

RECYCLED WATER

A Tool for Secure Irrigation Water Supply and Stream Flow Restoration in the Sammamish Valley

Project Update March 10, 2022

Jacque Klug, King County Recycled Water
Nicole Gutierrez, WWT Project Manager



WASHINGTON STATE
UNIVERSITY



WASHINGTON
WATER TRUST



King County

Project Team

Washington Water Trust

Nicole Gutierrez, Jason Hatch

Washington State University

Doug Collins

Nathan Stacey

University of Washington- Tacoma/Seattle

Ed Kolodziej

King County

Richard Jack

Jacque Klug

Erika Kinno

Drew Thompson

Kristina Westbrook



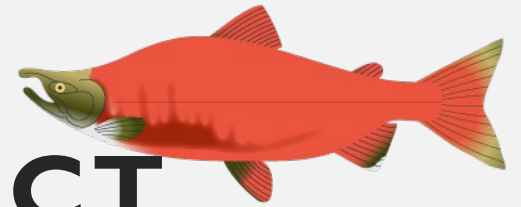
PRESENTATION OUTLINE

1. Project Overview and Background
2. Year 1: Study Results
 - Contaminants of Emerging Concern
 - Agronomic Parameters
3. 2021 Outreach Results
4. Next Steps





SAMMAMISH VALLEY RECYCLED WATER PROJECT



PROJECT GOALS



Assess the potential impact of irrigating food crops with recycled water.



Identify and address perceptions and concerns of irrigating food crops with recycled water throughout the food supply chain.



Reduce irrigation diversions from the Sammamish river and improve instream habitat for salmon.

PROJECT COMPONENTS

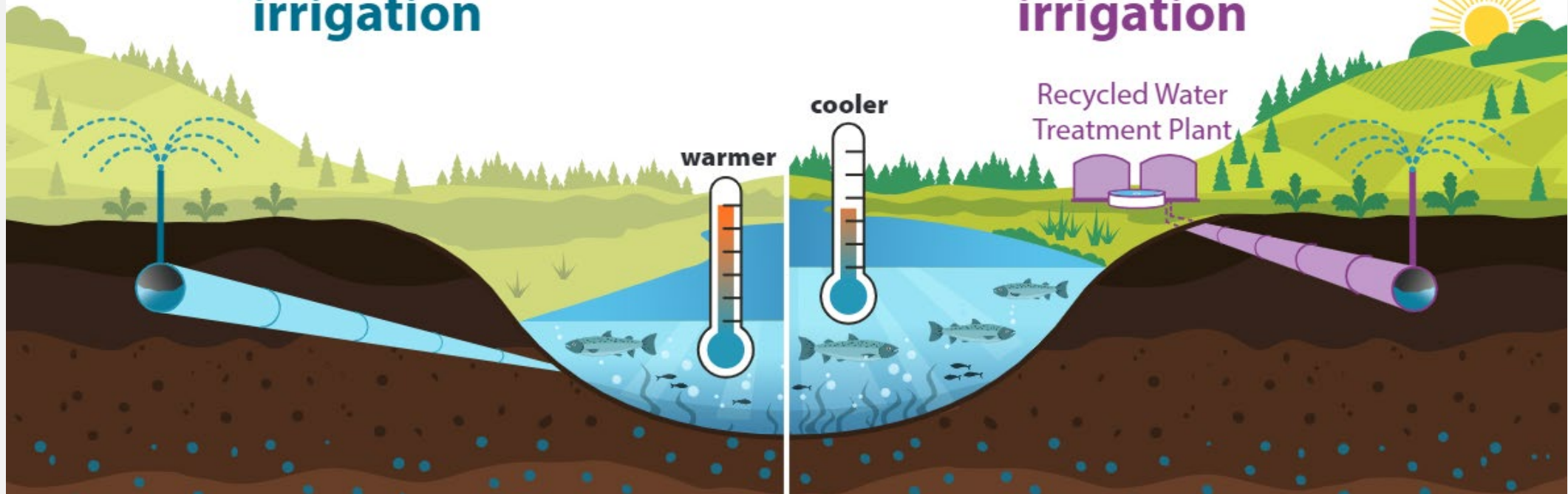
- ✓ Conducted an in-basin research study that evaluated the impact of recycled water vs. Sammamish River water on soil and produce.
- ✓ Conducted producer interviews and consumer outreach to identify concerns and perceptions related to the use of recycled water. Information gathered will be used to create communication material to address these concerns.
- ✓ Identify potential source switch opportunities which could restore **3-5 CFS** with Irrigation Water Rights

