider the safest?

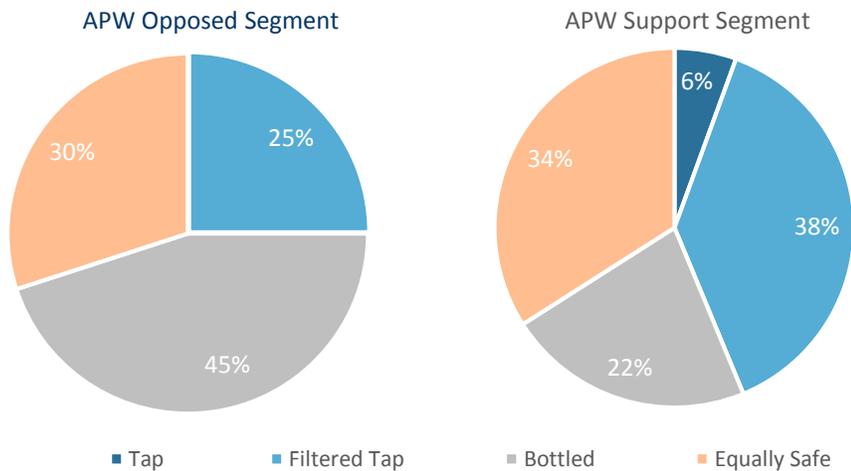


Figure 3. The safest water source selected by respondents opposed to adding APW to Ventura’s water supply (left) and respondents in support of adding APW (right). 45% of respondents who opposed adding APW to the water supply considered bottled water (bright blue) to be the safest water source. Only 25% considered filtered tap water (dark blue) to be the safest and 0% believed tap was the safest (n = 20). 22% of respondents in support of APW considered bottled water to be the safest source. 38% believed filtered tap water to be the safest and 6% believed tap was the safest (n = 144).

Culturally learned ideas of safety also play a role in the yuck factor. Studies show that disgust-based aversion is attributed to perceived health concerns, which can be inaccurate (Nemeroff & Rozin, 2000; Rozin & Nemeroff, 1990; Nemeroff & Rozin, 1994). For example, 45% of survey respondents that were opposed to adding APW to Ventura’s drinking water supply believed that bottled water was the safest drinking water source (n = 20, Figure 3). This number decreases to 22% (n = 144, Figure 3) for respondents who supported APW. Understanding how perceptions of safe water sources - both culturally learned and as a result of misinformation - may affect one’s opinion of APW, and shed light on what a community deems as acceptable drinking water.



Trust

Trust in the authorities that are managing DPR is a significant component in developing public acceptance. Here, we define trust as the level of confidence communities have in the water authority’s ability to maintain rigorous health and safety protocols in the production of APW (Stanford, Walker, & Alexander, 2015). 64% of Ventura Resident Survey respondents indicated that they either highly or somewhat trust Ventura Water to provide safe drinking water to the community (Figure 4).

A lack of trust in the responsible authority, shaped by a lack of transparency, inconsistent messaging, and confusion around the authority’s motivation for pursuing a particular water reuse scheme, has delayed and derailed water reuse project in the past (Nancarrow, Leviston, & Tucker, 2009; WaterReuse Association Webinar, 2016). It is therefore important that strategic and transparent delivery of information from Ventura Water - both on water quality and the DPR process - be included in any public outreach plan.

Increasing trust levels in the water authority also increases residents’ confidence in other aspects of the water treatment scheme, such as water quality and system operations. A 2009 study on water reuse in Australia found that greater trust in the water authority directly resulted in lower perceived health risk (perceived threat of the water on human health) and system risk (perceived threat of something going wrong with the recycling process) (Nancarrow, Leviston, & Tucker, 2009).

Q: How much would you say you trust Ventura Water to provide safe drinking water?

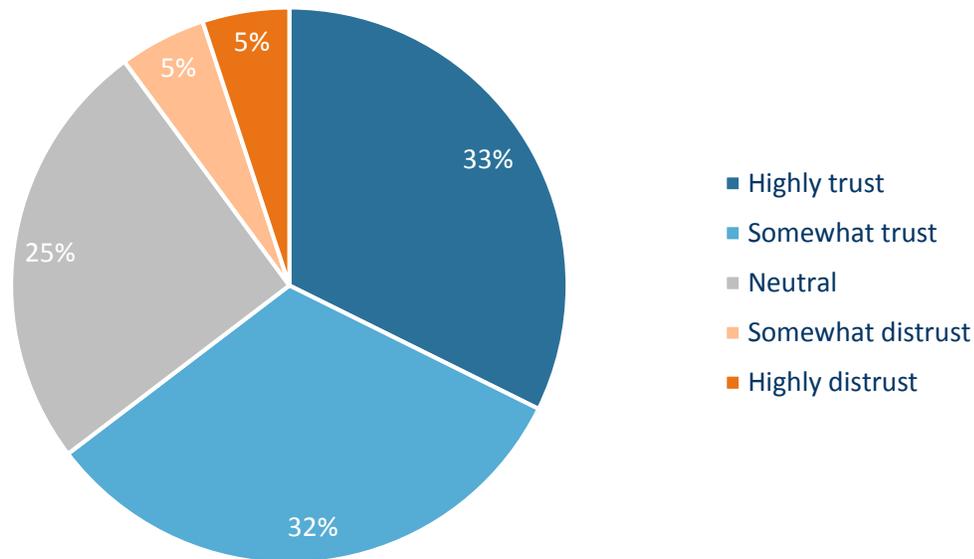


Figure 4. Trust levels in Ventura Water. 65% of respondents trust Ventura Water to provide safe drinking water (blue), while only 10% distrusted (orange) and 25% were neutral (gray; n = 256).

Among Ventura Resident surveys, the most frequent concerns, prompted by the question *“Please list any specific concerns you have about drinking advanced purified water that is blended with Ventura’s existing water supply,”* related to trust in Ventura Water included:

- **Monitoring Concerns** (“Need to make sure there is fail safe monitoring”; “Need to see demonstrated ability to ensure safety”; “Would like to see daily water testing to make sure it is safe”)
- **Human Error Concerns** (“Worried about margin of error/human error”; “Lapses in the purification process”; “There are always chances for problems/slips, with this source of water it would be particularly worrying”)
- **Safeguarding Concerns** (“Is there a failsafe system?”; “There can’t be any breakdown in the APW treatment process or it will lose public support”; “Need to make sure there is failsafe monitoring”)

The most frequent comments listed to gain support for APW, prompted by the question *“Please list any factors that would increase your support for adding advanced purified water to Ventura’s existing water supply,”* also related to trust in Ventura Water’s monitoring abilities, included:

- Testing & Reporting Transparency (“Testing to make sure it is safe”; “Transparency”; “Reported levels of human waste metabolites; analysis procedures and identification of what acceptable levels are”)
- Safety Assurance: (“Need to guarantee that people/residents won't get sick”; “Need a better understanding of steps that would be taken to assure quality standards & transparency of the process”; “Demonstrated ability to ensure safety of water”)
- “Proof” from other water reuse facilities: (“Have it used for a year somewhere else to test”; “Proof from other districts on taste, consistent monitoring, and most all knowing other places did not get sick”)

Trust must also be taken into consideration when identifying the best source for distributing information around APW and the DPR treatment process. The WaterReuse Association (Webinar, 2016) recommends the use of external water experts in disseminating information, rather than local officials involved in the water scheme. Correspondingly, Ventura Resident survey results indicate that sources considered to be the most trustworthy for information about advanced purified water were scientists, medical researchers, and independent lab researchers (with 73%, 71%, and 70% of respondents selecting “Trust,” respectively). Information sources associated with the highest levels of neutrality or distrust were local radio stations, newspapers, City Council members, and the Mayor of Ventura (Figure 5).

Q: The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.

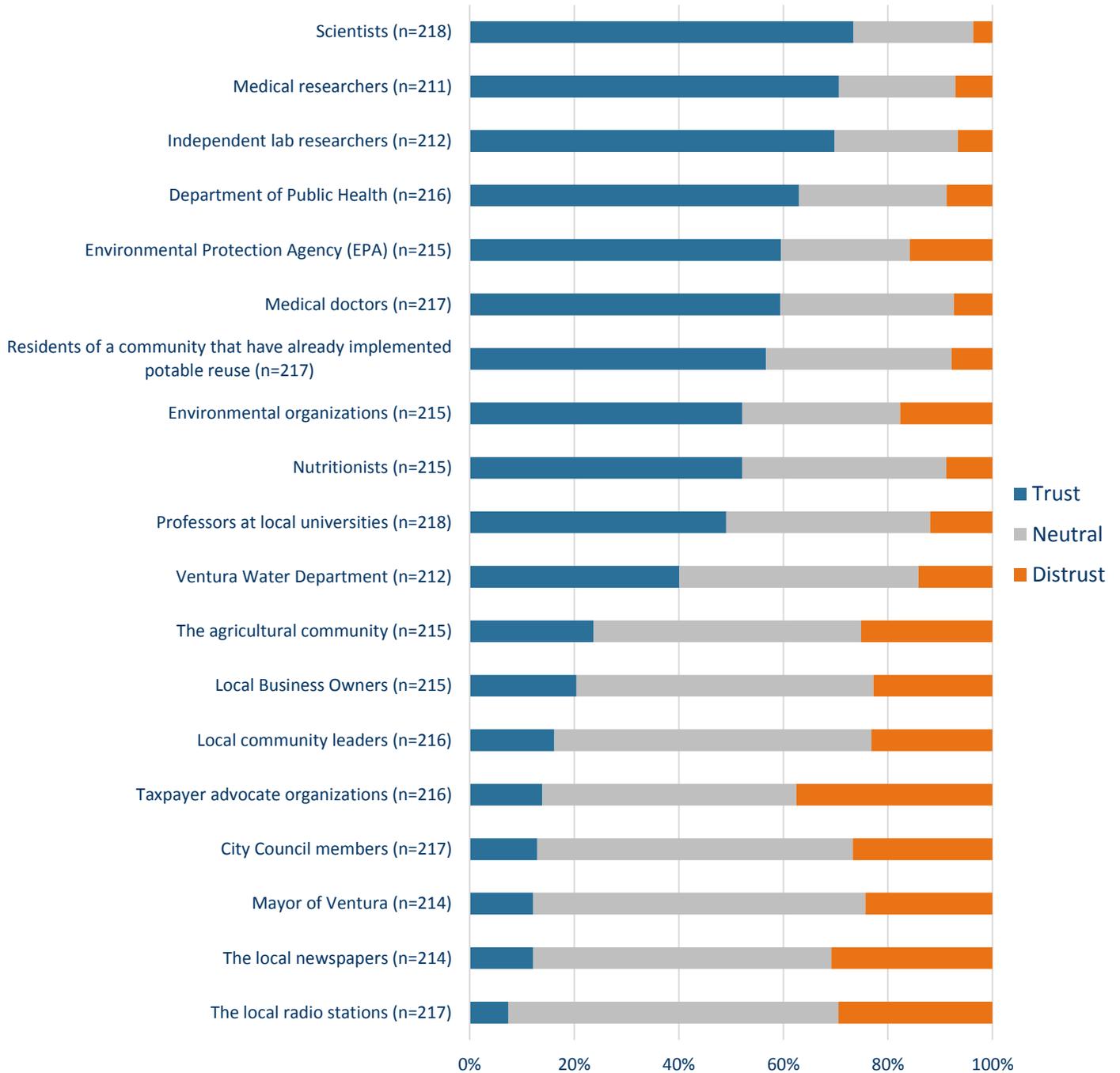


Figure 5. Trust in information sources about APW. Most trusted sources are show in descending order from top to bottom, with trust indicated in blue. Respondent most trusted third party sources, such as scientists (73%) and medical researchers (71%), to provide them with information about APW.



Water Quality and Safety

Water quality can be defined in several ways, depending on the audience. Some water users in Ventura characterize quality in terms of taste, odor, and appearance. Conversely, other users and water treatment managers characterize quality and safety by the regulation of constituents and pollutant levels in the water. As such, when communicating about water quality and safety of potable reuse, it is important to describe “quality” in language that is relevant to each audience. Some water users may be more concerned about how their water tastes or the mineral content, while others are worried about pollutants and constituents of emerging concern (CECs).

Many people believe that APW contains more chemicals and microorganisms than other forms of treated water (Dolnicar & Schäfer, 2009). The most frequently cited concerns involve the presence of microorganisms (including bacteria, viruses, protozoa, and helminthes) (Dishman, Sherrard, & Rebhun, 1989; Miller, 2006; Dolnicar & Schäfer, 2009; Crook, 2010; Chan, 2014), trace organic compounds (such as pharmaceuticals or “endocrine disrupting chemicals”) (Dishman, Sherrard, & Rebhun, 1989; Miller, 2006; Dolnicar & Schäfer, 2009; Crook, 2010; Chan, 2014), and hazardous chemicals that are byproducts of the treatment process (Dolnicar & Schäfer, 2009). More common water contaminants such as nitrates, other nitrogenous compounds, and heavy metals are also cited as concerns (Dishman, Sherrard, & Rebhun, 1989; Crook, 2010; Chan, 2014).

The two primary concerns, identified in both the Ventura Resident Survey and Demonstration Facility Survey, are water quality and safety. For the Ventura Resident survey, approximately 53% of respondent comments brought up the safety of the potable reuse treatment process. Although 48% of respondents were satisfied with reliable monitoring throughout the treatment process, 32% felt unsure (n = 232, Figure 8). Many respondents stated that they worried about viruses, chemicals, and pharmaceuticals surviving the treatment process, as well as the ability of the equipment to reliably detect these contaminants. Many respondents also raised concerns about the possibility of human error or lack of safeguards within the treatment process. Educating the public about the treatment process, safety components, and monitoring built into the equipment is important for increasing support for potable reuse (Crook, 2010; Chan, 2014). Making data readily available to the water users about the levels of constituents in the water is also critical to increasing support (Yousef, 2011; Schultz & Fielding, 2014; Crano & Prislín, 2006).

Based on all survey results, 64% of respondents agreed that they felt APW was safe enough to drink (n = 245, Figure 6). However, 33% of respondents still preferred alternative water sources

like desalination (n = 245, Figure 7). Although the water treatment facility’s main concern is to produce safe water, it is essential to communicate the quality of APW to the public.

Q: I feel that advanced purified water is clean enough to drink.

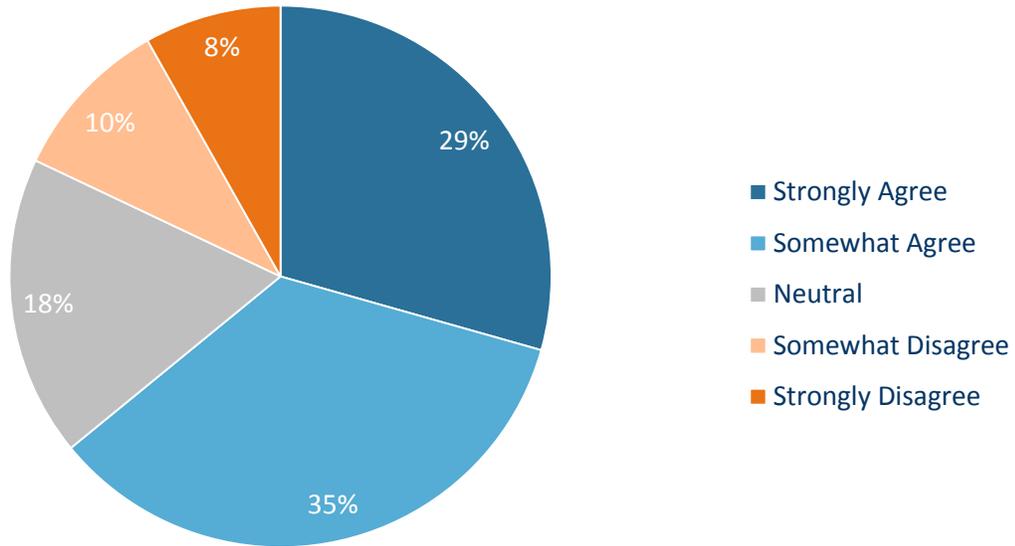


Figure 6. Safety of advanced purified water. 64% of respondents agreed that advanced purified water is clean enough to drink (blue), while 18% were neutral (gray) and 18% disagreed (orange) (n = 245).

Q: I feel other alternative water sources (e.g. desalination or imported water supplies) are preferable

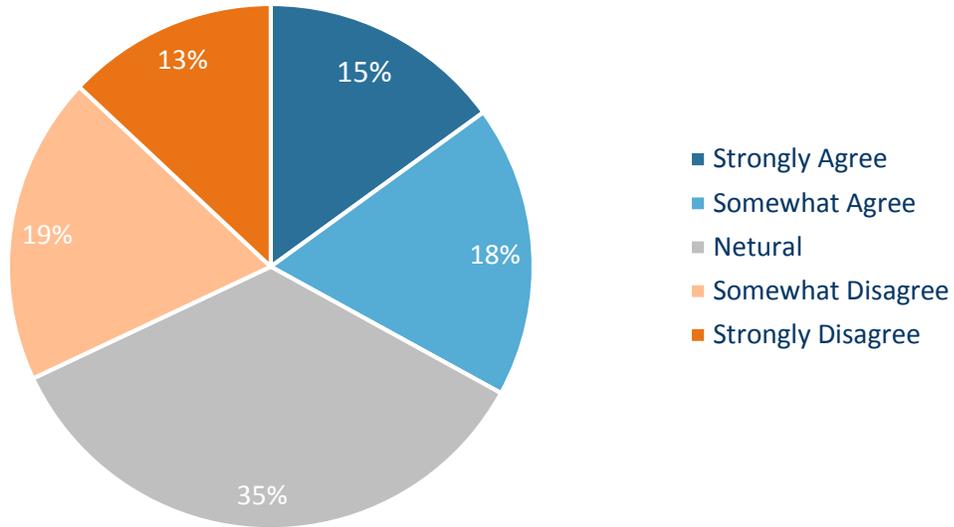


Figure 7. Water supply preferences. 53% of respondents felt that other alternative water sources, such as desalination, were preferable to DPR (blue), while 19% felt neutral (gray) and 32% felt that DPR was preferred (orange) (n = 245).

