CITY OF SANTA CRUZ
City Hall
809 Center Street
Santa Cruz, California 95060

Water Department

WATER COMMISSION

Regular Meeting

July 6, 2020

7:00 P.M. GENERAL BUSINESS AND MATTERS OF PUBLIC INTEREST, COUNCIL CHAMBERS/ZOOM

COVID-19 ANNOUNCEMENT: This meeting will be held via teleconference ONLY.

In order to minimize exposure to COVID-19 and to comply with the social distancing suggestion, the Council Chambers will not be open to the public. The meeting may be viewed remotely, using the following source:

Facebook Live: https://www.facebook.com/SantaCruzWaterDepartment/?epa=SEARCH_BOX

PUBLIC COMMENT:
If you wish to comment during the meeting on items 1-6, please see information below:

- **Call any of the numbers below. If one number is busy, try the next one. Keep trying until connected.**
  +1 669 900 9128
  +1 346 248 7799
  +1 253 215 8782
  +1 301 715 8592
  +1 312 626 6799
  +1 646 558 8656

- Enter the meeting ID number: **941 9706 9279**
- When prompted for a Participant ID, press #.
- Press *9 on your phone to "raise your hand" when the Chair calls for public comment.
  - It will be your turn to speak when the Chair unmutes you. You will hear an announcement that you have been unmuted. The timer will then be set to three minutes.
  - You may hang up once you have commented on your item of interest.
  - If you wish to speak on another item, two things may occur:
    1) If the number of callers waiting exceeds capacity, you will be disconnected and you will need to call back closer to when the item you wish to comment on will be heard, or
    2) You will be placed back in the queue and you should press *9 to "raise your hand" when you wish to comment on a new item.

NOTE: If you wish to view or listen to the meeting and don't wish to comment on an item, you can do so at any time via the Facebook link or over the phone via Zoom.

The City of Santa Cruz does not discriminate against persons with disabilities. Out of consideration for people with chemical sensitivities, please attend the meeting fragrance free. Upon request, the agenda can be provided in a format to accommodate special needs. Additionally, if you wish to attend this public meeting and will require assistance such as an interpreter for American Sign Language, Spanish, or other special equipment, please call Water Administration at 831-420-5200 at least five days in advance so that arrangements can be made. The Cal-Relay system number: 1-800-735-2922.

APPEALS: Any person who believes that a final action of this advisory body has been taken in error may appeal that decision to the City Council. Appeals must be in writing, setting forth the nature of the action and the basis upon which the action is considered to be in error, and addressed to the City Council in care of the City Clerk.

Other - Appeals must be received by the City Clerk within ten (10) calendar days following the date of the action from which such appeal is being taken. An appeal must be accompanied by a fifty dollar ($50) filing fee

Call to Order

Roll Call

Statements of Disqualification - Section 607 of the City Charter states that ...All members present at any meeting must vote unless disqualified, in which case the disqualification shall be publicly declared and a record thereof made. The City of Santa Cruz has adopted a Conflict of Interest Code, and Section 8 of that Code states that no person shall make or participate in a governmental decision which he or she knows or has reason to know will have a reasonably foreseeable material financial effect distinguishable from its effect on the public generally.

Oral Communications - No action shall be taken on this item.

Announcements - No action shall be taken on this item.

Consent Agenda (Pages 3 - 32) Items on the consent agenda are considered to be routine in nature and will be acted upon in one motion. Specific items may be removed by members of the advisory body or public for separate consideration and discussion. Routine items that will be found on the consent agenda are City Council Items Affecting Water, Water Commission Minutes, Information Items, Documents for Future Meetings, and Items initiated by members for Future Agendas. If one of these categories is not listed on the Consent Agenda then those items are not available for action.

1 City Council Actions Affecting the Water Department (Pages 4 - 6)

Accept the City Council actions affecting the Water Department.

2 Water Commission Minutes from June 1, 2020 (Pages 7 - 15)

Approve the June 1, 2020 Water Commission Minutes.

3 WSAS Quarterly Work Plan Update (Pages 16 – 32)

Accept the WSAS Quarterly Work Plan Update.

Items Removed from the Consent Agenda

General Business (Pages 33 - 100) Any document related to an agenda item for the General Business of this meeting distributed to the Water Commission less than 72 hours before this meeting is available for inspection at the Water Administration Office, 212 Locust Street, Suite A, Santa Cruz, California. These documents will also be available for review at the Water Commission meeting with the display copy at the rear of the Council Chambers.

4 Meter Replacement Program (Pages 33 – 39)

Receive a presentation on the proposed Meter Replacement Program including contract installation approach and take action on a request to recommend the program to the Council for its consideration.

5 Size and Probability of Potential Future Water Shortages and Water Shortage Contingency Plan Demand Reduction Strategy (Pages 40 – 97)

Receive a presentation on staff's analysis of the probability and size of potential future water shortages, provide feedback to staff on the analysis and provide feedback to staff on demand reduction strategy (strategies) for further development as part of the Water Shortage Contingency Plan.

6 Establish an Ad Hoc Subcommittee of Water Commissioners to Work with Staff on Revenue Forecasting and Financial Scenario Planning (Pages 98 - 100)

Authorize the Water Commission Chair to establish a three member Water Commission ad-hoc subcommittee to work with staff on revenue forecasting and financial scenario planning.

Subcommittee/Advisory Body Oral Reports - No action shall be taken on this item.

7 Santa Cruz Mid-County Groundwater Agency

8 Santa Margarita Groundwater Agency

Director's Oral Report - No action shall be taken on this item.

Information Items

Adjournment

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WATER COMMISSION
INFORMATION REPORT

DATE: 6/29/2020

AGENDA OF: July 6, 2020

TO: Water Commission

FROM: Rosemary Menard, Water Director

SUBJECT: City Council Actions Affecting the Water Department

RECOMMENDATION: Accept the City Council actions affecting the Water Department.

BACKGROUND/DISCUSSION:

June 9, 2020

Laguna Creek Diversion Retrofit Project: Master Service Agreement Laguna-First Amendment with Ecological Concerns Incorporated for Restoration and Revegetation Services (WT)

Motion carried authorizing the City Manager to execute Laguna-First Amendment to the Master Service Agreement for professional services for planning work related to restoration and revegetation for the Laguna Creek Diversion Retrofit Project with Ecological Concerns Incorporated (Santa Cruz, CA) in a form approved by the City Attorney.

Newell Creek Dam Inlet/Outlet Replacement Project – Budget Adjustment (WT)

Resolution No. NS-29,672 was adopted appropriating $7,100,000 from Water Enterprise Fund 711 to fund construction work in Fiscal Year 2020 for the Newell Creek Dam Inlet/Outlet Replacement Project.

June 23, 2020

City Lease Agreement from Garland & Summers LLC for Real Property at 123 Jewell Street to Provide Interim Office Space for the Water Department During the Graham Hill Water Treatment Facility Infrastructure Upgrade Project (ED/WT)

Resolution No. NS-29,680 was adopted authorizing and directing the City Manager to execute a lease agreement, in a form acceptable to the City Attorney, and any amendments or documents necessary thereto of a non-substantive nature, with Garland & Summers LLC. for real property located at 123 Jewell Street.

Application for U.S. Department of the Interior Bureau of Reclamation Grant Funding for a Decision Support Tool to Inform Development of Water Supply Projects (WT)

Resolution No. NS-29,687 was adopted authorizing the Water Department to apply for U.S. Department of the Interior Bureau of Reclamation grant funding for a decision support tool to inform development of water supply projects in order to increase resiliency to drought and other climate change impacts.

Deferral of Planned July 1, 2020 Water and Wastewater Rate Increases (WT/PW)

Motion carried to defer the planned July 1, 2020 Water and Wastewater rate increases and approve rescheduling them for implementation on July 1, 2021.

Graham Hill Water Treatment Plant Facility Improvements Project: Authorization to use Progressive Design Build Project Delivery Method (WT)

Motion carried to authorize use of the best value project delivery method, Progressive Design Build, for the Graham Hill Water Treatment Plant Facilities Improvement Project.

Resolution to Apply for United States Environmental Protection Agency Loan for Backbone Water Infrastructure Projects (WT)

Resolution No. NS-29,688 was adopted authorizing the Water Department to apply for United States Environmental Protection Agency (EPA) Water Infrastructure Finance and Innovation Act (WIFIA) loan for Backbone Water Infrastructure Projects.

Construction Safety Consultant – Award of Professional Services Agreement (WT)

Motion carried authorizing the City Manager to execute an agreement in a form to be approved by the City Attorney with Safety Management Consultation Services, Inc. (Yuba City, CA) in the amount of $117,100 for safety consultation support services.

Resolution Authorizing Approval of a Construction Installment Sale Agreement with the California State Water Resources Control Board for the Newell Creek Inlet/Outlet Replacement Project (WT)

Resolution No. NS-29,689 was adopted authorizing the Water Director to sign a Construction Installment Sale Agreement with the California State Water Resources Control Board for the Newell Creek Inlet/Outlet Replacement Project in a form approved by the City Attorney.

Contract Amendment No. 2021-01 with HDR, Inc. for Program Management Services for Water System Capital Improvement Projects (WT)

Motion carried authorizing the City Manager to execute Contract Amendment No. 2021-01 with HDR, Inc. for Service Order No. 6 in the amount of $7,010,373 in a form to be approved by the City Attorney.

PROPOSED MOTION: Motion to accept the City Council actions affecting the Water Department.

ATTACHMENTS: None.

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Water Department

Water Commission
7:00 p.m. – June 1, 2020
Council Chambers/Zoom Teleconference
809 Center Street, Santa Cruz

Summary of a Water Commission Meeting

COVID-19 ANNOUNCEMENT: This meeting was held via teleconference ONLY.

In order to minimize exposure to COVID-19 and to comply with the social distancing suggestion, the Council Chambers will not be open to the public. The meeting may be heard remotely via telephone by following the directions listed below.

PUBLIC COMMENT AND ORAL COMMUNICATIONS:
If you wish to comment on items 1-8, please see information below:

Call at the start of the item.

- **Call any of the numbers below. If one line is busy, try the next one.**
  - 1-669-900-9128
  - 1-346-248-7799
  - 1 253-215-8782
  - 1-301-715-8592
  - 1-312-626-6799
  - 1-646-558-8656

- Enter the meeting ID number: **977 6938 2537**
- When prompted for a Participant ID, press #.
- Press *9 on your phone to "raise your hand" when the Chair calls for public comment.
  - It will be your turn to speak when the Chair unmutes you. You will hear an announcement that you have been unmuted. The timer will then be set to three (3) minutes.
  - You may hang up once you have commented on your item of interest.
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NOTE: If you wish to listen to the meeting and don't wish to comment on an item, you can do so at any time via one of the three methods above.

Call to Order: 7:01 PM

Roll Call

Present: D. Engfer (Chair), S. Ryan (Vice Chair), J. Mekis, A. Páramo, D. Schwarm, W. Wadlow, L. Wilshusen

Absent: None

Staff: R. Menard, Water Director; C. Coburn, Deputy Director/Operations Manager; K. Crossley, Senior Professional Engineer; M. Kaping, Management Analyst; H. Luckenbach, Deputy Director/Engineering Manager; N. Dennis, Acting Finance Manager; M. Zeman, Engineering Associate; K. Fitzgerald, Administrative Assistant III;

Others: 1 member of the public (unidentified caller)

Presentation: None.

Statement of Disqualification: None.

Oral Communications: None.

Announcements: None.

Consent Agenda

1. City Council Items Affecting the Water Department

2. Water Commission Minutes From May 4, 2020

3. FY 2020 3rd Quarter Financial Report

4. Updated Water Commission Work Plan

5. Santa Cruz Water Program Update

Can staff comment on what types of impacts are affecting revenues as a result of the COVID-19 Shelter-In-Place order?

- The data we have to define specific impacts are preliminary but we are tracking. In general, and as expected, the COVID-19 related Shelter-In-Place order resulted in significant decreases in water use in the commercial sector as well as for UCSC and a slight uptick in residential use. When considering the overall impacts of this information, however, it is important to recognize the water use in both the commercial sector and at UCSC account for only about a quarter of system water use. So while the reductions in these use categories are significant, the overall impact of these reductions are muted by their limited contribution to total water use.

How do the billings from last year compare to this year?

- Water revenues are down in comparison to last year and we are carefully monitoring the trends associated with billing receipts versus amounts billed.

Why would the value engineering process for the Graham Hill Water Treatment Plant Concrete Tanks Replacement project result in an increase of $5 million as discussed on page 3.3?

- It wasn't actually the value engineering that raised the price for the project, and the value engineering process completed on the 75% design did come up with several cost-saving estimates. The price increase was the result of finishing the project design to 100% which provided detailed information on which to estimate cost.

Can you explain what's going on with the ASR planning section?

- The ASR Planning project has been used to track all components of the ASR evaluation. What is shown in this quarterly report is ASR Planning (that contains all existing contracts), as well as new projects for each groundwater basin, and the project components within each basin. This better reflects progress being made in evaluating ASR and the schedule of implementation of projects.
- For the current fiscal year, all accounting is appearing in ASR Planning (e.g., the $3.3 million figure). Starting in FY2021 funds will appear in the appropriate project.

Are the techniques that will be used to maintain water quality in the Loch Lomond reservoir during construction at the Newell Creek Inlet/Outlet Pipeline Replacement proven to be effective?

- Yes, these techniques are proven and are considered the industry standard.

Ms. Menard commented the working draft of the Water Commission Work Plan includes an item on the agenda for the 8/24/20 meeting that will discuss bathymetry results for Loch Lomond, the planned dredging in the lake as part of the construction of the new intake structure and the installation of the silt curtain and additional water quality protection measures that will be used to ensure that water from Loch Lomond is available as needed for supply needs.

Can staff explain how COVID-19 related safety measures are being implemented at active construction sites?

- Contractors for each construction site are developing and submitting for City review employee health and safety plans and will be implementing these plans to minimize and manage health risks for all personnel working at construction sites. Typical actions included routine health screening, maintaining social distancing when possible, the use of personal protection equipment when social distancing is not possible, frequent handwashing, and face coverings.

Commissioner Mekis moved the Consent Agenda. Commissioner Ryan seconded.

No public comments were received.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

Items removed from the Consent Agenda - None

General Business

6. Discussion Water Pricing Objective Exercise

Ms. Menard introduced Mr. Sanjay Gaur from Raftelis Consulting for the presentation and discussion on priority setting for Water Pricing Objectives. This conversation was a continuation of the May 4th discussion.

Ms. Menard commented on the "Administrative Ease" objective reminding Commissioners that, although Commissioners generally rated that objective as a lower priority, the reality is that with

the current utility billing system, there are and will continue to be constraints on the administrative complexity of rate structures.

What is there that we do not know from the department side that could make "Administrative Ease" a higher priority?

- The main issue involves how complicated the rate structure is to implement in the City's billing system and how more complicated rate structures are to implement over time. When a new rate structure is introduced, there is a transition phase that involves programming and testing the system to make sure that the new structure has been accurately configured in the system and the system can reliably support its implementation. Additionally, when customers begin receiving bills with the new rate structure, call volumes to Customer Services increase significantly. The more complicated the rate structure is, the more time consuming it is to explain to customers and for customers to adapt to. These factors are considered when designing rate structures and contribute to either higher or lower levels of "ease of implementation" and "ease of administration."

How does this process compare to the process during the last rate study and at what point during this process will we determine if a new rate structure is necessary?

- Mr. Gaur responded that during the last process, we included the "Promotes Efficiency" objective and while water efficiency is always important, water usage in Santa Cruz is already so low that we decided to not include it as a pricing objective for this study.
- Mr. Gaur responded that a new rate structure is not necessarily required but the cost of service analysis will help determine what rates are needed. One of the main challenges with the current rate structure is that while it addresses affordability, it does not provide revenue reliability.
- Ms. Menard added that Mr. Gaur's presentation last month included a summary of the pricing objectives prioritized in 2016. The current plan is to complete the Cost of Service Analysis, which uses data from a recent "base year" (in this case 2019), and then present that analysis to the Water Commission at its August 24th meeting. Work on water rate structure development would not begin until early in calendar year 2021, which will allow time for better information about the economic forecast to be considered. In the summer and fall of 2020, the Department will be working on financial planning scenarios and revenue forecasting, which is a necessary input to moving from the Cost of Service Analysis to rate structure design and rate development.

Could the large variances between Water Commissioners' ranking responses be explained by the similarity between some of the objectives?

- Yes. As noted in Melissa Elliot's presentation and discussion of pricing objective "policy themes," the Water Commission's rating of the top six or eight objectives did include a greater diversity of rankings than was the case for the lower-ranked objectives. Regrouping the Water Commission top-ranked objectives under three policy themes,
    - Ensures water for essential use is affordable to all customers
    - Maintains transparency and equity for capital and water reliability needs
    - Provides sufficient revenues to meet operating, capital and customer service level needs,

  results in conveying all the Water Commission high priority pricing objectives without getting tangled up in trying to figure out how to align everyone's individual rankings.

Why was Prop 2018 not included as a pricing objective?

- Mr. Gaur responded that compliance with Prop 2018 is a foundational element that needs to be addressed and complied with regardless of other considerations.

In evaluating affordability, will we consider how our rates compare to the rates of neighboring districts?

- We can certainly survey neighboring districts, however, we need to remember that our rate structure must be based on what it costs to provide the service to our customers.

Is there a standardized amount that is considered to be affordable?

- Mr. Gaur responded: Not necessarily. Different metrics, such as income levels and other costs of living statistics, would need to be analyzed to determine what is affordable for each city or district while being compliant with Prop 218.

Are wastewater fees included in property taxes for unincorporated areas of Santa Cruz?

- Yes.

Is water prioritized last to be credited when a utility bill is paid?

- Yes, though it is not clear as to why this is or when it was established. We are working to determine whether this approach was adopted for policy reasons or for computer programming reasons, and the reason makes a difference. In further internal conversations, it seems that the main concern would be when an account is closed without completed payments, as would be the case when a bankruptcy is filed.

What determines whether we choose a rate stabilization fee or an increase in the fixed charge?

- The rate stabilization reserve addresses revenue instability. Looking at historic revenue instability and our current rates will help inform our options for maintaining our financial stability.

Can we see comparisons with other agencies' reserve funds when we discuss rates?

- Yes, we will ask Public Financial Management to provide some examples.

Can Mr. Gaur clarify his statement on lowering the rate stabilization charge?

- Mr. Gaur responded that he meant if a fixed charge were to be implemented then the need for a rate stabilization charge could decrease but perhaps not disappear entirely.

Commissioners commended the Water and Public Works Departments for opting not to implement the planned FY21 rate increases due to the economic hardships and uncertainties the community is facing due to the coronavirus pandemic.

Will the County choose to not implement their rate increase for wastewater since the City is deciding to implement increases?

- We cannot comment because we do not maintain that relationship with the County.

Will this material be brought to City Council for approval?

- Since we are not taking action at this time, we will not be presenting this material to the Council until we have made more progress on the cost of service analysis and the Long Range Financial Plan.

No public comments were received.

Commissioner Schwarm moved the staff recommendation on Item 6. Commissioner Wadlow seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

7. FY 2021 Operating and Capital Budgets

Ms. Menard introduced Ms. Nicole Dennis, Ms. Heidi Luckenbach, Ms. Malissa Kaping, and Mr. Dave Culver for the discussion of the FY 2021 Operating and Capital Budgets.

How has hiring for new positions been affected by the coronavirus pandemic?

- The City has implemented a hiring freeze, but we were lucky enough to receive authorization to fill several key positions within our Department. We are not seeing any other measurable impacts of the hiring freeze at this point.

Will the Water Department be effected by a City-implemented furlough?

- At this time, a personnel services cost reduction of ten percent, likely in the form of a furlough, is being implemented city-wide, including in all enterprise funded functions. Provisions of the reduction approaches are being negotiated with each of the City's various bargaining units, so Water Department staff in the Mid-Managers, Supervisors, and SEIU Service Worker bargaining units will be affected by the agreements reached for each group. Enterprise funded operations are being included, both because their employees are part of City-wide bargaining units and because there is an assumption that the COVID-19 Shelter-In-Place orders have or will affect revenues available to enterprise funded operations as well as general funded operations.

There is information in the materials about what the rate impacts of adding $10 million in debt are, and the answer provided is that the cost to the average customer would be about $1.00 per month. Is there a requirement for debt service costs to be charged as part of the fixed charge associated with any rate structure?

- No. The result was expressed that way for simplicity.

It appears that the operating budget over the last several years would be nearly flat if the chart just compared actual budgets for each of the last several years. Is this correct?

- Yes.

Why does the management reserve seem to be increasing?

- The two sets of numbers that make up the management reserve compare the management reserved carries in the CIP budget that was done in February and the pro forma which was updated in March. The FY 21 CIP budget estimates were based on a total management reserve of $20 million which was insufficient to provide recommended 10% coverage through the year 2025. The pro forma is now carrying a ten percent management reserve for Program projects in each year and the management reserve was increased to $50 million which covers years beyond 2025.

On page 7.12, why does the bond issuance in year 2021 include the issuance for 2022?

- Bond sales typically include some relatively substantial fixed issuance costs, and it can be more cost-effective to borrow what we need for a two or three year period rather than go to the bond market every year.

Commissioners complimented staff for the thoroughness of the budget and CIP materials presented.

No public comments were received.

Commissioner Paramo moved the staff recommendation on item 7. Commissioner Ryan seconded.

VOICE VOTE: MOTION CARRIED
AYES: All
NOES: None
ABSTAIN: None

8. Presentation on the Graham Hill Water Treatment Plant Facility Improvement Project

Ms. Menard introduced Mr. Matt Zeman and Mr. Kevin Crossley for the presentation on the Graham Hill Water Treatment Plant Facility Improvement Project (FIP).

Ms. Menard commented that the Department has worked with the City Attorney to retain an independent attorney, Richard Mah of Hunt-Ortmann, in Southern California, who specializes in construction law, particularly legal issues involving alternate project delivery or best value procurement. Mr. Mah has been retained to provide additional legal support for the FIP and the proposed progressive design-build procurement process and other projects as needed.

What is the risk of investing time and resources into pursuing the WIFIA loan should we not be selected?

- Being selected for a loan has more to do with having a viable project. Most of those who submitted letters of interest were being invited to apply for the loan. While it is possible that funding availability can change, Department staff strongly believe that the benefits outweigh the risks.

How are environmental constraints being addressed during the design phase?

- Our environmental and design team consultants will meet during the design phase to develop strategies to address possible constraints, however, we recognize that not all constraints can be identified during the design process. Addressing unknown problems will continue to be a challenge that we will have to manage throughout the project, and with the designer and the builder engaged concurrently in both the design and environmental phases we should have the best team in place to solve these challenges.

