Enhancing Data Visualization for the Public and your Office

Emma Petke, *Performance Analyst at WSSC Water*

10/28/2022

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Agenda

- Introduction

- The Value of Data Visualizations

- What We've Done at WSSC Water

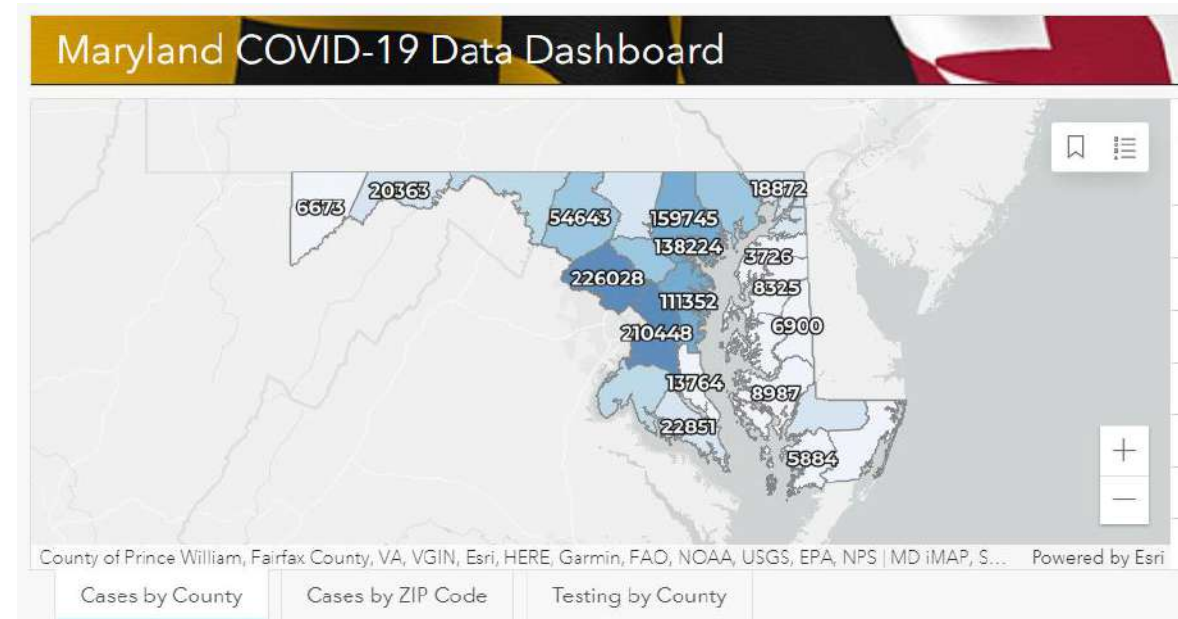- What You Can Do at Your Organization

The Value of Data Visualizations

What is Data Visualization?

- Representation of data in the form of a graph, map, icon, picture, etc.

- Ex: MD COVID-19 Data Dashboard

- More engaging than showing numbers in a table

*Visual from https://coronavirus.maryland.gov/

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Why use Data Visualizations?

- Data Visualizations can make data that we know to be important, more accessible and understandable to a wider audience

- With Data Visualizations and Data Storytelling, you can:
    - Provide key decision makers an at-a-glance view of data
    - Explain key takeaways
    - Show why the audience should care about the data

GFOA Budget Presentation Award Program

#C5:   Charts and graphs should be used, where appropriate, to highlight financial and statistical information. Narrative interpretation should be provided when the messages conveyed by the graphs are not self-evident.

Charts and Graphs	1. Are charts and graphs used in the document to convey essential information (*e.g., key policies, trends, choices and impacts*)? _____ 2. Are graphics explained? _____

Data Storytelling can be used to meet the requirements of the GFOA Presentation Award program!