Q: I feel satisfied that there is reliable monitoring throughout the treatment process

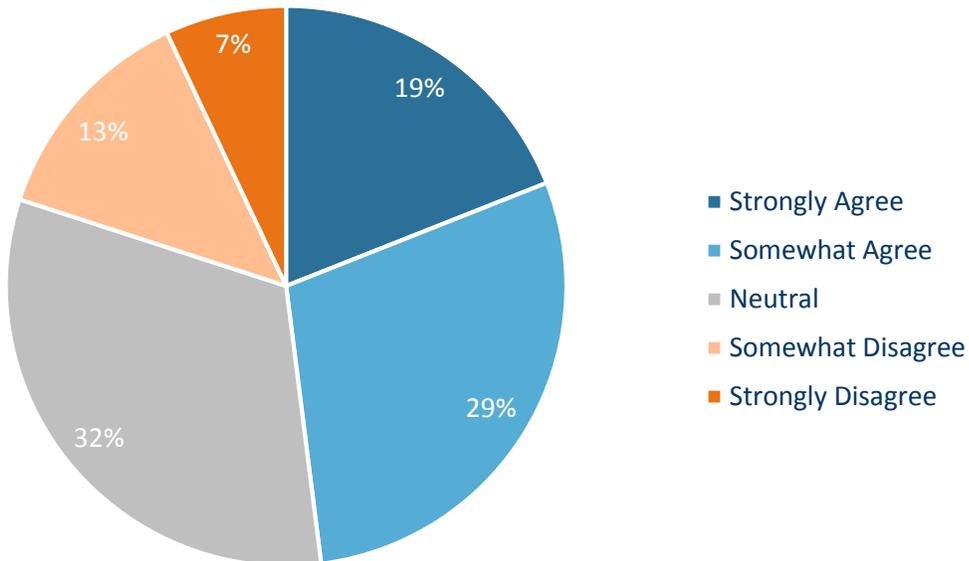


Figure 8. Satisfaction with monitoring of the DPR treatment process. 48% of respondents were satisfied with monitoring of the DPR treatment process (blue), while 32% were neutral (gray) and 20% disagreed (orange) (n = 232).



Information and Education

Information about potable reuse projects, including the treatment process and associated risks, plays a large role in public acceptance. Potable reuse is generally an unfamiliar topic for most people, so information about the treatment process is the first basic piece of education that a water utility should offer (Po et al., 2004; Hurlimann, 2007; Marks, Martin, & Zadoroznyj, 2008). 58% of the survey respondents collected in Ventura who left comments asked for more information about the DPR treatment process, as well as its effectiveness and costs. Providing this information will help residents to form an educated opinion about potable reuse in their community.

The VenturaWaterPure Demonstration Facility tours offered an opportunity to test the effect of education about the DPR process on support of DPR. Tour attendees were asked about their support of potable reuse before the tour began, and asked the same question following the tour, which included detailed information about the DPR treatment process and resulting water quality. An analysis of Demonstration Facility Survey data indicated that education about the DPR process significantly increased support for adding recycled water to Ventura's drinking water supply ($n = 276$, pre-tour rank mean = 3.79, post-tour rank mean = 4.25), $Z = 7.92$, $p < 0.001$, $r = 0.48$; Figure 9). Tour attendees listed education about the treatment process, including the multiple treatment steps and their effectiveness, as well as learning that potable reuse has been successful and safe in other communities, among the factors that changed their opinion about potable reuse.

Q: How do you feel about adding recycled water to our drinking water supply?

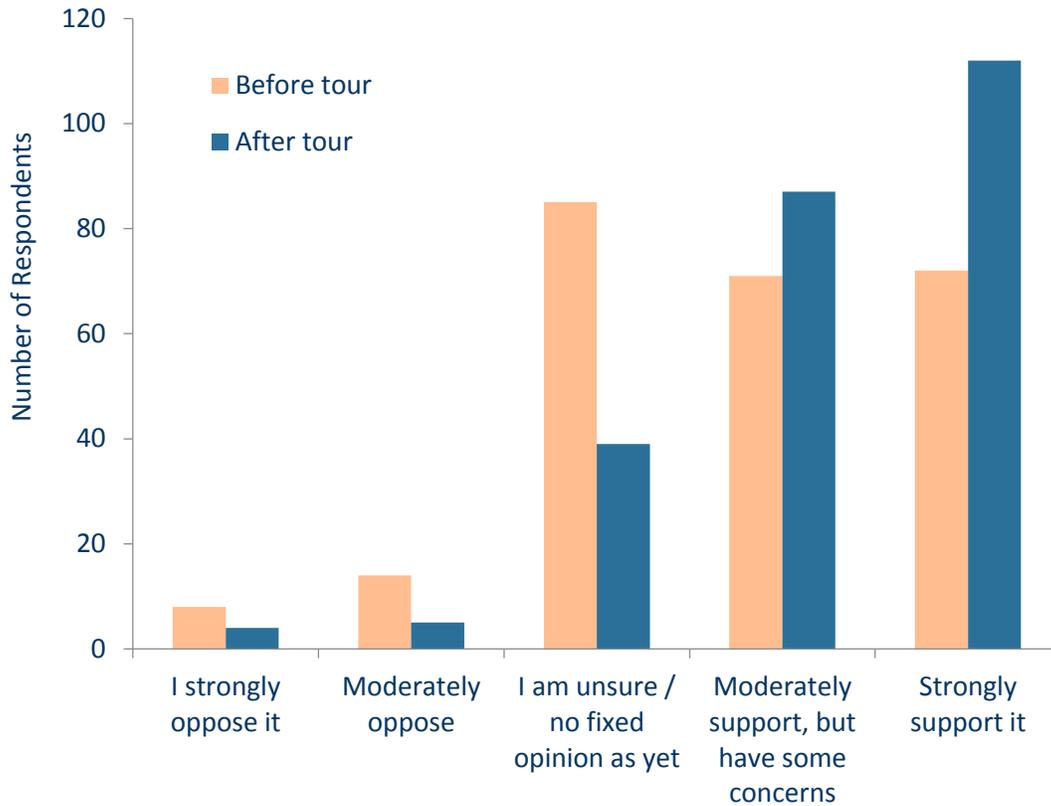


Figure 9. Support for adding recycled water to Ventura’s drinking water supply, before and after an educational tour. Most pre-tour opinions (orange) were unsure and supportive. Post-tour results (blue) showed a decrease in opposed and neutral counts and an increase in support counts (n = 276).

Safety concerns are one of the major barriers water utilities must overcome prior to implementing a potable reuse project (Miller, 2006; Yousef, 2011). Survey respondents in Ventura raised concerns as to whether the DPR process could remove constituents such as pharmaceuticals, herbicides, pesticides, and heavy metals. Respondents also expressed a desire for transparency, consistent monitoring at the treatment facility, and guarantees that the treatment process produces safe drinking water. Water utilities must emphasize that safety is their biggest concern (Khan & Gerrard, 2006; Chan, 2014), as well as make sure to address these common concerns early in the outreach process to begin overcoming possible barriers to DPR project implementation. Water utilities must also be clear about the parameters they are using when reporting on the safety of DPR; for example, explaining in detail the criteria that are used to determine whether water is safe to drink (Russel & Hampton, 2005). One survey respondent in Ventura said they were “not sure how pure [the water] really is,” while another

was concerned with the margin of error allowed in the treatment process. The water utility will need to clarify at what level various constituents are considered “safe” in order to have full transparency in project implementation.

Data will be required to help convince the public of the safety of the DPR process. For example, survey respondents in Ventura wanted to see water quality test results reported frequently to the public. Although the water quality data itself can be an important persuader, the source of information about DPR is also important in gaining public acceptance (Crano & Prislin, 2006; Yousef, 2011). Endorsement from experts including engineers, scientists, doctors, and health services professionals can help to increase public acceptance of a potable reuse project (Dishman, Sherrard, & Rebhun, 1989; Khan & Gerrard, 2006; Chan, 2014). Furthermore, examples of successful projects in other areas can help to ease worries about potable reuse projects (Chan, 2014).

Regulatory approval is a key piece of information that can sway public opinion (Khan & Gerrard, 2006; Tchobanoglous, Leverenz, Nellor, & Crook, 2011; Chan, 2014). Respondents in Ventura wanted to know that the project was following strict guidelines with oversight over the water treatment process. Water utilities should emphasize that these standards are being met, that water quality is being closely monitored, and that there is a failsafe in place to prevent against possible contamination in the drinking water supply (Khan & Gerrard, 2006; Chan, 2014).

The Ventura Resident Survey asked respondents what would help improve their perceptions of drinking advanced purified water. Respondents indicated that education about the treatment process, a positive track record for potable reuse in other areas, and scientists reporting that the treatment process was clean and safe would be most helpful in improving their perceptions, the communities perceptions, or both (97%, 96%, and 94%, respectively; Figure 10). These top strategies are in line with the factors that helped increase the perceptions of Demonstration Facility tour survey respondents, and are strategies that Ventura Water should focus on in their DPR outreach.

Q: How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

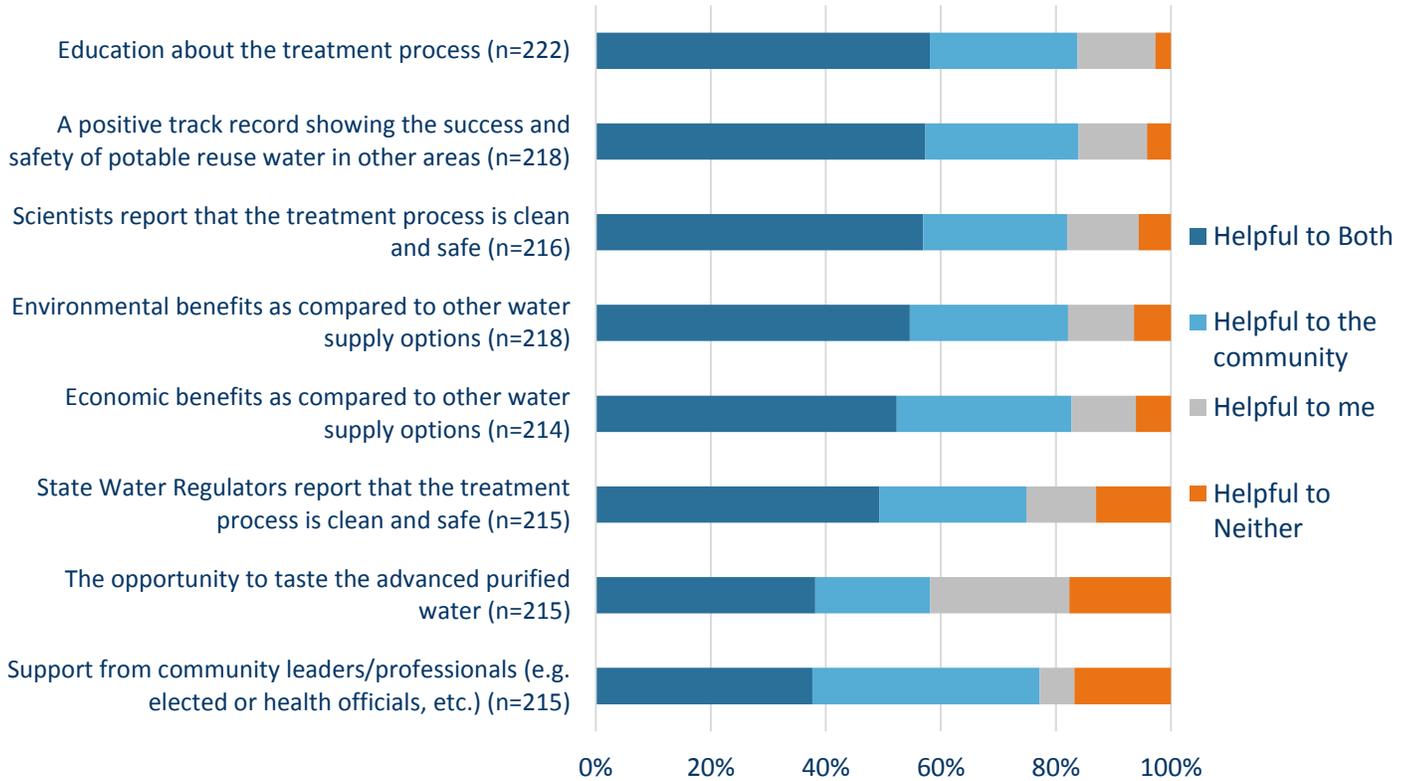


Figure 10. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both. The most helpful information for both the respondent and their community is shown in descending order from top to bottom. The most helpful information included education about the treatment process (97%) and showing a positive track record for potable reuse in other areas (96%).

Who to Influence

As with any proposed public project, the prospect of DPR in Ventura is met with one of three types of response: support, uncertainty, and opposition. While a typical political campaign seeks to identify which groups must be mobilized in order to gain voter support (Arceneaux & Kolodny, 2009), this public outreach campaign aims to identify the concerns of opposed or uncertain residents, in order to increase awareness and acceptance rates.

Opinions held by those in direct support and in opposition tend to be stronger and more polarizing, making them less receptive to new information than those who are uncertain and have yet to form a strong opinion (Holbrook & McClurg, 2005). This group represents Ventura Water's greatest opportunity for increasing acceptance. However, those who are uncertain are also expected to encounter less outreach information as they are typically less engaged with their communities, and with the planning process for public projects (Holbrook & McClurg, 2005). Reaching this group will be more difficult than reaching the partisan groups (Holbrook & McClurg, 2005).

Over one third of Ventura respondents strongly disagree, somewhat disagree, or feel neutral about Advanced Purified Water as a safe drinking water source, according to our survey analysis. These respondents are the primary group that Ventura Water should be targeting outreach toward. Understanding the characteristics of this group (how they are concentrated geographically, demographically, and by other factors) should be the mission of future surveying efforts, and will help ensure that outreach messages are delivered in a strategic and targeted way possible (Schneider & Ingram, 1983).

Outreach Strategy Recommendations

Recommendations Methods

Outreach strategies identified through the literature review were compiled and synthesized into a master list. Each recommendation was categorized according to the four main themes identified in the literature: emotional response, trust, safety and water quality, and information and education. For example, a literature recommendation to clearly describe the steps of the DPR treatment process, emphasizing careful monitoring and oversight to ensure water quality, would be categorized under both “water safety and quality” and “trust” themes. The synthesized list of outreach strategies were then ranked by the number of times they were cited in the literature, the number of different themes they address, and the amount of overlap with concerns that were brought up by respondents in the Ventura Resident Survey and the Demonstration Facility Survey.

Top Recommendations

The following are a condensed list of top recommendations for Ventura, which most accurately address the concerns that were identified in our literature review and also appeared frequently in the Ventura resident surveys. In addition, we outline below a more comprehensive list of outreach strategies in two sections: immediate and easily-implementable strategies aimed at sharing basic information and establishing transparency, as well as more strategic, longer-term recommendations aimed at building trust and maintaining credibility.

1. Develop a clear explanation of the need for DPR.
2. Promote examples of potable reuse success stories.
3. Highlight the role of external experts in developing, implementing, and overseeing the DPR process.
4. Develop a clear explanation of the DPR treatment process.
5. Provide opportunities for public participation early in the DPR planning process.
6. Continue to survey Ventura residents to obtain a more representative sample.
7. Evaluate effectiveness of proposed strategies over time.

Immediate Implementation

This list of recommendations are considered the “low-hanging fruit” of an outreach strategy, and includes several key, brief messages that should be shared early in the DPR planning process. The messages focus on promoting safety, transparency, and demonstrating how DPR is

the necessary solution to a larger water supply problem. Implementing these steps can be accomplished more quickly than some of the longer-term, more involved recommendations.

Develop a clear explanation of the need for DPR, including broader water supply issues facing the community and how DPR would help solve them. Furthermore, it must be clear that DPR is a fundamental part of Ventura Water’s mission to provide sustainable, secure water supplies (Institute for Participatory Management and Planning, 1994; Chan, 2014). [*Information & Education*]

Example message: “Purified water enhances water supply reliability and helps protect us from droughts by diversifying supply sources—keeping us from relying too much on any one source of water that may run low in a drought. Currently, DPR is the best solution for meeting this need.” (Millan, Tennyson, & Snyder, 2015)

Develop a clear explanation of the DPR treatment process, focusing on the multiple treatment barriers and monitoring procedures. Explain the DPR process in terms that will resonate with a non-technical audience (MacPherson, 2010; Chan, 2014; Millan, Tennyson, & Snyder, 2015). [*Trust, Information & Education*]

Example message: “The water is then treated through reverse osmosis, where it is forced through membranes that remove salt and microorganisms, including viruses, bacteria, and most constituents of emerging concern.” (Millan, Tennyson, & Snyder, 2015)

Provide examples of successful potable reuse projects (both DPR and IPR) to demonstrate that potable reuse has been successfully and safely implemented in the past (Khan & Gerrard, 2006; Millan, Tennyson, & Snyder, 2015; WaterReuse Association Webinar, 2016). [*Quality & Safety, Information & Education*]

Example message: “Orange County’s potable reuse project began in 2008 and provides enough water to meet the needs of nearly 850,000 residents every day.”