Commissioners complimented staff for the outreach efforts to the neighbors who reside near the GHWTP.

Ms. Luckenbach commented that staff from the Department and HDR, Inc. have been meeting with state regulatory agencies to discuss and receive feedback on planned projects.

How is staff approaching security for the public tours during construction?

- We will be limiting access to areas that are deemed safe, but we are still developing security and safety protocols.

Is the reducing CECs the main goal of the facility improvement plan?

- No. The FIP will provide a substantially more robust treatment process that will allow the Department to treat more turbid water, reduce disinfection byproducts and CECs in treated water and build in the ability to more readily adapt to changing regulations in the future.

How will the treatment plant continue to operate during construction?

- It is not uncommon for water or wastewater facilities to need to continue to operate throughout major facility rehabilitation and replacement projects. As the GHWTP is the City's sole surface water treatment facility, planning the construction phasing to accommodate ongoing plant operation is a key issue and we will be consulting with an experienced industrial treatment plant contractor early in the construction process to work with us in developing the construction phasing plan.

No public comments were received.

No action was taken on this item.

Subcommittee/Advisory Body Oral Reports

9. Santa Cruz Mid-County Groundwater Agency (MGA)

The MGA will have its next meeting on June 18th to approve the next year's budget and take action to retroactively ratify the submission of the first annual report, submitted to the State in April, and will conduct business on implementation activities with the basin.

10. Santa Margarita Groundwater Agency (SMGWA)

The SMGWA met on May 28th and discussed acceptable groundwater quality and groundwater levels. San Lorenzo Valley Water District representatives abstained from two decisions regarding groundwater quality and levels.

Director's Oral Report: The July 6th, 2020 Water Commission meeting has been reinstated and the meeting agenda will include items on the meter replacement program, approaches on the water shortage contingency plan, and the probability of shortages. The August 24th meeting will include an item on the cost of service analysis.

A chart on North Coast Agriculture water consumption was sent and shows that its current consumption matches winter consumption.

With respect to promoting water efficiency, we will continue to convey to the community that is always in good taste to use water wisely and that water efficiency is valued.

Adjournment Meeting adjourned at 10:06 PM.

Respectfully submitted,

Katy Fitzgerald, Staff

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WATER COMMISSION
INFORMATION REPORT

DATE: 06/30/2020

AGENDA OF: July 6, 2020

TO: Water Commission

FROM: Heidi Luckenbach, Deputy Director/Engineering Manager

SUBJECT: Water Supply Augmentation Strategy, Quarterly Work Plan Update

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RECOMMENDATION: Receive information regarding the status of the various components of the Water Supply Augmentation Strategy and provide feedback.

BACKGROUND and DISCUSSION: Following the completion of the Water Supply Advisory Committee (WSAC) process, the City Council accepted the Final Report on Agreements and Recommendations that included a detailed Implementation Plan and Adaptive Management Strategy. The WSAC work was adopted as part of the 2015 Urban Water Management Plan and is currently referred to as the Water Supply Augmentation Strategy (WSAS) that includes an Implementation Work Plan (Work Plan).

As per the Final Agreements and Recommendations of the Water Supply Advisory Committee (WSAC), the Water Commission shall receive quarterly updates on the status of the various elements of the recommended plan. This is the eighteenth quarterly update.

The content and format of this report will continue to be modified to provide a comprehensive overview of the progress, findings, obstacles, etc. of the various elements of work. Outstanding requests by the Commission include:

- Provide an update of the Phase 2 Recycled Water Study once alternatives have been selected. See below.
- Develop a spreadsheet that shows all the supply projects and portfolios of projects with all the metrics related to decision-making. This will begin with the work of Dr. Robert Raucher. See below.
- Provide an ongoing narrative and/or spreadsheet showing the nexus between water supply projects specifically spelled out in the WSAC report and other projects and studies being performed by the Water Department. Ongoing.

The Water Supply Augmentation Strategy (WSAS) consists of the following elements as defined by the WSAC:

- Element 0: Demand Management. Implementation of the Long Term Water Conservation Master Plan is foundational to the WSAS.

- Element 1: In Lieu. This alternative could include the sale of water to other agencies with or without the assumption of additional water back to the City during droughts.
- Element 2: Aquifer Storage and Recovery. Evaluations of both the Mid-County and Santa Margarita Groundwater Basins are being conducted.
- Element 3: Advanced Treated Recycled Water or Seawater Desalination.

Progress and status of the various WSAS-related work are described in detail below as well as that of other projects related to but not explicitly mentioned in the WSAS.

ELEMENT 0: DEMAND MANAGEMENT

Overview: Element 0 of the City's Water Supply Augmentation Strategy consists of ongoing demand management activities. The primary goal of this element is to generate an additional 200 to 250 million gallons per year in demand reduction by year 2035 from expanded water conservation.

Summary: Since the last quarterly report in March 2020, the Water Conservation section has been actively working on the following projects:

- Water Shortage Contingency Plan update
- Preparation of final water supply outlook
- Implementation of WaterSmart Software platform for all customers
- Working in cooperation with Customer Service on the meter replacement program

Staff also participated in a DWR workshop March 9 on the new requirement for suppliers to conduct an annual water supply and demand assessment (WSDA) pursuant to Senate Bill 606. Staff made a presentation for that workshop that summarizes our perspective and experience to inform the development of WSDA guidance.

Since April and the start of the Covid-19 shelter-in-place, several Conservation staff have been working in the field in cooperation with meter shop staff on the meter box field inventory project. This important fieldwork is being conducted in order to get a full picture of the condition of all meter boxes. The fieldwork consists of GPS locating, and photo and written documentation of the condition of each box. The goal is to have a full inventory of all meter boxes in the service area to facilitate meter replacement by having a better understanding of the location and condition of existing infrastructure.

The following is a summary of the status of selected measures in the Water Conservation plan:

No. 5 Home Water Use Reports. An independent evaluation of the effect of the first year of this program has been completed. Although the evaluation of the program saw no water savings as a direct result of the water reports overall, there was some evidence of savings within a customer group of high water users who signed up for the customer portal. Staff decided to continue a program with WaterSmart in order to provide a customer portal and water reports only to the highest users. Welcome letters were sent in late May and early June to all customers that did not participate in the WaterSmart program in 2019; all customers have now been invited in sign up for the portal. Water reports will be sent to a small group of approximately 2,000 of the highest-using single-family customers. In addition, hourly interval water use data from the Badger meter

system was integrated into WaterSmart so that it is visible in the WaterSmart portal. As customers' meters are replaced, their new data will appear in the portal. Thus far the WaterSmart program has received very positive feedback from customers.

No. 6 Water and Energy-Saving Assistance Program. This program offers free toilet replacement to qualifying low-income households, in conjunction with free weatherization and energy efficiency services funded by PG&E. This program has been successfully implemented in our service area. The shelter in place orders have temporarily halted fieldwork for several months but as of early June, the work has resumed. Staff is preparing a contract amendment to continue this program through the next fiscal year.

ELEMENT 1: WATER TRANSFERS AND/OR WATER EXCHANGES

Overview: This work is considering the feasibility of sending excess City surface water to neighboring agencies for the purpose of passively recharging the groundwater basin(s). In-Lieu is now described as follows.

- Water Transfers: Selling water to neighboring agencies for the purpose of augmenting their supplies and possibly (passively) recharging the groundwater basin.
- Water Exchanges: Negotiating an agreement whereby water provided to neighboring agencies would, by allowing the groundwater basins to recharge, provide additional groundwater back to the City during water supply shortages.

Summary: As previously mentioned, due to the lack of rainfall this past winter, water supply conditions and the water available from the north coast sources, Phase II of the water transfers had been put on hold and was formally ended on January 31, 2020. The total volume of water that had been transferred up until that date was 33.7 million gallons and was averaging roughly 0.6 million gallons per day.

Next Steps: City and SqCWD staff have engaged in discussions regarding the potential extension of the current water transfer agreement that is to expire at the end of the year.

Contract Update(s)
Purchase Order Agreement with SqCWD for cost sharing of Water Quality Sampling and Development of Water Quality Results Technical Memorandum (TM).

- PO Opened: January 2017
- Project Partner(s): Soquel Creek Water District
- Engaged Stakeholders: None at this time.
- Original PO Amount: $60,000
- PO Change Order (Phase 2 WQ Monitoring): $45,000
- Amount Spent: $70,787
- Amount Remaining: $34,213

ELEMENT 2: AQUIFER STORAGE AND RECOVERY

Overview: Aquifer Storage and Recovery (ASR) is being evaluated as a form of actively recharging the groundwater basin(s). Work in this area includes the Mid-County Groundwater Basin (MCGB) and the Santa Margarita Groundwater Basin (SMGB).

Summary: The City contracted with Pueblo Water Resources (Pueblo) in 2016 for Phase I of the three-phase program to evaluate the feasibility (and potentially implement) of ASR as a water supply alternative. Phase I consists of higher-level feasibility work; i.e., site-specific injection capacity and geochemical analyses, groundwater modeling and development of a pilot test program. Phase II includes the pilot testing and Phase III is project implementation.

The groundwater modeling component of Phase I is ongoing and will continue through the completion of Phase II as part of the iterative process to ensuring project success. In the 2018 Summary of Initial Groundwater Modeling Results memo, Pueblo described initial modeling scenarios 1.0 – 9.0. Since that time, and based on model results, several additional scenario iterations (Scenarios 8.1 – 8.3) and new scenarios (Scenarios 10.0 – 11.3) have been performed in an effort to refine an implementable project. As can be seen in Attachment 1, Scenarios 1-9 are intended to cover the MCGB, SMGB, and a combined project. The exceptions are Scenarios 8.1, 8.2 and 8.3 that were intended to gain more information specific to the performance of the MCGB. Only scenarios using the MCGB groundwater model have been performed to date. Scenarios reflect different climate and water demands scenarios, and different ASR well configurations.

Below is additional information about the new suite of modeling scenarios.

<u>Scenarios 8.1 through 8.3</u>

- Rationale: To gain additional information on ASR performance in the MCGB using different combinations of wells along with combining SqCWD's Pure Water Soquel Program (PWS).
- Climate Period: GFDL2.1 A2 climate change scenario used during WSAC
- Water Demand: 3.2 billion gallons per year as developed during the WSAC timeframe
- Total ASR injection rates: 3.0 million gallons per day (mgd)
- Total ASR extraction rates: 3.0 or 4.1 mgd
- Wells: 6 to 7 simulated new ASR wells
- Findings:
    - Scenario 8.1 added PWS
    - Scenario 8.2 uses the 4 existing Beltz wells converted to ASR wells plus 3 new ASR wells
    - Scenario 8.3 combines Scenario 8.2 with PWS.
    - All 3 of these new scenarios were deemed technically infeasible due to excessive water levels at some of the simulated ASR wells.
    - Additional scenarios with smaller capacities were considered under this scenario group, but were not run due to the direction to look at different demand scenarios (2016-2018 demands), climate scenario (Catalog Climate) along with developing a City ASR project that focused on the Beltz area only.

Scenarios 10.0 through 10.2

- Rationale: To understand a project's feasibility under the Catalog Climate that was used in the basin's Groundwater Sustainability Plan (GSP).
- Climate Period: Catalog Climate future climate change scenario
- Water Demands: 2016 – 2018 demand projections of 2.6 BG
- Total ASR injection rates: varies
- Total ASR extraction rates: varies
- Wells: 4 existing Beltz Wells converted to ASR wells
- Findings
    - Scenario 10.0 had a total injection capacity of 1.5 mgd and extraction capacity of 2.5 mgd. This scenario was found to be infeasible due to excessive injection and extraction water levels at some of the simulated ASR wells; i.e., water levels in ASR wells rose above ground surface at times and also dropped below the top of the well screens.
    - Scenario 10.1 consisted of reduced injection/extraction capacities of 1.0/1.5 mgd, respectively, and was found to be feasible with acceptable injection and extraction water levels at all of the simulated ASR wells.
    - Scenario 10.2 consisted of Scenario 10.1 combined with PWS, and was also found to be technically feasible.

Scenarios 11.0 through 11.3

- Rationale: To develop a "Beltz Only" ASR project that focused on leveraging existing infrastructure by converting the existing Beltz wells to ASR wells and installing new ASR wells all within the City's service area.
- Climate Period: GFDL2.1 A2
- Water Demands: 2016 – 2018 demands projections of 2.6 BG
- Total ASR injection rates: 0 (for establishing the baseline), and 2mgd
- Total ASR extraction rates: 0 (for establishing the baseline), and 3mgd
- Wells: 4 existing Beltz wells converted to ASR wells plus 3 or 4 new ASR wells
- Findings:
    - Scenario 11.1 added 3 new ASR wells to the existing Beltz wells and was found to be infeasible due to excessive injection water levels at some of the simulated ASR wells.
    - Scenario 11.2 added a fourth new ASR well to existing Beltz wells to spread out the same injection capacity and was found to be feasible as injection and extraction water levels were acceptable.
    - Scenario 11.3 consisted of Scenario 11.2 combined with the PWS project and was found to be infeasible (as configured) due to injection well interference effects between the ASR and PWS wells and excessive injection water levels at some of the simulated ASR wells.

As mentioned above, groundwater modeling will continue through the completion of Phase II as part of an iterative process to ensure project success. To that end, future modeling iterations may involve re-running some scenarios with actual data obtained from the piloting of ASR at the City's Beltz wells. In addition, City staff and PWR have begun preliminary discussions about the benefits of installing a seawater intrusion barrier well along the coast. These discussions may lead to developing a new scenario that includes both a new seawater intrusion barrier well along

with potentially operating the existing Beltz wells differently and at higher extraction rates knowing that protective water levels for seawater intrusion will be met and maintained with the inclusion of the barrier well.

Since the conclusion of the fieldwork conducted under Phase II work at the Beltz 12 well site on July 31, 2019, staff from the City and Pueblo Water Resources evaluated the data collected and worked to generate a Technical Memorandum (TM) documenting results of the pilot. The final TM was prepared and submitted to the City by Pueblo Water Resources in June 2020. As documented in the Final TM, and as previously mentioned, the following recommendations are made:

- Beltz 12 should be converted to a permanent ASR facility.
- For planning purposes, a long-term operational ASR capacity of approximately 335 gpm injection and 455 gpm recovery pumping should be assumed for Beltz 12.
- Permanent ASR operations at the well should include ongoing monitoring for geochemical interactions during aquifer storage and ASR recovery, with particular focus on long-term water-quality interactions such as solubilization/leaching of metals and DBPs.

Following Council approval in December 2019, the Water Department entered into a professional services contract with Pueblo to perform an ASR pilot at Beltz 8 and to construct two monitoring wells under that contract. The two new monitoring wells were drilled at the Beltz 8 site and Pleasure Point between January and March 2020. Similar to the Beltz 12 ASR Pilot Test, the test program at Beltz 8 involves three repeated ASR cycles of operations and monitoring, each of larger volume and duration than the preceding cycle. To date, Pueblo has completed Cycles 1 and 2 of the Beltz 8 pilot test. Cycle 3 was scheduled to begin in May 2020 but was postponed until further data collection and evaluation could be completed. While the results from the monitoring data collected at Beltz 8 were within the range of historical values and below the maximum contaminant level (MCL), the Arsenic (As) concentrations measured at the monitoring wells during Cycle 2 was unexpectedly high. The table below shows Arsenic results obtained from Beltz 8 and the newly installed monitoring well (MW) prior to Cycle 1, through Cycles 1 and 2, and after the conclusion of Cycle 2.

As shown by the increasing values through the various stages of Cycle 2 recovery, the data from Beltz 8 could indicate that an adverse leaching or dissolution reaction may be occurring. Pueblo is continuing to monitor and collect samples from the wells to investigate the results. In addition, Pueblo is analyzing aquifer mineralogy and performing geochemical modeling to assess the situation and provide a recommendation for the Beltz 8 Pilot Test Program. Because the values seen from Cycles 1 and 2 of the pilot for Beltz 8 were below the MCL (10 ug/L), it is too early to determine if arsenic concentrations will be a fatal flaw for ASR moving forward at this well or if concentrations will "peak" at some point and drop off before they exceed the MCL. Results from the mineralogy analysis and geochemical modeling combined with results seen from Cycle 2 will ultimately inform the City's decision to proceed with Cycle 3 of the pilot along with moving forward with ASR at this well. These efforts are expected to be complete in August 2020.

Date/Time	Description	As (ug/L)	
		Beltz 8	MW
3/18/20 11:00	Pre-Injection	1.4	29
3/23/20 10:10	Cycle 1 Recovery (0%)	0.59	
3/23/20 14:00	Cycle 1 Recovery (25%)	1.1	
3/23/20 18:00	Cycle 1 Recovery (50%)	1.4	
3/23/20 22:00	Cycle 1 Recovery (75%)	1.6	
3/24/20 2:00	Cycle 1 Recovery (100%)	3.1	
3/24/20 6:00	Cycle 1 Recovery (125%)	3.8	
4/8/20 12:00	Cycle 2 Storage	0.41	
4/15/20 11:10	Cycle 2 Recovery (0%)	1.2	6.5
4/16/20 10:20	Cycle 2 Recovery (25%)	4.2	
4/17/20 10:30	Cycle 2 Recovery (50%)	5.5	
4/18/20 10:30	Cycle 2 Recovery (75%)	6.0	
4/19/20 10:30	Cycle 2 Recovery (100%)	5.8	
4/20/20 10:30	Cycle 2 Recovery (125%)	4.9	
4/21/20 10:30	Cycle 2 Recovery (150%)	4.5	7.4
4/29/20 11:20	Post-ASR Testing (interim)	3.5	6.5

Sustainable Groundwater Management Act
No major activities; update to be provided elsewhere in the agenda for this meeting.

Next Steps: Work over the next few months will include:

- Continue working with Pueblo on water quality data evaluation and geochemical modeling to fully assess water quality concerns associated with the preliminary arsenic results seen during Cycles 1 and 2 of the Beltz 8 pilot test.
- Obtain recommendation(s) from Pueblo for the continuation of the Beltz 8 Pilot Test Program.

- Continue working with Pueblo to determine the need for any future modeling scenarios using data obtained from piloting along with developing a scenario that involves the installation of a saltwater intrusion barrier well.
- Continue with discussions on climate change modeling efforts that are used in the HCP (Habitat Conservation Plan) process, ASR groundwater modeling and the work being done for both the Santa Cruz Mid-County Groundwater Agency and the Santa Margarita Groundwater Basin.

Contract Update(s):

Consultant: Pueblo Water Resources (Pueblo) – Phase I

- Contract Signed: February 2016
- Project Partners: None at this time.
- Engaged Stakeholders: SqCWD, County of Santa Cruz, Scotts Valley Water District, San Lorenzo Valley Water District
- Original Contract Amount: $446,370
- Contract Amendment No. 1: $377,615
- Contract Amendment No. 2: $35,000
- Amount Spent: $725,324
- Amount Remaining: $123,661
- Status: On schedule for work in MCGB and delayed approximately 18 months for work in the SMGB.

Consultant: Pueblo Water Resources (Pueblo) – ASR Phase II – Beltz 12 ASR Pilot Test

- Contract Signed: October 2018
- Project Partners: None at this time.
- Engaged Stakeholders: SqCWD, County of Santa Cruz
- Original Contract Amount: $458,085
- Amount Spent: $429,491
- Amount Remaining: $28,594
- Status: On Schedule.

Consultant: Pueblo Water Resources (Pueblo) – ASR Phase II – Beltz 8 ASR Pilot Test

- Contract Signed: January 2020
- Project Partners: None at this time.
- Engaged Stakeholders: SqCWD, County of Santa Cruz
- Original Contract Amount: $1,051,945
- Contract Amendment No. 1 (Increase in monitoring well depth): $47,172
- Amount Spent: $876,861
- Amount Remaining: $222,256
- Status: Delayed – Duration unknown at this time.

ELEMENT 3: ADVANCED TREATED RECYCLED WATER AND DESALINATION

Overview: Advanced Treated Recycled Water and Desalination were included within the same Element with the intention that, following feasibility-level work, just one would proceed for further evaluation and preliminary design.

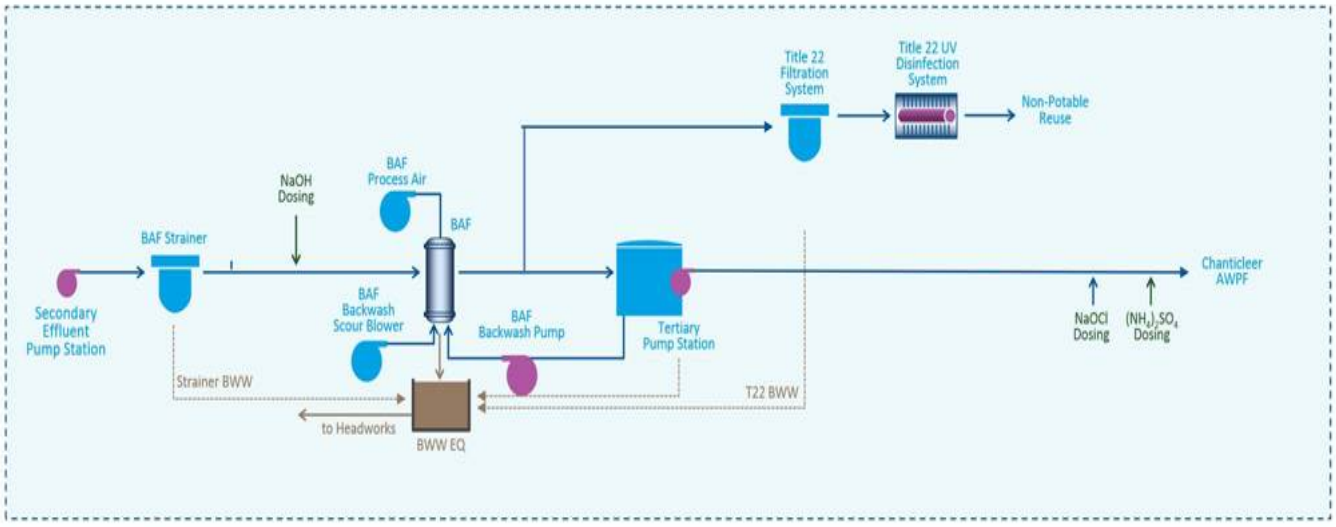
Summary: Kennedy Jenks was hired in 2016 for Phase 1 of a study that evaluated beneficial uses of treated wastewater as both a water supply as well as other options such as irrigation that may or may not result in supply augmentation. Phase 1 was a fairly broad study that developed supply augmentation alternatives to sufficient levels of detail to be able to compare and contrast with the desalination alternative. In November 2018, City Council took action to prioritize recycled water over desalination.