WSSC WATER
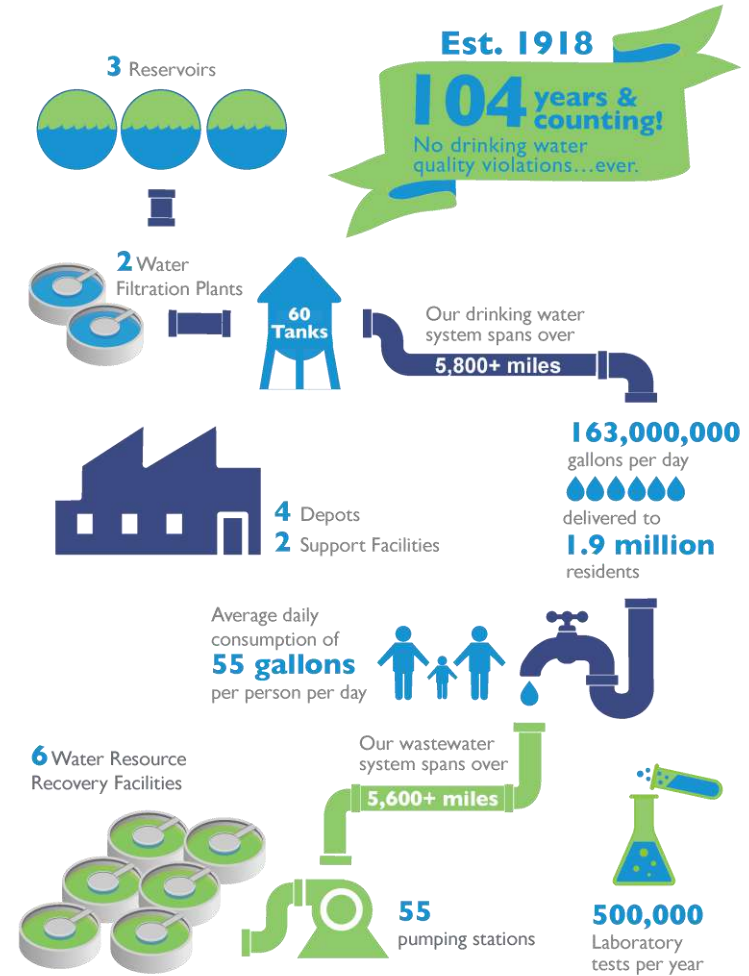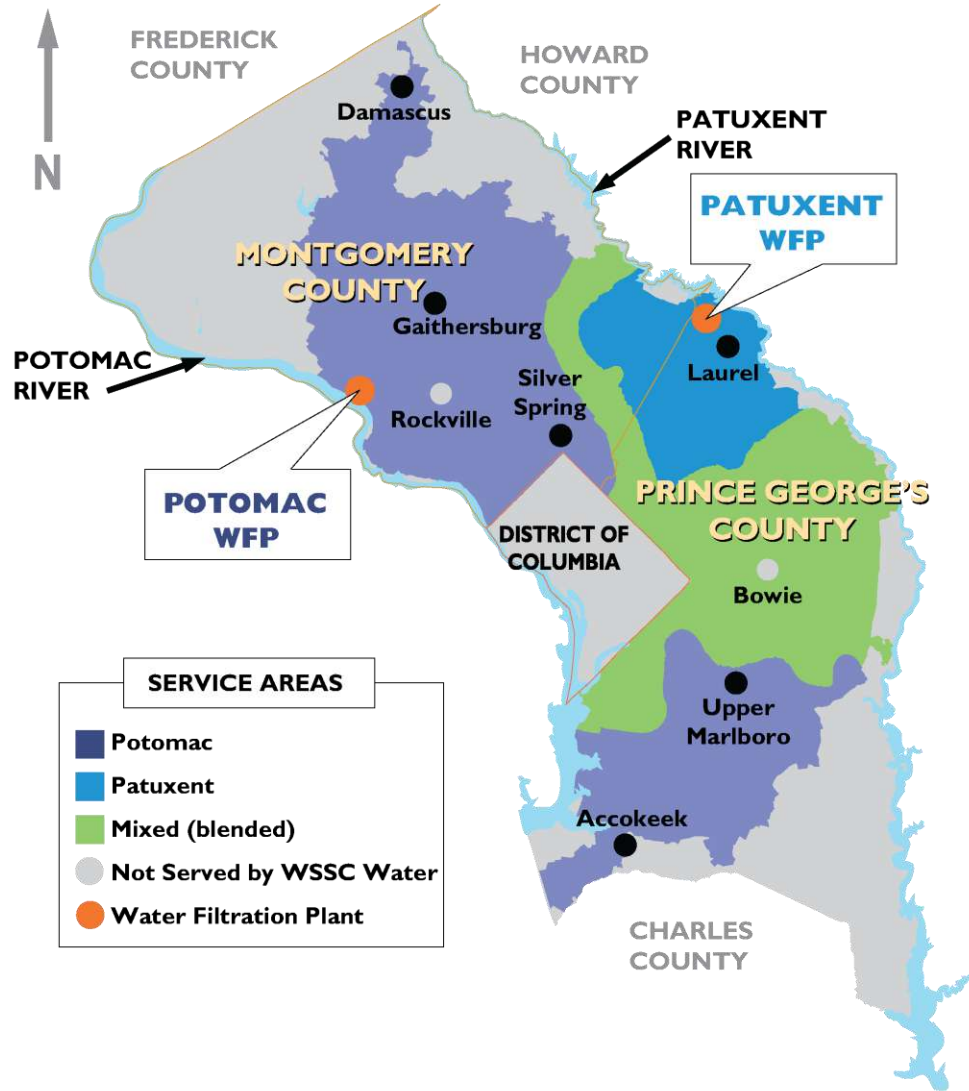DELIVERING THE ESSENTIAL

Example: Introductory Graphic

- In the beginning of Yvonne's presentation, she used these visuals to show some fun facts about WSSC Water

- This slide is included in our PowerPoint template for public presentations and is a good way to highlight key facts quickly in an engaging manner!

- Let me show you why…
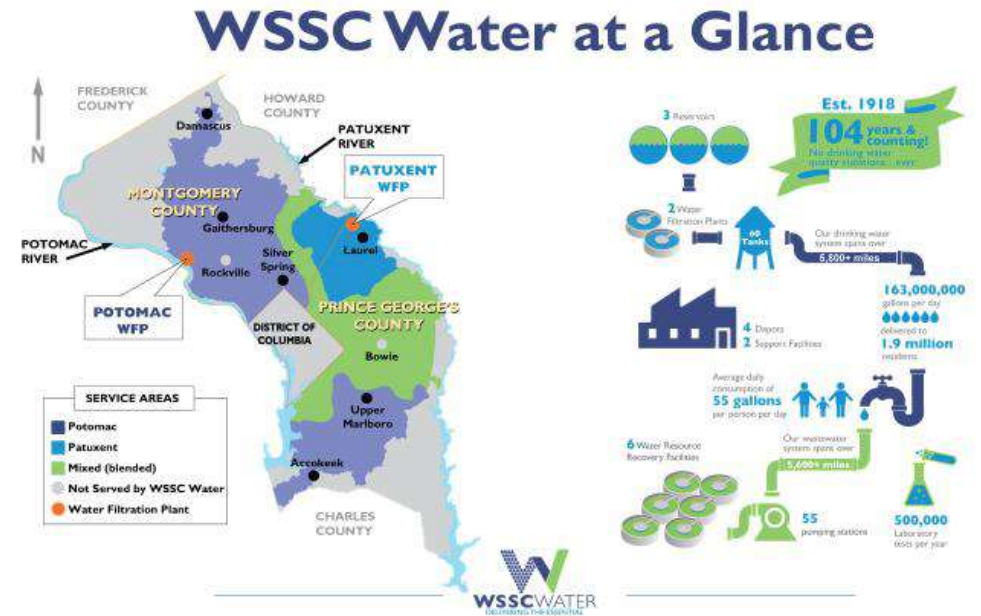
WSSC Water at a Glance