Restoring Sammamish River water to save salmon

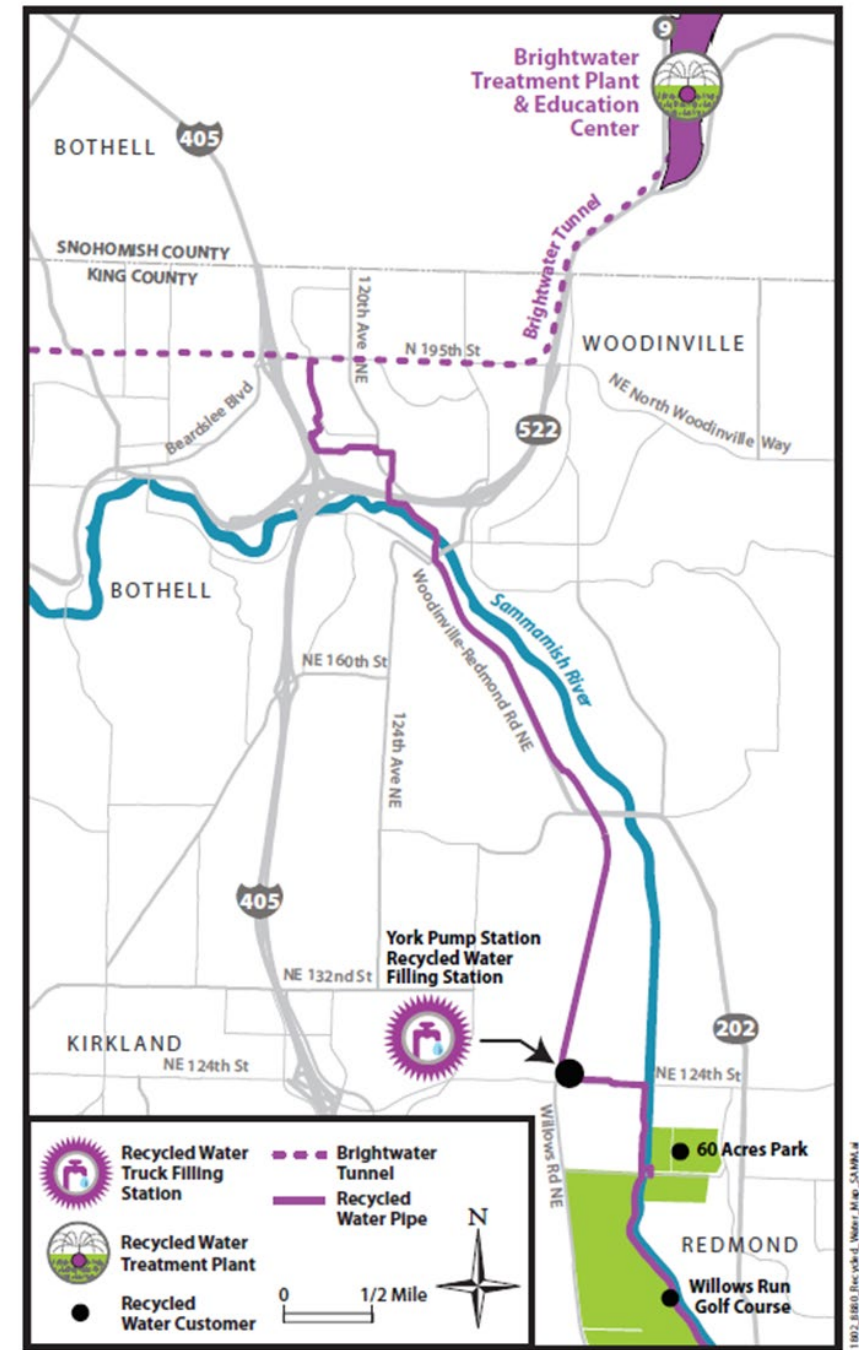
LEAVING WATER IN THE RIVER MEANS BETTER HABITAT FOR FISH

River water irrigation

Recycled water irrigation



BRIGHTWATER TREATMENT PLANT



SAMMAMISH VALLEY

King County
Department of Natural Resources and Parks
Wastewater Treatment Division



Recycled water is a water resource for agriculture

Recycled water has been authorized for irrigation of food and non-food crops in Washington state since 1992 and most states, including organic crops.

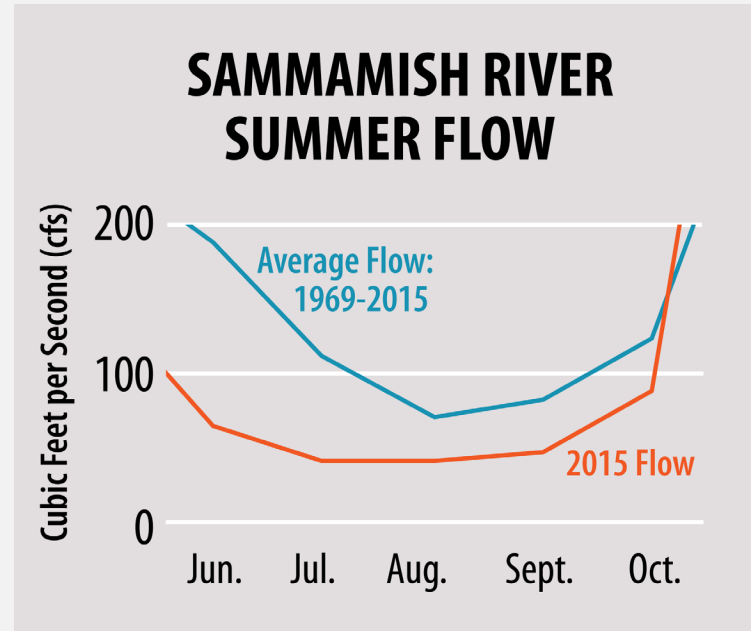
Recycled water is a drought-proof water supply and is used extensively in water scarce regions.

- Recycled water supplies 50% of water supply for agricultural irrigation in Israel.
- In CA, 219,000 acre-feet (71 billion gallons) of recycled water is used for agricultural irrigation each year.

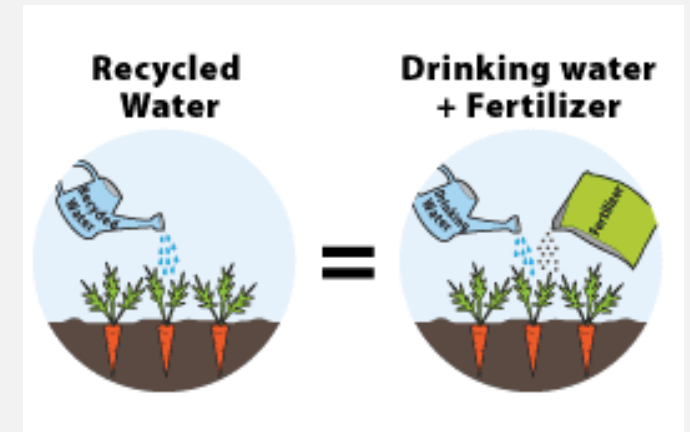
BENEFITS OF RECYCLED WATER



Supports healthy streams and aquifers

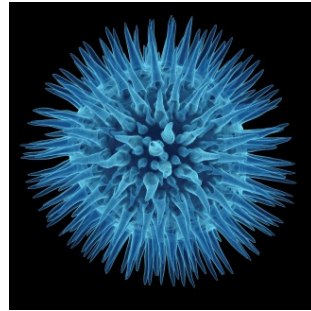


Provides reliable water supplies for farms even during droughts and water right limitations