Phase 2 is building on the work developed in Phase 1 by adding a higher level of detail to those alternatives showing potential for augmenting water supply. Work began on Phase 2 following the Council approval in December 2019. In May 2020, City Council approved Contract Amendment Number 1 that, as described in more detail in last quarter's report, incorporates the work of Drs. Robert Raucher and Casey Brown. Phase 2 will incorporate the current status of projects by both Scotts Valley Water District and Soquel Creek Water District.

At this time the study is focused on non-potable reuse for irrigation and indirect-potable reuse for groundwater injection. A notable difference between Phase 1 and Phase 2 is the ongoing work by Soquel Creek Water District on their Pure Water Soquel (PWS) Program.

The PWS Program includes a bifurcated treatment system with tertiary pretreatment occurring at the City's Wastewater Treatment Facility (WWTF) and advanced purification occurring at their Chanticleer site. During Phase 1 of the recycled water study, an assumption was made that the tertiary pretreatment occurring at the WWTF would produce up to 1,800 acre-feet per year (afy) of Title 22-quality water, permittable through the state as disinfected for purposes such as outdoor irrigation and as high-quality source water to the PWS advanced purification system. Due to source water quality issues related to the secondary-treated wastewater from the WWTF, specifically nitrite, ammonia and TOC, the PWS treatment facility at the WWTF will produce Title 22, disinfected tertiary recycled water for 300 afy for City uses and 1,500 afy of tertiary treated, non-disinfected recycled water that will be treated further at the Chanticleer to purified standards for the PWS Program with microfiltration, reverse osmosis, UV light and advanced oxidation. The tertiary pretreatment for the 300 afy stream and the 1,500 afy will be different.

Nitrite, ammonia and TOC will impact the downstream advanced purification processes. To address these water quality issues, the PWS Program is pursuing nitrifying Biological Aerated Filter (nBAF) to reduce nitrite, ammonia and TOC, meet regulated target discharge levels and eliminate the need for a costly Ozone system. The nBAF would be located at the Santa Cruz WWTF (see schematic below) and would receive secondary effluent as the source water supply. A chlorine residual will be maintained after the nBAF to help mitigate biological growth in the PWS pipeline.



The implications for Santa Cruz's use of recycled water include the following:

- **Recycled Water Direct from Santa Cruz WWTF:** The PWS is planning to construct a separate 300afy tertiary treatment and disinfection system (e.g. granular media filter and ultraviolet (UV) light) at the Santa Cruz WWTF to serve recycled water to La Barranca Park, a truck fill station and for in-plant uses. The Recycled Water Feasibility Study (RWFS) will evaluate the cost-effectiveness of increasing the capacity of this system to serve other non-potable customers directly from the Santa Cruz WWTF.
- **Tertiary Water from the PWS Pipeline:** The tertiary water in the PWS pipeline would not meet Title 22 disinfected requirements for non-potable reuse because nBAF is not an approved Title 22 tertiary treatment process and the chlorine residual would not meet Title 22 disinfection requirements. The RWFS will evaluate the cost-effectiveness of a turnout along the PWS pipeline to send tertiary water to Pasatiempo, where their existing satellite treatment facilities could be used to produce recycled water for golf course irrigation. No other users are identified along the PWS pipeline because of the need for costly satellite treatment systems, and Pasatiempo currently receives source water from the City of Scotts Valley. This alternative would be practical only with regional partnerships in North Santa Cruz County.
- **Recycled Water Direct from Chanticleer Site:** The microfiltration system at the PWS's advanced water treatment plant at the Chanticleer site could be expanded to produce tertiary Title 22 disinfected water for non-potable reuse or purified water for indirect potable reuse. The RWFS is evaluating options to serve nearby customers or recharge the groundwater basin in the Beltz Wellfield.

The District and their consultant team are working to complete a 30% design of treatment facilities by mid-July and a 100% draft Title 22 Engineering Report by August that defines treatment facilities to meet regulatory requirements for non-potable reuse in Santa Cruz and indirect potable reuse in the Mid-County Groundwater Basin. The City and District continue to work closely on all aspects of the PWS project to increase future opportunities for interested parties.

Figure 1 of Attachment 2, includes an updated market assessment of potential irrigation sites, with modified infrastructure to reflect the need to achieve additional pretreatment at the

Chanticleer site to meet Title 22 requirements for irrigation. As described above, Phase 1A projects would build on the small Title 22 disinfected system at the WWTF; Phase 1B projects would require a satellite treatment system to meet Title 22 requirements and therefore are only including Pasatiempo and Scotts Valley. Phase 3 would require expansion of the microfiltration system at the Chanticleer site to meet Title 22 disinfected requirements and could then be used for irrigation at DeLaveaga Golf Course, etc.

Based on preliminary estimates, the current cost of potable water for Pasatiempo Golf Course and DeLaveaga Golf Course is greater than the estimated life cycle unit cost for recycled water. Serving recycled water to these golf courses would offset approximately 335 afy of potable water with a local, drought-resistant supply. Depending on the future rates for recycled water, these customers may realize cost savings over time if connected to recycled water. Pasatiempo could utilize its existing satellite facility to store and treat tertiary water from the PWS pipeline. DeLaveaga could be served by a new pipeline from the Chanticleer site, assuming expansion of the PWS MF system with the addition of disinfection (e.g. UV).

In addition to using recycled water for irrigation, the project team is currently evaluating three alternatives that would build on the PWS Program by constructing additional groundwater injection wells with, or without, an ASR project. See Figure 2 in Attachment 2. There may be efficiencies in this type of partnering and, as will be informed by the work of Drs. Raucher and Brown, there may be a point in time when recycled water is more abundant and reliable than surface water. Below are the details of the three alternatives being considered in the MCGB.

Indirect-potable Alternatives/Groundwater Injection MCGB (Attachment 2 Figure 2)

- 2.A: Injection at well sites SC2, SC4, and/or HB5 and extraction at Beltz Wells #8, 9, 10 and 12 (No ASR and injection limited by expansion capacity at Chanticleer)
- 2.B: Injection at well sites J, D, F, B and extraction at Beltz Wells #8, 9, 10 and (No ASR; limited by expansion capacity at Chanticleer)
- 2.C: Injection at well sites SC2, SC4, and/or HB5 and extraction at Beltz Wellfield ASR extraction wells (with ASR and injection limited by basin capacity and ASR operations)

Similarly, Figure 3 of Attachment 2 shows preliminary concepts for indirect potable alternatives/groundwater injection in the SMGB.

Next Steps: 1) The Kennedy Jenks team is working with the ASR team to develop a series of groundwater modeling scenarios that will further the understanding of using injection wells for recycled water as opposed to surface water. 2) The Commission had requested staff to present work to the Water Commission following Task 3.1 Develop and Evaluate Phase 2 Alternative. Due to some scheduling issues with the Commission and consultants, this is being deferred until a future meeting, (likely August or October). See below for work on the Water Supply Augmentation Implementation Plan.

Contract Update(s):

Consultant: Kennedy Jenks, Recycled Water Feasibility Study – Phase 2

- Contract Signed: December 20, 2019
- Project Partners: City Public Works

- Engaged Stakeholders: Scotts Valley Water District, Soquel Creek Water District, County of Santa Cruz
- Original Contract Amount: $260,000
- Contract Amendment No. 1: $496,205
- Amount Spent: $50,198
- Amount Remaining: $706,205
- Schedule: RWFS December 2020; Water Supply Augmentation Implementation Plan August 2021

OTHER

The projects and programs reported below were not specifically identified in the WSAC work plan but are related in various ways. Staff is in the process of organizing this quarterly report in a manner that clearly describes the relationship, or nexus, between these items with those above. This is a work in progress and the format of this quarterly report will continue to evolve.

Development of Water Supply Augmentation Implementation Plan
When last reported, this work was planned to be performed under a contract with Corona Environmental Consulting team. Dr. Raucher has since left this firm and the contract is now structured as two sub-consultant contracts, one with Raucher, LLC and the other with Hydrosystems Group at the University of Massachusetts.

City Council approved this contract amendment in May 2020. Staff is currently working with Drs. Raucher and Brown to kick off the climate change work. Their start date was delayed by approximately two months to accommodate the submission of a grant application with the US Bureau of Reclamation through the WaterSMART Drought Response Program.

Source Water Monitoring
No new update.

Santa Cruz Water Rights Project
This project involves the modification of existing City water rights to increase the flexibility of the water system by improving the City's ability to utilize surface water within existing allocations. In addition to improved flexibility, the success of this project is necessary to facilitate future water supply projects.

Work is continuing on the development of the Draft Environmental Impact Report (EIR), with current work still focusing on refining the scope and extent of the project and associated impact modeling. An update presentation to the Water Commission is planned for October 2020.

Revised change petitions reflecting the updated project description and other requested information are expected to be completed and submitted to State Water Resources Control Board in July. The Draft EIR is expected to be circulated for public review in fall 2020, and the Final EIR is expected to be completed in spring 2021.

Outreach and Communication
Outreach during this quarter has included the following:

- Monthly email newsletters to WSAC email list.
- Water Supply Advisory Committee Recommendations Annual Report, year 4

FISCAL IMPACT: None.

PROPOSED MOTION: Receive information on the Water Supply Augmentation Strategy, Quarterly Work Plan Update.

ATTACHMENT(S):
1. ASR Groundwater Model Scenario Summary
2. Preliminary Concepts for Non-Potable and Indirect Potable Reuse Projects

Groundwater Modeling Scenario Summary

Scenario No.	Assumed City Demands	Climatic Period	Project Type	GW Basin	Infrastructural Capacity (mgd)		Number of Wells		Project Description / Comments
					Inj	Ext	Inj	Ext	
1.0	WSAC Developed	1985 - 2015 (historical)	In-Lieu Only	SMGB	NA	2.0	NA	2	Recharge flows maximized for ea basin based on the In-Lieu demands of each District (i.e., essentially simulates ea basin being utilized in isolation, not conjunctively).
				MCGB	NA	2.0	NA	2	
				Combined	NA	4.0	NA	4	
2.0			ASR Only	SMGB	2.75	2.0	9	9	Recharge and recovery flows split 50/50 between basins.
				MCGB	2.75	2.0	6	6	
				Combined	5.5	4.0	15	15	
3.0			In-Lieu plus ASR	SMGB	1.0	2.0	3	3	Recharge and recovery flows split 50/50 between basins.
				MCGB	0.5	2.0	2	2	
				Combined	1.5	4.0	5	5	
4.0		1973 - 1984 (historical)	In-Lieu Only	SMGB	NA	1.9	NA	2	Recharge and recovery flows apportioned to ea basin proportionally based on relative District demands.
				MCGB	NA	2.1	NA	2	
				Combined	NA	4.0	NA	4	
5.0			ASR Only	SMGB	2.75	2.0	9	9	Recharge and recovery flows split 50/50 between basins.
				MCGB	2.75	2.0	6	6	
				Combined	5.5	4.0	15	15	
6.0			In-Lieu plus ASR	SMGB	0.75	1.89	3	3	In-Lieu recharge and recovery flows apportioned to ea basin proportionally based on relative District demands. ASR flows split 50/50
				MCGB	0.75	2.11	2	2	
				Combined	1.5	4.0	5	5	
7.0		2020 - 2070 (GFDL2.1 A2 Climate Change scenario)	In-Lieu Only	SMGB	NA	1.9	NA	2	Recharge and recovery flows apportioned to ea basin proportionally based on relative District demands.
				MCGB	NA	2.1	NA	2	
				Combined	NA	4.0	NA	4	
8.0			ASR Only	SMGB	3.0	3.0	9	9	Recharge and recovery flows split 50/50 between basins.
				MCGB	3.0	3.0	6	6	
				Combined	6.0	6.0	15	15	
8.1				*MCGB*	*3.0*	*3.0*	*6*	*6*	*Combo run of Scenario 8.0 w/PWS*
8.2					*3.0*	*4.1*	*7*	*7*	*Beltz wellfield only. Combination of converted existing 4 wells and 3 new wells.*
8.3					*3.0*	*4.1*	*7*	*7*	*Combo run of Scenario 8.2 w/PWS*
9.0			In-Lieu plus ASR	SMGB	1.0	3.1	3	3	In-Lieu recharge and recovery flows apportioned to ea basin proportionally based on relative District demands. ASR flows split 50/50.
				MCGB	1.0	3.4	3	3	
				Combined	2.0	6.5	6	6	
10.0	'16 - '18 Demands Projection	2020 - 2070 (Catalog Climate Change scenario)	ASR Only	MCGB	1.5	2.5	4	4	Existing Beltz wells only, converted to ASR.
10.1					1.0	1.5	4	4	*Reduced per-well injection/extraction capacities based on results of Scenario 10.0.*
10.2					1.0	1.5	4	4	*Combo run of Scenario 10.1 w/PWS*
11.0		2020 - 2070 (GFDL2.1 A2 Climate Change scenario)			0.0	0.0	0	0	Revised Baseline No-Project scenario (updated Beltz pumping)
11.1					2.0	3.0	7	7	Existing Beltz wells converted to ASR + 3 new ASR wells
11.2					2.0	3.0	8	8	Existing Beltz wells converted to ASR + 4 new ASR wells
11.3					2.0	3.0	8	8	ASR Scenario 11.2 combo with PWS

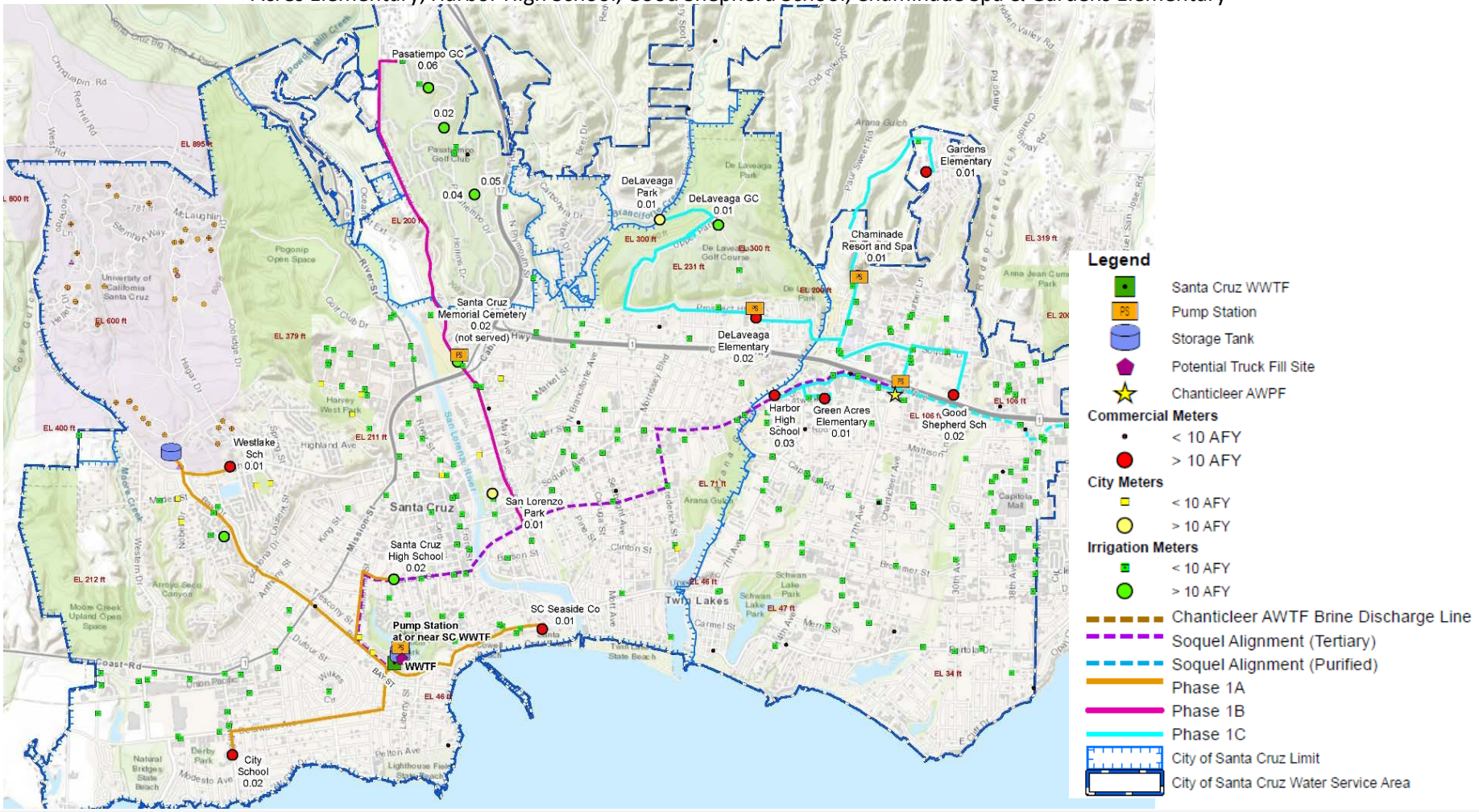
Notes:

1 - Cummulative Losses at end of scenario

Attachment 2, Figure 1: Preliminary Concept | Non-Potable Reuse/Irrigation

Potential Non Potable Reuse Customers (0.74 MGD ave annual demand)

Baseline (0.13 MGD)	Title 22 RW from SC WWTF to serve in Plant uses, La Barranca Park, Neary Park and Filling Station
Alt 1A (0.21 MGD)	Title 22 RW from SC WWTF to SC Seaside, City School, Sta Cruz High School & UCSC
Alt 1B (0.17 MGD)	Tertiary (non-Title 22) water from turnout from Pure Water Soquel Pipeline to Pasatiempo GC (satellite treatment)
Alt 1C (0.23 MGD)	Title 22 RW from Chanticleer Site to DeLaveaga GC, DeLaveaga Park and DeLaveaga Elementary, Green Acres Elementary, Harbor High School, Good Shepherd School, Chaminade Spa & Gardens Elementary



Attachment 2,

Figure 2: Preliminary Concept | Indirect Potable Reuse/IPR Mid-County Groundwater Basin

Indirect Potable Reuse (IPR) – City Led Groundwater Replenishment in Mid-County GW Basin

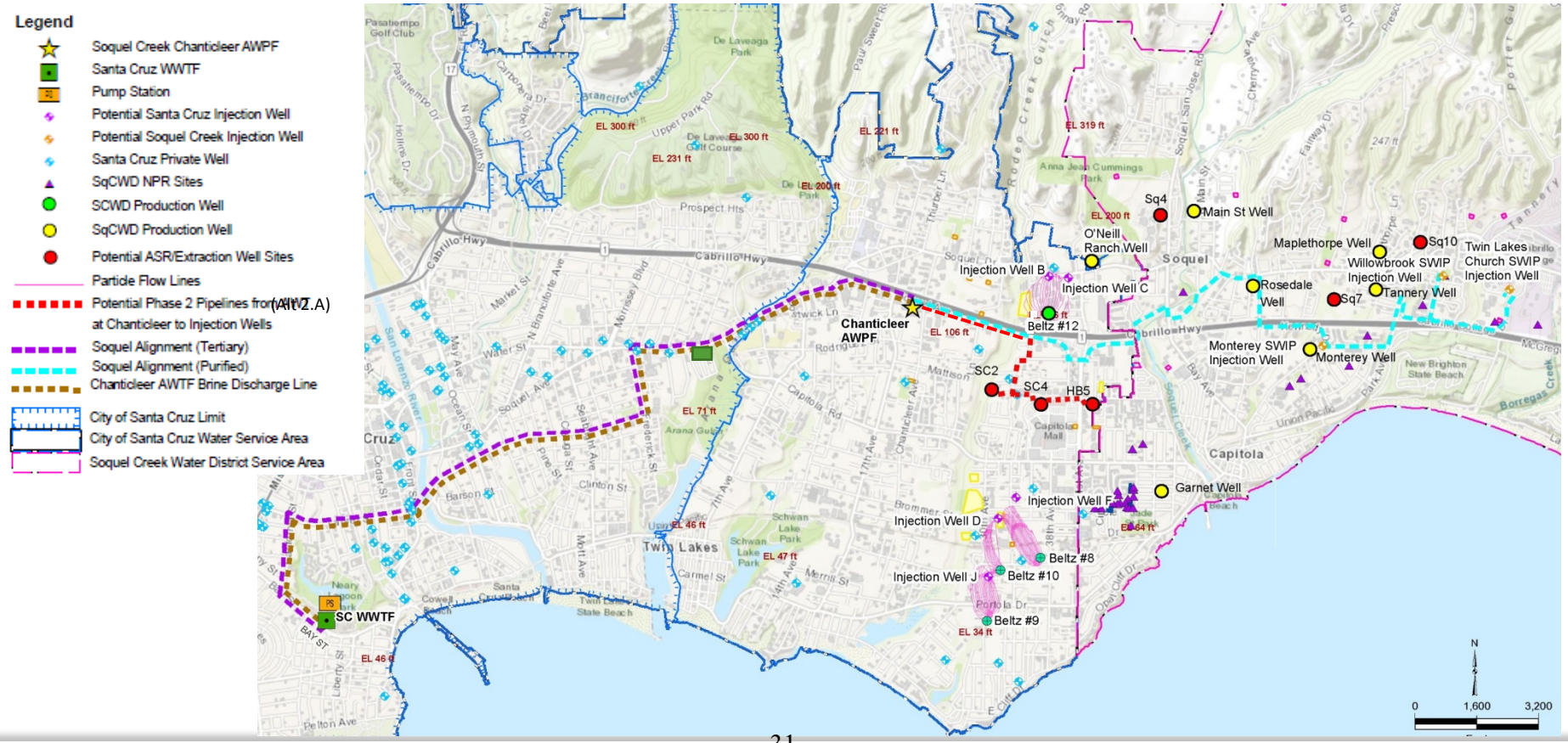
Expanded Purified Treatment at Chanticleer AWTF for injection at Beltz Wellfield. RWFPS Phase 1 estimated recharge potential in Beltz Wellfield to be 2.0 mgd. Average annual recharge to be updated based on PWS project, groundwater modeling and Aquifer Storage and Recovery (ASR) project findings.