- WSSC Water serves Montgomery and Prince George's counties in Maryland. The utility was established in 1918, and has had 104 years with no water quality violations. WSSC Water has:

  o 3 reservoirs

  o 2 water filtration plants

  o 4 depots

  o 2 support facilities

  o 60 tanks

  o A drinking water system spanning over 5800 miles

  o a wastewater system spanning 5600 miles.

  o 6 water resource recovery facilities

  o 55 Pumping stations

- WSSC Water produces 163 million gallons per day, with each person consuming an average of 55 gallons of water per day and conducts half a million laboratory tests per year
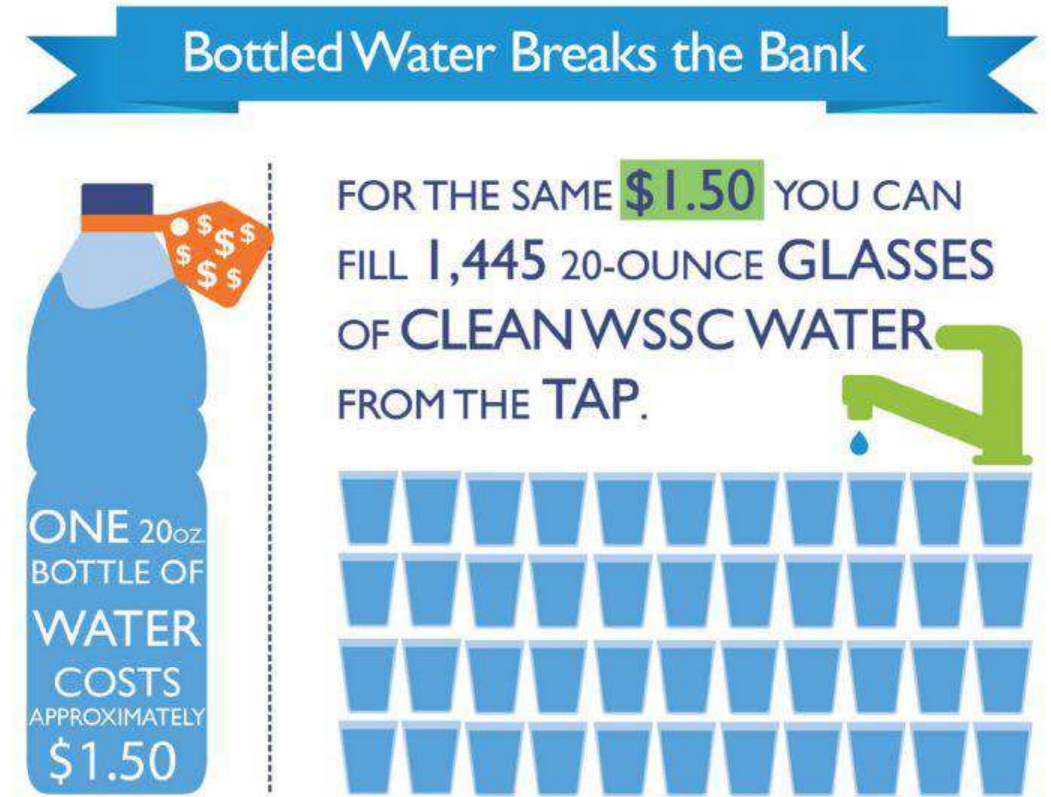
WSSC Water at a Glance

Map legend:

FREDERICK COUNTY
HOWARD COUNTY
PATUXENT RIVER
Damascus
PATUXENT WFP
MONTGOMERY COUNTY
Gaithersburg
POTOMAC RIVER
Silver Spring
Laurel
Rockville
POTOMAC WFP
PRINCE GEORGE'S COUNTY
DISTRICT OF COLUMBIA
Bowie
Upper Marlboro
Accokeek
CHARLES COUNTY
N

SERVICE AREAS
- Potomac
- Patuxent
- Mixed (blended)
- Not Served by WSSC Water
- Water Filtration Plant

Infographic statistics:

- **3** Reservoirs
- **2** Water Filtration Plants
- **60** Tanks
- **Est. 1918** — **104** years & counting! No drinking water quality violations…ever.
- Our drinking water system spans over **5,800+ miles**
- **163,000,000** gallons per day delivered to **1.9 million** residents
- **4** Depots
- **2** Support Facilities
- Average daily consumption of **55 gallons** per person per day
- **6** Water Resource Recovery Facilities
- Our wastewater system spans over **5,600+ miles**
- **55** pumping stations
- **500,000** Laboratory tests per year

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Value of Tap VS Bottled Water

Water Source	Cost	Amount
Bottled Water	$1.50	20 Ounces
Tap Water	$1.50	28,900 Ounces

vs

Bottled Water Breaks the Bank

FOR THE SAME $1.50 YOU CAN FILL 1,445 20-OUNCE GLASSES OF CLEAN WSSC WATER FROM THE TAP.