Supplies needed nutrients for crops

Compounds of Concern Potentially in Recycled Water



Pathogens: bacteria, protozoa, viruses

Inorganic chemicals: nutrients, metals and salts

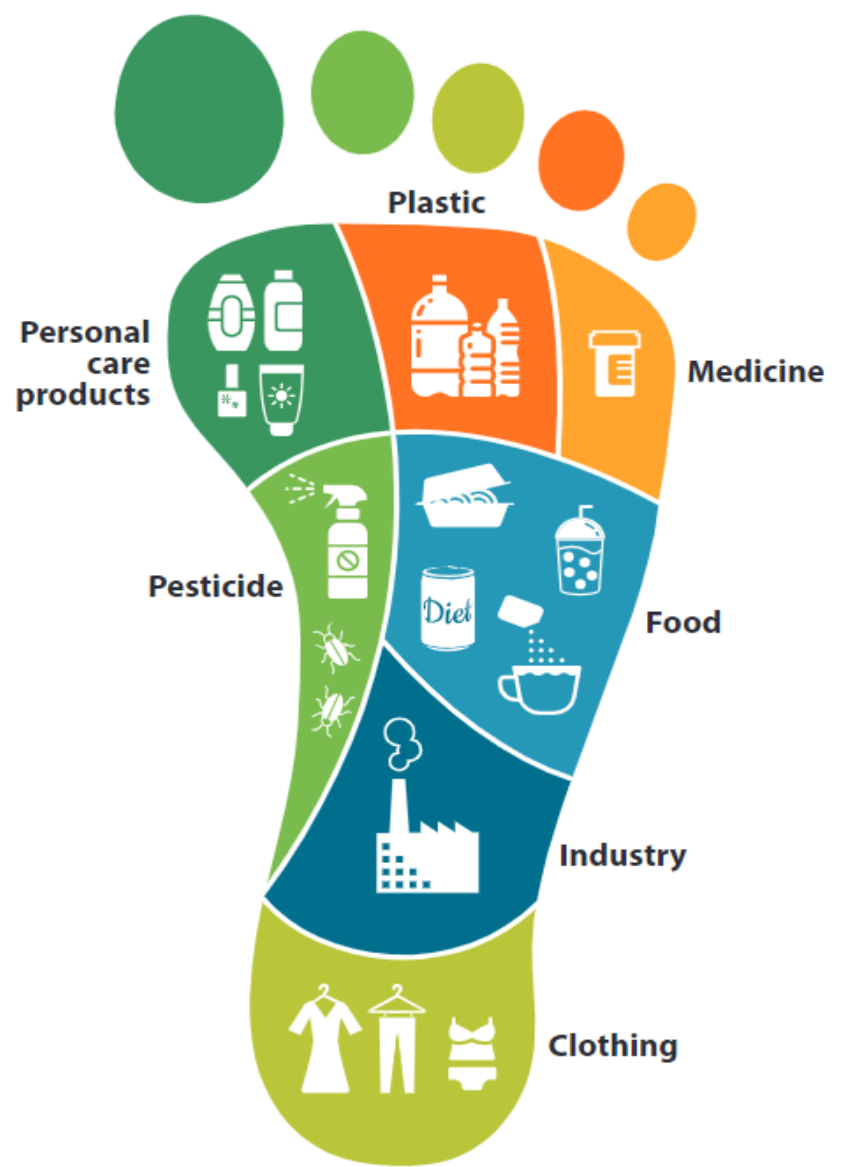


Contaminants of Emerging Concern: trace chemicals from medicines, personal care products and industrial chemicals

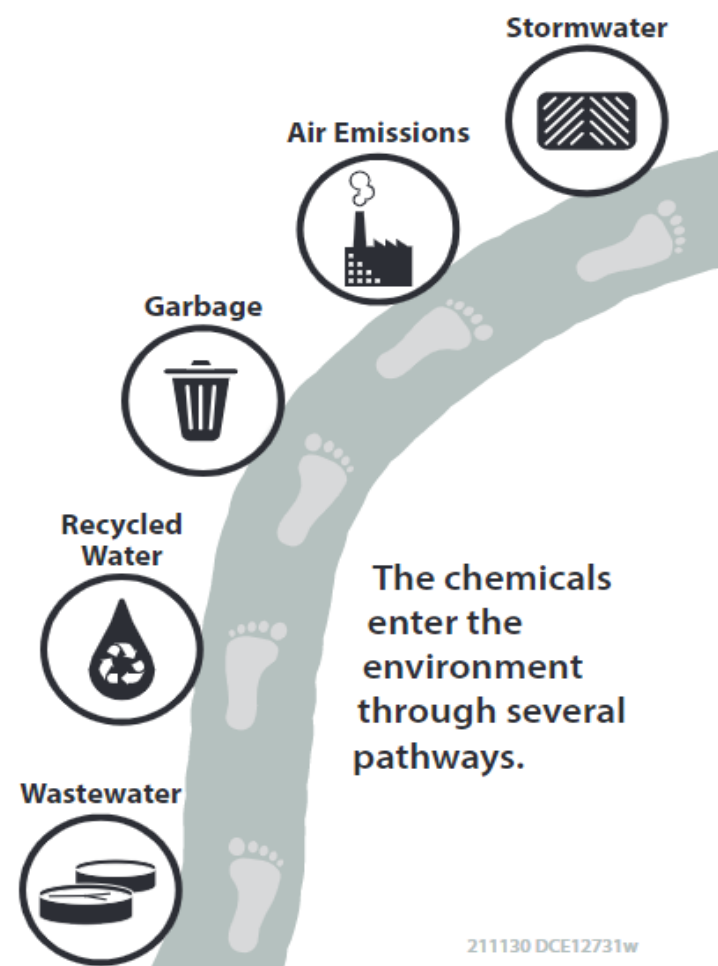


Chemical footprint

We are exposed to chemicals from the products we use every day.