Educate the public about the urban and natural water cycle to show that all water is recycled, and that the treatment process is merely a replication of the nature's own water treatment process (Millan, Tennyson, & Snyder, 2015; Khan & Gerrard, 2006). [*Emotional Response*]

Example message: “The amount of fresh water on the planet does not change, so through nature all water has been used and reused since the beginning of time. Using advanced technology to purify recycled water merely speeds up a natural process. In fact, potable reuse provides a needed water supply that is of higher quality than what occurs naturally.” (Millan, Tennyson, & Snyder, 2015)

Compare DPR water's treatment process, its environmental impacts, and its economic benefits to those of conventional and/or more trusted water sources (i.e. imported water, desalinated water). (Khan & Gerrard, 2006; Dolnicar & Schäfer, 2008; Dolnicar, Hurlimann, & Grün, 2011; Millan, Tennyson, & Snyder, 2015; WateReuse Webinar, 2016). *[Quality & Safety, Information & Education]*

Example message: "The DPR treatment process includes reverse osmosis, which is the same filtration technology used in the desalination and bottled water processes."

Example message: "The more recycled water we use for whatever purpose, the less we have to take out of rivers, streams, and our scarce groundwater supplies. We should recycle and reuse as much of our limited water supplies as we possibly can—water is too valuable to be used just once." (Millan, Tennyson, & Snyder, 2015)

Leverage words like "pure" and "advanced purified", which are more reassuring to the public than other technical reuse terms such as "reuse", "recycled", and "wastewater" (MacPherson, 2010; WateReuse Association Webinar, 2016; Millan, Tennyson, & Snyder, 2015). *[Emotional Response]*

Promote safety as the water treatment organization's highest priority in order to bolster and grow their reputation (Khan & Gerrard, 2006; Chan, 2014; Millan, Tennyson, & Snyder, 2015). *[Quality & Safety, Information & Education]*

Highlight that the DPR process was developed and implemented with guidance from external experts, and that the health and safety of advanced purified water will be overseen by health services and regulatory authorities (Khan & Gerrard, 2006; Crook, 2010; Yousef, 2011; Millan, Tennyson, & Snyder, 2015). *[Trust, Information & Education]*

Long-Term Implementation

This is a set of recommendations which should be implemented throughout the duration of the planning and implementation process. They focus less on immediate messages, and more on building trust, transparency, and a space for public interaction in the long term.

Emphasize the quality tests that must be conducted and water standards that must be met prior to distributing water to customers. A key message should be that water is rigorously and reliably tested for drinking safety before distribution (Chan, 2014; WateReuse Association Webinar, 2016). *[Quality & Safety, Information & Education]*

Example message: "Purified water is tested, in real-time, with online sensors and will be strictly monitored by the Department of Health." (Millan, Tennyson, & Snyder, 2015)

Continually compare the treatment process and water quality of DPR to trusted water sources. Bottled water is viewed by many community members as the safest source of drinking water, so it is useful to compare the quality of bottled water to the quality of water produced through the DPR process (Dolnicar & Schäfer, 2008; WateReuse Association Webinar, 2016).

[Emotional Response]

Example message: “The purification process produces water that is more pure than most bottled waters.” (Millan, Tennyson, & Snyder, 2015)

Provide transparent water quality and monitoring reports, which include potential impacts of pharmaceuticals and fail-safe guards used in the treatment process (Yousef, 2011; WateReuse Association Webinar, 2016). *[Trust, Quality & Safety]*

Clearly define water "safety" criteria, such as commonly tested contaminant levels (Russell & Hampton, 2005). *[Quality & Safety]*

Emphasize the quality and reliability of advanced purified water, while minimizing the focus on the source of the water (Chan, 2014). *[Emotional Response]*

Provide a space for public participation in the planning of potable reuse projects. Community members must view the process as fair, so water utilities should provide detailed information about the safety procedures and possible risks associated with potable reuse projects and incorporate community feedback into their finalized plans (Stenekes *et al.*, 2006; Ross, Fielding, & Louis, 2014; Hurlimann, 2008; Hartley, 2006). *[Trust]*

Conduct potable reuse facility tours. Tours can be used to demonstrate the treatment process and safeguards that are in place. They also allow community members to see the quality of advanced purified water with their own eyes and taste the water for themselves (Dolnicar, Hurlimann, & Grün, 2011; Dolnicar & Grun, 2011; Millan, Tennyson, & Snyder, 2015; Goetz, 2015). *[Quality & Safety, Information & Education]*

Understand oppositional groups: who/where they are, what their interests are, what acceptance barriers are (Institute for Participatory Management and Planning, 1994).

Continue to survey residents to obtain a more representative sample of the Ventura community. Continued sampling will help Ventura to develop a better understanding of resident needs and concerns, improving statistics on community acceptance levels.

Evaluate the effectiveness of proposed strategies. It is important to continually re-evaluate communications strategies to refine which messages are having the greatest impact in the Ventura community.

Evaluation

It will be important for Ventura to monitor the success of their outreach strategies, and although there is limited research into the quantitative methods for this evaluation, we recommend the following next steps:

1. Continue to distribute the Ventura Resident Survey, and reevaluate the percent of residents that are supportive of DPR annually to track any changes in this trend (Chan, 2014). See Sample Sizes section below for more detail.
2. Test the effectiveness of chosen education and outreach materials with surveys before and after outreach is conducted.
3. Adjust outreach materials over time to ensure relevance to the community.
4. Engage key community groups to hold in-depth and open discussions about DPR to highlight new and emerging concerns around potable reuse. This can help Ventura better tailor its outreach material, strategy, and message (Rowe & Frewer, 2000).

Sample Sizes

Continuous surveying throughout the lifespan of the project will be critical for accurately gauging public acceptance of DPR. A representative sample is needed and will be more reflective of demographic distributions in Ventura. In order to determine the sample size needed, Ventura Water will need to decide the desired accuracy (confidence level) and precision (margin of error) values for survey results. Results from Table 2 reflect ideal sample sizes. Moderate values to be used for future analyses are a 3% margin of error with a 95% confidence level.

Furthermore, minimum sample sizes to obtain an appropriate power of 80% for statistical tests used in this report have been listed in Table 3. An 80% power reflects the minimum sample size needed to greatly reduce the chance of incorrectly finding the results of a statistical analysis to be insignificant.

Table 2. Sample sizes needed for representative sample based on confidence level and margin of error. Results based on a Ventura population size of 107,231 (US Census Bureau, 2015).

	Confidence Level: 95%			Confidence Level: 99%		
Margin of Error	1%	3%	5%	1%	3%	5%
Sample Size	8,815	1,057	383	14,366	1,812	660

Table 3. Minimum sample size needed for a power of 80% for various statistical analyses.

Test	Min. Sample Size
Chi-Squared	151
Wilcoxon Signed-Rank	38

Conclusion

The goal of this project was to develop a tailored DPR outreach strategy to increase public awareness and acceptance rates in Ventura, enough to enable successful project implementation within 10-15 years. Though technical and regulatory hurdles have the potential to delay implementation, public opposition remains the biggest factor in the derailment of DPR projects. An effective outreach strategy aimed at increasing public acceptance of DPR is critical to mitigate public opposition and set the stage for successful implementation.

A structured literature review of studies focused on public perceptions, communications, and outreach of recycled water projects was used to design a Ventura-specific public opinion survey (Ventura Resident Survey, Appendix 1). In addition, the literature review was used in conjunction with survey results to distill best practices and outreach strategies that most accurately fit the needs of Ventura. The key themes used to categorize public perceptions and concerns were emotional response, trust, water safety and quality, and education and information dissemination. The consultant-designed Demonstration Facility Survey was used to supplement the findings of the Ventura Resident Survey, and study the role of a demonstration facility tour in shaping perceptions of DPR.

Key survey findings include:

- ✓ 22% of respondents were unsure about their support for adding APW to Ventura's drinking water supply while 9% of respondents were somewhat or moderately opposed to the idea.
- ✓ 64% of respondents stated they somewhat or highly trust Ventura Water to provide safe drinking water.
- ✓ Top concerns around APW include the idea of drinking recycled water, trust in Ventura Water to provide transparent information about water quality, the potential presence of pharmaceuticals and other contaminants in the water, and the reliability of monitoring the DPR process.
- ✓ Many respondents did not understand the treatment process and want more information about it before developing an opinion of their support for DPR.
- ✓ 64% of survey respondents feel that APW is clean enough to drink.
- ✓ The top three trusted sources of information on APW include scientists (73%), medical researchers (71%), and independent lab researchers (70%).
- ✓ Education about the treatment process during Demonstration Facility tours significantly increased support of adding recycled water to Ventura's drinking water supply.

Key outreach recommendations:

1. Develop a clear explanation of the need for DPR.
2. Develop a clear explanation of the DPR treatment process.
3. Highlight the role of external experts in developing, implementing, and overseeing the DPR process.
4. Promote examples of potable reuse success stories.
5. Provide opportunities for public participation early in the DPR planning process.
6. Evaluate effectiveness of proposed strategies.
7. Continue to survey to obtain a more representative sample.

The outreach recommendations in this report target the major concerns and perceived risks around DPR use in Ventura. If implemented in advance, with special attention paid to identifying characteristics of oppositional groups, these strategies will increase awareness and acceptance rates in the city to allow for smoother implementation of DPR in Ventura.

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Appendix

Appendix 1: Ventura Resident Survey

Ventura Water Customer Potable Reuse Survey

General Questions

1. What water source do you consider the safest?
 - a. Tap water
 - b. Tap water that is filtered (e.g. in your fridge or through a pitcher)
 - c. Bottled water
 - d. All are equally safe

2. How often do you think about the safety of your drinking water?
 - a. Every day
 - b. A few times per week
 - c. A few times per month
 - d. A few times per year
 - e. Never

3. How often do you conserve water in your own home? (e.g. taking shorter showers, not watering your lawn, capturing the cool water while your shower heats up for other household uses)
 - a. Every day
 - b. A few times per week
 - c. A few times per month
 - d. A few times per year
 - e. Never

4. How much would you say you trust Ventura Water to provide safe drinking water?
 - a. Highly trust
 - b. Somewhat trust
 - c. Neutral
 - d. Somewhat distrust
 - e. Highly distrust

Advanced Purified Water Questions

The following questions will ask your opinion about advanced purified water. Some helpful terms are defined below.

Potable Reuse: *Potable reuse is the process of purifying recycled wastewater through several advanced steps including ultrafiltration, reverse osmosis, and advanced oxidation with ultraviolet light disinfection before it is sent back to the drinking water system.*

Recycled Water: *Recycled water is wastewater that has gone through three treatments that make it clean enough to release back into the environment. Often, this water is used to irrigate*

Please list any specific concerns you have about drinking advanced purified water that is blended with Ventura's existing water supply:

8. How much would you support adding **advanced purified water** to Ventura's water supply if it would lead to the following benefits?

a. Advance purified water will increase Ventura's overall drinking water supply.				
1 Extremely Unsupportive	2 Unsupportive	3 Neither Supportive or Unsupportive	4 Supportive	5 Extremely Supportive
b. Advanced purified water has a lower environmental impact than other alternative water supplies (e.g. desalination or imported water).				
1	2	3	4	5
c. Advanced purified water is less expensive than other alternative water supplies (e.g. desalination or imported water).				
1	2	3	4	5
d. Advanced purified water will improve Ventura's overall drinking water quality.				
1	2	3	4	5
Please list any factors that would increase your support for adding advanced purified water to Ventura's existing water supply:				
<hr/>				
<hr/>				

9. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking **advanced purified water** in Ventura? Write a check mark (✓) next to each action that you feel applies.

	Helpful to me	Helpful to the community	Helpful to neither
a. Education about the treatment process.			
b. Scientists report that the treatment process is clean and safe.			
c. State Water Regulators report that the treatment process is clean and safe.			

crops or landscaping and is pumped through “purple pipes” to be recognized as non-potable water.

Advanced purified water: *This water is the end product of the potable reuse process and meets or exceeds drinking water quality standards.*

5. How do you feel about adding advanced purified water to Ventura’s drinking water supply if it was treated to the same quality (or higher) as regular tap water? (Please circle)

I strongly oppose it	I moderately oppose it	I am unsure / no fixed opinion yet	I moderately support it, but have some concerns	I strongly support it
1	2	3	4	5

6. How do you think your local community would feel about adding advanced purified water to Ventura’s drinking water supply if it was treated to the same quality (or higher) as regular tap water? (Please circle)

They strongly oppose it	They moderately oppose it	They are unsure / no fixed opinion yet	They moderately support it, but have some concerns	They strongly support it
1	2	3	4	5

7. Please rate the extent to which you agree/disagree with the following statements about blending **advanced purified water** with Ventura’s existing water supply:

a. I feel the water is clean enough to drink.				
1 Strongly disagree	2 Somewhat disagree	3 Neutral	4 Somewhat agree	5 Strongly agree
b. I feel other alternative water sources (e.g. desalination or imported water supplies) are preferable.				
1	2	3	4	5
c. I feel satisfied that there is reliable monitoring throughout the treatment process.				
1	2	3	4	5
d. The source of the water does not impact my comfort in drinking it.				
1	2	3	4	5

d. Support from community leaders/professionals (e.g. elected or health officials, etc.).			
e. The opportunity to taste the advanced purified water.			
f. A positive track record showing the success and safety of potable reuse water in other areas.			
g. Economic benefits as compared to other water supply options.			
h. Environmental benefits as compared to other water supply options.			

10. The following is a list of people and organizations that may provide information about **advanced purified water**. Please tell us whether you would generally trust or distrust each on this issue. (Please only check (✓) ONE box for each person or organization).

	I trust their opinion	I distrust their opinion	I am neutral
a. Department of Public Health			
b. Local Business Owners			
c. Nutritionists			
d. Environmental Protection Agency (EPA)			
e. Residents of a community that have already implemented potable reuse			
f. Environmental organizations			
g. Independent lab researchers			
h. Ventura Water Department			
i. Medical researchers			
j. The local newspapers			
k. Mayor of Ventura			
l. Local community leaders			
m. City Council members			
n. Scientists			
o. Taxpayer advocate organizations			
p. Medical doctors			
q. The agricultural community			
r. The local radio stations			
s. Professors at local universities			

General Demographic Information

The following is a short list of questions about you which will remain strictly confidential and anonymous.

11. What is your age?
 - a. 18 - 29
 - b. 30 - 49
 - c. 50 - 64
 - d. 65+
 - e. Decline to state
12. You are:
 - a. Male
 - b. Female
 - c. Decline to state
13. Are there children (under 18 years) in your household?
 - a. Yes
 - b. No
 - c. Decline to state
14. Please specify your ethnicity
 - a. Caucasian/White
 - b. Asian
 - c. African American/Black
 - d. Latino/Hispanic
 - f. Native Hawaiian or Other Pacific Islander
 - g. Native American
 - h. Other/mixed
 - i. Decline to state
15. What is your combined annual household income?
 - a. Less than \$25,000
 - b. \$25,000 to \$49,999
 - c. \$50,000 to \$74,000
 - d. \$75,000 to \$99,999
 - e. \$100,000 to \$150,000
 - f. \$150,000+
 - g. Decline to state
16. What is your education level?
 - a. Completed some high school
 - b. High school graduate
 - c. Some college
 - d. Associate's degree or certificate program
 - e. Bachelor's degree

- f. Master's, Ph.D, law, medical degree or other advanced degree
- g. Decline to state

17. What is your ZIP code? _____

Appendix 2: Ventura Resident Survey Consent Form

Bren School Research Consent Form, Ventura Potable Reuse Survey

PURPOSE:

You are being asked to participate in a research study. The purpose of the study is to determine public barriers, perceived risks, and best practices that may be used to identify criteria for an effective strategy for promoting advanced purified water as a water source in Ventura.

PROCEDURES:

The meeting will involve a brief introduction to our study, a 10-minute anonymous survey, and a <15-minute discussion (if time permits) about the topic of potable reuse in Ventura. You must be at least 18 years of age and a resident of the city of Ventura to participate.

RISKS:

There are no risks, discomforts and/or inconveniences that may result to you for participation in this study.

BENEFITS:

There may be no direct benefit to you anticipated from your participation in this study, however, your responses to this survey may help the City of Ventura to pursue an additional water source that may be more reliable and/or drought resistant for the residents and/or water customers in the City of Ventura.

CONFIDENTIALITY:

This survey will be completely anonymous. The data we collect will not be linked to your identity in any way.

RIGHT TO REFUSE OR WITHDRAW:

You may refuse to participate and still receive any benefits you would receive if you were not in the study. You may change your mind about being in the study and quit after the study has started.

By completing this survey, you are consenting to have your anonymous responses included in our study analysis.

QUESTIONS:

If you have any questions about this research project or if you think you may have been injured as a result of your participation, please contact:

VenturaPotableReuse@lists.bren.ucsb.edu or visit VenturaPotableReuse.weebly.com

If you have any questions regarding your rights and participation as a research subject, please contact the UCSB Human Subjects Committee at (805) 893-3807 or hsc@research.ucsb.edu.