ONE 20 oz. BOTTLE OF WATER COSTS APPROXIMATELY $1.50

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Key Considerations in Data Visuals

- How long does it take me to understand this data?

- Is it engaging?

- Can it be read clearly and easily by anyone, including those who are colorblind?

Visuals Best Practices Example

Default excel graph

Chart Title
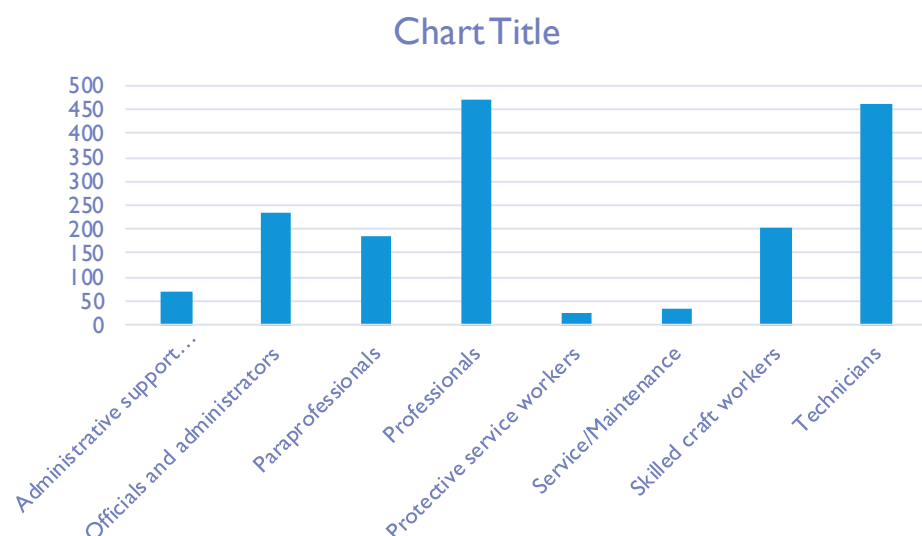
Optimized graph following best practices

WSSC Water Employees by Job Classification

Professionals	469
Technicians	462
Officials and administrators	234
Skilled craft workers	202
Paraprofessionals	185
Administrative support	71
Service/Maintenance	34
Protective service workers	27
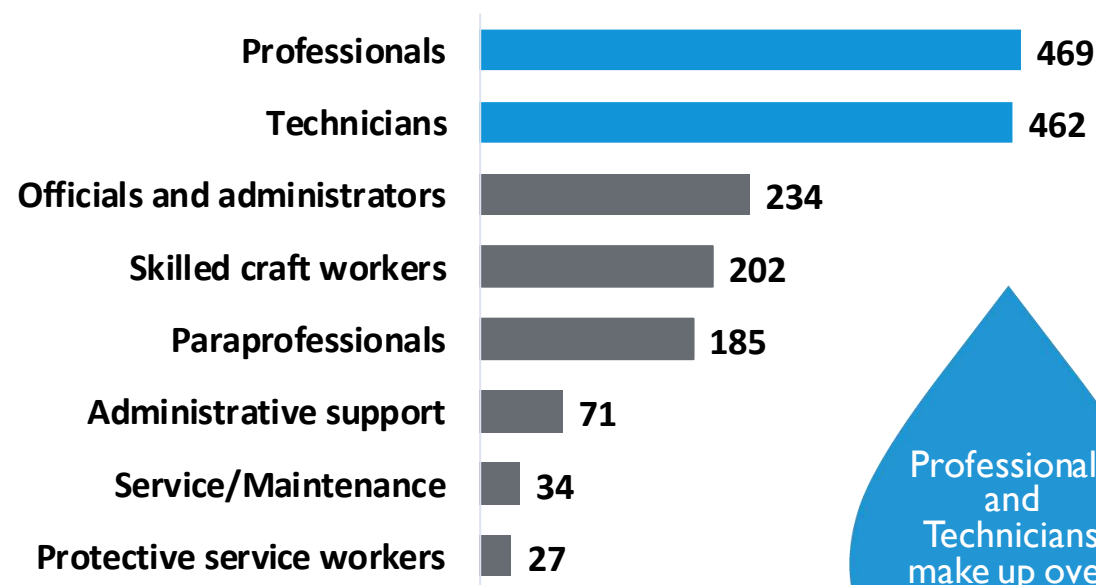
Professionals and Technicians make up over half our workforce

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Tables: Two Examples

These tables contain identical data, however, the table on the right is clear and concise, while the table on the left is confusing and takes longer to read

Contract	FY21	FY22	FY23
AB35920	5,202,000	5,818,000	325,600
BD24814	1,000,000	3,030,000	2,360,000
Total	6,202,000	8,848,000	2,685,600

Contract	FY21	FY22	FY23
AB35920	$5,202,000	$5,818,000	$325,600
BD24814	$1,000,000	$3,030,000	$2,360,000
Total	$6,202,000	$8,848,000	$2,685,600

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Colorblindness

- For those who have colorblindness, some graphs or charts may be difficult to read. The most common form of colorblindness is red green colorblindness: You can see an example below* of how a graph can look to those who experience red-blindness.