Alternatives:

Alt 2.A IPR Injection at well sites SC2, SC4, and/or HB5 and extraction at Beltz Wells #8, 9, 10 and 12 (No ASR; limited by expansion capacity at Chanticleer)

Alt 2.B IPR Injection at well sites J, D, F, B and extraction at Beltz Wells #8, 9, 10 and (No ASR; limited by expansion capacity at Chanticleer)

Alt 2.C IPR Injection at well sites SC2, SC4, and/or HB5 and extraction at Beltz Wellfield ASR extraction wells (with ASR; limited by basin capacity and ASR operations)



Attachment 2,
Figure 3: Preliminary Concept | Indirect Potable Reuse/IPR Santa Margarita Groundwater Basin

Indirect Potable Reuse (IPR) – Regional Groundwater Replenishment Project in San Margarita GW Basin

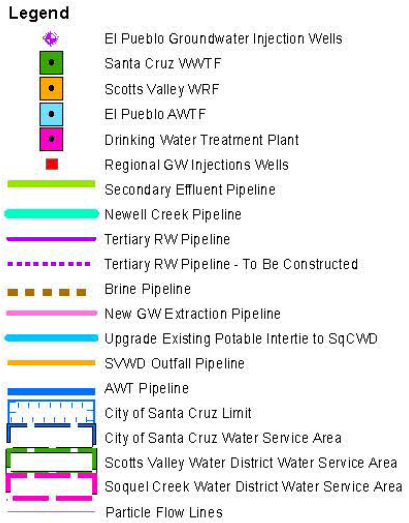
Expanded Tertiary Treatment at Santa Cruz WWTF or Chanticleer AWTF for injection at El Pueblo Site and/or Hansen Quarry. RWFPS Phase 1 estimated recharge potential to be up to 3.2 mgd for SCWD and 0.5 mgd for SVWD. Average annual recharge to be updated based on PWS project, groundwater modeling and ASR project findings.

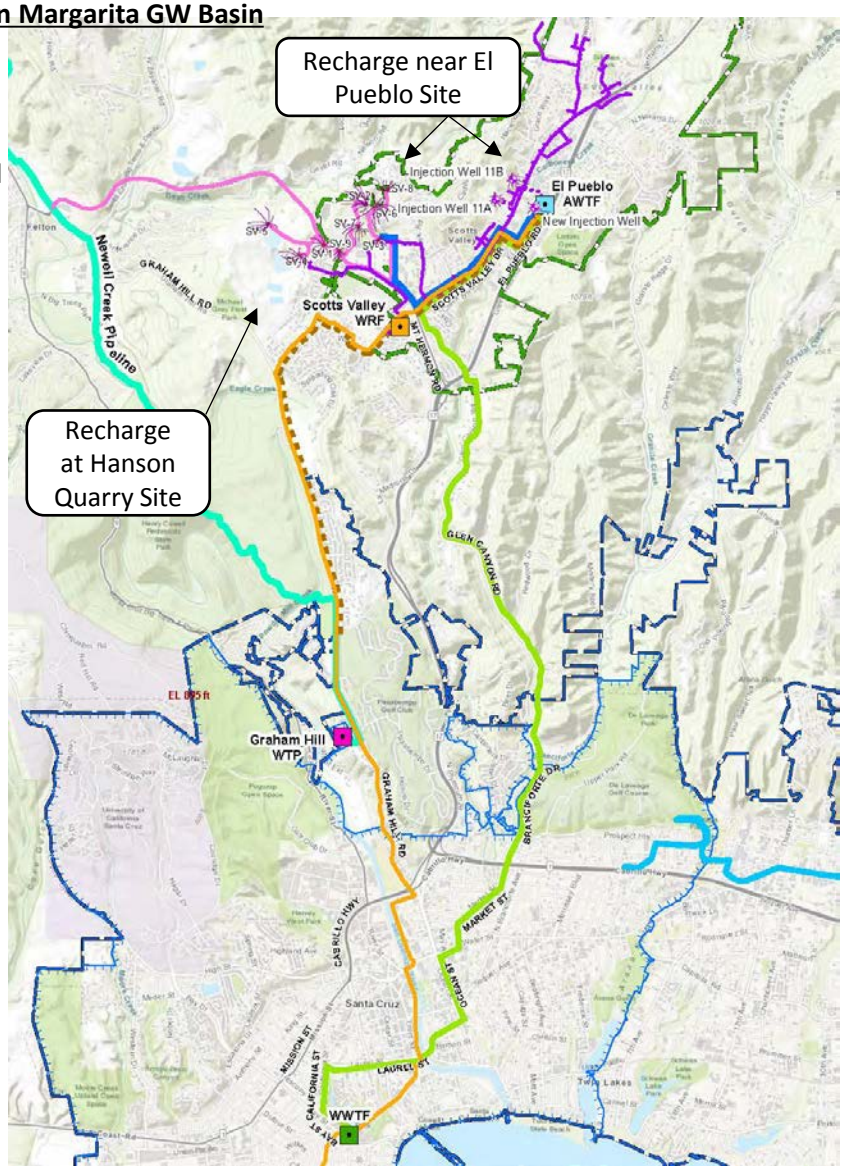
Alternatives:

Alt 3.A Tertiary water from Santa Cruz WWTF conveyed to new AWTP at El Pueblo with recharge nearby

Alt 3.B Purified water from AWTP Chanticleer Site conveyed to Scotts Valley (limited to 1,500 AFY)

Alt 3.C Tertiary water from Santa Cruz WWTF conveyed to new AWTP with recharge at Hansen Quarry





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WATER COMMISSION
INFORMATION REPORT

DATE: 7/1/2020

AGENDA OF: July 6, 2020

TO: Water Commission

FROM: Kyle Petersen, Customer Service Manager

SUBJECT: Meter Replacement Program

RECOMMENDATION: That the Water Commission recommend the contract meter replacement installation option to City Council as the optimal approach for replacing the water system's aging meters.

BACKGROUND: The Water Department reads and bills over 27,000 meters every month, generating approximately $35M in annual volumetric water sales. With over 90% of water revenue collected based on the amount of water used, meters are a critical asset. However, as meters age, their accuracy diminishes. The average age of the meter population is now 17 years with an expected useful life of 20 years. Under-registering and stuck meters contribute to approximately $2M in lost volumetric water sales revenue. Additionally, Meter Shop staff commit most of their time to retrieving failed meter reads through an individual "go-back" meter reading process, leaving only about one week per month to perform maintenance on the system metering assets. Lastly, the presence of stuck and under-registering meters is contributing to inequitable water charges between customers as the backlog of meter failure grows.

DISCUSSION: In anticipation of oncoming meter failure rates, the Water Department contracted with Jacobs last year to assess the feasibility of replacing the metering system. The key finding of this assessment was that the cost of replacing the system in a short period of time was less than the cost of replacing meters over time as they failed. This finding was made, in large part, because the Department could achieve significant savings in purchasing meters at wholesale prices for a defined project (as opposed to paying retail prices for ad hoc replacement over time). Following this assessment, the Department recently asked Jacobs to identify several options for *how* to replace the meter system. Jacobs identified three replacement approaches and evaluated each based on the cost, duration, and risk of the approach. The following table summarizes Jacobs' findings:

Replacement Approach	Cost	Duration	Risk
Contract Installation: contract with a third-party meter installer to replace the City's aged and failing meter population using local labor force.	Lowest	Shortest	Low
Augmented Workforce: hire temporary employees to replace the City's aged and failing meter population as part of a program that the City executes and fully manages.	Moderate	Moderate	High
In-House Labor: The City of Santa Cruz's water meter staff continues its current practices and replaces meters and drive-by radios as they fail.	Highest	Longest	Highest

The chief advantage of contract installation is found in the efficiency of having an installer execute and manage a full replacement project. Proven workflows minimize costly data handling errors and shorten the overall project to quickly remediate failing meters and recover lost volumetric water sales revenues. In addition to evaluating contract meter installation and comparing it to other alternatives, Department staff also asked Jacobs to identify opportunities for using local labor as part of the installation contract. Jacobs indicated that a local hire strategy for a contracted meter replacement project was very feasible.

As a prelude to a potential meter replacement project, the Water Department is conducting a system-wide meter box field inventory with the goal of being able to more efficiently deploy meter replacement resources based on having GIS location data for all system meter boxes. To implement the meter box field inventory, the Water Department is currently recruiting up to 20 additional temporary employees to complete an inventory over the next few months. These same employees could expect to leverage their knowledge and experience acquired on the inventory project to transition to roles on the contract installation team.

Given the basic advantages of contract installation, and the opportunity to create local labor opportunities during a meter replacement project, staff recommends contract installation as the optimal approach for replacing the water system's aging meters.

FISCAL IMPACT: The Meter Replace Project is funded at $12.5M in the FY 2021 CIP budget. Because this project's timeline is being accelerated, additional funding will be identified from within the existing CIP budget for FY 2021 and made possible by refining timelines and cost estimates for other projects.

PROPOSED MOTION: Motion to recommend contract meter installation to City Council as the optimal approach for replacing the water system's aging meters.

ATTACHMENTS:
1. Jacobs Meter Replacement Strategy Memorandum, 5/18/2020

Jacobs

Memorandum

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Subject	**Meter Replacement Strategy**	**Project Name**	Meter Replacement Strategy
Attention	Kyle Petersen	**Project No.**	D3354800
From	Joe Ball, Jaason Englesmith		
Date	May 18, 2020		
Copies to	Jim Keller, Ben Pink		

1. Introduction

As a continuation of Jacobs work with the City of Santa Cruz (City), Jacobs has prepared this technical memorandum to outline three potential meter replacement options for the City to consider. After the City's review and selection of its preferred option, Jacobs will develop a detailed implementation plan for the selected option.

2. Background

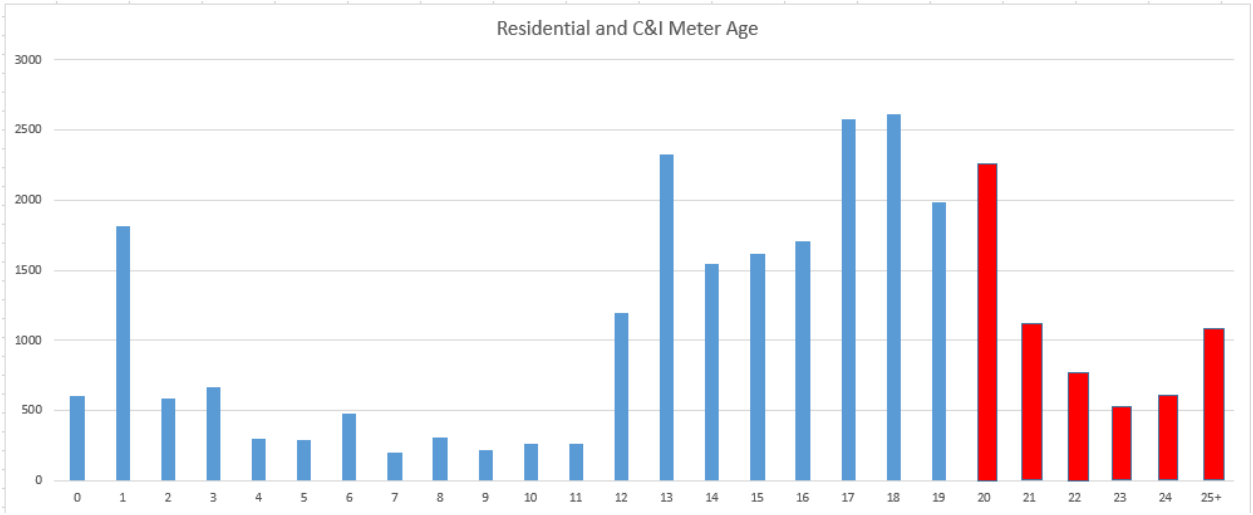
In 2018 the City of Santa Cruz contracted with Jacobs Engineering Group to perform a Feasibility Study to investigate the viability of a system-wide replacement of the City's metering infrastructure to solve a variety of challenges. In March of 2019 Jacobs issued its Advanced Meter Infrastructure Feasibility Study final report, which demonstrated a strong justification for a system-wide meter replacement. Recognizing the need to replace the existing infrastructure, the City has since asked Jacobs to identify and assess several implementation options, taking into account local conditions and opportunities.

As of May 2020, the critical challenges the City faced and documented in 2019 which include stuck, aging and under-performing meters, failing drive-by meter reading radios and inability to collect 100% of each month's billing reads have gotten worse. The following key findings from Jacob's Feasibility Study have been updated as of April 2020.

- The average age of the existing meter population is now 17 years and 20% of the population exceeds the expected useful life of 20 years. (See Figure 1)
- Stuck meters now account for approximately $330,000 of lost revenue each year in the residential sector alone.

- The disparate meter reading systems and failing equipment is a drain on current resources and hindering the staff's ability to efficiently acquire accurate reads and leaves little to no time for higher-value tasks.
- 50% of the meter shop staff's time is spent retrieving meter reads and replacing failed meters and AMR radios.

Figure 1: Current Meter Population - Quantity (y-axis) and Age (x-axis)



3. Meter Replacement Recommendations

Based on Jacobs' experience we believe the City has three options (listed below) to replace its failing meter infrastructure without a system-wide approach. Regardless of the chosen path forward, the current contract with Badger Meter should be renegotiated to achieve economies of scale for both meter pricing and ongoing connectivity charges. Likewise, as the City enters into an exclusive agreement with Badger, the migration away from Sensus devices and termination of the Sensus contract would be required.

1. **Contracted Installation:** Contract with a third-party meter installer to replace the City's aged and failing meter population using local labor force.
2. **Augmented Workforce:** Hire temporary employees to replace the City's aged and failing meter population as part of a program that the City executes and fully manages.
3. **In-house Labor:** The City of Santa Cruz's water meter staff continues its current practices and replaces meters and drive-by radios as they fail.

4. Meter Replacement Options

Contracted Installation: Contracting with a third-party meter installer to replace the City's aged and failing meters has several key advantages.

- The meter installer would utilize their proven replacement processes, automated field installation tools and installer training program to efficiently plan, execute and manage a full meter replacement project.
- The City can require the meter installer to hire its personnel for the project from the local labor pool contributing to the local economy at a much-needed time.
- The meter installers focused effort would allow them to complete the project in a much shorter time than utilizing the City's staff therefore reducing the amount of lost revenue due to aged and failing meters.

The meter installer would be responsible for managing all aspects of the meter replacement allowing the City's staff to focus on their day to day responsibilities. Experienced meter installation companies typically complete a replacement the size of the City's within 12 to 18 months, and the shorter replacement project will move the City's meter shop staff from its current emergency mode to a mode in which they can enhance its customer service and the water operations.

Cost: Lowest	Professional installers will be proficient with the installation of meters and associated equipment, reducing the effort required, but they will charge a premium for the service.
Duration: Shortest	Professional installation companies will want to move quickly and get the project done as efficiently as possible. A professional installation company will typical complete a project of this size in 12-18 months.
Risk: Low	Professional installation companies will have proven workflows for error checks and quality assurance. They will also assume the risk for incorrect installations and be required to resolve any customer issues.

Augmented Workforce: Hiring temporary employees to perform meter replacements has some similar advantages to contracted installation. The City can hire the contract workers from the local labor pool contributing to the local economy and the additional workers can focus solely on replacing meters, enabling the City to complete the system-wide replacement quicker than using its existing staff.

However, there are several disadvantages to be considered:

- While temporary employees will augment regular staff, the City's existing team will have to plan, execute and manage the replacement activities in addition to the day to day work. While the City's staff is very experienced, their expertise is with water operations and not specifically with systematic meter replacement or management of third-party meter installers.
- Without full focus on the meter replacement, there is the possibility of the replacement activities getting derailed by higher priority water operations work, lengthening the time frame for completion.
- The longer the replacement project the more lost revenue due to the aged and failing meter population. Due to the longer replacement project the City's staff will have to continue to operate inefficiently with disparate meter reading systems.

Cost: Moderate	Temporary employees will need training and management and won't be as efficient as professional installers. The risk of data/ entry errors could make the overall cost higher than contract installations and continued lost revenue could be significant.
Duration: Moderate	The time available for City staff to manage the temporary employees and train them is limited. Installations will likely take longer than the Contracted Installation scenario and will require additional field inspection for quality control.
Risk: High	Temporary employees with City management will lack the digital workflows required to effectively avoid data entry and installation errors. Extensive field inspection and data validation checks will be required to avoid customer impacts.

In-house Labor: There are no foreseen advantages to this option, with the City's staff continuing its current practices. There are several disadvantages ranging from lost revenue due to aged and failing meter assets, the stress of continuing to operate in emergency mode, no additional contribution to the local economy, etc. There is a real threat that the meter failures will accelerate as large populations (5000+) of 17 and 18 year old meters begin to fail and will exceed City staff's capacity to perform replacements.

Cost: Highest	Without having to hire additional resources, this scenario would appear to have the lowest initial cost, however the backlog of meter replacements

	will continue to grow, creating significant lost revenue and an overall sustainability problem. In addition, the impact of data errors, inefficient workflow, and potential staff turnover would contribute significantly to the overall cost.
Duration: Longest	City staff are already having a difficult time keeping up with replacements (half time reading, half time replacements). They are at capacity replacing 1500 to 2000 meters per year, which would take 15 years to complete.
Risk: Highest	Installation risk itself is not as high as the Augmented Workforce scenario, however the risk to the organization of falling behind on replacements and having continued stuck meters or estimated bills is very high.

5. Leverage City's Existing Efforts

The City is actively working to develop local labor opportunities with existing efforts like its meter box field inventory (MBFI) project. The MBFI project is the first phase of the City's larger system-wide meter replacement project. The Water Department has requested authorization to hire 20 temporary employees to support the MBFI work. The experience the temporary employees gain working on the MBFI project will be valuable as the next phases of the project develop. The Water Department would expect to able to offer the temporary employees the ability to transition to roles on the Contracted Installer's team, leveraging their knowledge and experience acquired working on the MBFI project.

6. Next Steps

This technical memorandum has provided three potential meter replacement options with their respective advantages and disadvantages and considerations for the City's review. Once the City has determined which option it is interested in pursuing, Jacobs can create a more detailed implementation plan for that selected option. The detailed plan will include the following:

1. Detailed execution plan
2. Replacement schedule with estimated cost
3. Defined roles and responsibilities
4. Estimated local labor resources
5. Replacement strategy

The City will be able to utilize the implementation plan to re-negotiate its contract with its existing meter manufacturer and to prepare for the next phase of the meter replacement project.

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WATER COMMISSION
INFORMATION REPORT

DATE: 7/1/2020

AGENDA OF: July 6, 2020

TO: Water Commission

FROM: Rosemary Menard

SUBJECT: Analysis of the Probability and Size of Potential Future Water Shortages

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RECOMMENDATION: That the Water Commission receive a presentation about the analysis of the probability and size of potential future water shortages and consider this analysis in providing feedback to staff on the demand reduction strategy to be used in the updated Water Shortage Contingency Plan that is currently being developed.

BACKGROUND**:** As a follow up to the discussion at the February Water Commission meeting about the data analysis for the Water Shortage Contingency Plan (Plan) update, staff was asked to provide some additional information that focuses on the supply side probabilities of water shortages.

As the February discussion is now several months in the past, the following information is provided to refresh Commissioner's memories about some of the key outcomes of the water use data analysis that has been conducted as part of the ongoing work to revise the 2009 Water Shortage Contingency Plan.

Attachment 1 is the presentation on the customer water use data analysis performed as part of the Water Shortage Contingency Plan update work that was provided to the Water Commission at its February 3, 2020 meeting. The presentation includes several key slides that provide relevant background for the analysis being presented here. Included are the following:

- Slide 15 – Water Use Comparison – Then versus Now;
- Slide 29 – Composition of Peak Season Usage by Priority (health and safety, versus commercial, versus irrigation);
- Slide 32 – Water Use Cutback Volumes under the revised Plan stages;
- Slide 34 – Details of Water Supply allocations to various customer classes in each Plan stage; and
- Slide 36 – Reductions in terms of millions of gallons per day, residential gallons per capita per day, and hundreds of cubic feet[1] per person per month.

[1] 100 cubic feet of water, the City's water billing unit = 748 gallons

Following the February Council meeting, staff was asked to help provide context to the somewhat alarming and draconian Water Shortage Contingency Plan data analysis by providing information about the potential frequency and size of water shortages. The idea was that having a supply-side analysis to go with the demand reduction work would help Commissioners have a better understanding of what the potential implications of implementing the Plan would be. For example, if most of the potential supply shortages were small and shortages didn't occur too frequently, then the potential need to make the kinds of cuts being suggested in the Plan would be less impactful to the community.

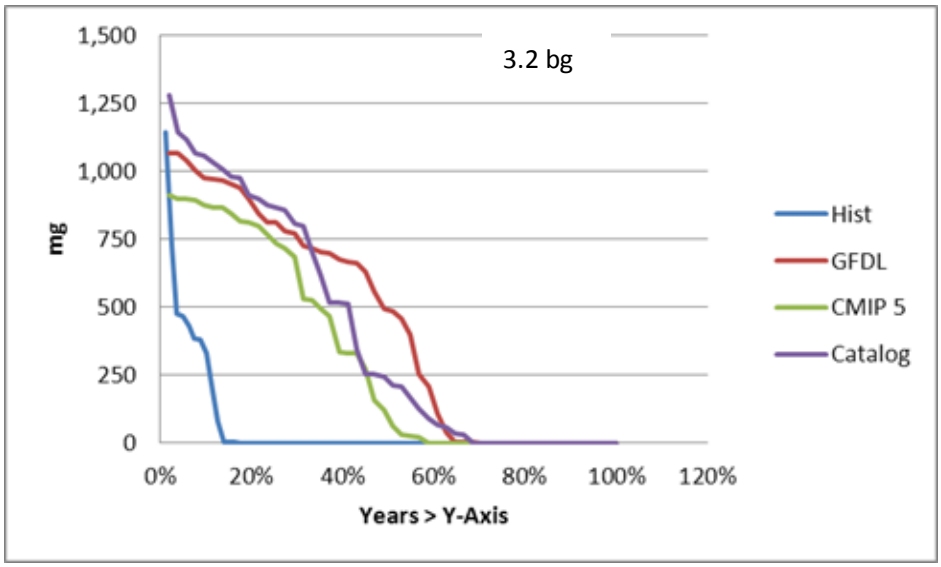
The good news is that we do have analysis and perspective to share on the supply side probabilities of shortages that will help provide this important context. Those who followed the work of the Water Supply Advisory Committee (WSAC) and also the ongoing work the Department has completed to implement the Council authorized WSAC recommendations will be familiar with some of this analysis. Attachment 2 is an excerpt from materials presented at the April 1, 2019 "tour de force" presentation for the Water Commission and the members of the former Water Supply Advisory Committee on the major progress that had been made. Slides 47 and 48 of the April 1, 2019 original presentation provide the information needed to connect supply-side analysis with demand-side analysis.