Appendix 3: Demonstration Facility Survey

Trusted life source for generations



Pre-tour questions

Before doing the tour, we'd like to ask you a few questions:

Q1 What prompted you to come to the VenturaWaterPure Demonstration Facility today? (Check one)

- Visiting with a school/community group
- Read about it in social media/online
- Read about it in the newspaper
- Saw a newsletter about it
- Other (please write in) _____

Q2 What is your primary source of drinking water?

- Regular tap water
- Filtered tap water
- Softened tap water
- Bottled Water
- Other (please write in) _____

Q3 If your drinking water source is NOT regular tap water, why not?

- I prefer the taste of filtered, softened or bottled water
- I don't think it is as safe as bottled or filtered water
- Bottled water is more convenient
- Other (please write in) _____

Q4 How much do you feel you know about Ventura's water sources? (Circle one)

I know nothing about it	I've heard about it, but I don't know much	I know a little bit	I know a lot
1	2	3	4

Q5 How do you feel about adding recycled water to our drinking water supply?

I strongly oppose it	Moderately oppose	I am unsure / no fixed opinion as yet	Moderately support, but have some concerns	I strongly support it
1	2	3	4	5

Q6 What concerns do you have about this water supply, if any? Write below.

Post-tour questions

(To be completed after your tour)

Q7 How informative was the tour today? (Circle one)

Not at all informative	Slightly informative	Quite informative	Very informative	Extremely informative
1	2	3	4	5

Q8 Is there any additional information you think should be included in the tour?

Q9 Having learned more about the water cycle and the treatment process, how do you feel now about the idea of adding recycled water to our drinking water supply?

I strongly oppose it	Moderately oppose	I am unsure / no fixed opinion as yet	Moderately support, but have some concerns	I strongly support it
1	2	3	4	5

Q10 If your thinking has changed since completing the tour, what in particular has changed your opinion?

Q11 Which of the drinking water scenarios would you prefer?

- Purified water pumped to a reservoir or groundwater then used again
- Purified water blended with other existing sources & put directly into supply

Q12 Please indicate the strength of your preference for your answer to Q10:

- Strong preference
- Moderate preference
- Slight preference

Q13 How do you feel about adding recycled water to our drinking water supply if it has received regulatory and government endorsement? (Circle one)

I strongly oppose it	Moderately oppose	I am unsure / no fixed opinion as yet	Moderately support, but have some concerns	I strongly support it
1	2	3	4	5

Q14 How would you rate your confidence in Ventura Water's ability to:

a) Operate this water recycling plant effectively: (Circle one)

I have little or no confidence	I am moderately confident	I am fully confident	I don't know enough to answer
1	2	3	4

b) Communicate when a malfunction in the operations occurs that may affect water quality:

I have little or no confidence	I am moderately confident	I am fully confident	I don't know enough to answer
1	2	3	4

Q15 Are you:

Male Female

Q16 What is the ZIP Code where you live? _____

Q17 Which of the following best describes your age? (Check one)

- Under 18 years of age
- 18 to 34 years
- 35 to 54 years
- 55 to 64 years
- 65 years +
- Rather not say

Q18 What is your level of education? (Check highest level achieved)

- Less than high school
- High school
- Some college or vocational training
- Four year college degree (i.e., BS, BA)
- Advanced degree (i.e., MS, PhD, JD, MD)

Thank you for your interest in the VenturaWaterPure Demonstration Facility!

Appendix 4: Segmented Analyses - Ventura Resident Survey Question 9

Table A4.1: Comparing All Data to the General Public community segment. There was no significant difference in the proportions of respondents selecting helpful to me, the community, or both for All Data compared to the General Public community segment. See Figures A4.1 and A4.2.

Question	Proportion selecting helpful to me, community, or both		Significant difference? ($p \leq 0.05$)
	All Data	General Public Segment	
How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	97%	95%	No ($\chi^2(1) = 0.34, p = 0.56$)
9b: Scientists report that the treatment process is clean and safe	94%	95%	No ($\chi^2(1) < 0.01, p = 1$)
9c: State Water Regulators report that the treatment process is clean and safe	87%	89%	No ($\chi^2(1) = 0.08, p = 0.78$)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	83%	81%	No ($\chi^2(1) = 0.12, p = 0.73$)
9e: The opportunity to taste the advanced purified water	82%	85%	No ($\chi^2(1) = 0.20, p = 0.65$)
9f: A positive track record showing the success and safety of potable reuse water in other areas	96%	95%	No ($\chi^2(1) < 0.01, p = 1$)
9g: Economic benefits as compared to other water supply options	94%	93%	No ($\chi^2(1) = 0.02, p = 0.90$)
9h: Environmental benefits as compared to other water supply options	94%	92%	No ($\chi^2(1) = 0.13, p = 0.72$)

Table A4.2: Comparing All Data to the Community/Volunteer community segment. There was a significant difference in the proportions of respondents selecting helpful to me, the community, or both for questions 9c, 9d, and 9e for All Data compared to the Community/Volunteer community segment. See Figures A4.1 and A4.3.

Question	Proportion selecting helpful to me, community, or both		Significant difference? ($p \leq 0.05$)
	All Data	Community/ Volunteer Segment	
How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	97%	99%	No ($\chi^2(1) = 0.03$; $p = 0.86$)
9b: Scientists report that the treatment process is clean and safe	94%	93%	No ($\chi^2(1) = 1.87$; $p = 0.17$)
9c: State Water Regulators report that the treatment process is clean and safe	87%	82%	Yes ($\chi^2(1) = 17.86$; $p < 0.001$)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	83%	85%	Yes ($\chi^2(1) = 12.75$; $p < 0.001$)
9e: The opportunity to taste the advanced purified water	82%	89%	Yes ($\chi^2(1) = 5.65$; $p = 0.02$)
9f: A positive track record showing the success and safety of potable reuse water in other areas	96%	97%	No ($\chi^2(1) < 0.001$; $p = 1$)
9g: Economic benefits as compared to other water supply options	94%	94%	No ($\chi^2(1) = 0.90$; $p = 0.34$)
9h: Environmental benefits as compared to other water supply options	94%	94%	No ($\chi^2(1) = 0.77$; $p = 0.38$)

Table A4.3: Comparing All Data to the Educator community segment. There was no significant difference in the proportions of respondents selecting helpful to me, the community, or both for All Data compared to the Educator community segment. See Figures A4.1 and A4.4.

Question	Proportion selecting helpful to me, community, or both		Significant difference? (p ≤ 0.05)
	All Data	Educator Segment	
How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	97%	94%	No ($\chi^2(1) < 0.01$; p = 0.96)
9b: Scientists report that the treatment process is clean and safe	94%	94%	No ($\chi^2(1) < 0.01$; p = 1)
9c: State Water Regulators report that the treatment process is clean and safe	87%	88%	No ($\chi^2(1) < 0.01$; p = 1)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	83%	75%	No ($\chi^2(1) = 0.25$; p = 0.62)
9e: The opportunity to taste the advanced purified water	82%	80%	No ($\chi^2(1) < 0.01$; p = 1)
9f: A positive track record showing the success and safety of potable reuse water in other areas	96%	94%	No ($\chi^2(1) < 0.01$; p = 1)
9g: Economic benefits as compared to other water supply options	94%	94%	No ($\chi^2(1) < 0.01$; p = 1)
9h: Environmental benefits as compared to other water supply options	94%	94%	No ($\chi^2(1) < 0.01$; p = 1)

Table A4.4: Comparing All Data to the Science/Environmental community segment. There was no significant difference in the proportions of respondents selecting helpful to me, the community, or both for All Data compared to the Science/Environmental community segment. See Figures A4.1 and A4.5.

Question	Proportion selecting helpful to me, community, or both		Significant difference? ($p \leq 0.05$)
	All Data	Science/ Environmental Segment	
How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	97%	100%	No ($\chi^2(1) = 0.49$; $p = 0.48$)
9b: Scientists report that the treatment process is clean and safe	94%	96%	No ($\chi^2(1) = 0.01$; $p = 0.90$)
9c: State Water Regulators report that the treatment process is clean and safe	87%	90%	No ($\chi^2(1) = 0.15$; $p = 0.70$)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	83%	86%	No ($\chi^2(1) = 0.10$; $p = 0.75$)
9e: The opportunity to taste the advanced purified water	82%	69%	No ($\chi^2(1) = 3.68$; $p = 0.06$)
9f: A positive track record showing the success and safety of potable reuse water in other areas	96%	96%	No ($\chi^2(1) < 0.01$; $p = 1$)
9g: Economic benefits as compared to other water supply options	94%	96%	No ($\chi^2(1) = 0.07$; $p = 0.80$)
9h: Environmental benefits as compared to other water supply options	94%	96%	No ($\chi^2(1) = 0.14$; $p = 0.70$)

Table A4.5: Comparing respondents who support adding APW to Ventura’s supply to those that oppose. There was a significant difference in the proportions of respondents selecting helpful to me, the community, or both for questions 9a, 9d, 9e, 9f, 9g, and 9h for respondents that support adding APW compared to respondents who oppose. See Figures A4.6 and A4.7.

Question	Proportion selecting helpful to me, community, or both		Significant difference? ($p \leq 0.05$)
	Support adding APW	Oppose adding APW	
How helpful would each of the following be for improving your perceptions and your community’s perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	100%	84%	Yes ($\chi^2(1) = 16.01, p < 0.001$)
9b: Scientists report that the treatment process is clean and safe	96%	89%	No ($\chi^2(1) = 0.47, p = 0.49$)
9c: State Water Regulators report that the treatment process is clean and safe	88%	80%	No ($\chi^2(1) = 0.50, p = 0.48$)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	86%	65%	Yes ($\chi^2(1) = 4.10, p = 0.043$)
9e: The opportunity to taste the advanced purified water	85%	63%	Yes ($\chi^2(1) = 4.17, p = 0.041$)
9f: A positive track record showing the success and safety of potable reuse water in other areas	99%	75%	Yes ($\chi^2(1) = 19.1, p < 0.001$)
9g: Economic benefits as compared to other water supply options	97%	74%	Yes ($\chi^2(1) = 11.9, p < 0.001$)
9h: Environmental benefits as compared to other water supply options	97%	70%	Yes ($\chi^2(1) = 19.1, p < 0.001$)

Table A4.6: Comparing respondents who support adding APW to Ventura’s supply to those that are unsure. There was no significant difference in the proportions of respondents selecting helpful to me, the community, or both for respondents that support adding APW compared to respondents who were unsure. See Figures A4.6 and A4.8.

Question	Proportion selecting helpful to me, community, or both		Significant difference? ($p \leq 0.05$)
	Support adding APW	Unsure about adding APW	
How helpful would each of the following be for improving your perceptions and your community’s perceptions of drinking advanced purified water in Ventura?			
9a: Education about the treatment process	100%	96%	No ($\chi^2(1) = 3.01, p = 0.08$)
9b: Scientists report that the treatment process is clean and safe	96%	93%	No ($\chi^2(1) = 0.22, p = 0.64$)
9c: State Water Regulators report that the treatment process is clean and safe	88%	86%	No ($\chi^2(1) = 0.04, p = 0.84$)
9d: Support from community leaders/professionals (e.g. elected or health officials, etc.)	86%	83%	No ($\chi^2(1) = 0.04, p = 0.83$)
9e: The opportunity to taste the advanced purified water	85%	81%	No ($\chi^2(1) = 0.11, p = 0.74$)
9f: A positive track record showing the success and safety of potable reuse water in other areas	99%	98%	No ($\chi^2(1) = 0, p = 1$)
9g: Economic benefits as compared to other water supply options	97%	98%	No ($\chi^2(1) < 0.01, p = 1$)
9h: Environmental benefits as compared to other water supply options	97%	93%	No ($\chi^2(1) = 0.81, p = 0.37$)

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

All Data

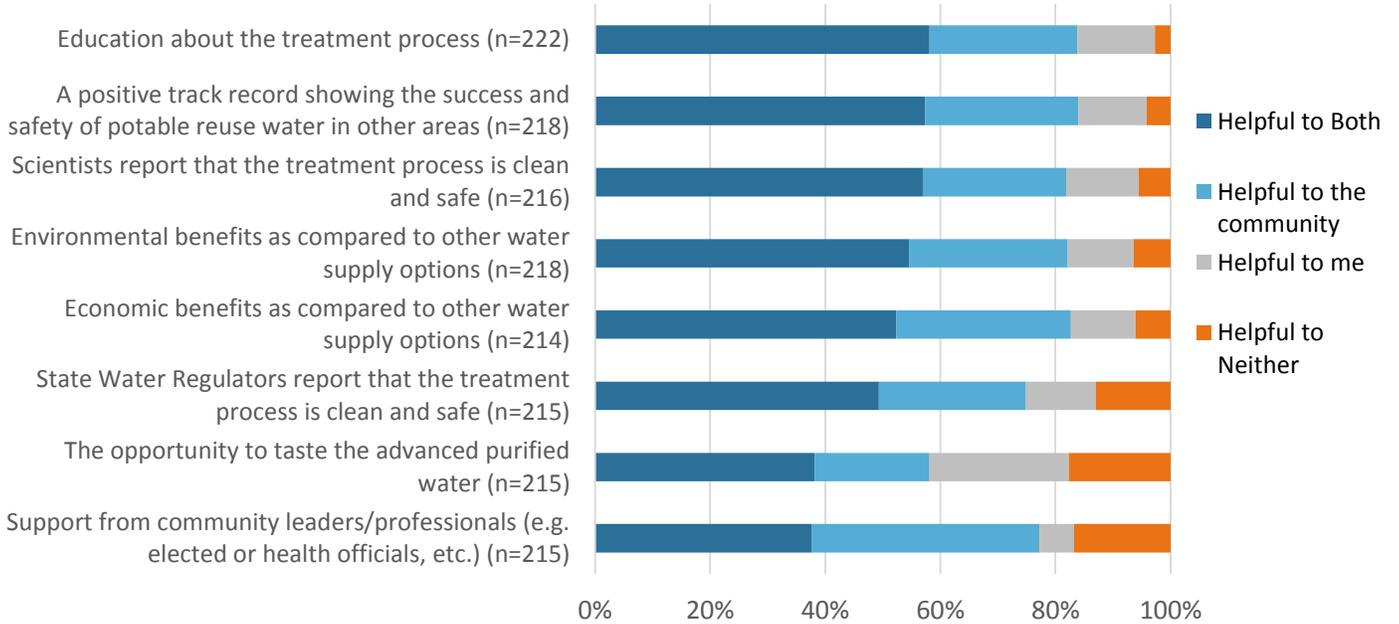


Figure A4.1: All Data. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents from the General Public community segment

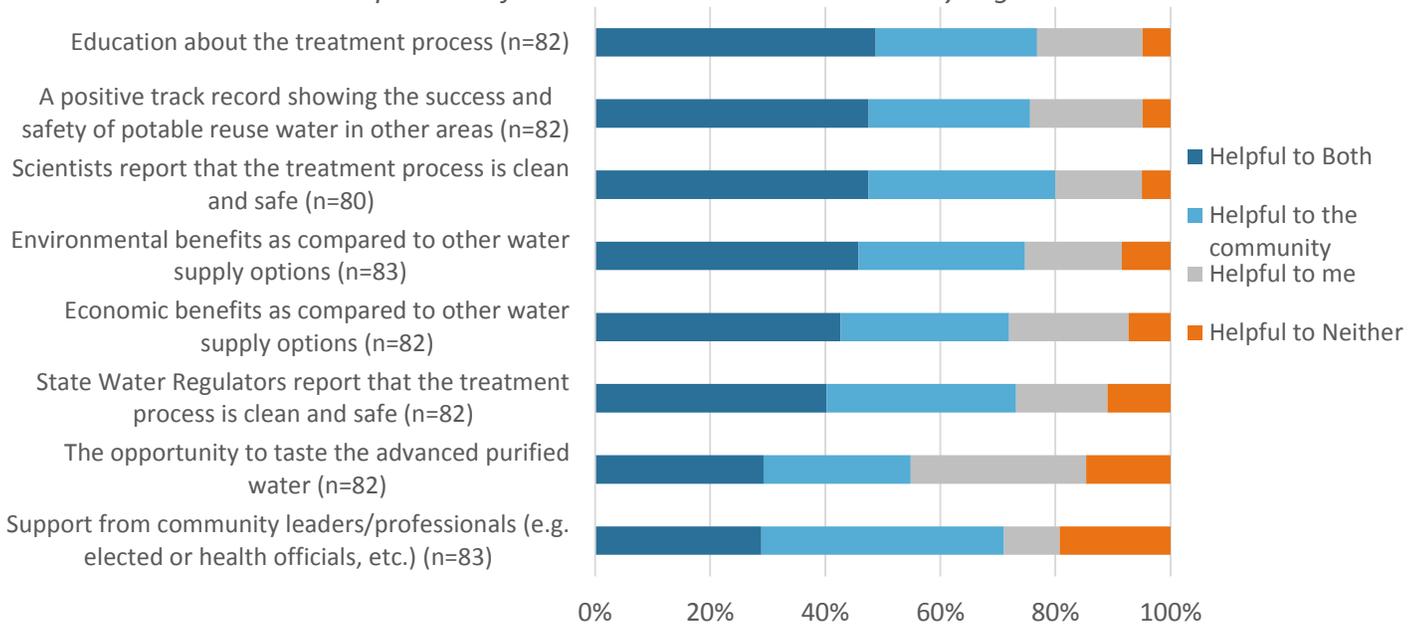


Figure A4.2: General Public community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents from the Community/Volunteer community segment