WSSC Water Employees by Gender

Female Male

488
29%

1207
71%

WSSC Water Employees by Gender

Female Male

488
29%

1207
71%
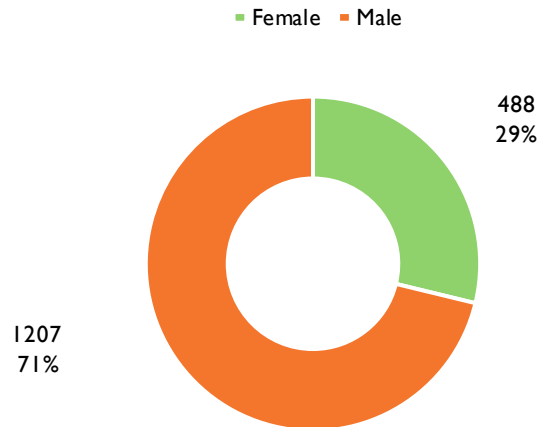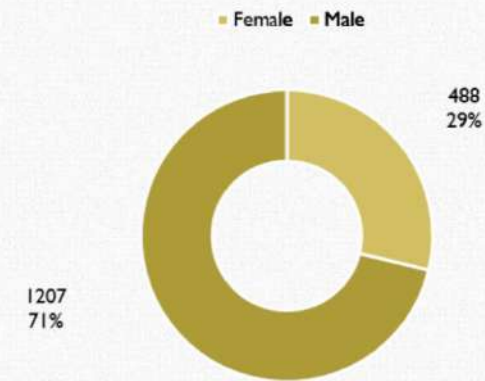
*You can test your own visuals with the simulator from Colblindor, linked here.

Colorblindness (Cont.)

- While we usually associate green with good or positive and orange or red with negative outcomes, using a shade of bright blue with the orange allows for an accessible contrast, and is thus recommended instead

WSSC Water Employees by Gender
- Female - Male
488 29%
1207 71%

WSSC Water Employees by Gender
- Female - Male
488 29%
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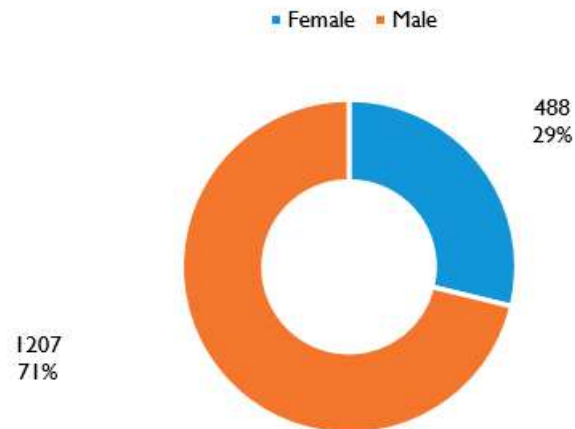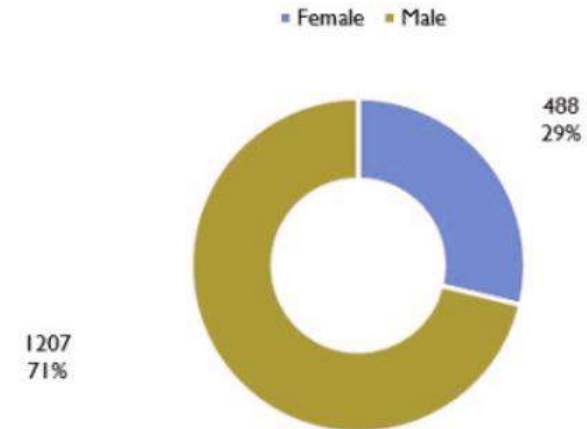
What We've Done at WSSC Water

Strategic Plan Connection

- Established Strategic Initiative under Transform Employee Engagement Strategic Priority to:

Advance achievement of WSSC Water's Strategic Plan by facilitating organizational development activities to enable data and risk-informed decisions that optimize business processes

- Data is key to **Executing the Strategic Plan**

Reassess the Plan

Consider Emerging Trends

Execute the Strategic Plan

Identify and Mitigate Enterprise Risks

Develop Strategic Plan

Endorse the Mission and Vision

Commission Performance Report

- Tracks our progress achieving the Strategic Plan via Key Performance Indicators (KPIs)

- Included in monthly General Manager Report, supports Plan's Accountability Core Value