Supply Side Probability Analyses

The Water Department has a long history of using the Confluence® model to analyze the probability and size of shortages. For those not familiar with Confluence, it is not an operational model that is used to make day to day decisions about how to operate the system. It is a tool for forecasting and simulating operations. Attachment 3 is a Primer on Confluence which was provided as part of the April 1, 2019 Water Commission packet materials. The Primer describes how Confluence works, what its inputs are and how it develops its projections of shortages.

A major output of Confluence analyses is a graph showing the probability of a shortage and the size of a shortage. The explanation of two of those graphs – one using the 2015 long term demand forecast of 3.2 billion gallons per year, and the second using the 2.6 billion gallons per year demand experienced over the last several years. Below is a detailed interpretation of the graphs presented on Slide #48. To make it easier to follow, the graphs on page 47 have been cut and pasted into the text.

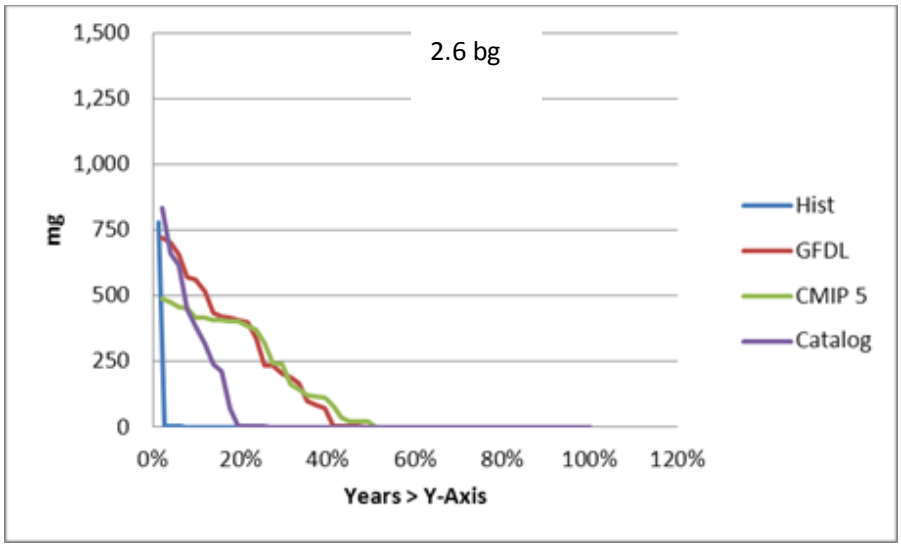
The 1st analysis is based on the 3.2 billion gallons long term demand forecast. The horizontal axis is the % of years in the hydrographic record (at least 50 years for the climate scenarios and 80 years for the historical record) and the vertical axis is the size of the shortage in millions of gallons.



Specifically,

- The blue line is based on the historical record and in that scenario a shortage occurs in (roughly) 15% of the years and no shortage occurs in roughly 85% of the years. Most of those shortages are small – 250 mg or less. Between 5 and 10% of the years have shortages of 250 mg to 500 mg. And in 2% of the years (or so) the shortages are bigger than 500 mg, with the worst shortage being 1.2 billion gallons.
- The next three lines (red, green, and purple) are based on various climate change scenarios.
    - The red line is based on the WSAC climate change scenario (GFDL 2.1) and is the warmest/driest of the three climate scenarios we've looked at. This climate scenario shows no shortages in about 35% of the years with shortages greater than 750 mg in about 35% of the years and greater than 1 billion gallons in about 20% of the years and a 1.1 billion gallon worst-case shortage.
    - The green line is based on the more recent CMIP 5 climate scenario and it is the most moderate climate scenario. It shows no shortages in 60% of the years and shortages greater than 500 mg in about 40% of the years. Shortages greater than 750 mg occur in about 25% of the years and the worst-case shortage is about 850 mg.
    - The purple line is the Historical Catalog climate scenario which was created from selecting warmer and drier years from the historical record along with a few more moderate years and randomizing them to create a new flow set. It shows no shortages in about 35% of the years, shortages greater than 750 mg in about 40% of the years and greater than 1 bg in about 20% of the year. The worst-case shortage in this scenario is the largest shortage of all the climate change scenarios at 1.3 billion gallons.

Switching to the other, lower 2016-2018 2.6 billion gallons per year demand scenario, the same kinds of results are shown below. Again, the horizontal axis is the % of years in the hydrographic record (at least 50 years for the climate scenarios and 80 years for the historical record) and the vertical axis is the size of the shortage in millions of gallons.



Specifically,

- The blue line is based on the historical record and in that scenario a shortage occurs in only a few percents of the years – say 2 or 3% at most. When the shortage does occur, the worst case is about 750 million gallons.
- The next three lines (red, green, and purple) are based on various climate change scenarios.
    - The red line is based on the WSAC climate change scenario (GFDL 2.1) and is the warmest/driest of the three climate scenarios we've looked at. This climate scenario shows no shortages in about 60% of the years and moderate shortages in the 250 to 400 million gallon range occurring in about 10% of the years.
    - The green line is based on the more recent CMIP 5 climate scenario and it is the most moderate climate scenario. It shows no shortages in 60% of the years and shortages of between 250 and 400 million gallons in about 15% of the years. In this scenario, the worst-case shortage is about 450 mg.
    - Finally, the purple line is the Historical Catalog climate scenario which was created from selecting warmer and drier years from the historical record along with a few more moderate years and randomizing them to create a new flow set. It shows no shortages in about 80% of the years, shortages between 250 and 500 mg in about 10% of the years and a worst-case shortage of about 800 mg.

Page 47 of Attachment 2 includes the updated gap analysis using the 2016-2018 demand level as well as the gap from the 3.2 billion gallons per year demand forecast.

Connecting the size and probability of Supply Shortages with Shortage Contingency Plan restriction levels

To connect the shortage probability information back to the demand side analysis from the Water Shortage Contingency Plan data analysis presentation staff created the table below. This analysis uses the 2.6 billion gallons per year level of demand that has been experienced over the last several years.

Here's a specific example of what the table tells us. Using the historical flow example, no shortage is predicted in 99% of the years. However, the model predicts that when a shortage occurs it's a huge on, and the degree of cutback required would be more than 50%.

Peak-Season Shortage Distributions with 2.6 bg Annual Demand				Level of Restriction Required	
Flows	Peak-Season Shortage		% of Yrs	Stage	Percent
	Percent	Vol (mg)			
Historical	0%	0	**99%**	None	0%
	<10%	1-152	**0%**	None	0%
	10-20%	153-304	**0%**	None	0%
	20-30%	305-456	**0%**	None	0%
	30-40%	457-608	**0%**	None	0%
	40-50%	609-760	**0%**	None	0%
	>50%	761+	**1%**	Stage 5+	≥50%
GFDL	0%	0	**61%**	None	0%
	<10%	1-152	**6%**	Stage 1	10%
	10-20%	153-304	**10%**	Stage 2	20%
	20-30%	305-456	**12%**	Stage 3	30%
	30-40%	457-608	**6%**	Stage 4	40%
	40-50%	609-760	**6%**	Stage 5	50%
	>50%	761+	**0%**	None	0%
CMIP 5	0%	0	**51%**	None	
	<10%	1-152	**18%**	Stage 1	10%
	10-20%	153-304	**6%**	Stage 2	20%
	20-30%	305-456	**20%**	Stage 3	30%
	30-40%	457-608	**6%**	Stage 4	40%
	40-50%	609-760	**0%**	None	0%
	>50%	761+	**0%**	None	0%
Catalog	0%	0	**80%**	None	0%
	<10%	1-152	**4%**	Stage 1	10%
	10-20%	153-304	**4%**	Stage 2	20%
	20-30%	305-456	**6%**	Stage 3	30%
	30-40%	457-608	**0%**	None	0%
	40-50%	609-760	**4%**	Stage 5	50%
	>50%	761+	**2%**	Stage 5 +	≥50%

For each of the scenarios, results have been divided into 10% chunks and shown the percent of the years in the scenario where that degree of shortage was predicted by model occurrence. The source data for the stage and percent reduction comes from Slide #32 from the February 3, 2020

Water Shortage Contingency Plan to indicate the stage of the plan that would need to be implemented in order to respond to the identified shortage.

DISCUSSION**:** In the various climate change scenario, no shortages are predicted many years, but reductions are required for moderate shortages (between 100 and 450 million gallons) in 28% of the years for the GFDL scenario, 44% of the years in the CMIP 5 scenario, and in 14% of the years in the Climate Catalog scenario. Larger shortages are predicted in 12%, 6% and 6% of the years for the three climate scenarios respectively.

In considering the analysis presented, it is important to take into account the following additional information:

1. **What do probabilities really mean?**

   We often hear people talk about 100 year storms or 1 in 10 year probabilities of this or that happening. For the percentage probabilities I summarized above, I want to clarify what we're really talking about. For example, a 1 in 10 year probability does not mean a thing will only happen 1 year in 10; it means that there is a 10% chance of the thing happening every single year.

   Discounting the Stage 1 shortages for the moment and focusing only on Stage 2 and Stage 3 sized shortages (153 to 450 million gallons per year), the table on the previous page tells us that the GFDL scenario has a 22% every single year of a shortage in that range. The CMIP 5 scenario tells us that this risk is 26%, and the Climate Catalog scenario tells us that this risk is 10% every year of having a shortage of this size.

   These probabilities are important because they help us focus on how near-term actions could provide significant benefits in helping us avoid frequent implementation of Stage 2 or Stage 3 type restrictions.

2. **How do modeling results relate to operating realities?**

   The modeling work that produces these results has the benefit of complete information for each water year included in the flow set. This means that the huge question of if/when it is going to rain and how much its going to rain have been answered so we can know exactly how big the shortage in any given year was.

   In real life, one of the big challenges of a system like Santa Cruz's is that our storage is so limited and we don't have the benefit of knowing when or how much it is going to rain next year as we're facing the coming year's dry season. A relevant and very accessible example is to think of this year. When we're trying to figure out what to do given the uncertainty of when it is going to rain, our basic fall back is to be conservative so as to be best positioned with respect to water supply should we have a second dry winter. This means that we typically will implement restrictions even when they turn out not to have been needed come November or December, because we really can't afford not to.

3. **How should we think about climate change scenarios?**

Much of the Department's work on water supply augmentation has considered various climate change scenarios so that staff can better understand the potential sensitivity of existing sources to potential changes in climate. While the analyses presented includes several climate change scenarios as well as information on model outcomes with historical flows, it is likely that none of the options presented really predict what the future will hold.

What has been experienced in recent years is more 'wet" and 'dry' years and fewer 'normal' years, a trend that includes more extreme conditions than has been the case historically. Whether this trend will continue, worsen or shift in some other way is unknown.

Work that is getting underway in the next fiscal year will look at the issue of climate change in a new way. Two of the existing scenario were developing using a "top down" process involving down-scaling of global climate models or assumption-based selection and randomizing of historical flows as was done in creating the "climate catalog."

4. What are the implications of this analysis for our Water Supply Augmentation Strategy?

Which brings us to the importance of our early action strategy for aquifer storage and recovery (ASR) in the Beltz wellfield. Increasing our supply by some of the medium size increments that might be possible could substantially reduce the number of instances of needing to implement various initial stages of water restrictions. This analysis makes it clear (to me at least) that while we're probably not going to be able to fully mitigate some of the larger potential shortages and their consequences – those worst-case scenarios – with actions in the next 5 years or so, we can certainly achieve reliability improvements that could reduce initiation of restrictions, which given how hardened our demand is, would be a highly desirable outcome.

5. What are the implications for our Water Shortage Contingency Plan demand reduction strategy?

Water Department staff have been working to update the 2009 Water Shortage Contingency Plan (Plan). The material provided below has been developed to describe and analyze demand reduction approaches that would be integrated into that Plan. The focus here is on demand reduction strategies for the Department's Single Family Residential Customers, with the expectation that following receipt of Water Commission feedback on the approach for Single Family Customers, appropriately aligned approaches for the other customer classes would be developed.

Water Shortage Contingency Plan 2020 Update – Shortage Allocation Strategy Part 1 Single Family Residential

A. General options for demand reduction in shortage plans

During a water shortage, ideally there should be a combination of demand reduction measures, communication actions, and internal utility actions working together to reduce

water demand.

In general, there are two main categories of demand reduction approaches. The first approach is to use *prescriptive measures* (rules, requirements, and prohibitions) for customers to follow. Such measures describe the ways customers can use water during a shortage. For example, many shortage plans contain progressively more stringent restrictions on outdoor irrigation such as limits on days per week, minutes per day, or time of day that customers are allowed to water.

The second approach to demand reduction during a shortage is to issue customer allocations. This method is to assign each customer a monthly allocation of water and then issue penalties (excess use fees) when the customer uses more than their allocation. There are forms of allocation systems for other customer groups as well, such as Commercial or Irrigation. For irrigation customers, allocations can be done using a water budget approach; during shortages, the water budget can be rationed down by a percent reduction approach. For commercial customers, allocation schemes take on a different form. Given that there are so many types of Commercial customers with a wide variety in operations and demand, it does not make sense to issue a general allocation for these customers as would be done with the residential sector. Instead, for commercial customers, the allocation could be based on the individual customer's water use history. For example, the allocation could be set at a percent reduction from the customer's prior 12 months of usage.

These two broad approaches, prescriptive measures and allocations, are not mutually exclusive. The existing WSCP contains prescriptive measures as well as customer allocations, with allocations coming into play at Stage 3 for residential customers. However, as discussed below, there may be reasons for why the 2020 WSCP update may recommend a single approach only.

B. Current demand characteristics

As presented to the Water Commission in February, the characteristics of water demand now are very different from the base year period of the existing shortage plan. The average annual demand, in the base period used for the existing plan (2003-2004) was 3.6 billion gallons. The base year period for this WSCP update is 2016-2019 and the average annual demand in this period was 2.6 billion gallons. In addition, there are approximately 10,000 additional people living in the service area in the new base year period.

Based on the new characteristics of water demand, it will clearly be harder now for customers to conserve because there is less discretionary water available to cut. The impact of this demand hardening is that eventually, when higher stages of reduction are required, water use reductions will at some point have an impact on health and safety. Health and Safety is one of the three usage priorities in the WSCP. Usage priorities are the components of overall water use, which include health and safety, commerce, and irrigation. These usage priorities are the same in this WSCP update as in the 2009 plan. The principle behind how water is curtailed during a shortage, the fundamental concept in the plan, is that when water is in short supply, certain end uses should have a higher priority than others. Based on this

concept, health and safety is the last usage priority to be cut (first priority), commerce is next (second priority), and irrigation is the first to be cut (third priority).

Water usage reductions come into play in Santa Cruz during the *peak season* only. Generally speaking, water is not in short supply during the winter and shoulder spring/fall seasons. The peak season as defined in this WSCP update is the six months June through November, which reflects water consumed Between May 1 and October 31. Peak season demand, in the prior base year period was 2.3 billion gallons. For the WSCP update, the new base year period peak season demand is 1.5 billion gallons.

Table 1 shows the composition of the peak season, using the new base year period 2016-2018, showing composition by usage priority. Compared to the older WSCP, in this update the amount of peak season water in the irrigation priority is 24% compared to 31%. The amount in the health and safety priority is 68% compared to 53%. What this shows is how the overall demand is lower now in the peak season compared to the prior plan and also how there is less water available in the discretionary irrigation category.

Table 1

Jun-Nov, 2016-2018	Usage Priority (million gallons)			
Customer Class:	**1 Health/Safety**	**2 Commerce**	**3 Irrigation**	Total
Single Family Residential	374		143	517
Multiple Residential	252		45	297
Business	213	64		277
University of California	71		20	91
Other Industrial		20		20
Municipal	7		26	33
Irrigation			59	59
Golf Course Irrigation		17	33	50
Coast Irrigation		13		13
Other		1		1
SUBTOTAL	**917**	**115**	**326**	**1,358**

To move forward with any water use reduction scheme, we need to understand how each usage priority would be affected when reductions are made. In work on the updated WSCP so far, we created a schedule of how much to reduce deliveries for each usage priority. The goal was to keep priorities 1 and 2 as whole as possible for as long as possible. We also tried to implement a logical stepwise percent reduction in irrigation (priority 3) that can be easily understood and easy to implement. Table 2 shows the reduction in water consumption by priority. The table shows that by Stage 4, there is no longer water available in the irrigation category. Even at Stage 2, due to our low water demand, the health and safety category is already affected by 10%.

Table 2

Priority:	1 Highest	2 Next highest	3 Lowest
Stage	Health/Safety (% of normal delivery)	Commerce (% of normal delivery)	Irrigation (% of normal delivery)
1	95%	95%	75%
2	90%	90%	50%
3	85%	85%	25%
4	80%	75%	0
5	70%	30%	0
6			

When you combine the composition of the peak season for each customer category with the reduction strategy for each usage priority, you get the full picture of what the reduction goals are for each stage of water shortage. The reduction goals are summarized in Table 3. In this table, only the three major customer classes, single-family residential, multi-family residential, and business are shown. For the full table, showing all the customer classes, please refer to Slide 34 in the presentation from the February Water Commission presentation on this topic. Reduction goals for the single-family residential sector are shown in red.

Table 3

Customer Class	Normal Demand (Million Gallons) Jun-Nov	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		Delivery (%)	Delivery (%)	Delivery (%)	Delivery (%)	Delivery (%)
		Volume (MG)	Volume (MG)	Volume (MG)	Volume (MG)	Volume (MG)
Single Family Residential	517	89%	79%	68%	58%	51%
		463	408	354	299	262
Multiple Residential	297	92%	84%	76%	68%	59%
		273	249	225	202	176
Business	277	95%	90%	85%	79%	61%
		263	249	235	218	168

C. Recommended demand reduction approach

The City's shortage plan written in 2009 contained demand reduction measures laid out for each stage of shortage. The measures were characterized as demand reduction measures, publicity/communication actions or internal operating actions. The demand reduction measures included both prescriptive measures as well as customer allocations, with the allocations starting in Stage 3 for residential customers.

While prescriptive measures may be appropriate for some locations, in the Santa Cruz situation this type of approach may have drawbacks. The key point about prescriptive measures is that it is hard to determine whether the measures will actually yield the level of savings required in that stage of the reduction plan. Due to the low demand in Santa Cruz and

the fact that there is less discretionary irrigation water available to cut, a plan that emphasizes prescriptive measures targeting discretionary water uses such as irrigation or filling swimming pools are likely not to produce much in the way of demand reductions. Additionally, prescriptive measures in general can be confusing and require both enforcement as well as education in order to help the measures be successful.

On the other hand, customer allocations and excess use charges can be implemented with the utility billing system and there is a financial incentive for customers to comply and stay within their allocations. An allocation system doesn't require staff time to enforce. In addition, customer allocations allow customers freedom in how they use water within their allocation, as opposed to prescriptive measures which attempt to limit how and when customers use water.

In this update to the WSCP, staff is proposing to recommend an approach to demand management that provides customer allocations starting at Stage 1 of the plan and continuing through the stages. This approach means no prescriptive measures, essentially giving customers an amount of water to use each month and allowing them to use that water as they see fit within that amount. This overall approach will not only free up staff from having to perform enforcement activities, but also help to ensure that the demand reductions required at each stage would actually be met. Of course, the allocation system would also need to be combined with a publicity/communications campaign in order to educate customers on the plan, as well as with internal operating actions to save water.

D. The allocation system explained

To illustrate how an allocation system would work, we will use the single-family residential sector as an example. Allocations for multi-family residential sector and for the commercial sector will also be developed.

Given the new characteristics of water demand, under a new allocation system for single-family residential customers the amount allotted per month would need to be considerably less than in the existing WSCP. Under the existing plan, single-family residential customers were given an allocation of 11 CCF per month for a family of four persons.

In order to determine a starting point for a new allocation scheme, we examine the composition of the peak season for the single-family residential sector and the reduction amounts required at each stage of shortage. Table 4 shows the reduction amounts that will be required for each stage of shortage, both in terms of overall amount in million gallons but also in terms of the average usage in CCF per month for a single-family account. Also shown in red on the last row is the amount of water in the single-family sector that comprises the health and safety priority, as well as how that amount translates into average CCF per month per account. What is apparent in this table is that when Stage 3 is reached, then the average usage per month per account will already be in the health and safety priority only.

Table 4

	CCF	MG	ACCOUNTS	CCF/YR	AVE CCF/MONTH
PEAK SEASON	691,176	517	19,000	36.4	6.1
Stage 1	618,984	463	19,000	32.6	5.4
Stage 2	545,455	408	19,000	28.7	4.8
Stage 3	473,262	354	19,000	24.9	4.2
Stage 4	399,733	299	19,000	21.0	3.5
Stage 5	350,267	262	19,000	18.4	3.1
H&S	500,000	374	19,000	26.3	4.4

Given that the average peak season usage per account using the new base year period is 6.1 CCF per month (Table 4), this amount seems like a possible logical starting point for a new allocation system. However, a closer look at the data reveals that this value may not be exactly right. To elaborate, when examining data from the peak season of 2019, a year with demand characteristics very similar to 2016-2018, there are a few facts to note: first, the mean or average water use in that season is 6.0 CCF, very close to the 6.1 CCF average for 2016-2018. However, the median of the data is 5.0 CCF. What the means is that the middle point in the data is lower than the average. In other words, it is likely that higher users are skewing the data higher so that the mean is higher than the median. Additionally, the mode of the data is 4.0 CCF. The mode is the number that is repeated most in the data set. This means that there are many customers using 4 CCF per month. All of this is to say that a value of 5.0 CCF may be the better number to start the allocation scheme with compared to 6.0 CCF.

Table 5 shows the recommended allotment amount for each stage. The allotment amounts shown are for a four-person household. An exemption process would be established for customers to apply for more water-based on additional home occupancy above four. Additionally, there would be a schedule of excess use fees for use over the allotment. These fees could be structured in such a way as to be lowest in Stage 1 and progressively higher in each successive stage. This approach is shown in Table 5 as Option A.