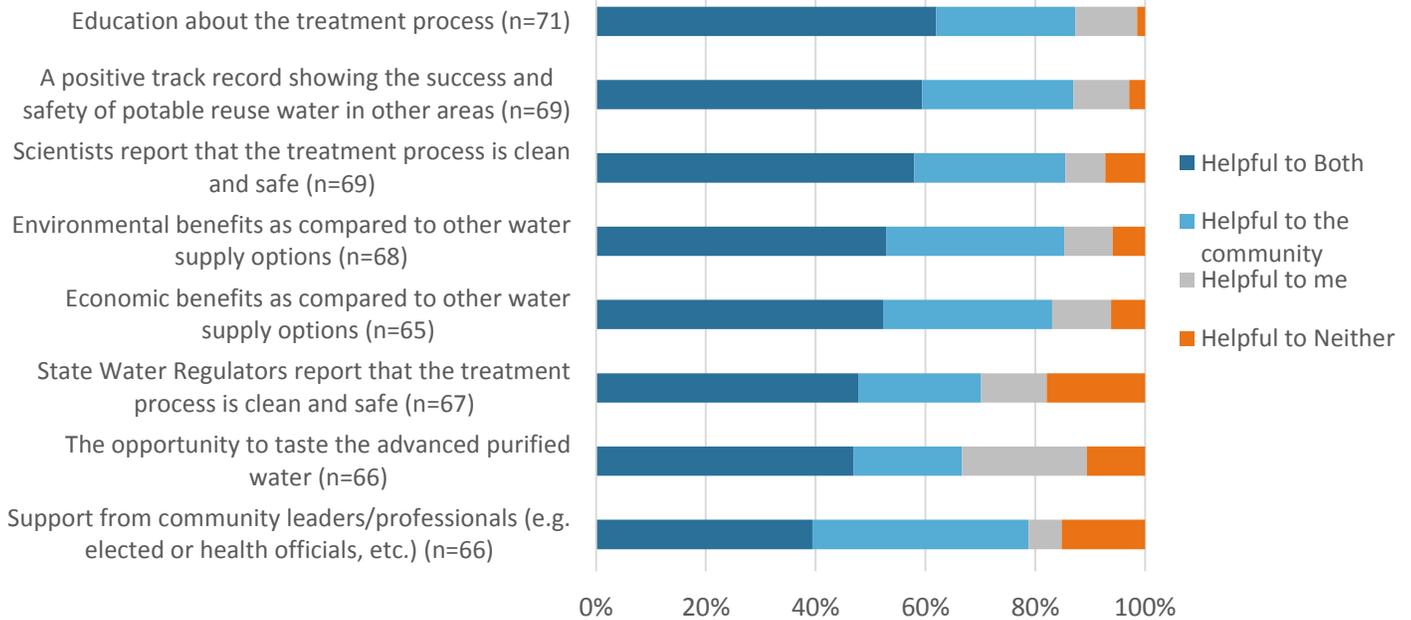


Figure A4.3: Community/Volunteer community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents from the Educator community segment

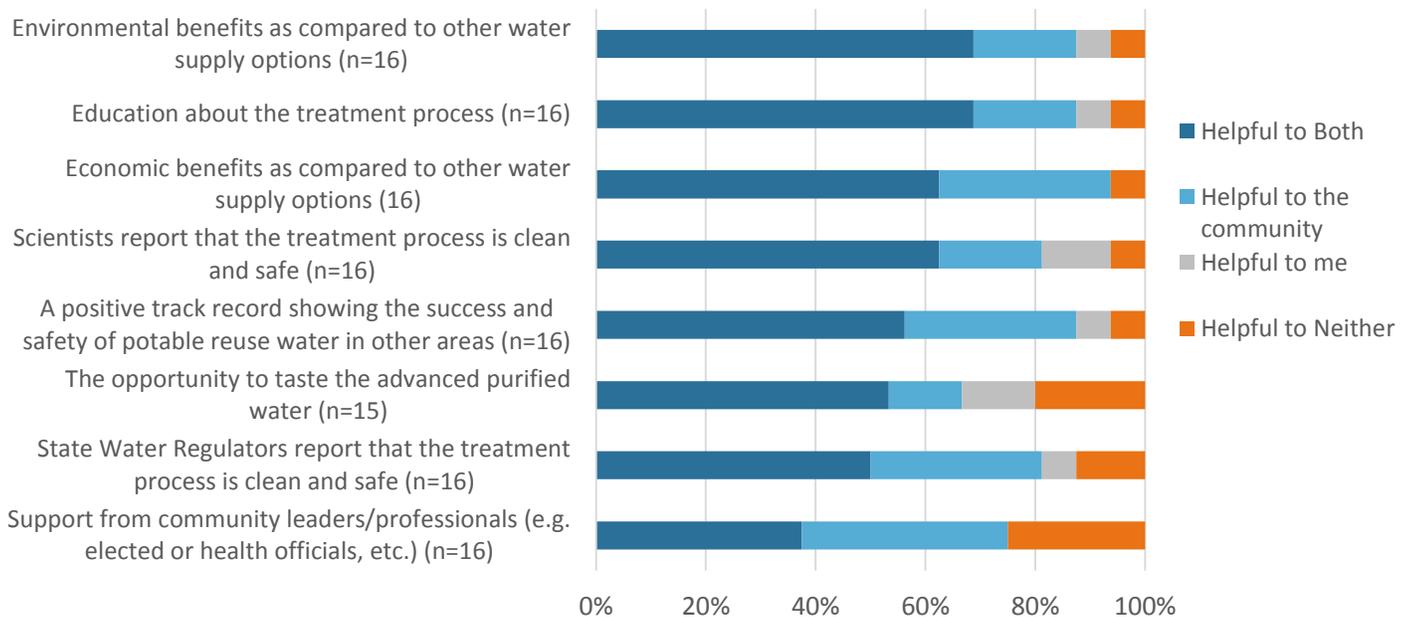


Figure A4.4: Educator community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents from the Science/Environmental community segment

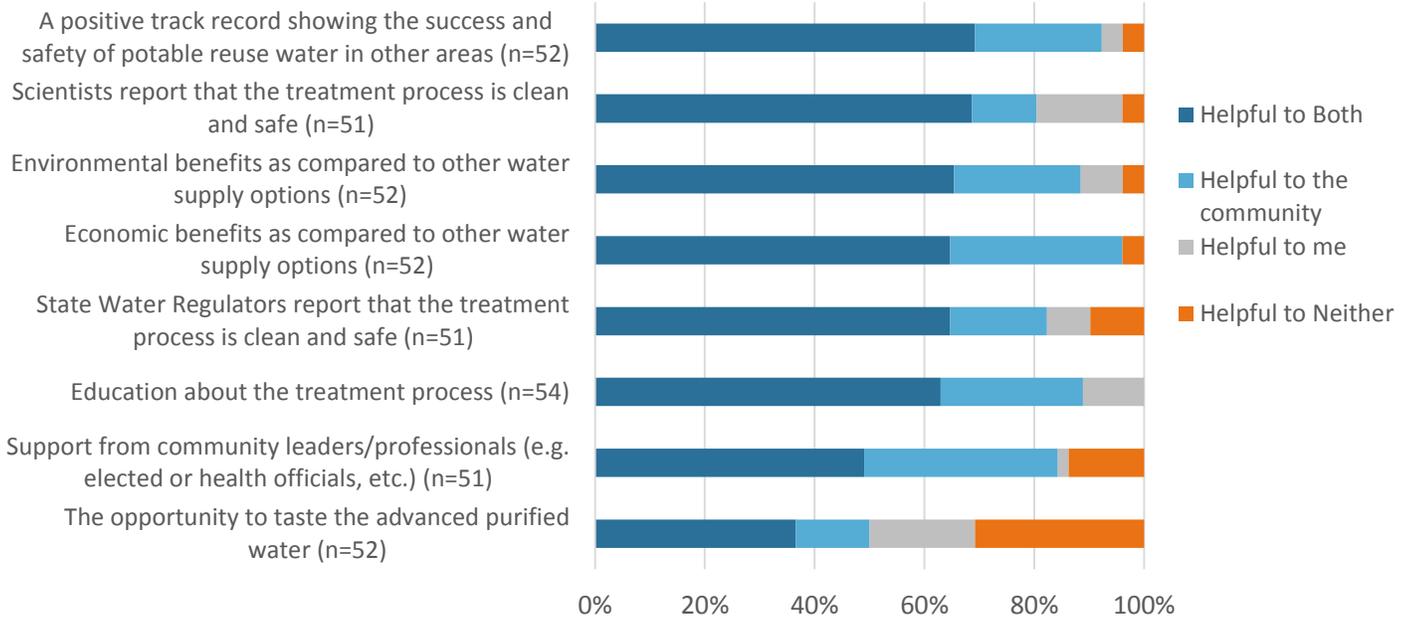


Figure A4.5: Science/Environmental community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents who support adding advanced purified water to Ventura's drinking water supply

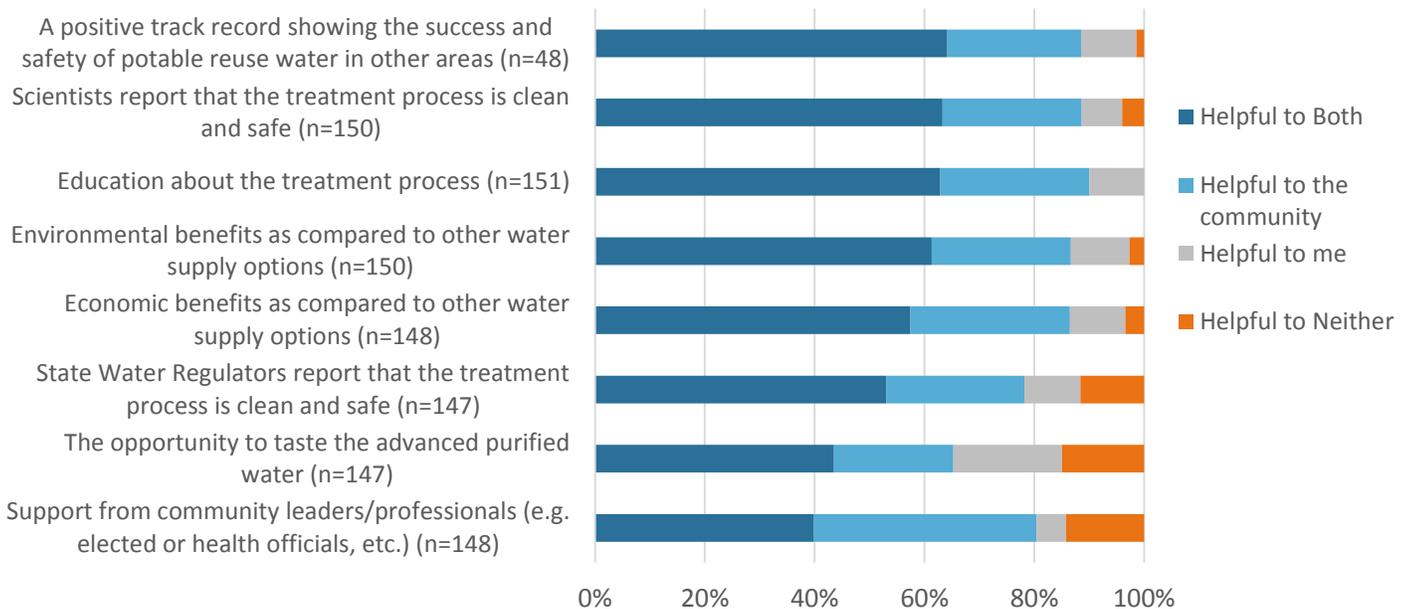


Figure A4.6: Support adding APW community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents unsure about adding advanced purified water to Ventura's drinking water supply

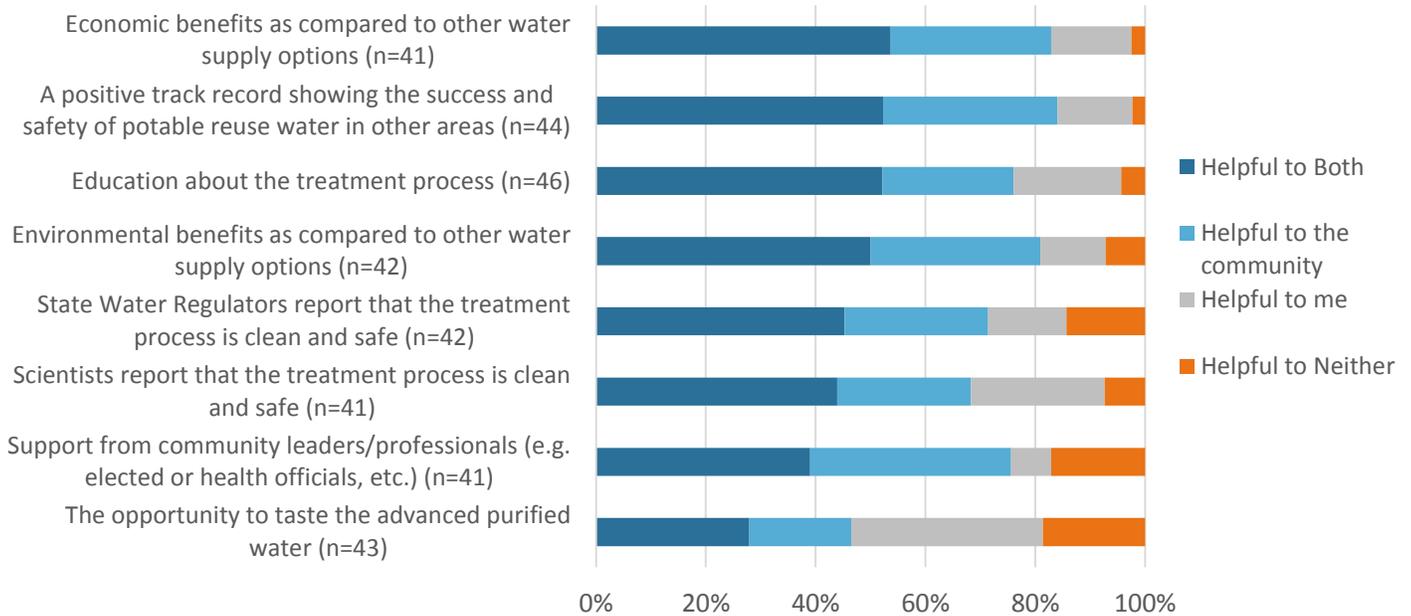


Figure A4.7: Unsure about adding APW community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?

Respondents opposed to adding Advanced Purified Water to Ventura's drinking water supply

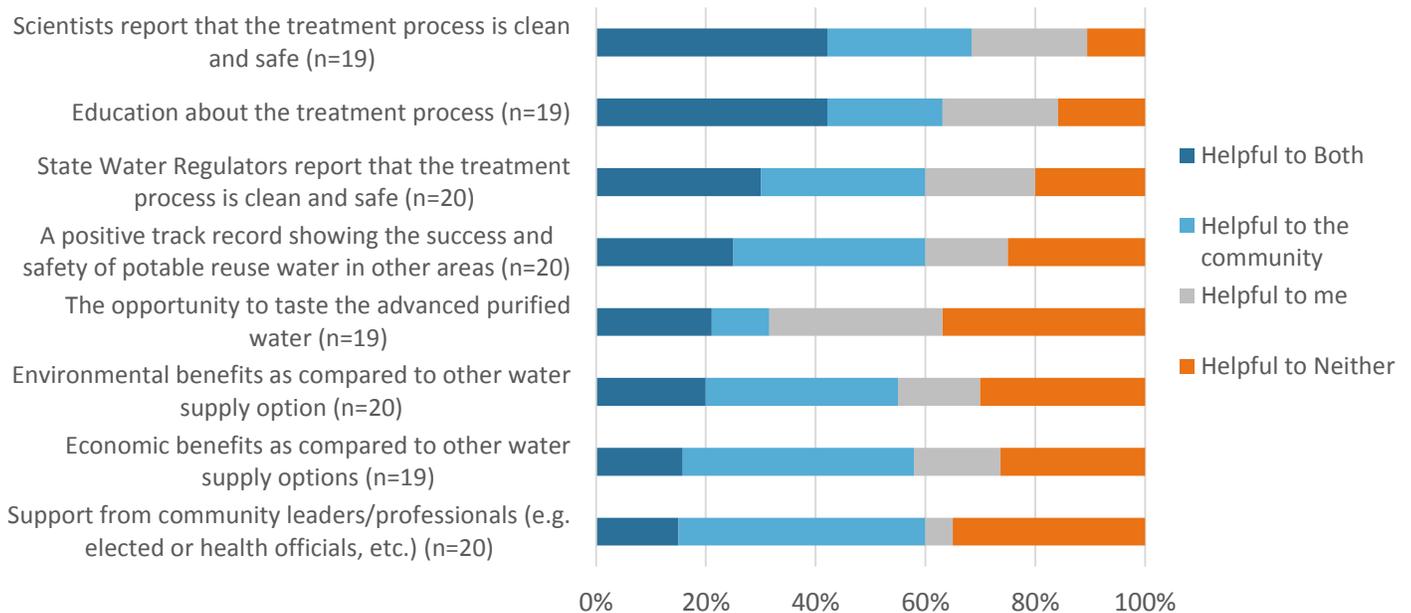


Figure A4.8: Oppose adding APW community segment. Desired information identified as helpful for improving perceptions of drinking APW for survey respondents, the community, or both.