- Serves as a tool for monitoring results, communicating progress, and identifying opportunities for improvement
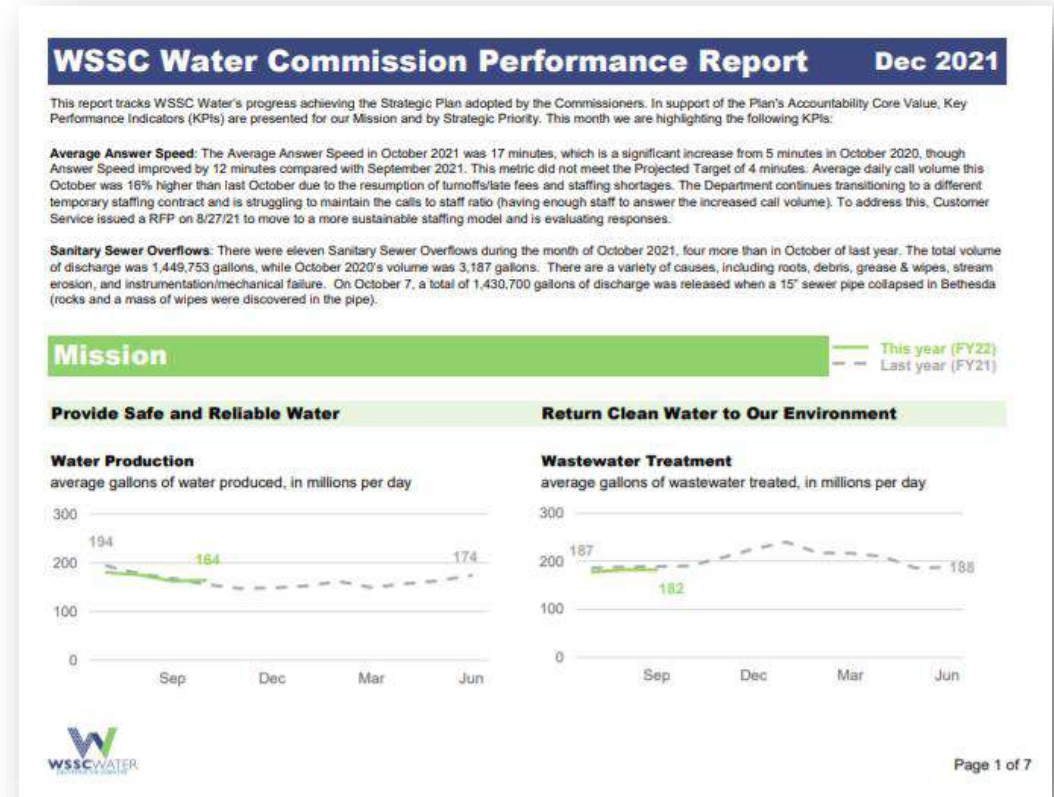
WSSC Water Data Community

- WSSC Water's Data Community consists of 115 employees from across the organization

- Formed in April of 2021 and its purpose is:

  o To foster a community where H2O People can discuss data, share resources and learn from one another

  o Raising awareness about key performance indicators

  o Increasing data literacy across the organization through training and outreach

Data Community Meeting Topics

WSSC Water's Data Community holds monthly meetings. Some topics we've covered include:

Guest speakers from Montgomery County

Report Re-Designs such as WSSC Water Quality Report
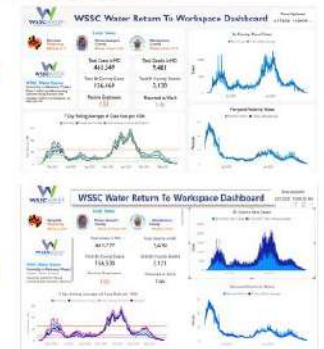
Dashboard Demos and Dashboarding best practices

Data Community Book Club

- The Data Community Book Club meets once a month separately from the usual Data Community meeting
- First book is Effective Data Storytelling by Brent Dykes, which had a book club discussion guide available through www.effectivedatastorytelling.com
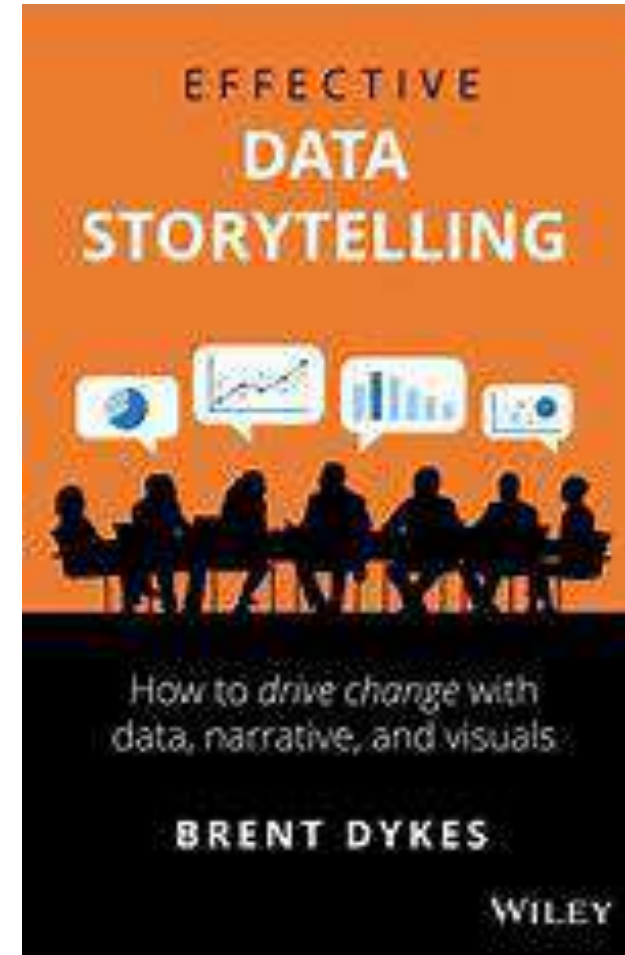
Data Community Benefits

- Because the community meets virtually and is set up as a Microsoft Teams group, employees across the company can participate easily, whether they telework, report to our headquarters building, or are at one of our depots or plants.

  o We also keep meeting recordings and resource documents on Teams

- We've noticed an increase in cross-department collaboration and interest in data work which helps reduce organizational silos