Table 5

PEAK SEASON	100%	AVE CCF/MONTH 6.1		
	PERCENT OF NORMAL DELIVERY	RESULTING AVE CCF/MONTH	RECOMMENDED ALLOTMENT OPTION A (CCF/MONTH)	RECOMMENDED ALLOTMENT OPTION B (CCF/MONTH)
Stage 1	89% (11% reduction)	5.4	5 (excess use fees begin)	5 (advisory, no excess use fees)
Stage 2	79% (21% reduction)	4.8	5 (increasing excess use fees)	5 (excess use fees begin)
Stage 3	68% (32% reduction)	4.2	4 (increasing excess use fees)	4 (increasing excess use fees)
Stage 4	58% (42% reduction)	3.5	3 (increasing excess use fees)	3 (increasing excess use fees)
Stage 5	51% (49% reduction)	3.1	3 (increasing excess use fees)	3 (increasing excess use fees)

OPTIONS

One of the considerations in implementing the allocation system is whether to institute the excess use fees starting at Stage 1. One possible option is to not implement excess use fees until Stage 2. If that option were chosen, customers would be given the advisory allocation in Stage 1 and the message conveyed would be that if Stage 2 conditions were met, then excess use fees would activate from then on. It is recommended that a significant outreach campaign be initiated to communicate with customers that *if* the drought continues and higher stages in the plan are reached, that successive stages will come with excess use fees for use over allocation. In Table 5, Option B shows this approach.

The advantage to the Option B approach is that customers could acclimate to the allocations before being subject to the excess use fees. The disadvantage is that there would be no guarantee of water savings if no excess use fees were attached to the allotments, and thus no way to be sure that the savings goal for that stage would be met.

ENFORCEMENT AND EXCESS USE FEES

As was touched on in other sections, from an enforcement perspective the use of customer allocations are preferred over prescriptive measures. Enforcement of an allocation system is essentially done through the financial incentive of avoiding excess use fees on customer's utility bills. Excess use fees are a dollar amount per CCF of water used over the customer allocation on a monthly basis. In the existing WSCP, there are two levels of excess use fees: $25/CCF for use 0-10% over allotment, and $50/CCF for use more than 10% over allotment.

In this WSCP update, it is recommended that rather than having a two-tiered structure for the fees, that there be one fee level per shortage stage. This concept will be both easier to implement within the billing system and easier to communicate to the public. Table 6 shows a possible schedule of excess use fees. Option A represents the scheme where excess use fees begin in Stage 1. Option B represents the scheme where no fees are implemented until Stage 2.

Table 6

OPTION A		OPTION B	
STAGE	**EXCESS USE FEE ($/CCF)**	**STAGE**	**EXCESS USE FEE ($/CCF)**
Stage 1	$30	Stage 1	N/A
Stage 2	$40	Stage 2	$40
Stage 3	$50	Stage 3	$50
Stage 4	$60	Stage 4	$60
Stage 5	$70	Stage 5	$70

E. Water savings analysis from single-family allocations

Table 7 highlights only the single-family residential sector and the reduction goals for each stage. The goal in Stage 1 is to reduce demand from 517 to 463 MG (54 MG), an approximately 11% reduction. The goal in Stage 2 is a demand reduction from 463 to 408 MG (55 MG), an approximately 21% reduction overall. The goal in Stage 3 is a reduction from 408 to 354 (54 MG), an approximately 32% reduction overall. The goal in Stage 4 is a reduction from 354 to 299 MG (55 MG), an approximately 42% reduction overall. The goal in Stage 5 is a reduction from 299 to 262 MG (37 MG), an approximately 49% reduction overall. We have not set goals yet for Stage 6.

If the single-family residential allocation of 5 CCF were implemented for Stage 1, and all 19,000 customer accounts used that amount, total usage in the sector would be 426 MG. This equates to an 18% reduction, more than the goal of 10% or 463 MG. If, on the other hand, Stage 1 had an allotment of 6 CCF and all customers used that amount, the total usage in the sector would be 512 MG. This equates to only a reduction of 5 MG (1%). At this time, it is not possible for the billing system to accommodate anything other than a whole number allocation. Therefore, in order to achieve the savings goals for each stage, starting with 5 CCF makes sense compared with 6 CCF. The amount saved in Stage 1 using an allocation of 5 CCF will be more than the savings goal for that stage, which will help to compensate at Stage 2. At Stage 2 with an allocation of 5 CCF and total usage equal to 426 MG, it would not quite meet the savings goal at that stage of 408 MG.

Table 7

PEAK SEASON AVERAGE	691,176	517					
	Reduction Target CCF	Reduction Target MG	Reduction Target %	ALLOTMENT	Usage Result (MG)	Reduction Amount (MG)	Reduction %
Stage 1	618,984	463	11%	5	426	91	18%
Stage 2	545,455	408	21%	5	426	91	18%
Stage 3	473,262	354	32%	4	341	176	34%
Stage 4	399,733	299	42%	3	256	261	51%
Stage 5	350,267	262	49%	3	256	261	51%

FISCAL IMPACT: None

PROPOSED MOTION: Motion to accept the presentation about the analysis of the probability and size of potential future water shortages and consider this analysis in providing feedback to staff on the demand reduction strategy to be used in the updated Water Shortage Contingency Plan that is currently being developed.

ATTACHMENTS:

Attachment 1 – Water Commission 2-3-2020 Presentation on the Update of the Water Shortage Contingency Plan

Attachment 2 – Excerpt of April 1, 2019 Water Commission Presentation for the Comprehensive WSAC Work Plan Update
Attachment 3 – Confluence Primer

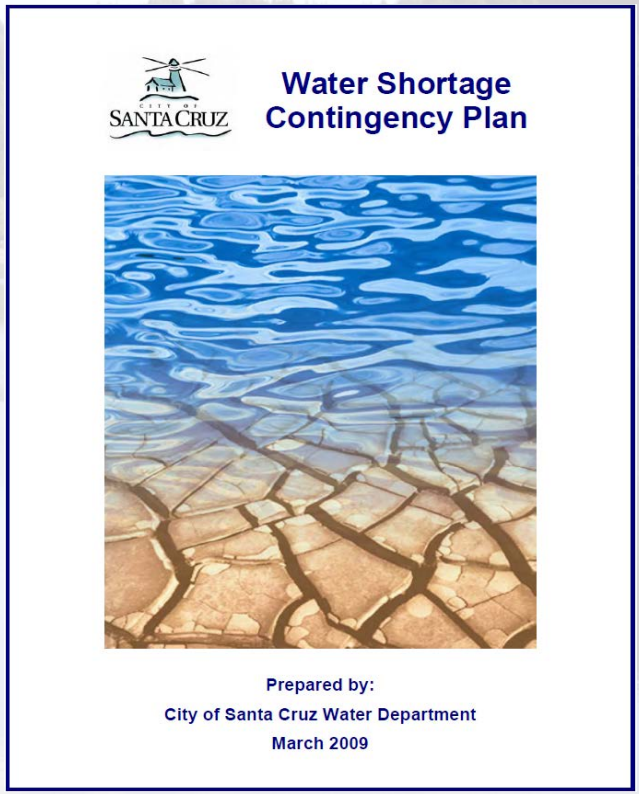

Water Shortage
Contingency Plan 2020
Update
Our Water, Our Future
SANTA CRUZ
Water Department

Agenda

- Part 1: Background
- Part 2: Water Demand Analysis
- Part 3: Water Supply Allocation
- Part 4: Discussion

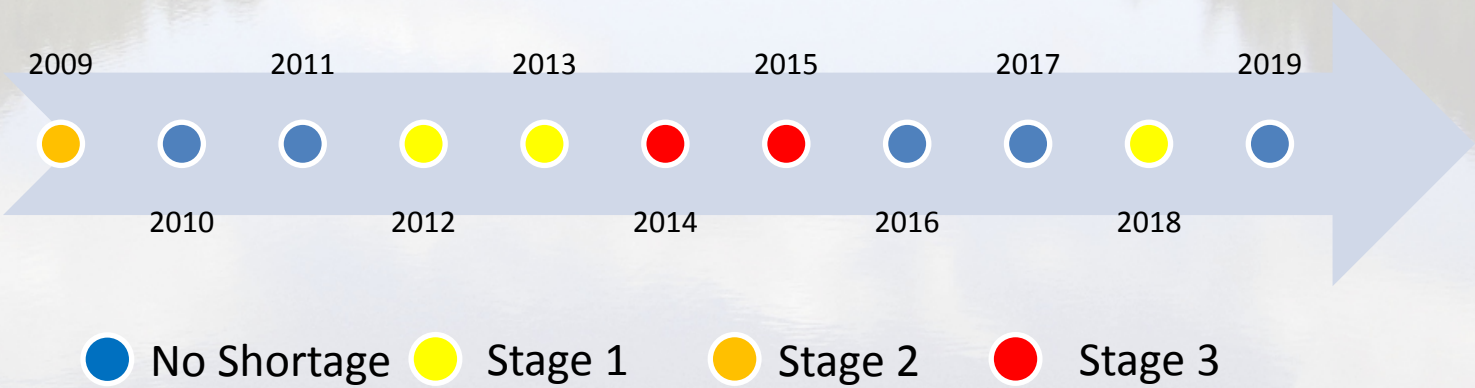
Part 1: Background

- Current plan completed and adopted by City Council in 2009
- Adopted again, as part of the 2010 and 2015 Urban Water Management Plans
- Plan available online: http://www.cityofsantacruz.com/government/city-departments/water/conservation/more-information/water-shortage-contingency-plan



Water Shortage Contingency Plan

- Consists of two parts:
  1) Written plan and
  2) Ordinance (Municipal Code Chapter 16.01)
- Ordinance was amended in 2010 and 2015
- Plan implemented six times over the last decade



Characteristics of the Existing Plan

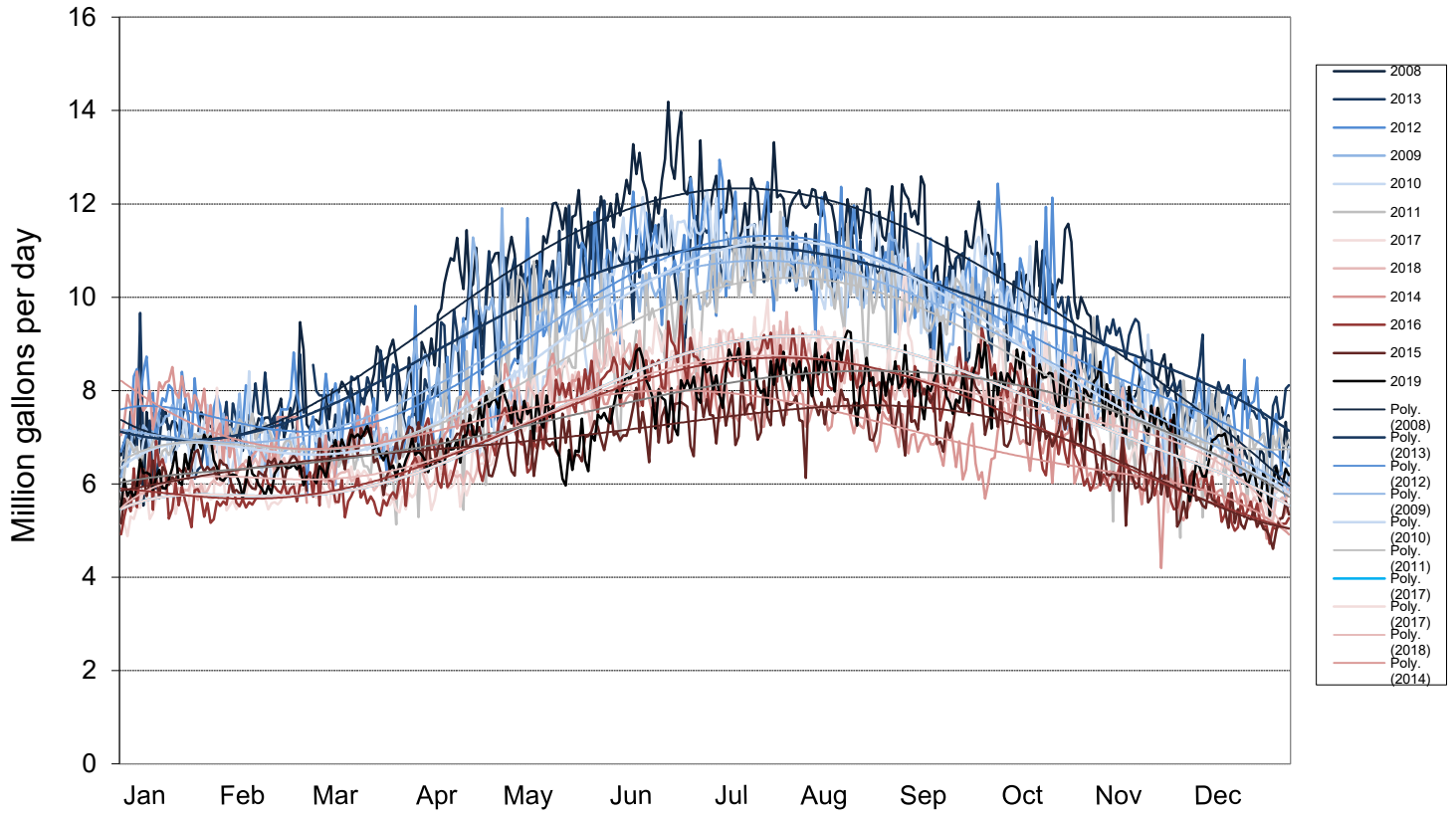
- Plan has five stages for water shortages ranging from 5 to 50 percent
- Designed in part to achieve the 15 percent curtailment objective of the 2003 Integrated Water Plan
- Exceeds the minimum requirements in the Urban Water Management Planning Act
- Features an allocation system based on water demands experienced in 2002-2004

What Has Changed Since 2009?

- The overall level of water demand now compared to when the last plan was created is significantly lower
- Peak season demand is also significantly lower
- Note: Our water supply crunch is primarily in the peak season – that part hasn't changed.

How Has Demand Changed Over Time?

Daily Water Production, 2008 – 2019 (Million Gallons Per Day)



What Else Has Changed?

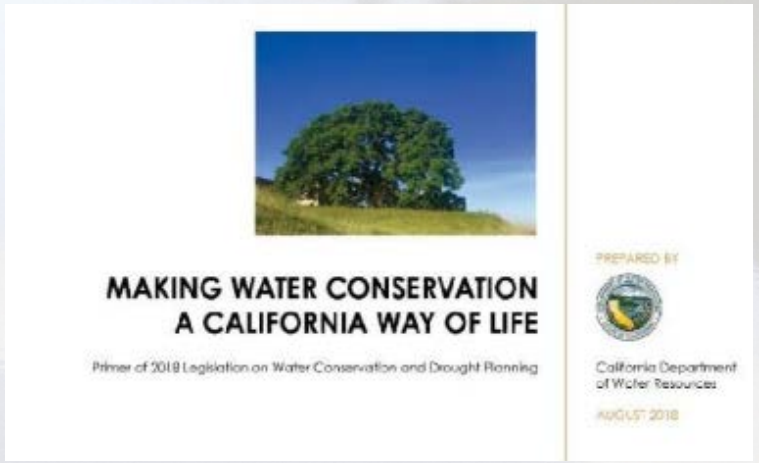
- Available supply reduced to allow for water for the environment (fish flow agreement)
- Greater appreciation for the effects of climate change
- Supplemental water supply direction (WSAS)
- Assumption about curtailment as a strategy
- New conservation tools
- Experience implementing WSCP
- Water rates, almost continuously since 2005

The New Environment in California

- Drought of 2012-2015 prompted changes in Statewide water management and changes in the law, like SGMA
- New Water Conservation legislation SB 606 and AB 1668

New Conservation Legislation: SB 606

- Strengthens requirements for WSCPs in Water Code 10632 for all urban water suppliers
- Updated WSCP due July 1, 2021 as part of 2020 UWMP update
- WSCP to have 10 required components, including new standardized stages:
  - Stage 1: 10%
  - Stage 2: 20%
  - Stage 3: 30%
  - Stage 4: 40%
  - Stage 5: 50%
  - Stage "X": >50%



Ten Required Elements of a WSCP

1	An analysis of water supply reliability *
2	An annual water supply and demand assessment
3	Six standard water shortage levels
4	Shortage response actions that align with the defined shortage levels
5	Communication protocols
6	Customer compliance, enforcement, appeal, and exemption procedures
7	A description legal authorities
8	A description of the financial consequences of, and responses for, drought conditions
9	Monitoring and reporting requirements
10	Reevaluation and improvement procedures

* This analysis to be conducted later as part of the UWMP

Updating the Existing Plan

- The existing WSCP contains many of the required measures but still is in need of updating
- Update will be done ahead of the UWMP
- Plan development and approval process:
  - Water Commission Review
  - Public Notification and Input
  - Coordinate with Neighboring Water Agencies and Jurisdictions Served
  - Public Hearing
  - City Council Adoption
  - Revise Ordinance

Part 2: Water Demand Analysis

- New base year period for water consumption: Three-year average **2016-2018**
- Revised start and end of peak season:
  - June through November instead of April through October (six months instead of seven)
  - Reflects water consumed Between May 1 and October 31
  - Water shortage regulations usually not in effect in April. Supplies are historically adequate in April to meet demand.
- A note about consumption vs. production: production = consumption + system losses

Example of Consumption Data

Values In Million Gallons/Month

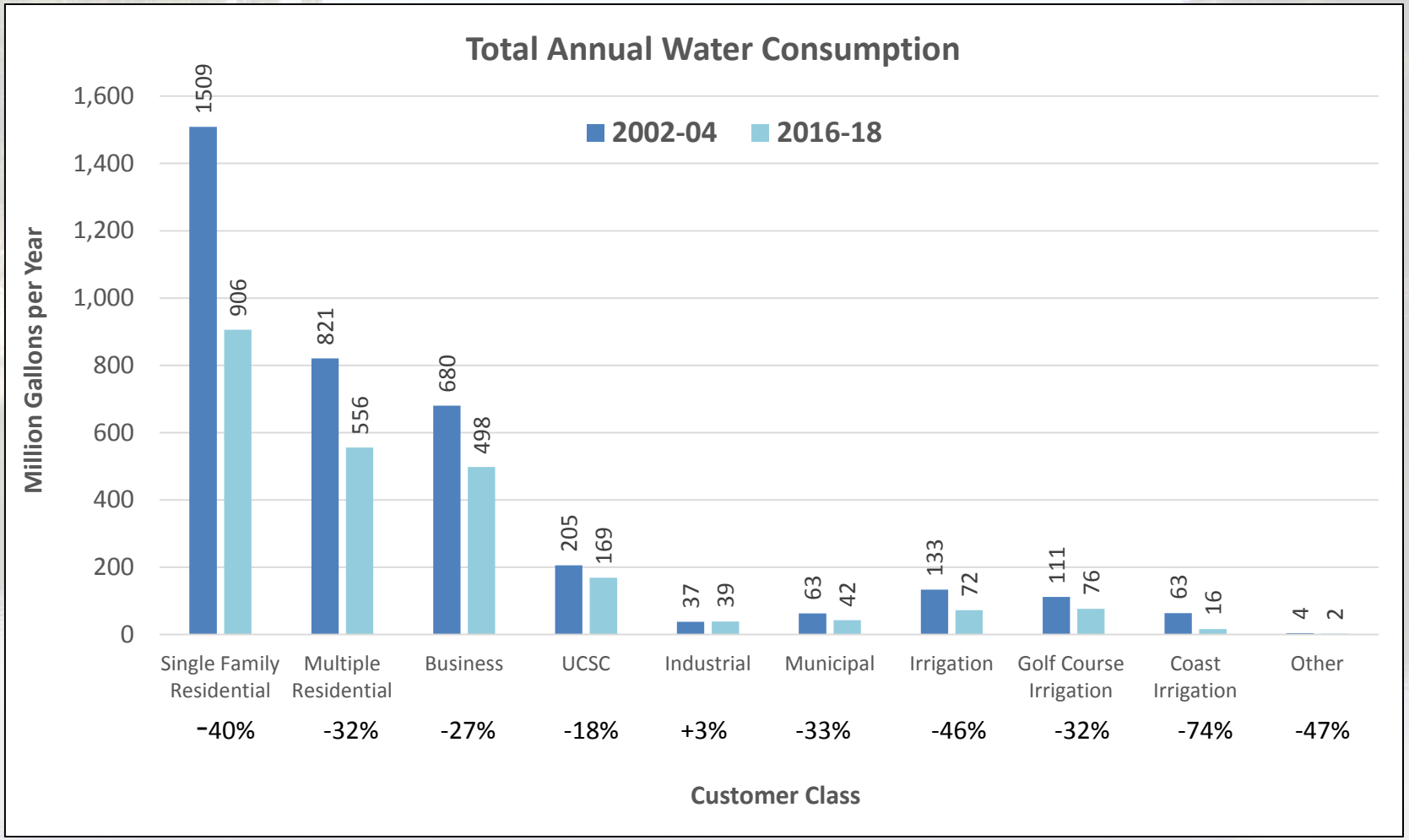
Customer Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single Family Residential	63	62	62	62	71	84	91	94	89	82	77	69	906
Multiple Residential	41	43	43	42	46	48	52	52	50	47	49	45	556
Business	34	35	36	37	40	44	47	52	48	43	43	38	498
UCSC	7	14	14	12	16	18	14	14	12	15	18	14	169
Industrial	2	3	4	3	3	3	3	3	3	3	3	3	39
Municipal	1	1	1	1	2	5	6	7	6	5	4	2	42
Irrigation	2	1	1	1	4	8	11	12	11	10	7	3	72
Golf Course Irrigation	0	0	0	0	4	8	9	11	9	10	4	1	55
Coast Irrigation	1	0	1	0	1	2	3	3	3	1	1	0	16
Other	0	0	0	0	0	0	0	0	0	0	0	0	2
TOTALS	**151**	**160**	**162**	**159**	**187**	**221**	**237**	**248**	**231**	**216**	**205**	**175**	**2,354**

Consumption data showing average in years 2016-2018
(Source is SCMU billing system)

Water Use Comparison: Then versus Now

	2002-2004	2016-2018	Change (Volume)	Percent Change	Direction
Total annual production (billion gallons)	3.9	2.6	-1.3	-33%	↓
Peak season production (billion gallons)	2.3	1.5	-0.8	-35%	↓
Peak month (million gallons)	467	270	-197	-42%	↓
Peak day (million gallons)	15.2	10.4	-4.8	-32%	↓
Average day during peak season (million gallons)	12.7	8.0	-4.7	-37%	↓
Population	87,000	97,000	+10,000	+11%	↑
Visitors (tourism)	?	?	?		↑