WE ALL HAVE
A CHEMICAL
FOOTPRINT FROM
OUR DAILY
ACTIVITIES



The chemicals enter the environment through several pathways.

CECs enter the environment through many pathways.

Humans are exposed by these chemicals in several ways.

Impact of the exposure is not known, thus the label “emerging”

STUDY DESIGN



2019

Irrigation water baseline sampling.

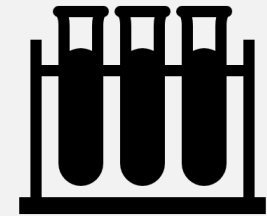


2020

Planted garden with carrots and kale. Irrigated garden with recycled water and river water.



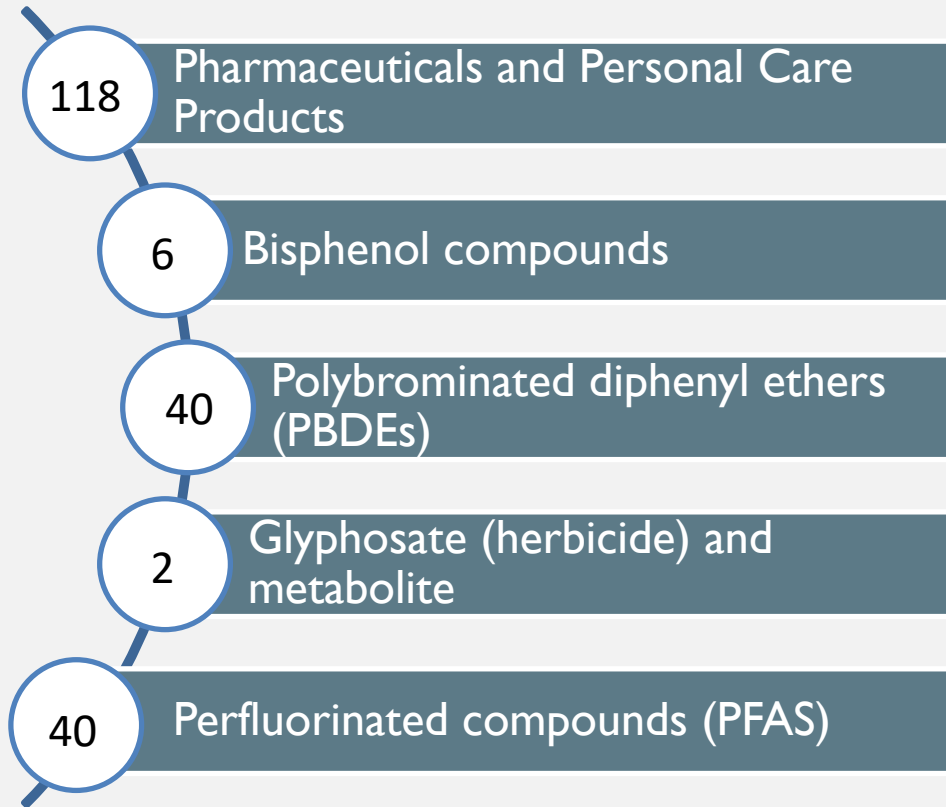
2020 - 2021



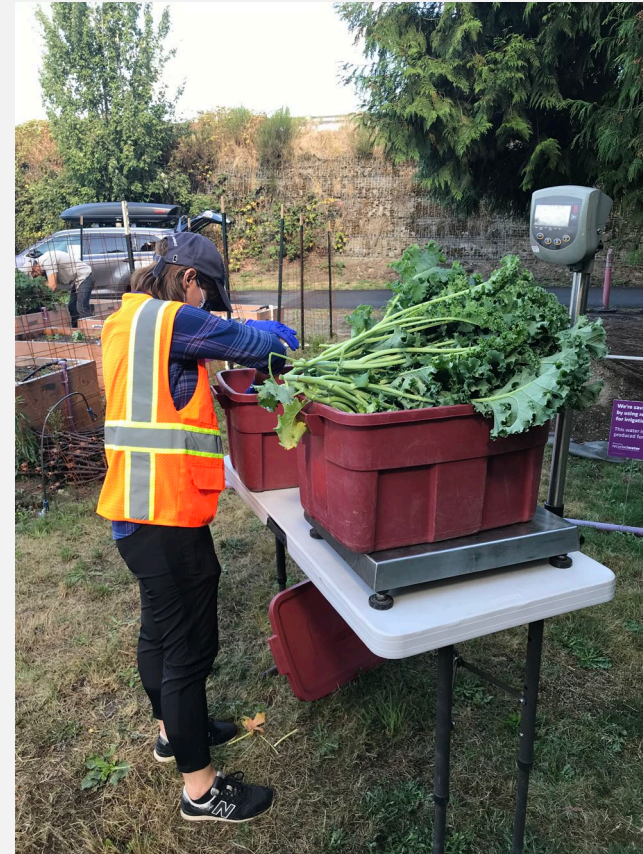
CEC and agronomic sampling of water, soil and plants.