WSSC Water Data Community · · ·

General

Articles and Outside Presentations

Branding

Data Community Admins

Data Visualization

Questions

Workshops
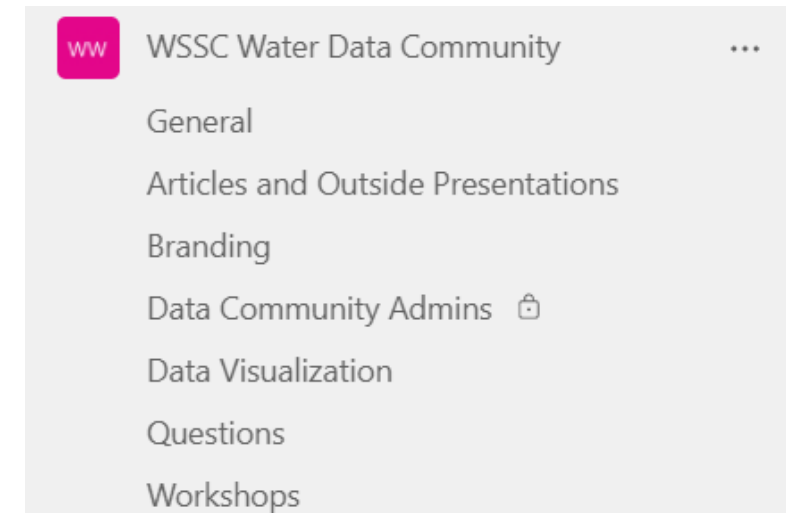
Power BI

- We've had over 60 employees attend Power BI trainings, to empower employees with the skills they need to create their own dashboards

- Benefits of Microsoft Power BI:

  o Can be connected directly to data sources to keep data as current as possible

  o Encourages data democratization and enables analysts to more quickly answer business questions

  o Encourages the use of data in day-to-day decision making

  o Reduces reliance on IT, as employees can develop dashboards themselves

Power BI Dashboard Directory

- We've established our Power BI Dashboard Directory as a spot that all employees can go to find published dashboards
- This helps increase data accessibility and data use across the organization

Power BI Dashboard Directory

Welcome to WSSC Water's home page for data dashboards designed in Microsoft Power BI. As part of WSSC Water's initiative to encourage data-driven decisions, analysts are encouraged to utilize Power BI to analyze, visualize and publish dashboards for use by H20 People.

If you would like your dashboard added to this dashboard page, please ensure it meets the requirements listed in the **WSSC Water Dashboard Creation Guidelines** document, and reach out to **SPO@wsscwater.com**. For more resources and support: join the **Data Community** on Teams.

C2M Performance Dashboard

The C2M Performance Dashboard provides visibility on how Customer to Meter (C2M) is performing from a business prospective & includes high level performance measures and detailed drill down datasets categorized by three of WSSC Water's Strategic Priorities:

- **Enhance Customer Experience** (Accounts Billed on Time, Consecutively Estimated Bills, To Do Volume, Customer Call Volume, Customer Calls Answered, Average Speed of Answer, Past Due Accounts & Past Due Amount)

- **Optimize Infrastructure** (Read Schedule Compliance, % Reads Uploaded Successfully, % Reads that Billed Automatically, Field Work Completion Rate, Field Work Volume, and Average Age of Open Field Work)
- **Spend Customer Dollars Wisely** (Payments Received, Revenue Billed, Days of Revenue Outstanding).

This dashboard is updated every business day, usually between the hours of 8-10AM.

Owners: Customer Service (**John.Curry@wsscwater.com**) Utility Services (**Jorge.Rodriguez@wsscwater.com**) & Finance (**Letitia.Carolina-Powell@wsscwater.com**)

Maintainer: IT Business Intelligence (**dl_it-erdw@wsscwater.com**)

User Guide
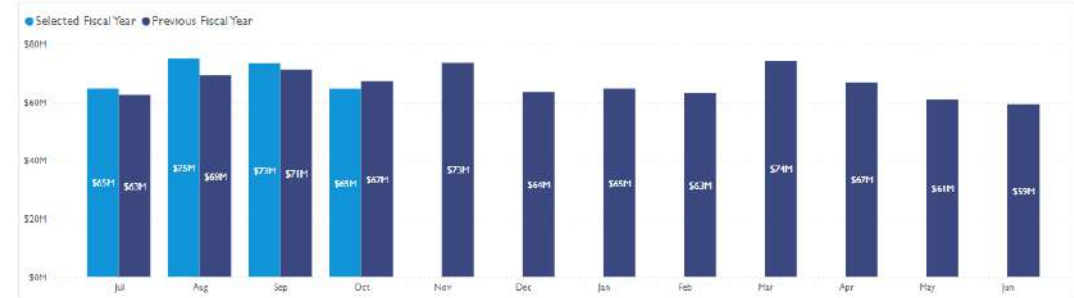
- Example: C2M dashboard shows metrics used to monitor customer service performance, connection to the Strategic Plan, and allows users to drill down further to each metric

Best Practices Guidance

- We've created guidelines for external presentations and dashboard creations that line up with the branding guidelines created by our Communications Department

- We have also created a Power BI Theme file to ensure dashboards match our branding guidelines

WSSC Water Power BI Dashboard Directory Guidelines

Dashboard Best Practices

Basic Branding Guidelines
Please be sure to follow these basic branding guidelines for colors:

Dark Blue   (Hex Code: #3C4981, RGB Code: 60 73 129)
Gray   (Hex Code: #676C73, RGB Code: 103 108 115)
Green   (Hex Code: #8FD16A, RGB Code: 143 209 106)
Orange   (Hex Code: #F4762D, RGB Code: 244 118 45)
Light Blue   (Hex Code: #1295D8, RGB Code: 18 149 216)

Typography: Gill Sans MT

- Text should always be Gill Sans MT. For readability, font size should not be smaller than 10 point.