Appendix 5: Segmented Analyses - Ventura Resident Survey Question 10

Table A4.7: Comparing All Data to the General Public community segment. There was no significant difference in the proportions of respondents selecting trust or neutral for All Data compared to the General Public community segment. See Figures A4.9 and A4.10.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	All data	General Public Segment	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	91%	84%	No ($\chi^2(1) = 2.64, p = 0.11$)
10b: Local Business Owners	77%	84%	No ($\chi^2(1) = 1.13, p = 0.29$)
10c: Nutritionists	91%	90%	No ($\chi^2(1) = 0.003, p = 0.96$)
10d: Environmental Protection Agency (EPA)	84%	81%	No ($\chi^2(1) = 0.22, p = 0.64$)
10e: Residents of a community that have already implemented potable reuse	92%	89%	No ($\chi^2(1) = 0.48, p = 0.49$)
10f: Environmental organizations	82%	81%	No ($\chi^2(1) = 0.002, p = 0.97$)
10g: Independent lab researchers	93%	90%	No ($\chi^2(1) = 0.63, p = 0.43$)
10h: Ventura Water Department	86%	80%	No ($\chi^2(1) = 1.18, p = 0.28$)
10i: Medical researchers	93%	88%	No ($\chi^2(1) = 1.01, p = 0.32$)
10j: The local newspapers	69%	68%	No ($\chi^2(1) = 0, p = 1$)
10k: Mayor of Ventura	76%	73%	No ($\chi^2(1) = 0.06, p = 0.80$)
10l: Local community leaders	77%	74%	No ($\chi^2(1) = 0.12, p = 0.73$)
10m: City Council members	73%	68%	No ($\chi^2(1) = 0.60, p = 0.44$)
10n: Scientists	96%	94%	No ($\chi^2(1) = 0.42, p = 0.52$)
10o: Taxpayer advocate organizations	63%	68%	No ($\chi^2(1) = 0.43, p = 0.51$)
10p: Medical doctors	93%	89%	No ($\chi^2(1) = 0.64, p = 0.42$)
10q: The agricultural community	75%	78%	No ($\chi^2(1) = 0.10, p = 0.75$)
10r: The local radio stations	71%	73%	No ($\chi^2(1) = 0.06, p = 0.80$)
10s: Professors at local universities	88%	89%	No ($\chi^2(1) = 0, p = 1$)

Table A4.8: Comparing All Data to the Community/Volunteer community segment. There was no significant difference in the proportions of respondents selecting trust or neutral for All Data compared to the Community/Volunteer community segment. See Figures A4.9 and A4.11.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	All data	Community/ Volunteer Segment	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	91%	96%	No ($\chi^2(1) = 0.80, p = 0.37$)
10b: Local Business Owners	77%	77%	No ($\chi^2(1) = 0, p = 1$)
10c: Nutritionists	91%	96%	No ($\chi^2(1) = 0.81, p = 0.37$)
10d: Environmental Protection Agency (EPA)	84%	76%	No ($\chi^2(1) = 1.62, p = 0.20$)
10e: Residents of a community that have already implemented potable reuse	92%	96%	No ($\chi^2(1) = 0.52, p = 0.47$)
10f: Environmental organizations	82%	79%	No ($\chi^2(1) = 0.13, p = 0.72$)
10g: Independent lab researchers	93%	97%	No ($\chi^2(1) = 0.62, p = 0.43$)
10h: Ventura Water Department	86%	88%	No ($\chi^2(1) = 0.09, p = 0.77$)
10i: Medical researchers	93%	96%	No ($\chi^2(1) = 0.23, p = 0.63$)
10j: The local newspapers	69%	71%	No ($\chi^2(1) = 0.005, p = 0.94$)
10k: Mayor of Ventura	76%	79%	No ($\chi^2(1) = 0.22, p = 0.64$)
10l: Local community leaders	77%	82%	No ($\chi^2(1) = 0.62, p = 0.43$)
10m: City Council members	73%	79%	No ($\chi^2(1) = 0.73, p = 0.39$)
10n: Scientists	96%	97%	No ($\chi^2(1) = 0, p = 1$)
10o: Taxpayer advocate organizations	63%	67%	No ($\chi^2(1) = 0.30, p = 0.58$)
10p: Medical doctors	93%	94%	No ($\chi^2(1) = 0.03, p = 0.86$)
10q: The agricultural community	75%	81%	No ($\chi^2(1) = 0.72, p = 0.40$)
10r: The local radio stations	71%	72%	No ($\chi^2(1) = 0.03, p = 0.87$)
10s: Professors at local universities	88%	83%	No ($\chi^2(1) = 0.93, p = 0.34$)

Table A4.9: Comparing All Data to the Educator community segment. There was no significant difference in the proportions of respondents selecting trust or neutral for All Data compared to the Educator community segment. See Figures A4.9 and A4.12.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	All data	Educator Segment	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	91%	94%	No ($\chi^2 (1) = 0, p = 1$)
10b: Local Business Owners	77%	75%	No ($\chi^2 (1) = 0, p = 1$)
10c: Nutritionists	91%	88%	No ($\chi^2 (1) = 0.002, p = 0.97$)
10d: Environmental Protection Agency (EPA)	84%	94%	No ($\chi^2 (1) = 0.45, p = 0.50$)
10e: Residents of a community that have already implemented potable reuse	92%	100%	No ($\chi^2 (1) = 0.44, p = 0.51$)
10f: Environmental organizations	82%	81%	No ($\chi^2 (1) = 0, p = 1$)
10g: Independent lab researchers	93%	94%	No ($\chi^2 (1) = 0, p = 1$)
10h: Ventura Water Department	86%	88%	No ($\chi^2 (1) = 0, p = 1$)
10i: Medical researchers	93%	94%	No ($\chi^2 (1) = 0, p = 1$)
10j: The local newspapers	69%	75%	No ($\chi^2 (1) = 0.04, p = 0.84$)
10k: Mayor of Ventura	76%	69%	No ($\chi^2 (1) = 0.10, p = 0.75$)
10l: Local community leaders	77%	75%	No ($\chi^2 (1) = 0, p = 1$)
10m: City Council members	73%	75%	No ($\chi^2 (1) = 0, p = 1$)
10n: Scientists	96%	100%	No ($\chi^2 (1) = 0.005, p = 0.95$)
10o: Taxpayer advocate organizations	63%	56%	No ($\chi^2 (1) = 0.05, p = 0.82$)
10p: Medical doctors	93%	88%	No ($\chi^2 (1) = 0.07, p = 0.80$)
10q: The agricultural community	75%	63%	No ($\chi^2 (1) = 0.63, p = 0.43$)
10r: The local radio stations	71%	63%	No ($\chi^2 (1) = 0.15, p = 0.70$)
10s: Professors at local universities	88%	88%	No ($\chi^2 (1) = 0, p = 1$)

Table A4.10: Comparing All Data to the Science/Environmental community segment. There was a significant difference in the proportions of respondents selecting trust or neutral for Q10d for All Data compared to the Science/Environmental community segment. See Figures A4.9 and A4.13.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	All data	Science/ Environmental Segment	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	91%	96%	No ($\chi^2(1) = 0.88, p = 0.35$)
10b: Local Business Owners	77%	68%	No ($\chi^2(1) = 1.51, p = 0.22$)
10c: Nutritionists	91%	88%	No ($\chi^2(1) = 0.14, p = 0.71$)
10d: Environmental Protection Agency (EPA)	84%	96%	Yes ($\chi^2(1) = 4.17, p = 0.041$)
10e: Residents of a community that have already implemented potable reuse	92%	90%	No ($\chi^2(1) = 0.02, p = 0.89$)
10f: Environmental organizations	82%	88%	No ($\chi^2(1) = 0.66, p = 0.42$)
10g: Independent lab researchers	93%	94%	No ($\chi^2(1) = 0, p = 1$)
10h: Ventura Water Department	86%	92%	No ($\chi^2(1) = 0.79, p = 0.38$)
10i: Medical researchers	93%	96%	No ($\chi^2(1) = 0.26, p = 0.61$)
10j: The local newspapers	69%	67%	No ($\chi^2(1) = 0.03, p = 0.86$)
10k: Mayor of Ventura	76%	76%	No ($\chi^2(1) = 0, p = 1$)
10l: Local community leaders	77%	75%	No ($\chi^2(1) = 0.03, p = 0.86$)
10m: City Council members	73%	73%	No ($\chi^2(1) = 0, p = 1$)
10n: Scientists	96%	98%	No ($\chi^2(1) = 0.05, p = 0.82$)
10o: Taxpayer advocate organizations	63%	51%	No ($\chi^2(1) = 1.91, p = 0.17$)
10p: Medical doctors	93%	98%	No ($\chi^2(1) = 1.23, p = 0.27$)
10q: The agricultural community	75%	67%	No ($\chi^2(1) = 1.03, p = 0.31$)
10r: The local radio stations	71%	67%	No ($\chi^2(1) = 0.14, p = 0.71$)
10s: Professors at local universities	88%	94%	No ($\chi^2(1) = 1.16, p = 0.28$)

Table A4.11: Comparing respondents who support adding APW to Ventura’s supply to those that oppose. There was no significant difference in the proportions of respondents selecting trust or neutral for respondents that support adding APW compared to respondents who oppose. See Figures A4.14 and A4.15.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	Support adding APW	Oppose adding APW	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	92%	85%	No ($\chi^2(1) = 0.49, p = 0.48$)
10b: Local Business Owners	78%	79%	No ($\chi^2(1) = 0, p = 1$)
10c: Nutritionists	93%	84%	No ($\chi^2(1) = 0.81, p = 0.37$)
10d: Environmental Protection Agency (EPA)	88%	74%	No ($\chi^2(1) = 1.66, p = 0.20$)
10e: Residents of a community that have already implemented potable reuse	95%	95%	No ($\chi^2(1) = 0, p = 1$)
10f: Environmental organizations	86%	80%	No ($\chi^2(1) = 0.10, p = 0.75$)
10g: Independent lab researchers	95%	95%	No ($\chi^2(1) = 0, p = 1$)
10h: Ventura Water Department	86%	74%	No ($\chi^2(1) = 1.18, p = 0.28$)
10i: Medical researchers	95%	95%	No ($\chi^2(1) = 0, p = 1$)
10j: The local newspapers	70%	70%	No ($\chi^2(1) = 0, p = 1$)
10k: Mayor of Ventura	77%	70%	No ($\chi^2(1) = 0.19, p = 0.66$)
10l: Local community leaders	79%	70%	No ($\chi^2(1) = 0.40, p = 0.53$)
10m: City Council members	74%	70%	No ($\chi^2(1) = 0.006, p = 0.94$)
10n: Scientists	97%	100%	No ($\chi^2(1) = 0, p = 1$)
10o: Taxpayer advocate organizations	63%	70%	No ($\chi^2(1) = 0.13, p = 0.72$)
10p: Medical doctors	93%	90%	No ($\chi^2(1) = 0.004, p = 0.95$)
10q: The agricultural community	78%	65%	No ($\chi^2(1) = 1.10, p = 0.29$)
10r: The local radio stations	73%	75%	No ($\chi^2(1) = 0, p = 1$)
10s: Professors at local universities	92%	75%	No ($\chi^2(1) = 3.77, p = 0.052$)

Table A4.12: Comparing respondents who support adding APW to Ventura’s supply to those that are unsure. There was no significant difference in the proportions of respondents selecting trust or neutral for respondents that support adding APW compared to respondents who oppose. See Figures A4.14 and A4.16.

Question	Proportion selecting trust or neutral		Significant difference? ($p \leq 0.05$)
	Support adding APW	Unsure about adding APW	
The following is a list of people and organizations that may provide information about advanced purified water. Please tell us whether you would generally trust or distrust each on this issue.			
10a: Department of Public Health	92%	91%	No ($\chi^2(1) = 0, p = 1$)
10b: Local Business Owners	78%	75%	No ($\chi^2(1) = 0.05, p = 0.82$)
10c: Nutritionists	93%	89%	No ($\chi^2(1) = 0.31, p = 0.58$)
10d: Environmental Protection Agency (EPA)	88%	78%	No ($\chi^2(1) = 1.91, p = 0.17$)
10e: Residents of a community that have already implemented potable reuse	95%	89%	No ($\chi^2(1) = 1.03, p = 0.31$)
10f: Environmental organizations	86%	76%	No ($\chi^2(1) = 1.77, p = 0.18$)
10g: Independent lab researchers	95%	89%	No ($\chi^2(1) = 1.12, p = 0.29$)
10h: Ventura Water Department	86%	91%	No ($\chi^2(1) = 0.32, p = 0.57$)
10i: Medical researchers	95%	86%	No ($\chi^2(1) = 2.94, p = 0.09$)
10j: The local newspapers	70%	67%	No ($\chi^2(1) = 0.01, p = 0.91$)
10k: Mayor of Ventura	77%	75%	No ($\chi^2(1) = 0.01, p = 0.92$)
10l: Local community leaders	79%	74%	No ($\chi^2(1) = 0.19, p = 0.66$)
10m: City Council members	74%	75%	No ($\chi^2(1) = 0, p = 1$)
10n: Scientists	97%	93%	No ($\chi^2(1) = 0.60, p = 0.44$)
10o: Taxpayer advocate organizations	63%	59%	No ($\chi^2(1) = 0.09, p = 0.77$)
10p: Medical doctors	93%	93%	No ($\chi^2(1) = 0, p = 1$)
10q: The agricultural community	78%	67%	No ($\chi^2(1) = 1.85, p = 0.17$)
10r: The local radio stations	73%	61%	No ($\chi^2(1) = 1.60, p = 0.21$)
10s: Professors at local universities	92%	82%	No ($\chi^2(1) = 2.46, p = 0.12$)

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.

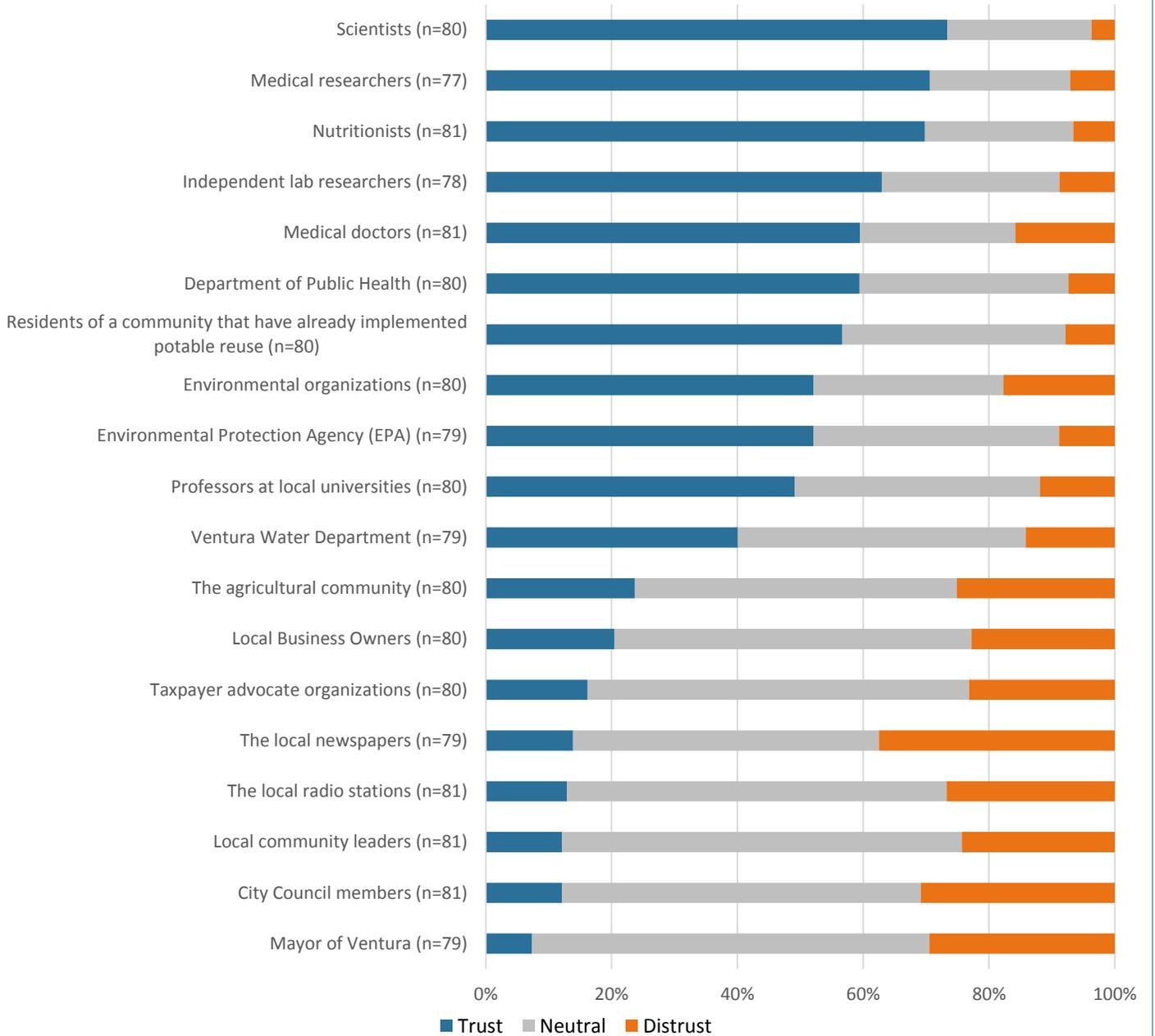


Figure A4.9: All Data. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.