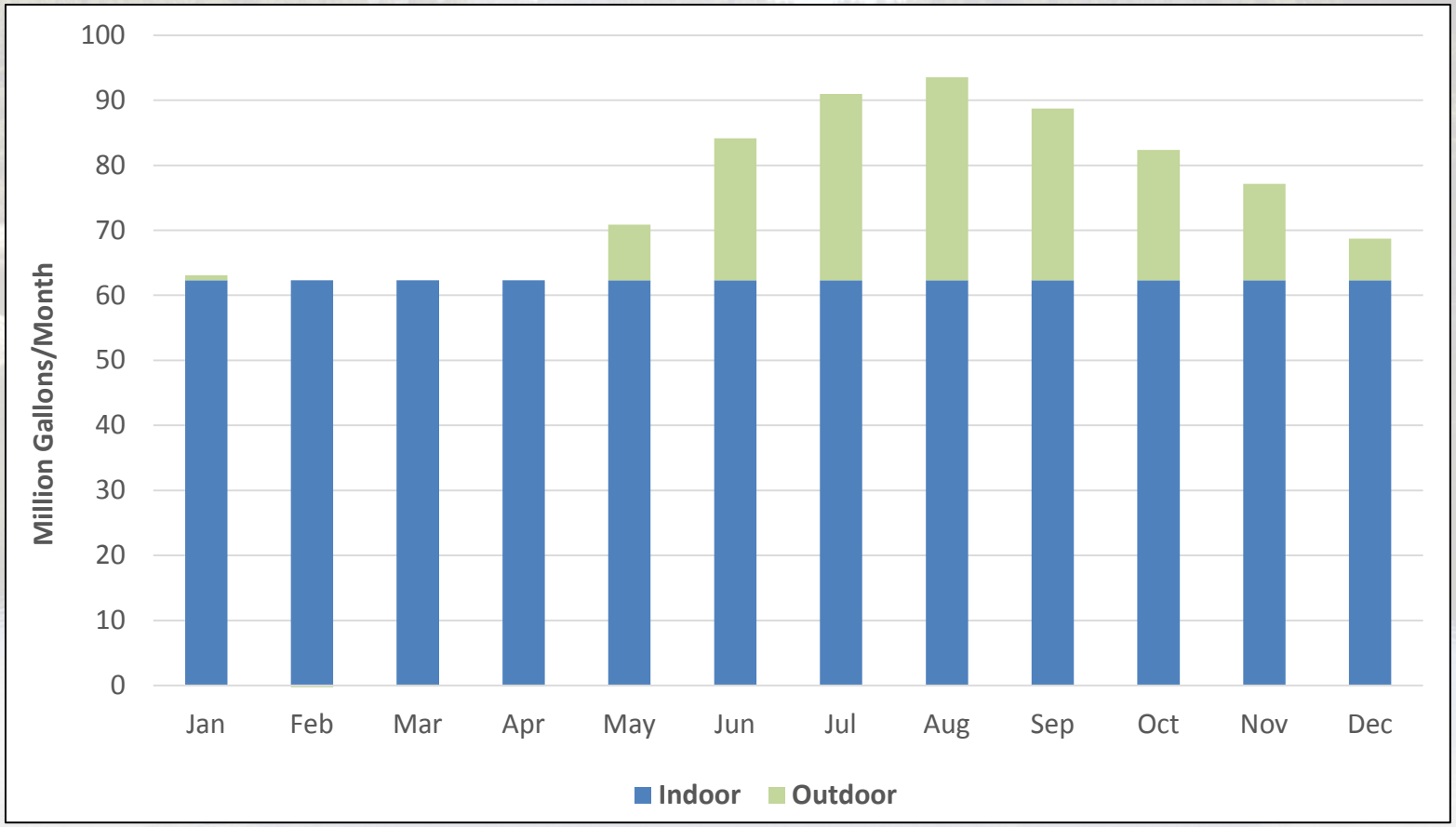
Water Use by Customer Class: Then versus Now



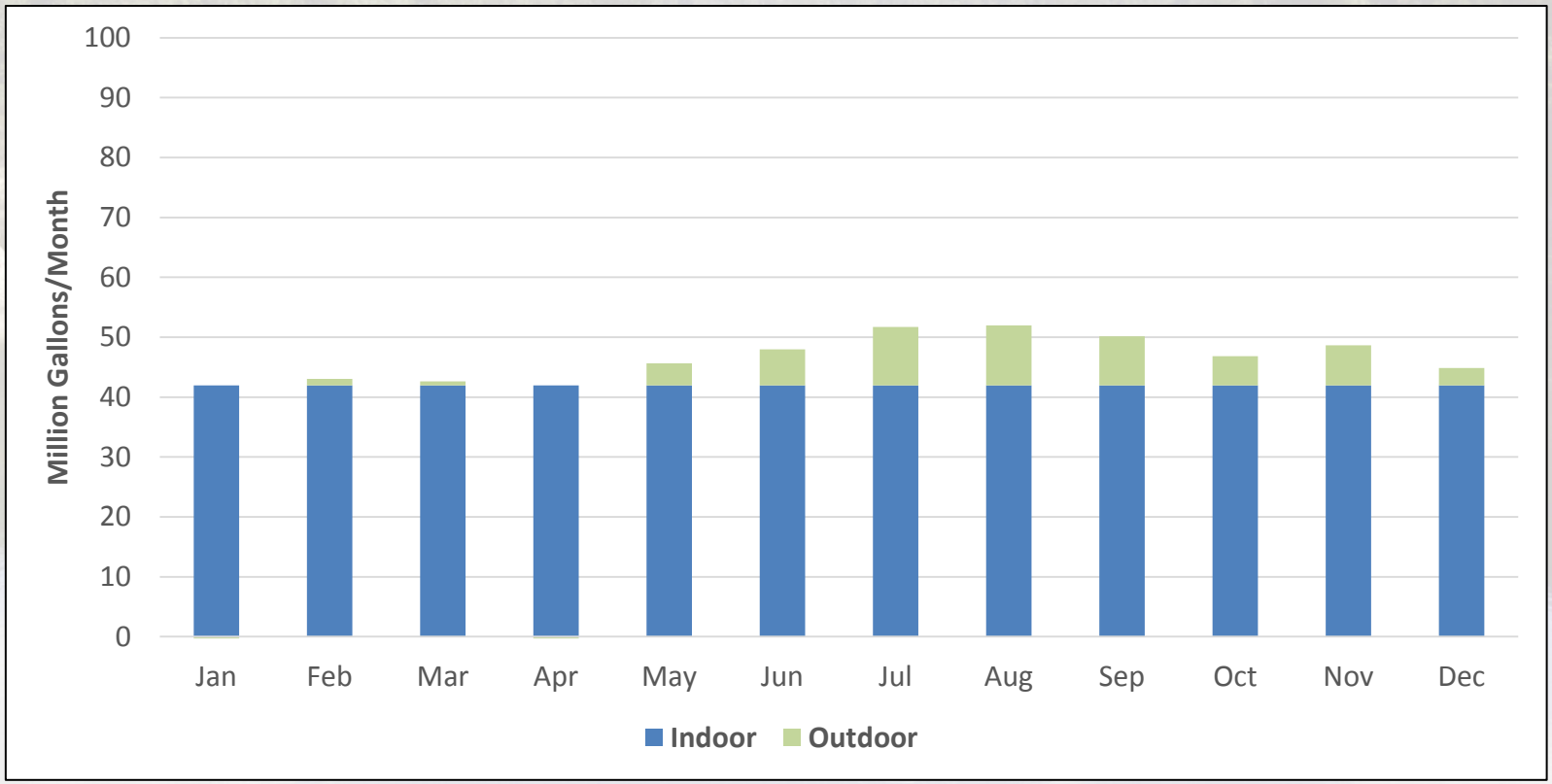
Steps in Water Demand Analysis

- Examine the level and seasonality of each customer category, monthly and annual basis
- Breakdown water use in each sector into indoor and outdoor/seasonal components, monthly and peak season
- These data are used to determine how water will be allocated during times of shortage:
  - For each customer group
  - For each stage

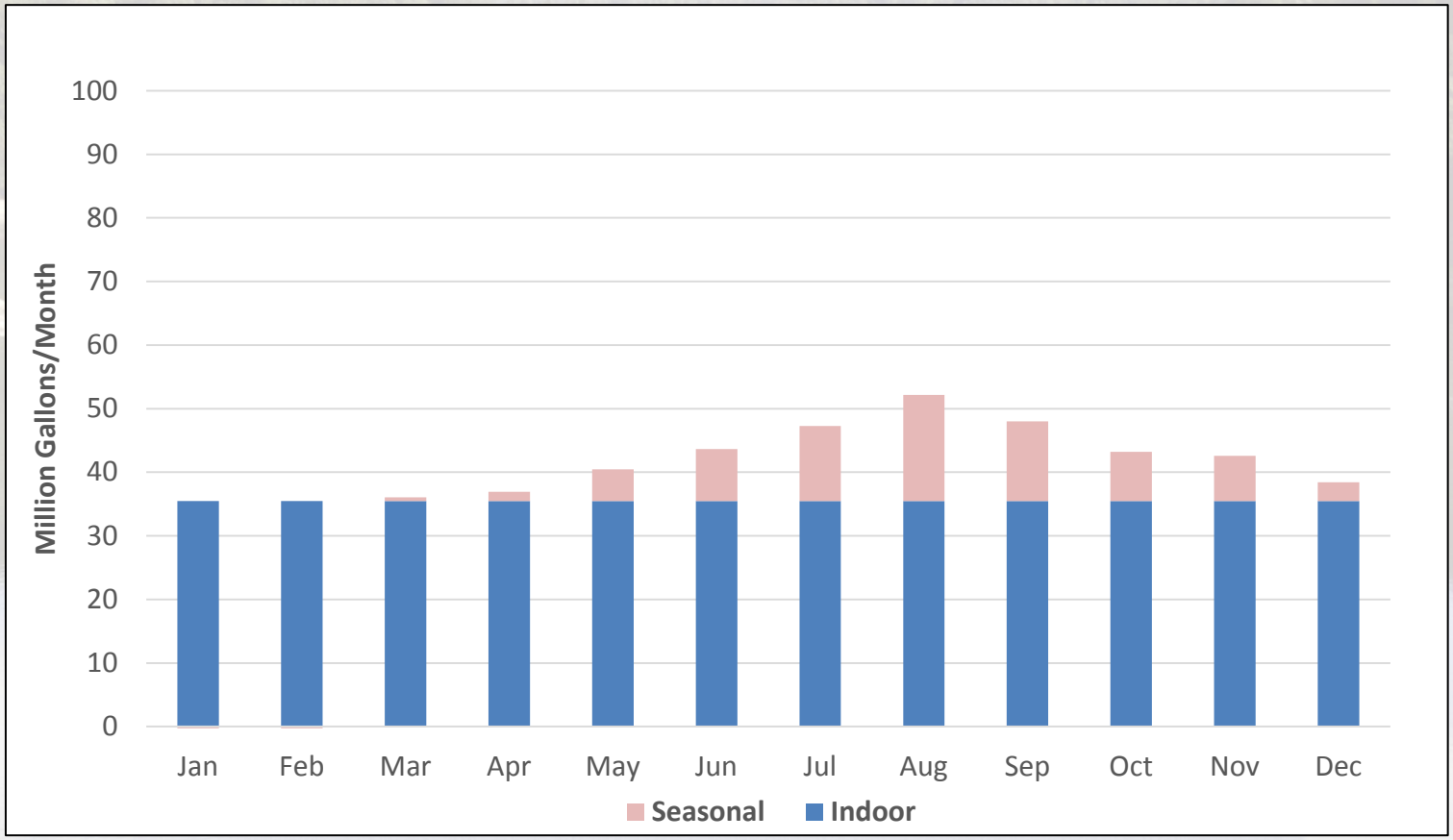
Single Family Residential Sector Composition 2016-2018



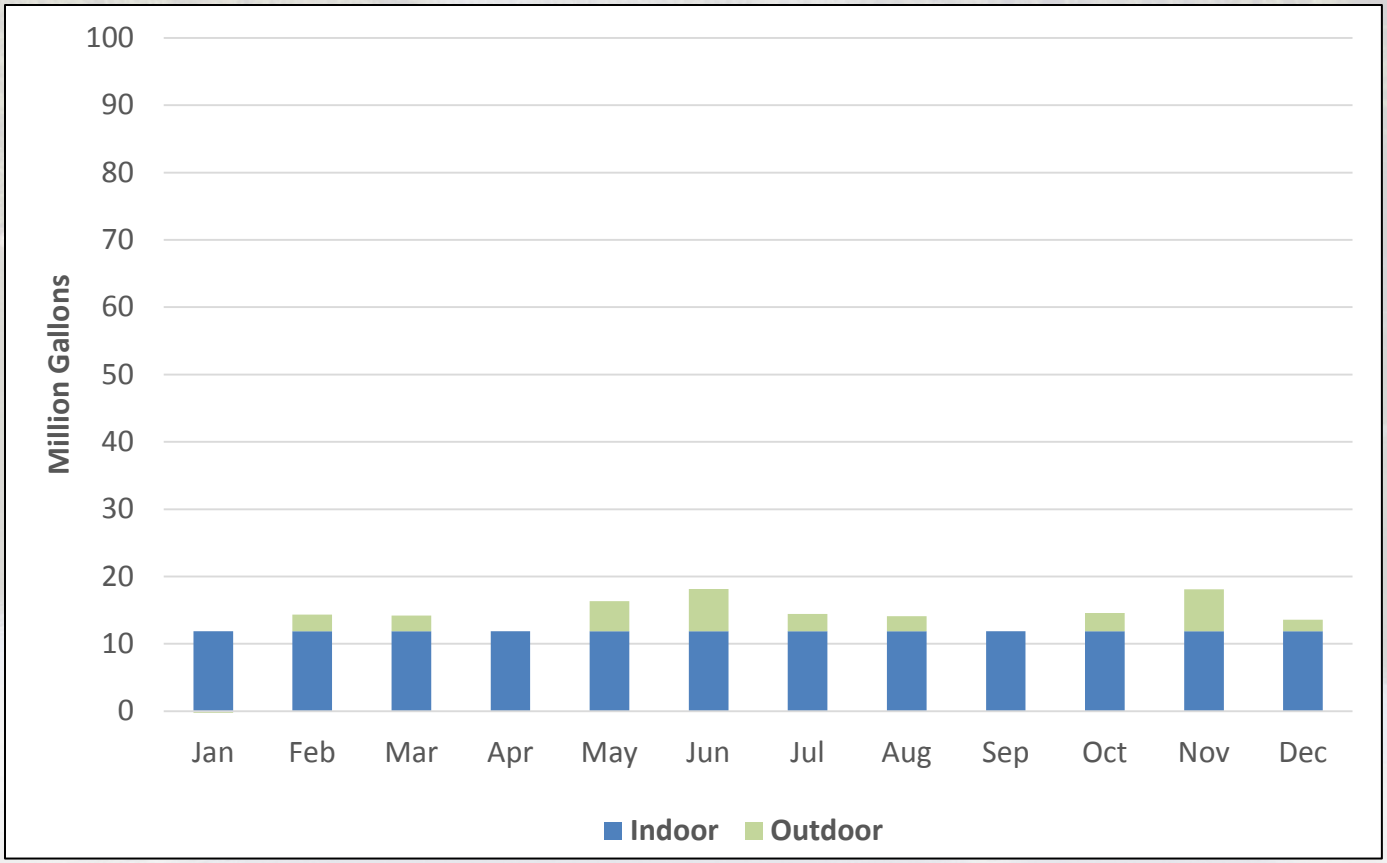
Multi-Family Residential Sector Composition 2016-2018