Finding Resources

- A Power BI theme file with these colors and fonts preloaded is available on the Data Community Teams page, linked here. **We highly recommend using this theme file for all official WSSC Water branded projects.**
  - For instructions on how to use a theme file in Power BI, please see the guidance from Microsoft linked here.
- Be sure to check out WSSC Water's official branding guidelines here for additional information.
- WSSC Water's approved Icons can be downloaded here.

Visualization Trainings

- We've had over 200 employees attend trainings conducted by an external trainer, Ann Emery of Depict Data Studio on Data Visualization

- Internal trainings have also been conducted for those who frequently prepare and review presentations for public facing meetings on our branding guidelines and established visualization best practices to ensure consistency across the organization
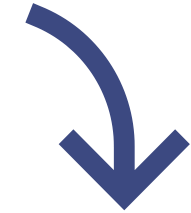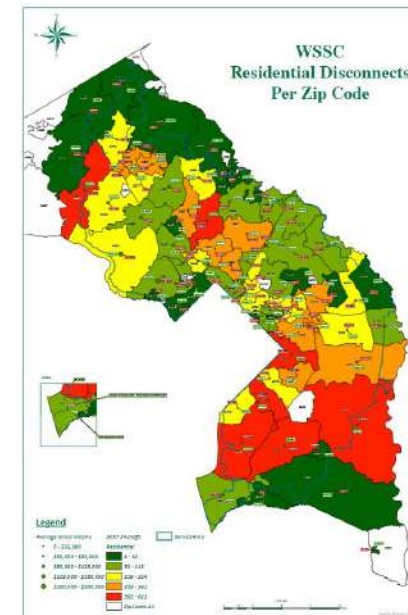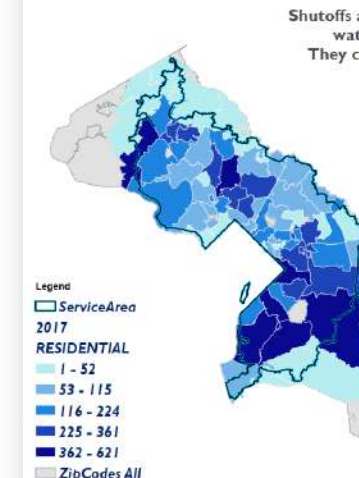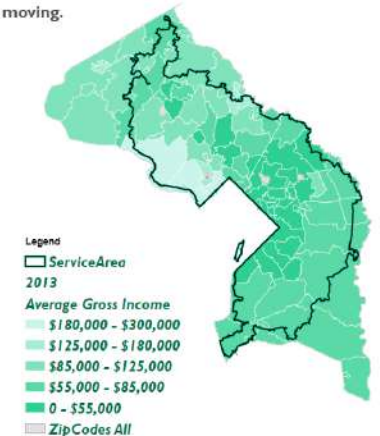
Data Visualization trainings help take Budget books from this…

FY'18 PROPOSED BUDGET
(How Each Dollar of a Water and Sewer Bill is Spent)

…To this! (FY23 Proposed Budget)

HOW
EACH OPERATING DOLLAR
IS SPENT

Capital Project Financing
• Debt payments and cash for the construction of pipes and facilities

42¢

Support Services
• Governance and management of organization
• Customer service
• Corporate finance
• Employee benefits
• IT Services

20¢

38¢

Operations & Maintenance
• Operations and maintenance for facilities (including share of Blue Plains)
• Fixing broken or leaking pipes and repairing roads
• Heat, light, and power for facilities
• Maintaining vehicles and equipment

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Simplify the Data

2020 Water Quality Results

Detected Subtance	Units	MCL	MCLG	Patuxent Tap	
				Level Found	Range
Barium	mg/L	2	2	0.03	0.02-0.03
Fluoride	mg/L	4	4	0.7	0.4-0.7
Nitrate	mg/L	10	10	2.0	0.6-2.0
Turbidity	NTU	TT=1 NTU	n/a	0.02	0.02-0.12 [1]
	% <0.3 NTU	100%	n/a	100%	n/a
Residual Chlorine	mg/L	TT>=0.2	n/a	met TT requirements	
Viruses	n/a	TT=99.99% removal	0	met TT requirements	
Giardia lamblia	n/a	TT=99.9% removal	0	met TT requirements	
Cryptosporidium	n/a	TT=99% removal	0	met TT requirements	
Total Organic Carbon	n/a	TT	n/a	met TT requirements	
Gross Beta	pCi/L	50 [2]	0	<4	n/d-5.2
Unregulated Subtance	Units	MCL	MCLG	Level Found	Range
Manganese [10]	µg/L	n/a	n/a	<0.4	n/d-0.78
Sodium	mg/L	n/a	n/a	13	12-14
1-butanol	µg/L	n/a	n/a	<2	n/d-2.2

TERMS

MCLG - Maximum Contaminant Level Goal. The level of a contaminant in drinking water below which there is no known or expected risk to health MCLGs allow for a margin of safety and are non-enforceable public health goals

MCL - Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology

TT - Treatment Technique. A required process intended to reduce the level of a contaminant in drinking water

AL - Action level. The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow

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

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

Turbidity - a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our treatment process

2020 Water Quality Report/11

What Can You Do?

- Identify and encourage best practices across your organizations to standardize presentations and publications

- Set up your own Data Community, large or small!

  o Encourage staff to share data work and break down silos

  o Attend meetings such as MASN (Mid-Atlantic Stat Network) to learn from others and meet people who may be willing to speak to your organization

- Look into trainings, and if it's not in the budget, you can use free resources online to learn and improve your skills

  o You can use some of the tips shared today!

  o Resources are also available at the Data Visualization Society

Questions?