Respondents from the General Public community segment

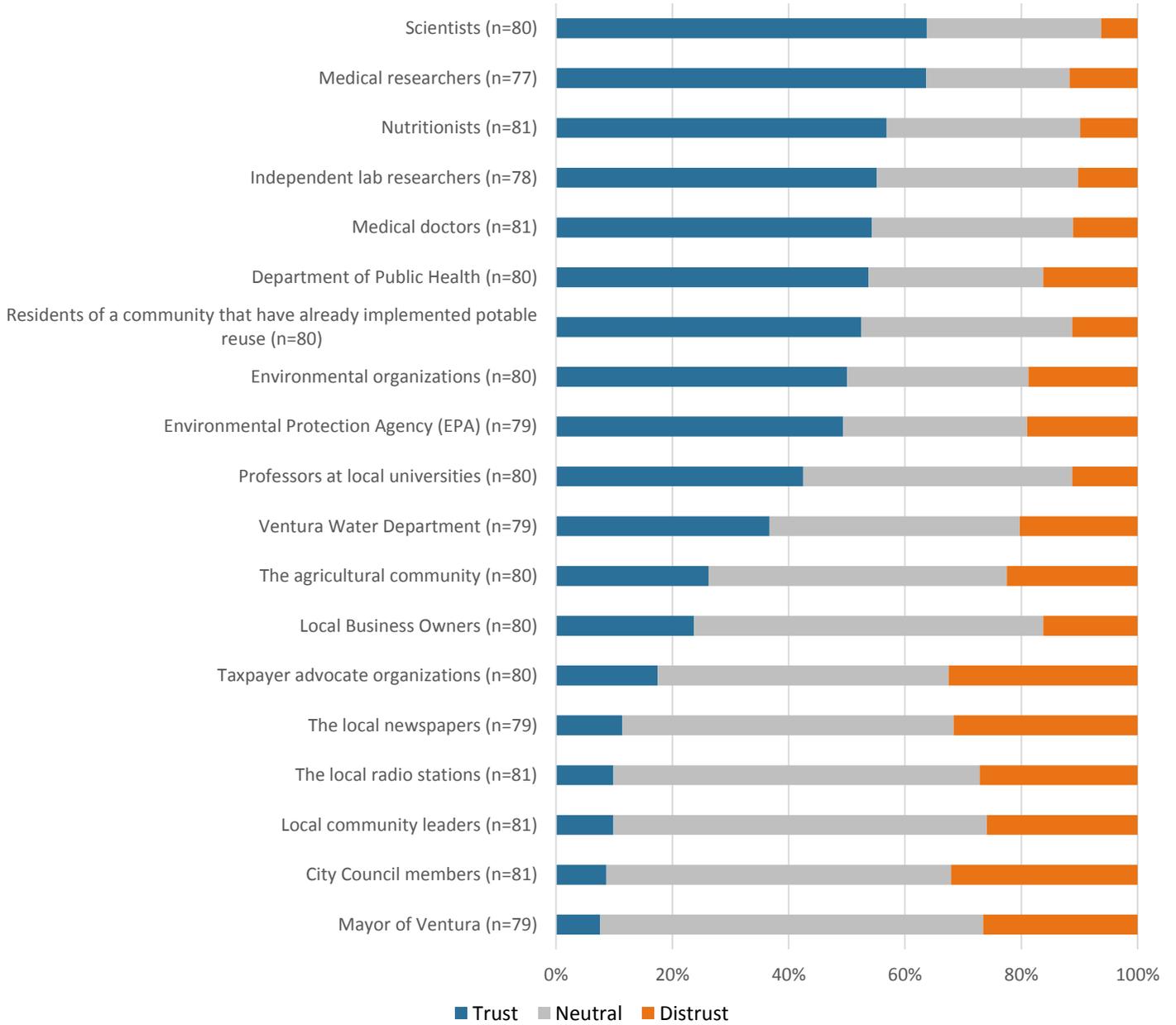


Figure A4.10: General Public community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.
Respondents from the Community/Volunteer community segment

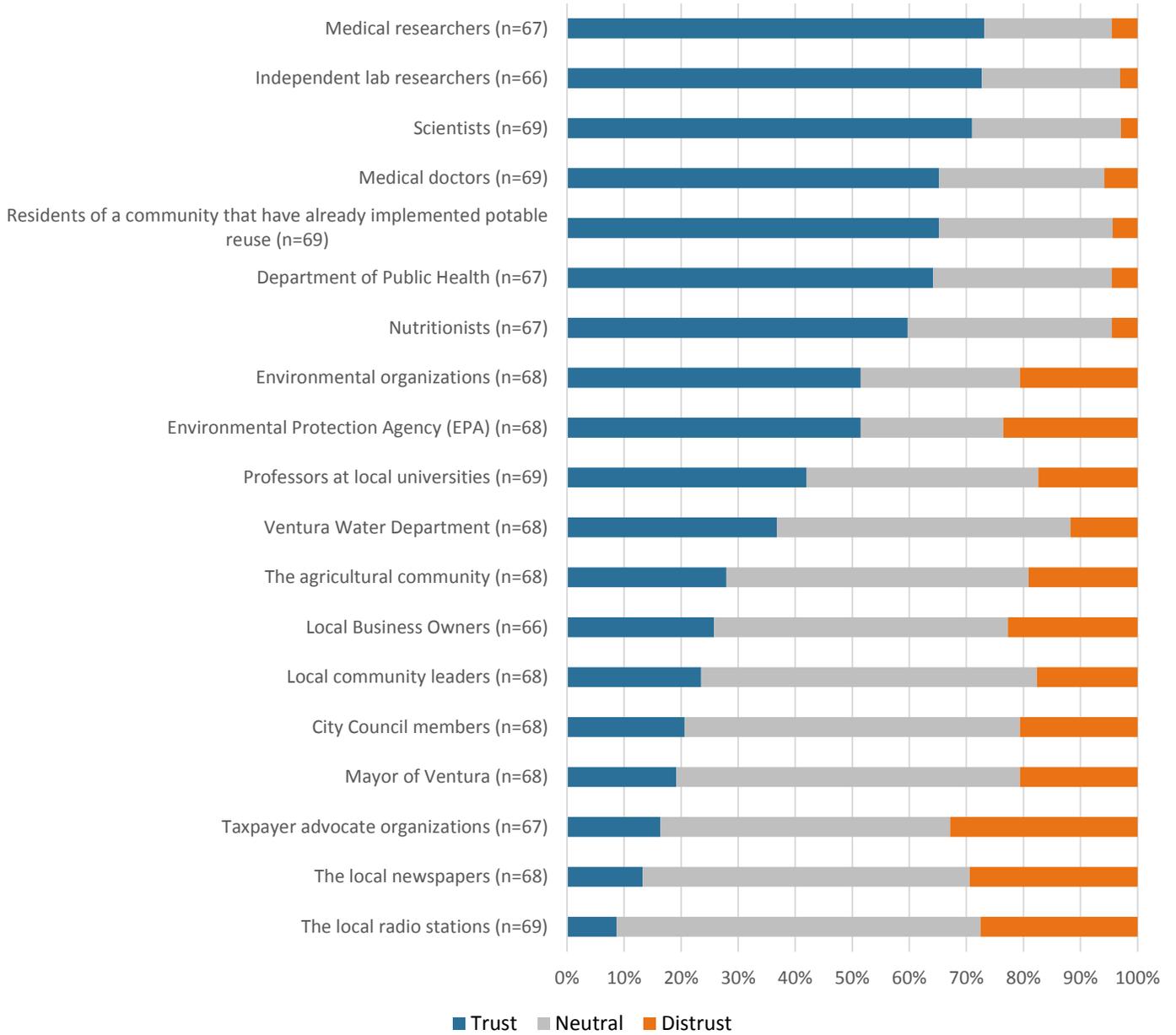


Figure A4.11: Community/Volunteer community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.

Respondents from the Educator community segment

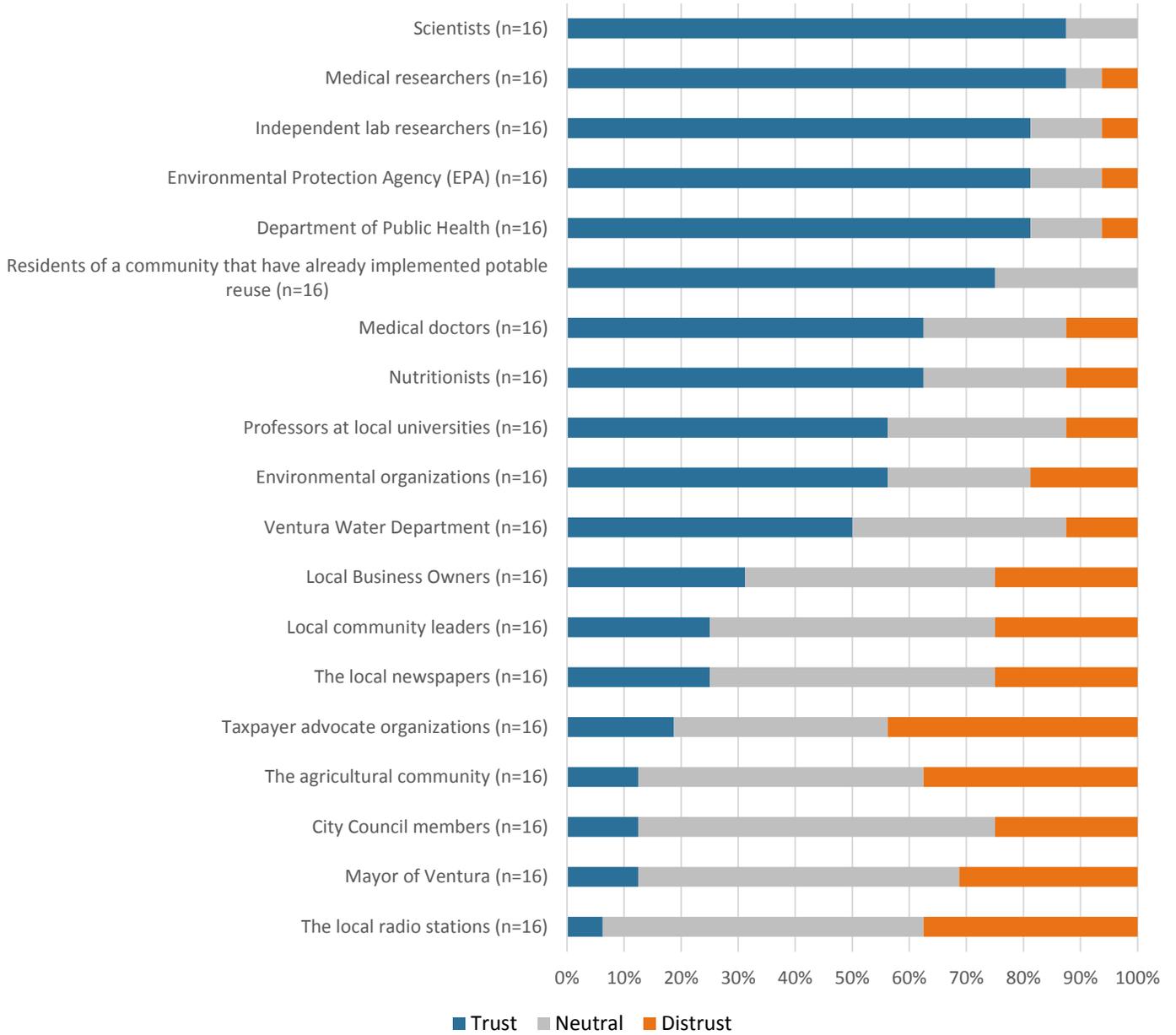


Figure A4.12: Educator community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.
Respondents from the Science/Environmental community segment

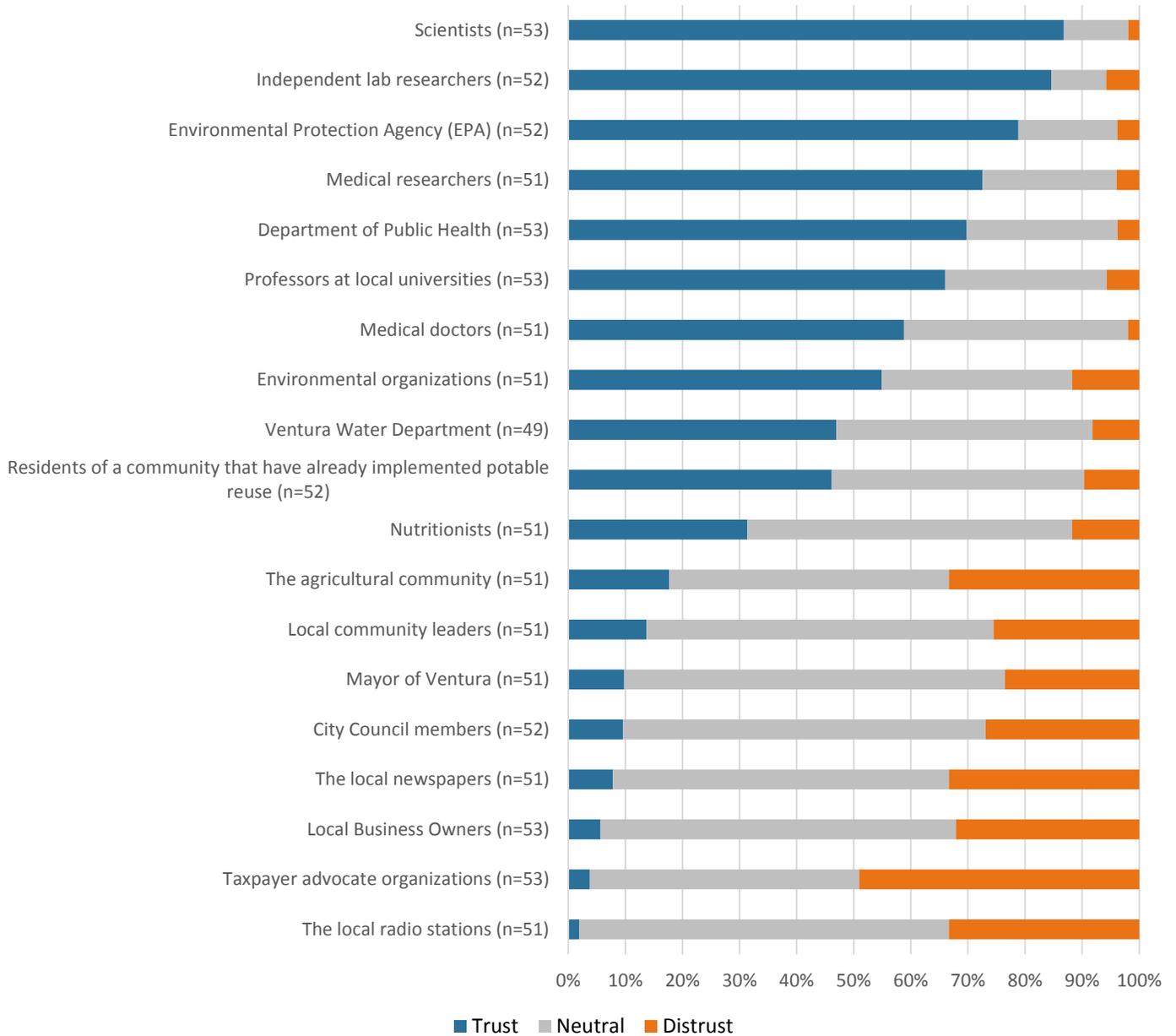


Figure A4.13: Environmental/Science community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.
Respondents who support adding Advanced Purified Water to Ventura's drinking water sup

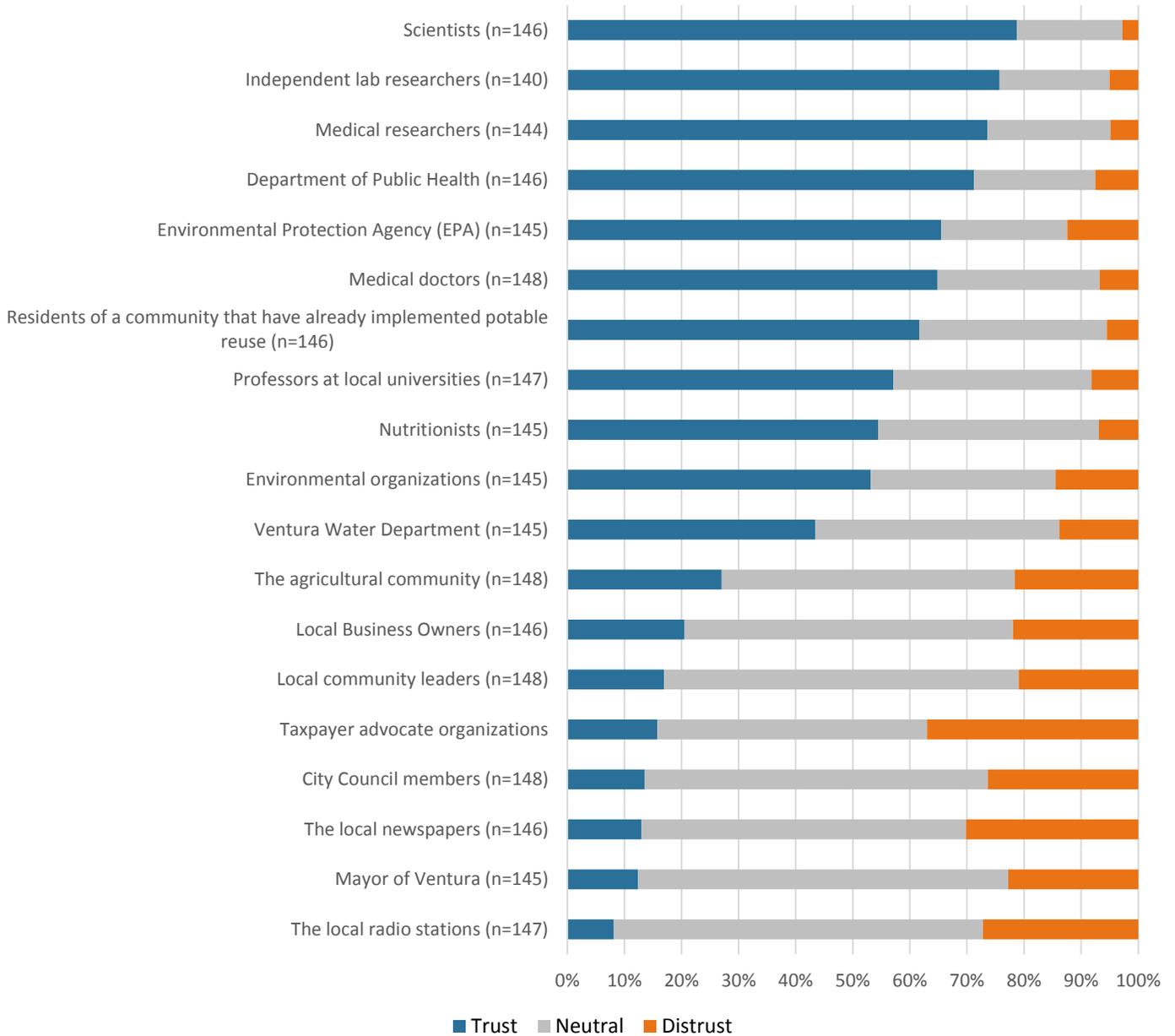


Figure A4.14: Support adding APW community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.
Respondents unsure about adding advanced purified water to Ventura's drinking water su