SAMPLE PARAMETERS

CEC Sample Matrix (n= 206)



Agronomic Parameters

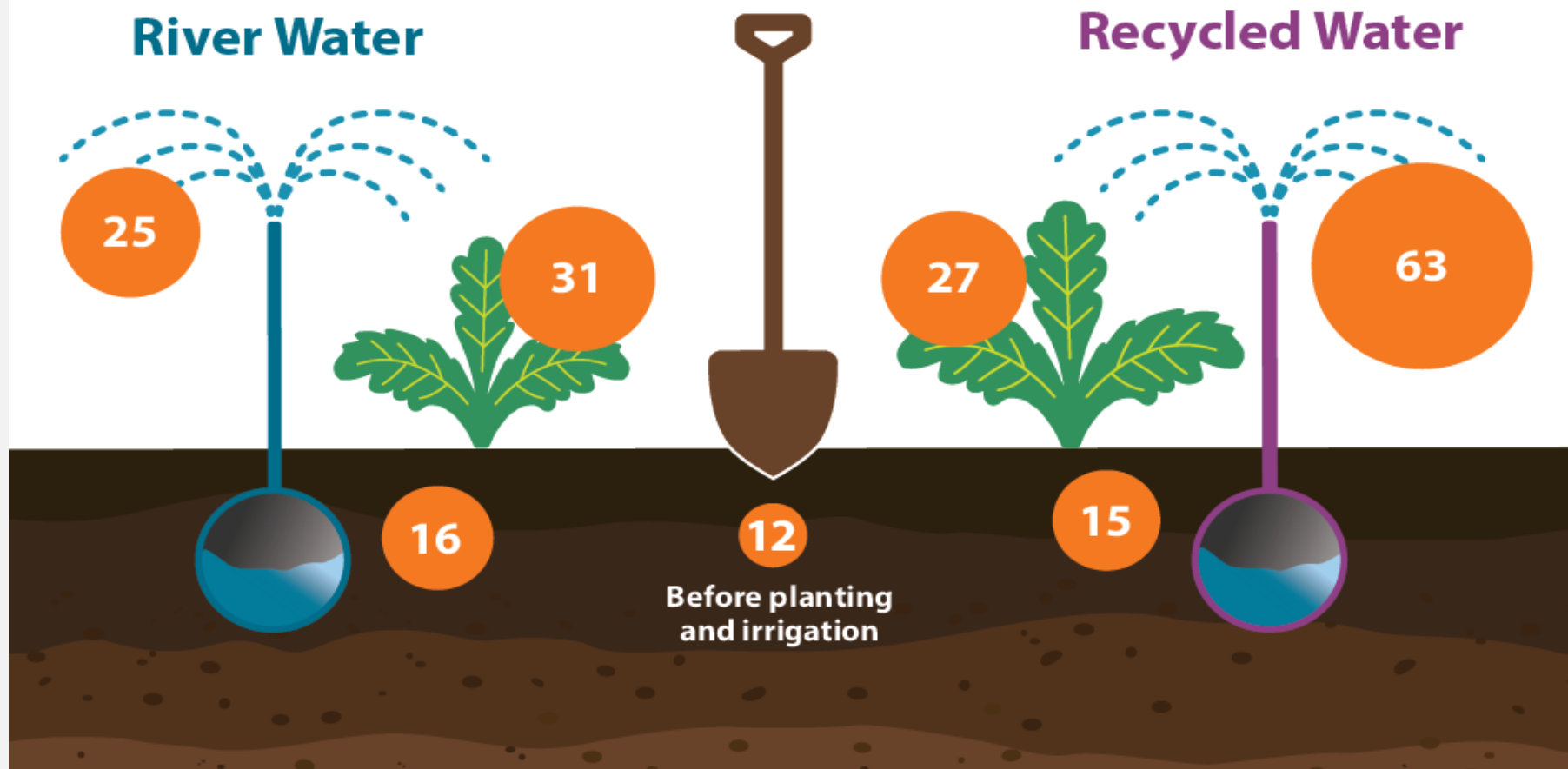


- Nutrients
- Salts
- pH
- Bulk Density

Number of Contaminants of Emerging Concern (CECs) detected locally

CECS
ARE FOUND
EVERYWHERE

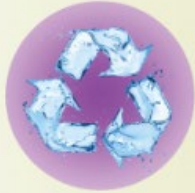
● = Number of CEC Detections
(size relative to number)



Plant sample Year 1 Results

RESULTS

18 CECs
detected in recycled
water irrigated kale



9 CECs detected in
recycled water
irrigated carrots

16 CECs detected
in river water
irrigated kale



15 CECs detected
in river water
irrigated carrots



CEC detections #s were similar in produce irrigated with river water and recycled water.

Only 9 compounds were present at concentrations well above method LOD and were present in ≥ 2 replicates:

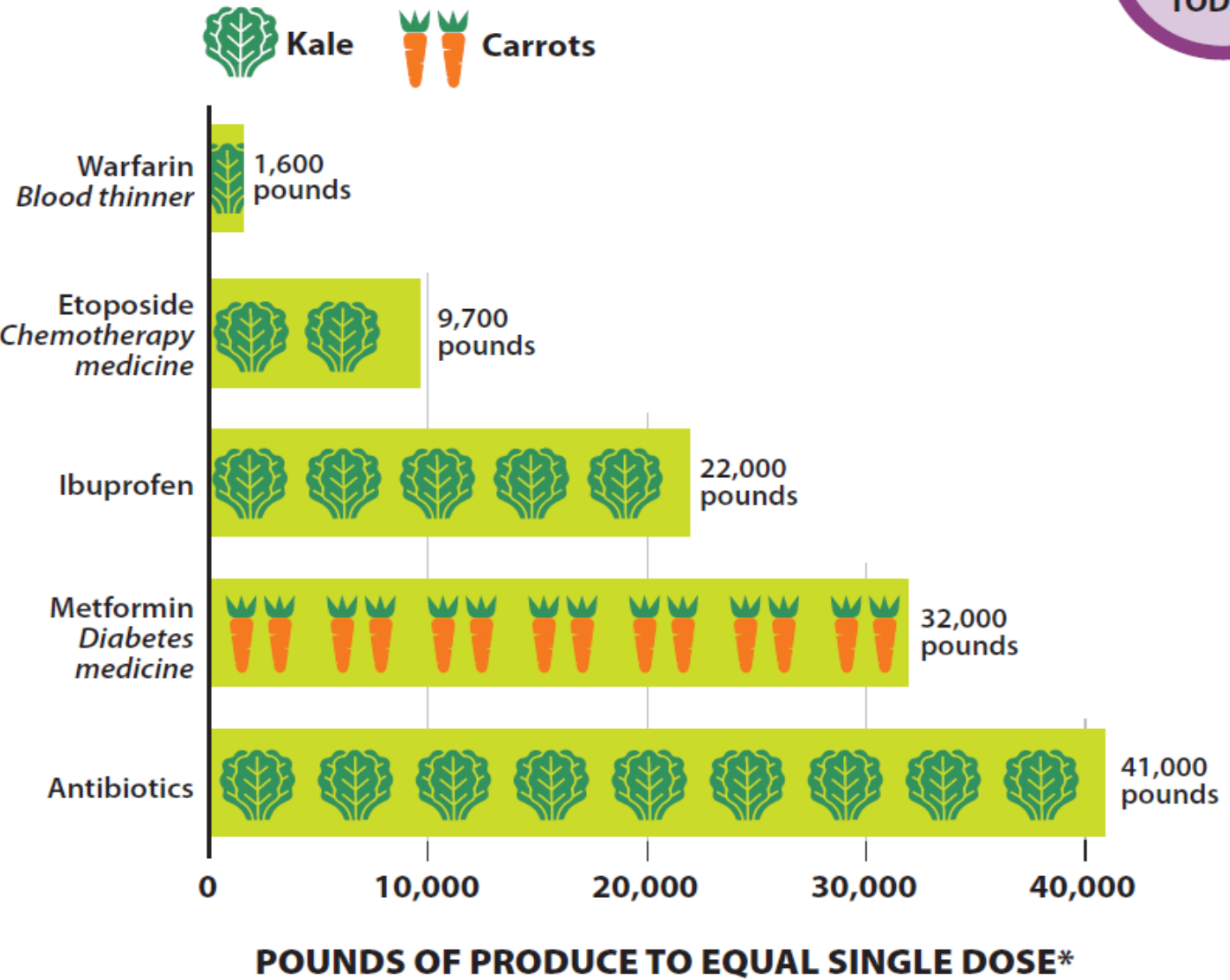
- PFAS (2) and 6 PPCPs
- In both river and recycled water irrigated plants
- Concentrations in recycled water tended to be higher



Pharmaceuticals in recycled water

You would need to eat this much produce every day to be exposed to a single dose of a drug

HOW HUNGRY ARE YOU TODAY?



CEC exposure from food crops is low in Year 1 samples

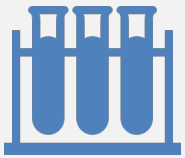


* Dosage from drugs.com

SAMMAMISH RESEARCH CEC INITIAL CONCLUSIONS



CECs are everywhere, come from multiple sources



CEC detections align with other recycled water research; Brightwater recycled water tends to have low concentrations



CEC compositions in natural waters correlate with land use



Irrigating with recycled water provides many benefits and is a low risk exposure pathway for CECs.

AGRONOMIC RESULTS: YIELD



Recycled water test garden: Year 1 crop yield and soil health results

Kale

POUNDS PER
GARDEN BED

10

147%
more

5



River
Water

Recycled
Water

Carrots

POUNDS PER
GARDEN BED

3

25%
more



River
Water

Recycled
Water

NUTRIENTS
IN RECYCLED
WATER MEANS
MORE CROP
YIELD

Recycled water
supports healthy
soil and plants

- ✓ Soil pH
- ✓ Salts
- ✓ Conductivity





2021 PRODUCER OUTREACH

Farmers are supportive of recycled water but are concerned about consumer's opinions on using recycled water for irrigation.



2021 CONSUMER OUTREACH

- Outreach at farmers markets
 - Four markets in 2021
 - Engaged 500 individuals
- Baseline Consumer Survey
- Two focus groups led by OSU Grad student

CONSUMER SURVEY

Layout:

- Online survey (QR CODE)
- Recycled Water Definition
- 5 baseline questions

96 total entries

SurveyMonkey Powered Online | +

← → ↻ surveymonkey.com/r/rewater

WASHINGTON WATER TRUST

Recycled Water Survey

Washington Water Trust is an environmental non-profit with a mission to restore rivers and streams throughout Washington State. We are asking for your help to understand consumer perceptions on the use of recycled water on food crops.

Recycled water is highly treated wastewater that has been filtered and disinfected to remove solids and other impurities. Simply put, recycled water is treated water that is used more than once.

This survey will take just two minutes and help inform the Recycled Water Project, which ultimately benefits Washington rivers and salmon!