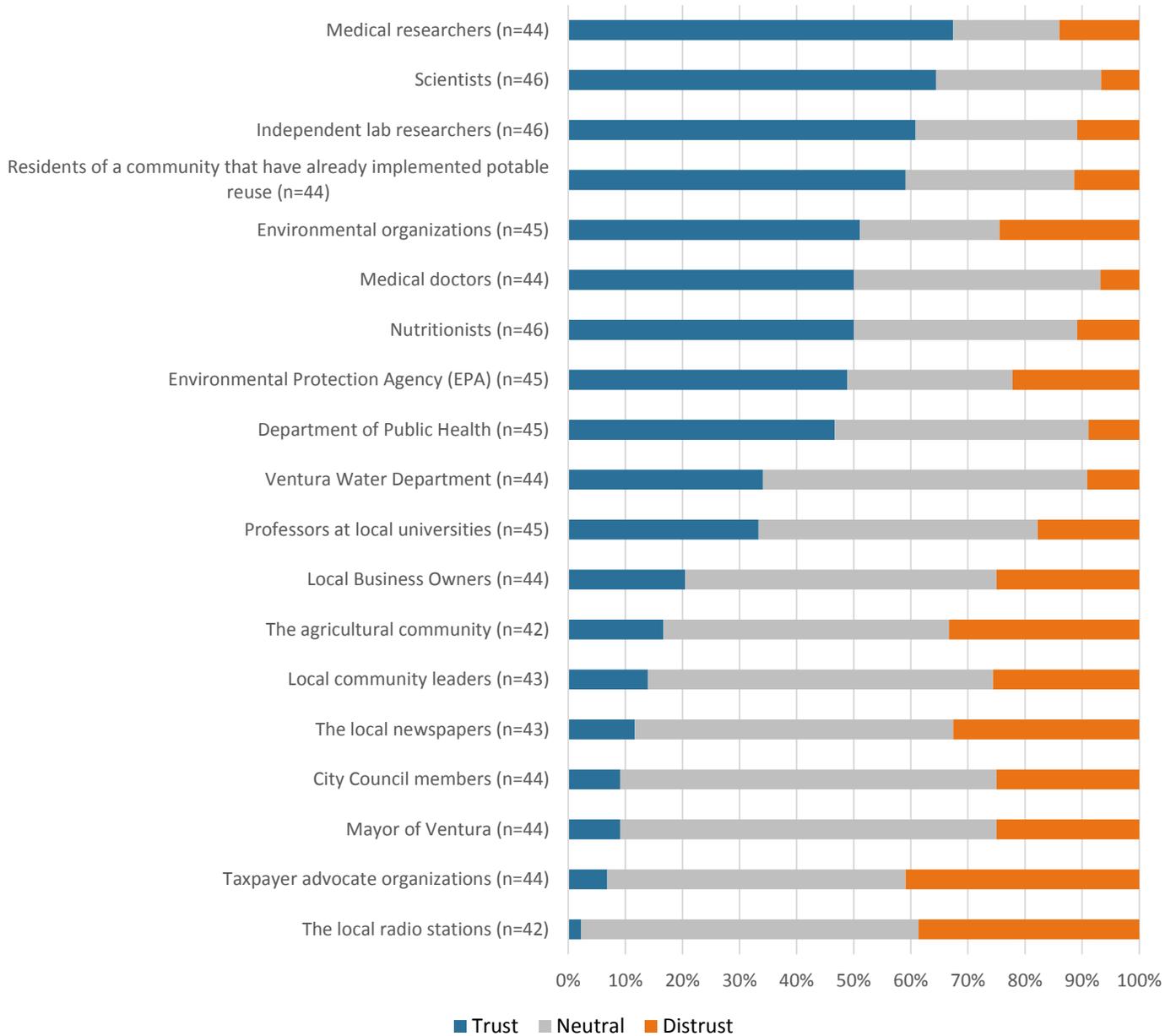


Figure A4.15: Unsure about adding APW community segment. Trust in possible sources of information about APW.

The following is a list of people and organizations that may provide information about advanced purified water. Please tell us who you would generally trust or distrust.
Respondents who oppose adding advanced purified water to Ventura's drinking water supply

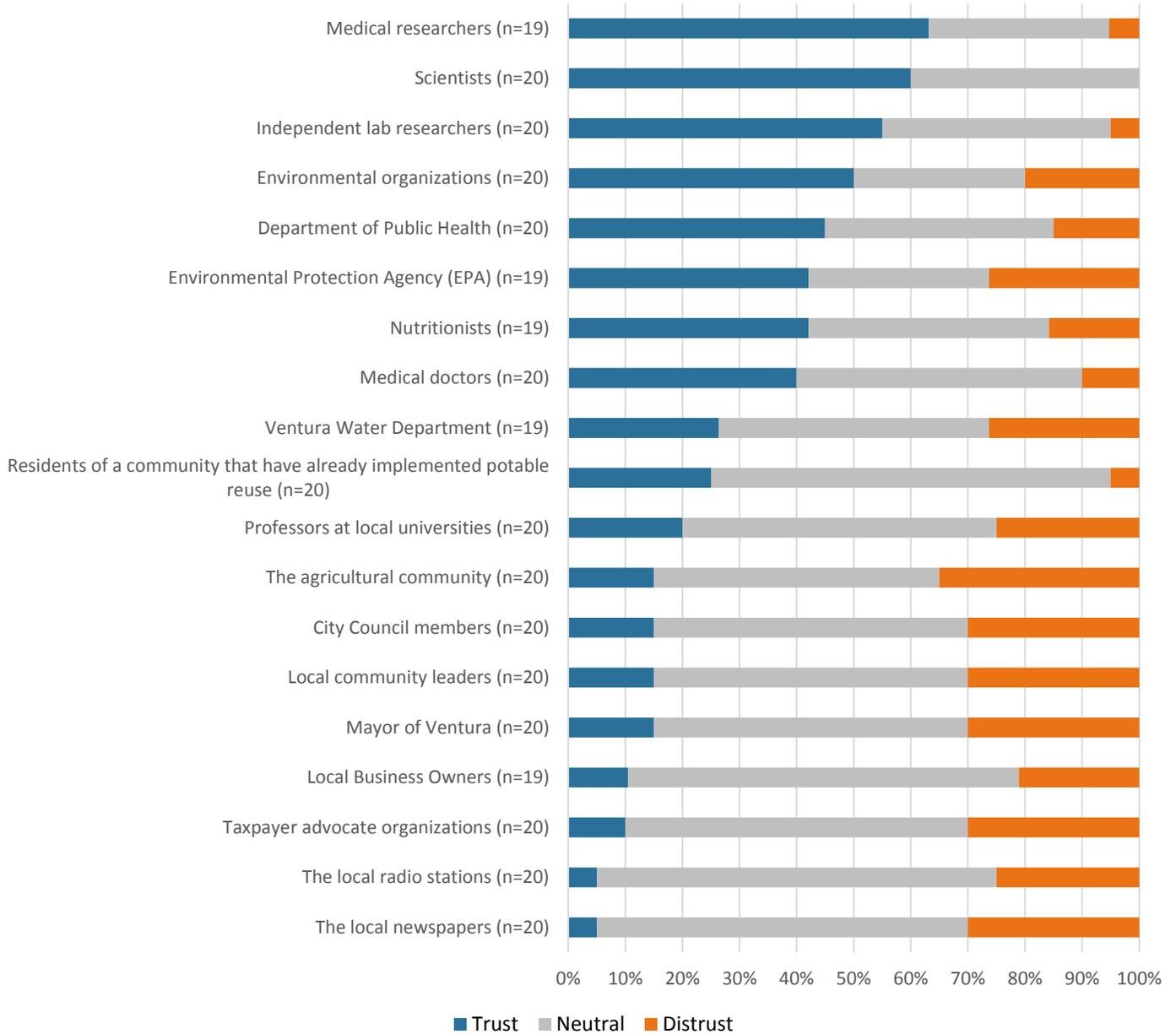


Figure A4.16: Opposed to adding APW community segment. Trust in possible sources of information about APW.

Appendix 6: Ordered Logistic Regressions

Ordered Logistic Regression: determining whether survey responses help to predict respondent's support for adding APW to Ventura's drinking water supply

An ordered logistic regression on the Ventura Resident Survey results revealed that the frequency that respondents consider the quality of their drinking water, the frequency that respondents take action to conserve water, and trust in the water utility did not significantly predict a respondent's level of support for potable reuse (Table 1).

Table 1.

Term	Coefficient	Standard Error	p-value	Odds Ratio	95% Confidence Interval
Safety	-0.016	0.094	0.87	0.98	[0.82, 1.18]
Conservation	-0.035	0.160	0.83	0.97	[0.70, 1.32]
Trust	0.197	0.124	0.11	1.22	[0.96, 1.55]

An ordered logistic regression on the Ventura Resident Survey results revealed that Education level significantly predicted a respondent's level of support for potable reuse (Table 2). The respondent's age, gender, and status as a parent of children under 18 did not significantly predict the respondent's support for potable reuse (Table 2).

As education level increases, the odds of having a higher support level for potable reuse increase. As the level of education increases, the odds of being somewhat supportive or extremely supportive; as opposed to somewhat opposed, extremely opposed, or neutral; increases by 27% (with a confidence interval between 5-53% increase) (Table 2).

Table 2.

Term	Coefficient	Standard Error	p-value	Odds Ratio	95% Confidence Interval
Age	-0.249	0.141	0.077	0.78	[0.59, 1.03]
Gender	-0.470	0.276	0.088	0.66	[0.36, 1.07]
Kids	-0.299	0.322	0.354	0.74	[0.39, 1.40]
Education	0.237	0.097	0.014	1.27	[1.05, 1.53]

Appendix 7: Survey Rationale Table

Theoretical Construct	Related Survey Questions
Social Norm Perceptions	3. How often do you conserve water in your own home? (e.g. taking shorter showers, not watering your lawn, capturing the cool water while you shower heats up for other household uses).
	6. How do you think your local community would feel about adding advanced purified water to Ventura’s drinking water supply if it was treated to the same quality (or higher) as regular tap water?
	7d. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: The source of the water does not impact my comfort in drinking it.
	9. How helpful would each of the following be for improving your perceptions and your community’s perceptions of drinking advanced purified water in Ventura?
Emotional Response	7d. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: The source of the water does not impact my comfort in drinking it.
	7. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: Free response.
Trust	4. How much would you say you trust Ventura Water to provide safe drinking water?
	10a. The following is a list of people and organizations that may provide information about advanced purified water: Department of Public Health
	10b. The following is a list of people and organizations that may provide information about advanced purified water: Local Business Owners
	10c. The following is a list of people and organizations that may provide information about advanced purified water: Nutritionists
	10d. The following is a list of people and organizations that may provide information about advanced purified water: Environmental Protection Agency (EPA)
	10e. The following is a list of people and organizations that may provide information about advanced purified water: Residents of a community that have already implemented potable reuse
	10f. The following is a list of people and organizations that may provide information about advanced purified water: Environmental organizations
	10g. The following is a list of people and organizations that may provide information about advanced purified water: Independent lab researchers
	10h. The following is a list of people and organizations that may

	provide information about advanced purified water: Ventura Water Department
	10i. The following is a list of people and organizations that may provide information about advanced purified water: Medical researchers
	10j. The following is a list of people and organizations that may provide information about advanced purified water: The local newspapers
	10k. The following is a list of people and organizations that may provide information about advanced purified water: Mayor of Ventura
	10l. The following is a list of people and organizations that may provide information about advanced purified water: Local community leaders
	10m. The following is a list of people and organizations that may provide information about advanced purified water: City Council members
	10n. The following is a list of people and organizations that may provide information about advanced purified water: Scientists
	10o. The following is a list of people and organizations that may provide information about advanced purified water: Taxpayer advocate organizations
	10p. The following is a list of people and organizations that may provide information about advanced purified water: Medical doctors
	10q. The following is a list of people and organizations that may provide information about advanced purified water: The agricultural community
	10r. The following is a list of people and organizations that may provide information about advanced purified water: The local radio stations
	10s. The following is a list of people and organizations that may provide information about advanced purified water: Professors at local universities
Safety	1. What water source do you consider the safest?
	2. How often do you think about the safety of your drinking water?
	7a. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: I feel the water is clean enough to drink.
	7c. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: I feel satisfied that there is reliable monitoring throughout the treatment process.
Information	7b. Please rate the extent to which you agree/disagree with the following statements about blending advanced purified water with Ventura’s existing water supply: I feel other alternative water sources (e.g. desalination or imported water supplies) are preferable.
	8a. How much would you support adding advanced purified water to Ventura's water supply if it would lead to the following benefits?: Advanced purified water will increase Ventura's overall drinking water supply.

	8b. How much would you support adding advanced purified water to Ventura's water supply if it would lead to the following benefits?: Advanced purified water has a lower environmental impact than other alternative water supplies (e.g. desalination or imported water).
	8c. How much would you support adding advanced purified water to Ventura's water supply if it would lead to the following benefits?:
	8d. How much would you support adding advanced purified water to Ventura's water supply if it would lead to the following benefits?: Advanced purified water will improve Ventura's overall drinking water quality.
	9a. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: Education about the treatment process.
	9b. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: Scientists report that the treatment process is clean and safe.
	9c. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: State Water Regulators report that the treatment process is clean and safe.
	9d. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?
	9e. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: The opportunity to taste the advanced purified water.
	9f. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: A positive track record showing the success and safety of potable reuse water in other areas.
	9g. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: Economic benefits as compared to other water supply options.
	9h. How helpful would each of the following be for improving your perceptions and your community's perceptions of drinking advanced purified water in Ventura?: Environmental benefits as compared to other water supply options.
Demographic Correlations	11. What is your age?
	12. You are: (M/F)
	13. Are there children (under 18 years) in your household?
	14. Please specify you you ethnicity
	15. What is your combined annual household income?
	16. What is your education level?
	17. What is your ZIP code?

Appendix 8: Example Recommendation Synthesis

The following is an excerpt from the recommendation synthesis table, showing the number of themes the recommendation covers, the number of sources that stated the recommendation, which themes the recommendation covers, and the citations for each piece of literature that states that recommendation.

# of checks	# of sources	Outreach Strategy	Emotional/ yuck	Trust	Safety/ Quality	Info Source
4	3	<ul style="list-style-type: none"> - Express successful projects that have happened elsewhere: we aren't the first to try, and we won't be the last - Highlight the successful implementation of DPR in other communities. -Message: water reuse is successfully practised in many other places 	X	X	X	<ul style="list-style-type: none"> - WaterReuse Research Foundation (2015) - WaterReuse Webinar 2016 -S.J. Khan & L.E. Gerrard (2006)
3	4	<ul style="list-style-type: none"> - "The community should be informed that water reuse schemes operate according to strict public health and safety guidelines that have, in many cases, been approved or endorsed by health services." - "It is also important to emphasize that the health-related aspects of an operation are closely regulated and overseen by appropriate authorities." -Emphasize the role of scientists and public health professionals in designing and monitoring the process. - Utilize credible third-parties to amplify message - "Assessment of the safety of using recycled water for direct potable reuse must consider several factors, such as microbial and chemical quality of the product water, treatment performance and reliability, multiple barriers, monitoring capability, and system operation and management. For direct potable reuse to proceed in California, these factors (and others) present issues that would need to be resolved by regulatory agencies during the development of regulations, policies, and/or guidelines." 		X	X	<ul style="list-style-type: none"> -S.J. Khan & L.E. Gerrard (2006) -WaterReuse Webinar 2016 -Yousef 2011 -National Water Research Institute (2010)

Appendix 9: Ventura Demographics

Comparison of Ventura Demographics (based on 2010 Census) and the demographics of the Ventura Resident Survey respondents.