OK

1. Rate your current understanding of the term "Recycled Water"

No Knowledge Limited Knowledge Not Sure Some Understanding Strong Understanding

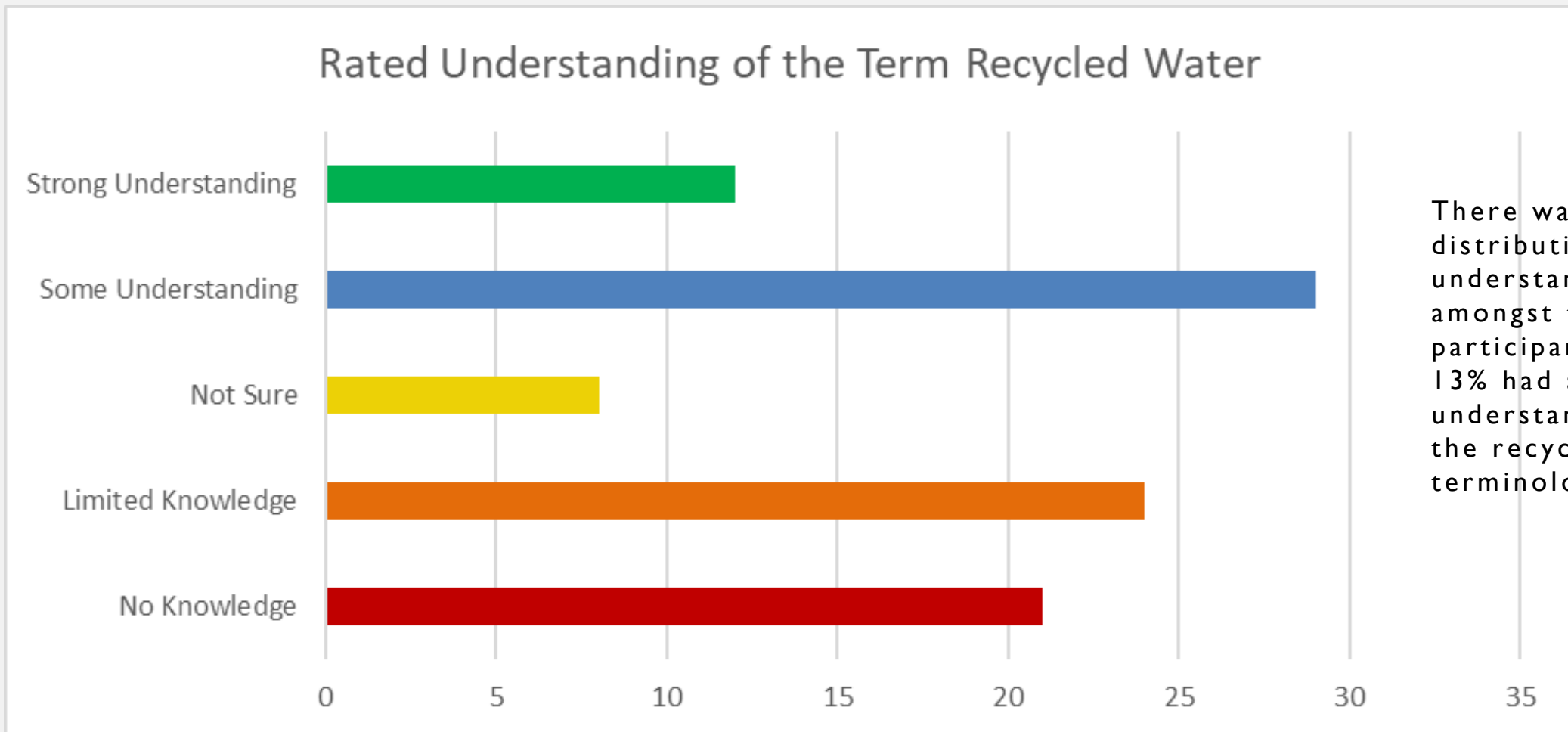
2. Have you ever knowingly eaten crops grown with recycled water?

0 of 12 answered

Baseline Survey Objective:

Gain understanding on consumer sentiment towards the use of recycled water on food crops.

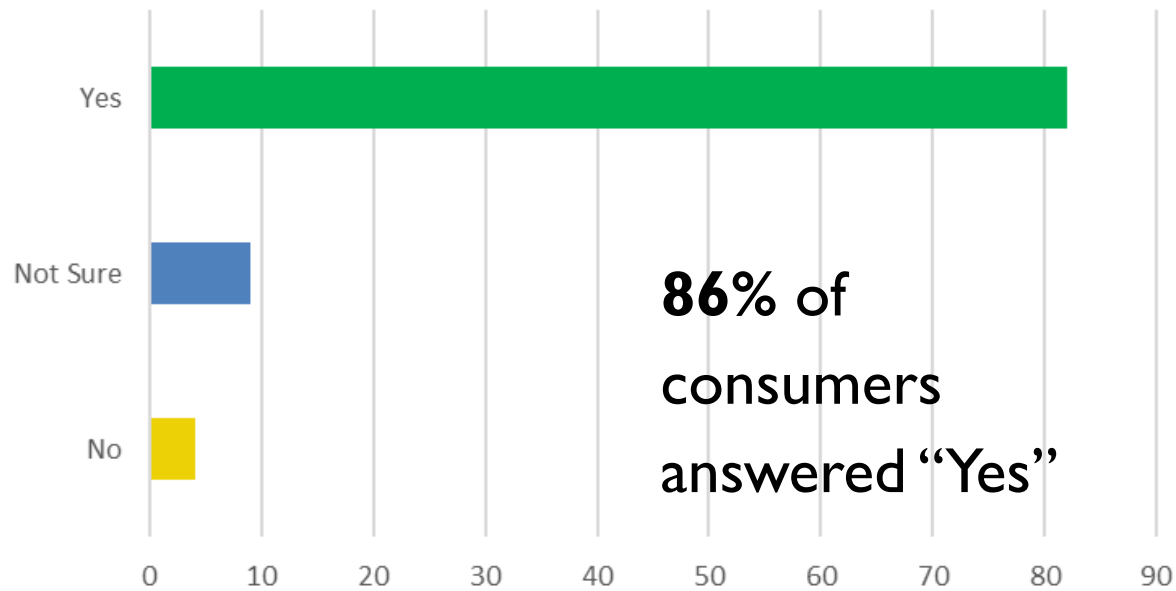
BASELINE SURVEY RESULTS



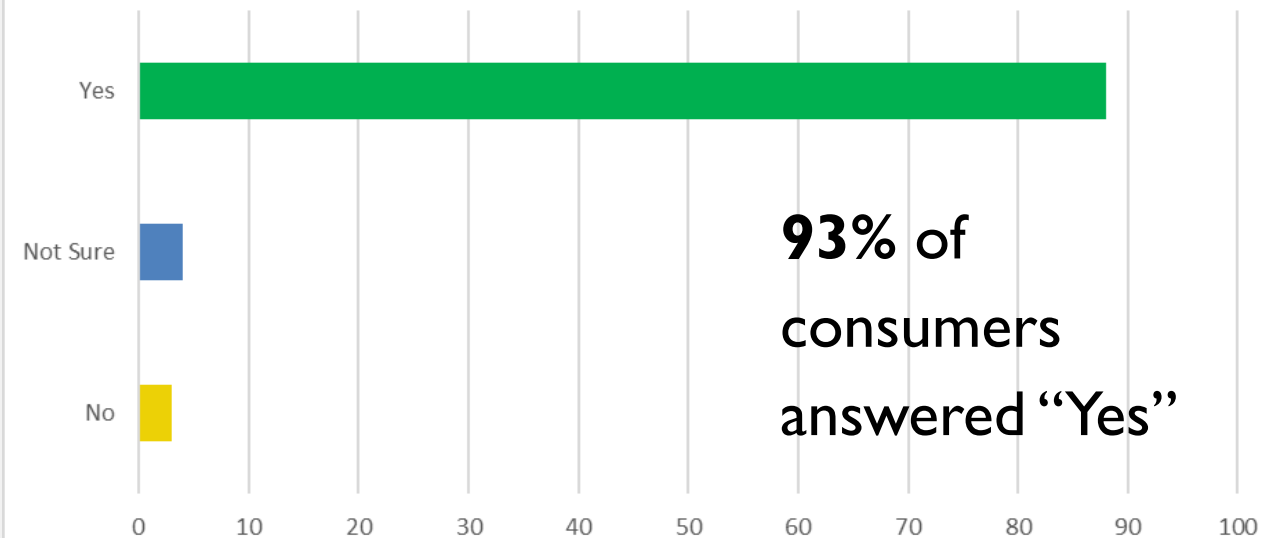
There was a distribution in understanding amongst the survey participants, only 13% had a strong understanding of the recycled water terminology.

BASELINE SURVEY RESULTS

Would you eat crops grown with recycled water?



Would you eat crops grown with recycled water if it helped protect endangered salmon?



When asked: “Would you eat crops grown with recycled water?” 86% of consumers answered that “Yes”, they would. As a follow-up question survey participants were then asked: “Would you eat crops grown with recycled water if it helped protect endangered salmon?”. The implication that eating crops grown with recycled water would have an environmental benefit related to salmon, increased consumer willingness to eat crops grown with recycled water by 7%. This result will be considered when creating communication and outreach materials that explain the benefits of using recycled water as a crop irrigation source.

FOCUS GROUPS

Gained a deeper understanding of consumer's thoughts, attitudes, and emotions towards recycled water.

- **Setting:** audio and video recorded on Zoom
- **Question Design:** 9 questions focused on consumer preferences
- **Two 1-hour focus groups**
- **9 consumers**
- **Transcripts and Coding:** OSU Grad student coded based on major themes found within the zoom transcripts



A subset of survey participants engaged in two focus group sessions. This was conducted to gain further insight on the survey results. Participants were led through a one hour discussion that explored their concerns about recycled water and what would improve their willingness to eat crops grown with recycled water.

FOCUS GROUP RESULTS

Most important aspects to furthering the acceptance of recycled water for crop irrigation:

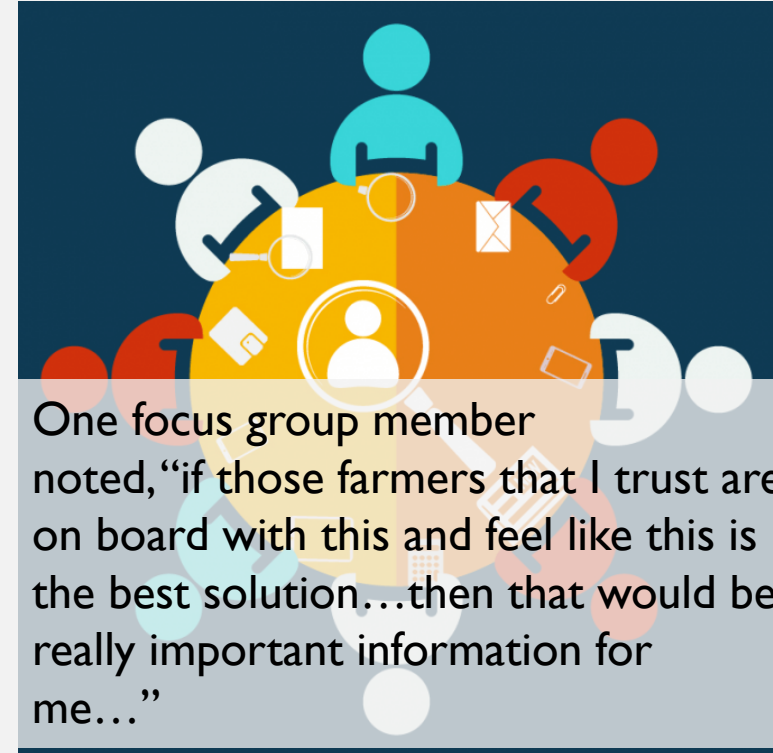
Education

- Target education and messaging differently based on audience
- Simple and easy to understand for the general public
- Access to science and research (Transparency)

Relationships

- Local farmers
- Trusted sources

Focus group participants were generally favorable to the idea of eating crops grown with recycled water. However, a common concern was there was a lack of understanding of the recycled water treatment process and the long term impacts of using recycled water as an irrigation source. Thus, one of the most important aspects that will further acceptance of recycled water is educating the public. Focus group participants shared that educational material should be accessible and targeted for specific audiences. Information should also be simple and easy to understand. Additionally, where the information comes from will also have an impact on how it is received. Participants shared that they would want the information to come from trusted sources, from entities such as non-profits, local government, and the ag community.



NEXT STEPS

- Year 2 data analysis of the Research Study (CECs and agronomic data)
- Continue Outreach along the Food Supply Chain
 - Phase 2 Consumer Outreach
 - Restaurateurs and Grocers
- Continue to assess potential source switch opportunities in the Valley

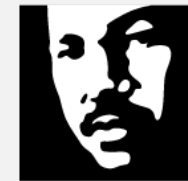


QUESTIONS?

Contact Jacque Klug - Jacque.Klug@kingcounty.gov
or
Nicole Gutierrez - nicole@washingtonwatertrust.org

**Thank You To Our
Project Funders:**

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King County

KCD
King Conservation District