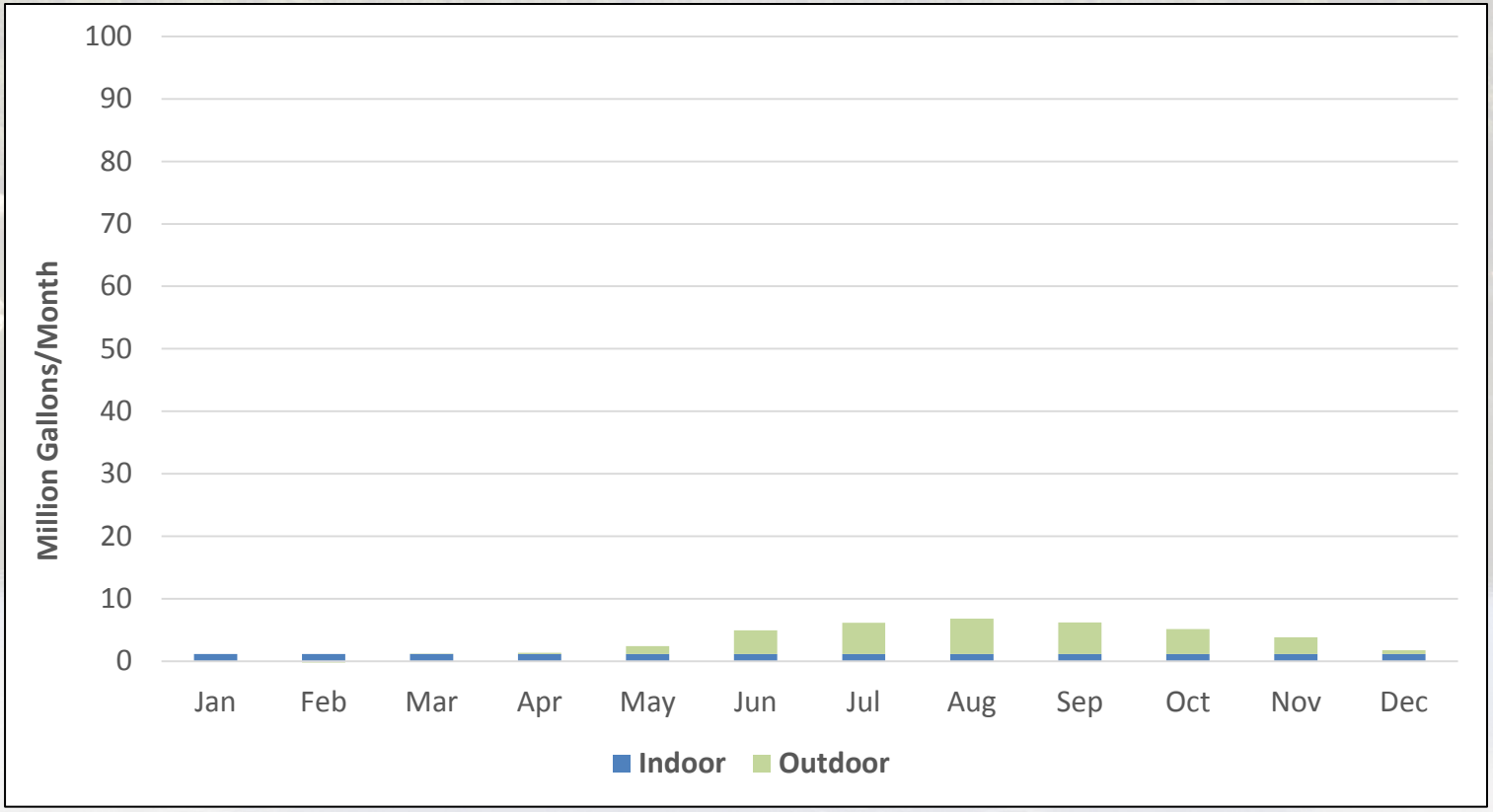
Business Sector Composition 2016-2018



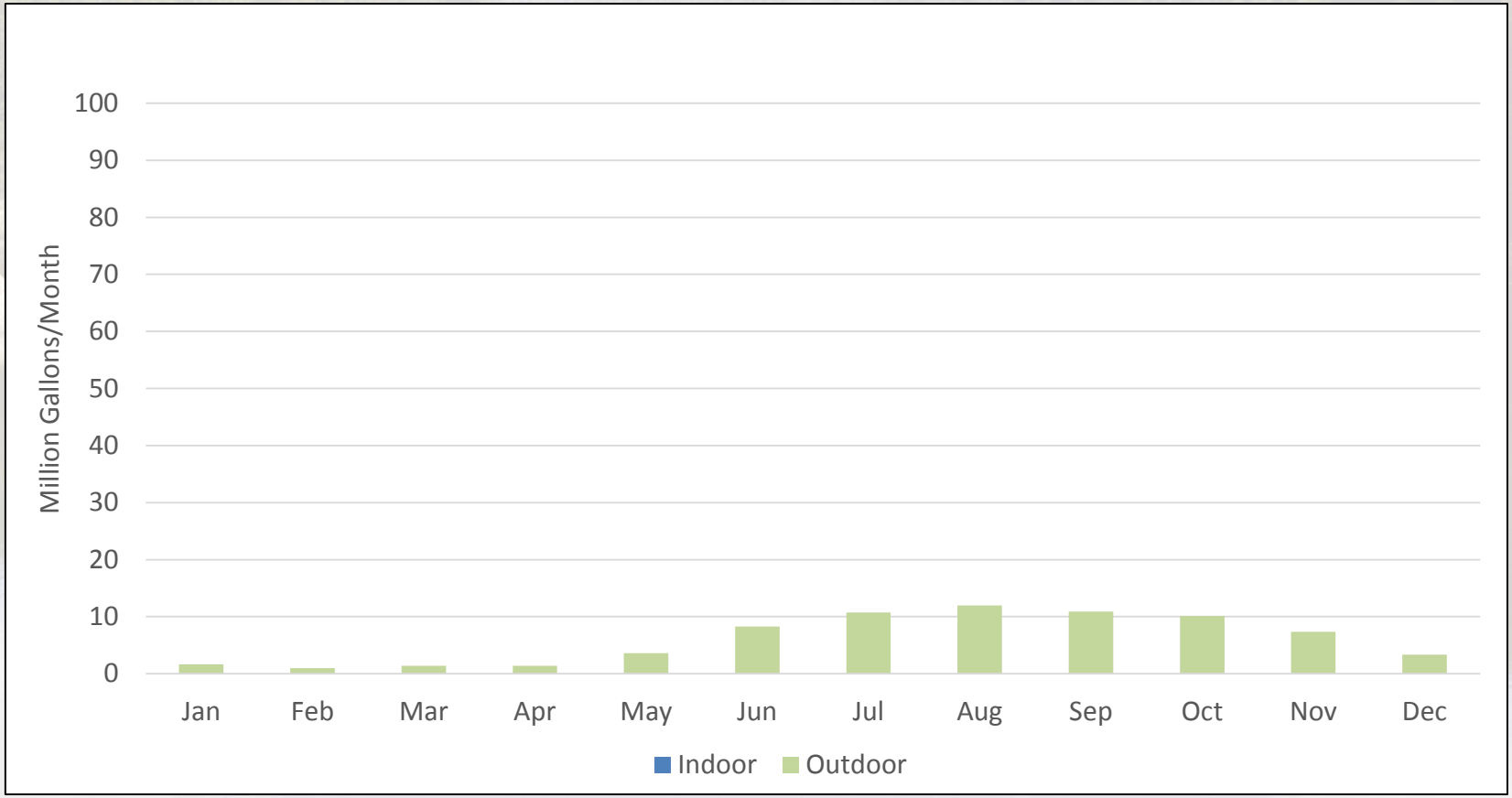
UCSC
Composition 2016-2018



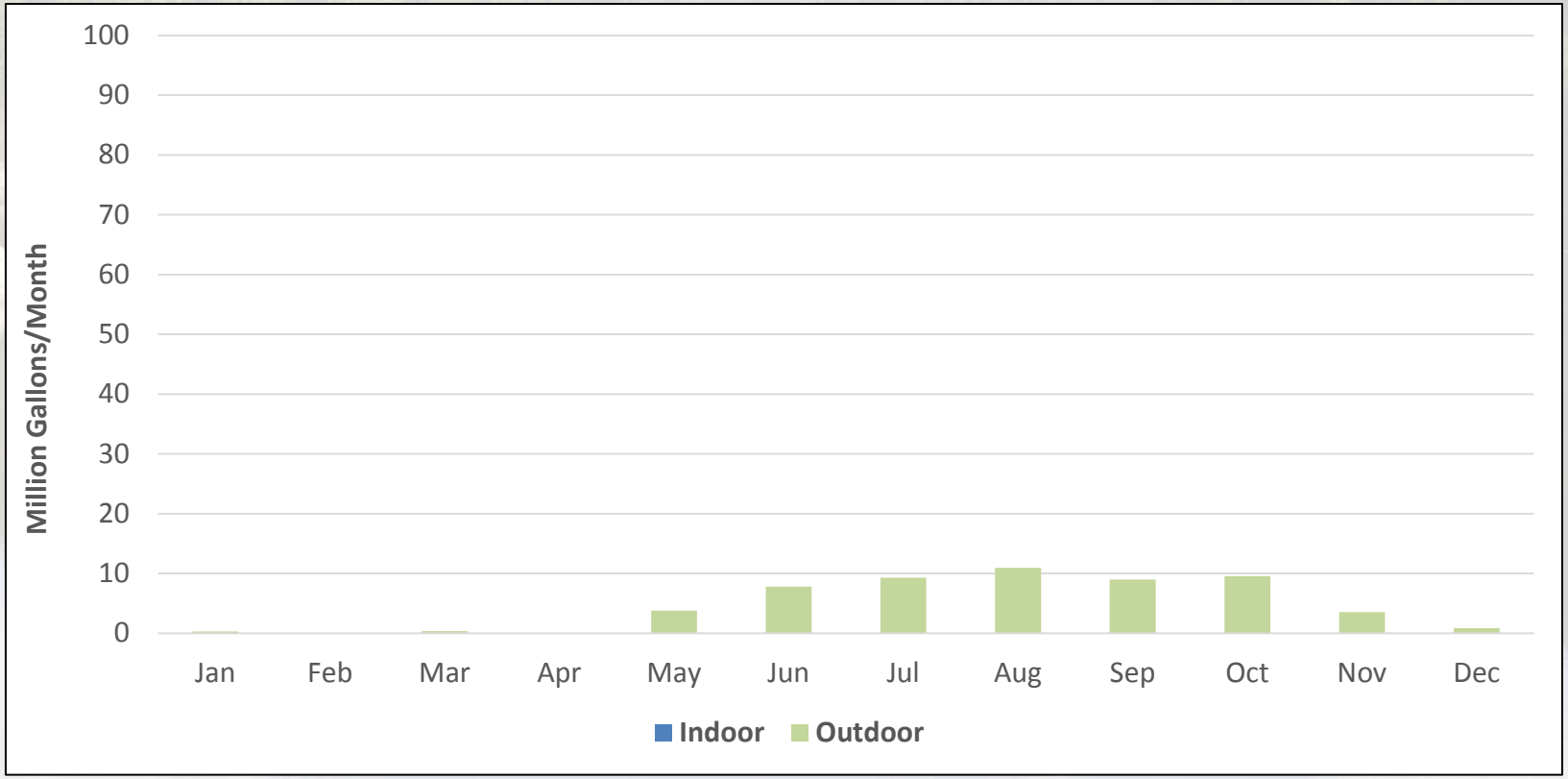
Municipal Sector Composition 2016-2018



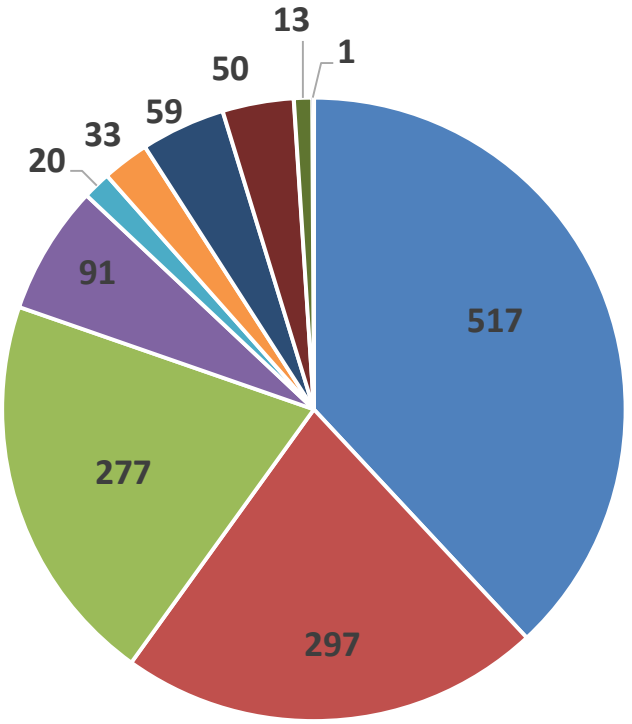
Irrigation Sector Composition 2016-2018



Golf Sector Composition 2016-2018



Peak Season Composition by Customer Class (2016-2018)



Million Gallons during the Peak Season

- Single Family Residential
- Multiple Residential
- Business
- UCSC
- Industrial
- Municipal
- Irrigation
- Golf Course Irrigation
- Coast Irrigation
- Other**

Total of 1,358 MG

Part 3: Water Supply Allocation

When water is in short supply, certain end uses should have a higher priority than others.

1. **Health and Safety: Highest priority**
   - Includes residential and non-residential interior domestic and sanitary uses, per CA Water Code Section 350
2. **Commerce: Second highest priority**
   - Includes all non-sanitary usage related to commercial and industrial activity
3. **Irrigation: Lowest priority**
   - Includes all irrigation & outdoor usage in all customer classes

Developing the Allocation System

Three step process:

- Break the composition of each customer class's water use into the three priorities areas;
- Reduce deliveries, with the most cutback to low priority uses, and least cutback to highest priority; and
- Apply the reductions to each class to develop allocation table.

Example of assigning usage by priority

Examine the single family residential sector:

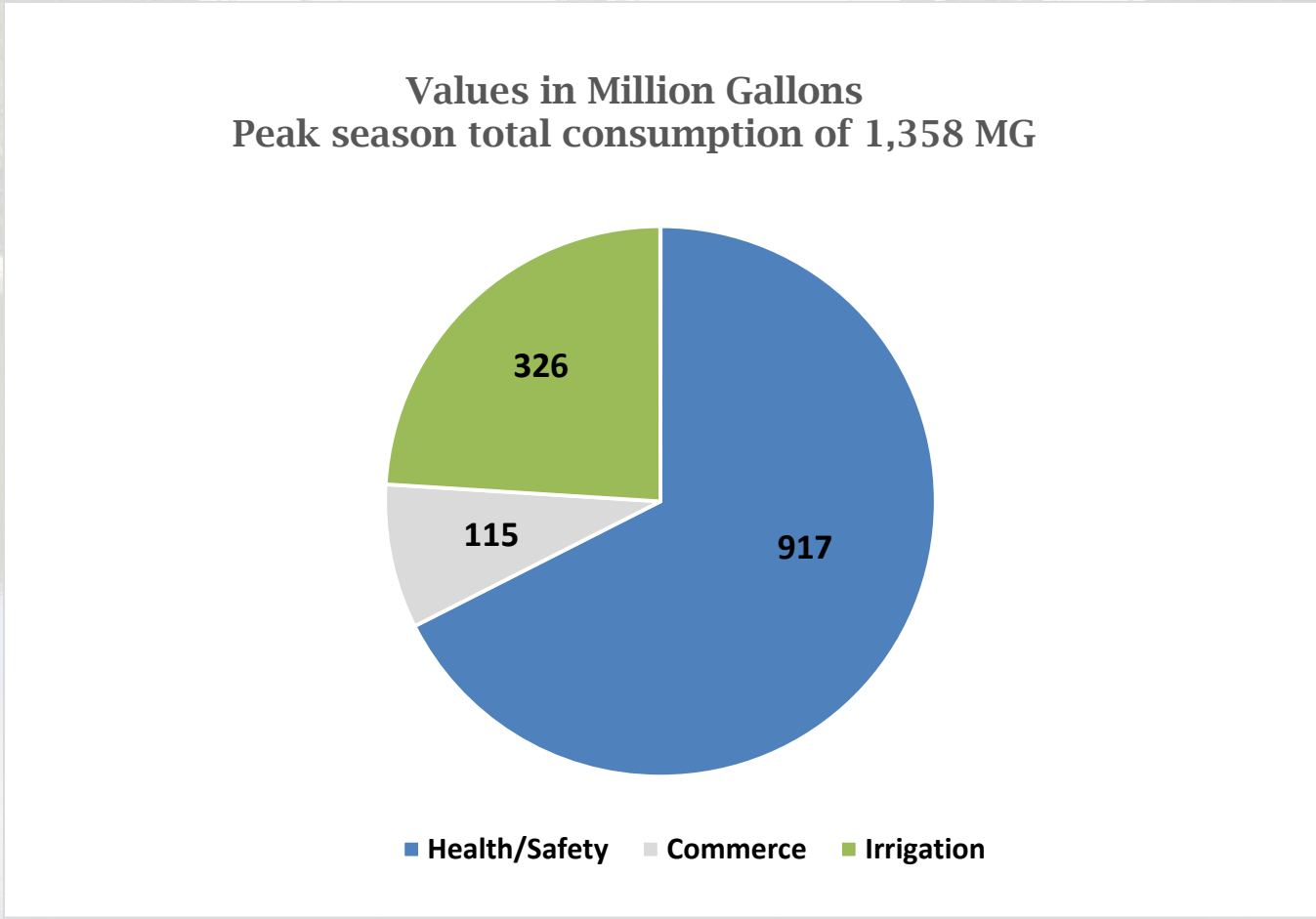
- Total of 1,358 MG for the peak season
- SFR is 38% of that total, or 517 MG
- Composition by priority is as follows:

Customer Class:	Health/Safety	Commerce	Irrigation	Total	% of Total
Single Family Residential	374	0	143	517	38%

Composition of Peak Season Usage, by Priority

Jun-Nov, 2016-2018	Usage Priority (million gallons)			
Customer Class:	**1 Health/Safety**	**2 Commerce**	**3 Irrigation**	Total
Single Family Residential	374		143	517
Multiple Residential	252		45	297
Business	213	64		277
University of California	71		20	91
Other Industrial		20		20
Municipal	7		26	33
Irrigation			59	59
Golf Course Irrigation		17	33	50
Coast Irrigation		13		13
Other		1		1
SUBTOTAL	**917**	**115**	**326**	**1,358**
Percent of Total	68%	8%	24%	100%

Composition of peak season, by usage priority



Composition of Peak Season, by Usage Priority Then versus Now

Usage Priority:	Health/Safety	Commerce	Irrigation	Total
2016-2018 Percent of Total	68%	8%	24%	100%
2002-2004 Percent of Total	53%	16%	31%	100%

Based on New Water Use Characteristics, Water Use Reductions by Volume at the New Stages Would Be:

Peak season total consumption of 1,358 MG

Stage	Overall System Shortfall:	Cutback (MG)	Consumption (MG)	Cutback (MGD)
1	10%	-136	1,222	-0.7
2	20%	-272	1,086	-1.5
3	30%	-407	951	-2.2
4	40%	-543	815	-3.0
5	50%	-679	679	-3.7
6	>50%		-680 or more	-3.8 or more

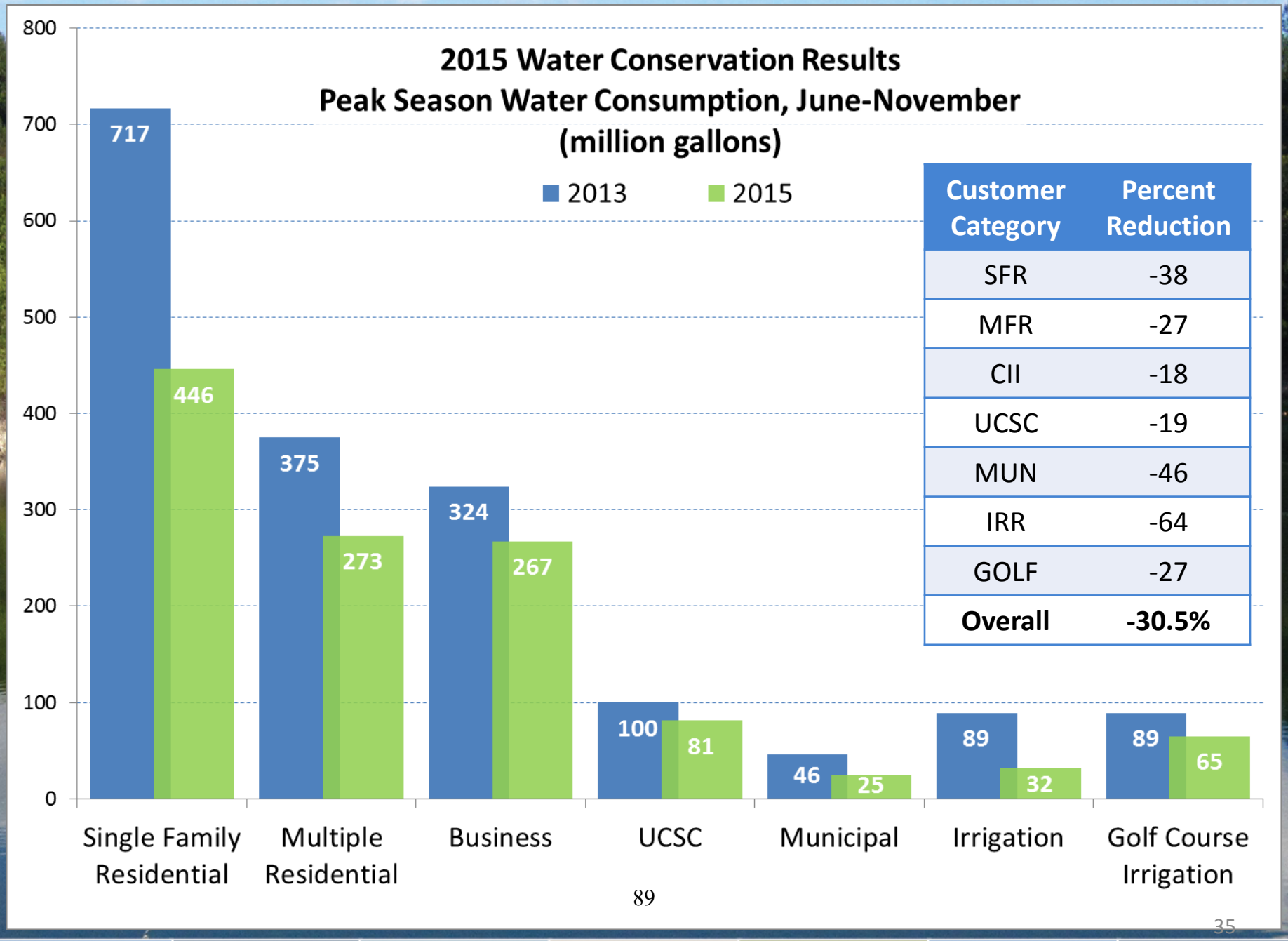
Reduction in Water Consumption by Priority

Peak season total consumption of 1,358 MG

Priority:	**1 Highest**	**2 Next highest**	**3 Lowest**
Stage	Health/Safety (% of normal delivery)	Commerce (% of normal delivery)	Irrigation (% of normal delivery)
1	95%	95%	75%
2	90%	90%	50%
3	85%	85%	25%
4	80%	75%	0
5	70%	30%	0
6			

Water Supply Allocation and Customer Reduction Goals

Customer Class	Normal Demand (Million Gallons) Jun-Nov	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		Delivery (%)	Delivery (%)	Delivery (%)	Delivery (%)	Delivery (%)
		Volume (MG)	Volume (MG)	Volume (MG)	Volume (MG)	Volume (MG)
Single Family Residential	517	89%	79%	68%	58%	51%
		463	408	354	299	262
Multiple Residential	297	92%	84%	76%	68%	59%
		273	249	225	202	176
Business	277	95%	90%	85%	79%	61%
		263	249	235	218	168
UC Santa Cruz	91	91%	81%	72%	62%	55%
		82	74	65	57	50
Other Industrial	20	95%	90%	85%	75%	30%
		19	18	17	15	6
Municipal	33	79%	58%	38%	17%	15%
		26	19	12	6	5
Irrigation	59	75%	50%	25%	0%	0%
		44	30	15	0	0
Golf Course Irrigation	50	82%	64%	45%	26%	10%
		41	32	23	13	5
Coast Irrigation	13	95%	90%	85%	75%	30%
		12	12	11	10	4
Other	1	95%	90%	100%	100%	100%
		1	1	1	1	1
Total	**1,358**	**1,225**	**1,092**	**959**	**820**	**677**
		Overall reduction in each stage				
		10%	20%	30%	40%	50%

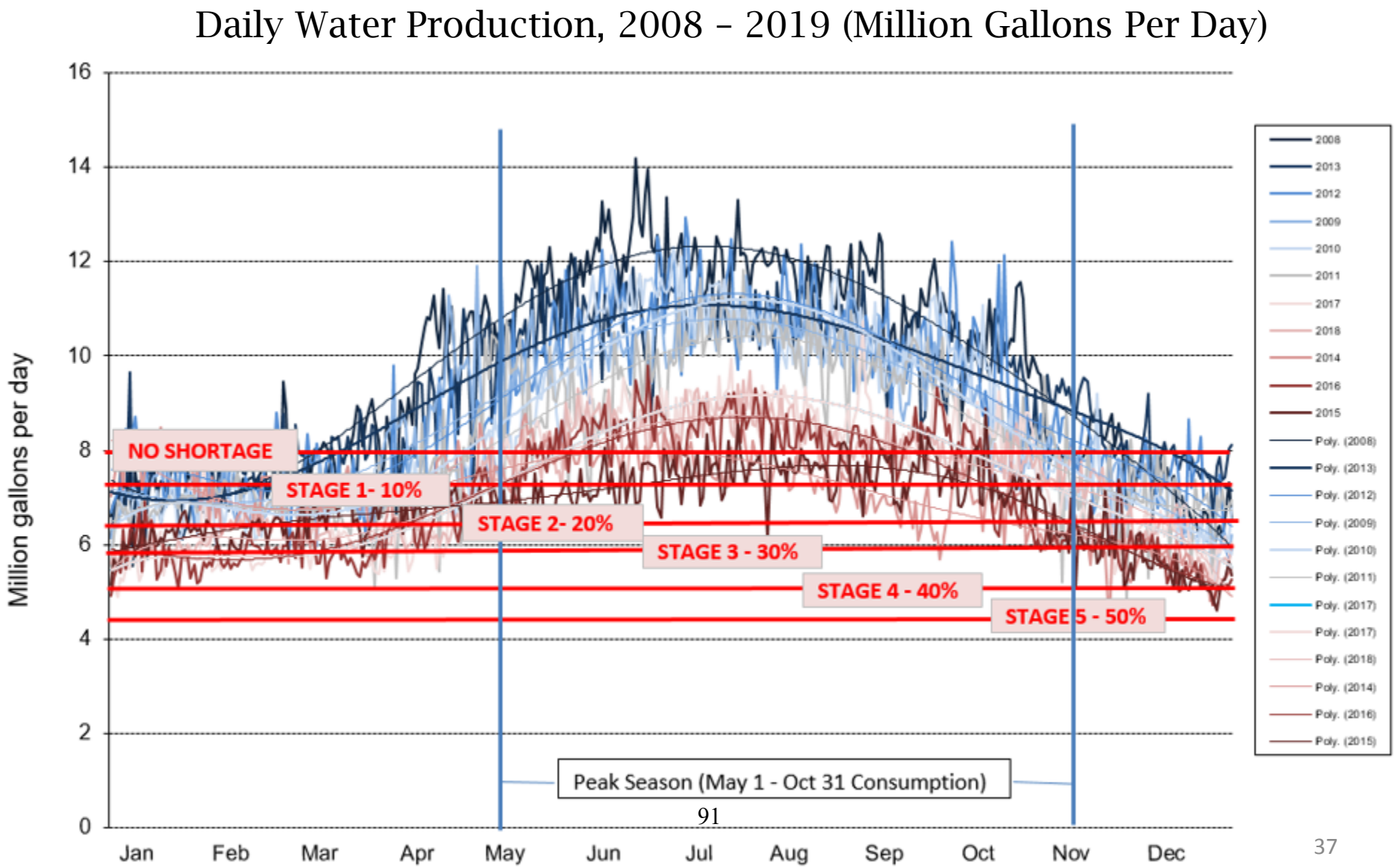


Customer Category	Percent Reduction
SFR	-38
MFR	-27
CII	-18
UCSC	-19
MUN	-46
IRR	-64
GOLF	-27
Overall	**-30.5%**

Reductions in terms of MGD, R-GPCD, CCF/Person/Month (Peak Season)

Stage	No Deficiency	10% Deficiency	20% Deficiency	30% Deficiency	40% Deficiency	50% Deficiency
Total (Million Gallons)	1,358	1,225	1,092	959	820	677
Demand Reduction (Million Gallons)	0	-133	-266	-399	-538	-681
Calculated R-GPCD	50	46	41	36	31	27
CCF/Person/ month	2.1	1.9	1.7	1.5	1.3	1.1
Daily Production (MGD)	8	7.3	6.6	5.9	5.1	4.3

Potential Water Reductions in Context



Part 4: Discussion

- Lower demand reduces overall vulnerability to shortage
- Lower demand makes cutbacks harder to achieve
- Feasibility of achieving higher levels of cutback at many stages of the plan in doubt
- Stage X: entering the unknown

Next Steps

- Researching demand management measures used at 21 other utilities around California

Cal American Water- Monterey	City of San Clemente
City of Hayward	City of Pasadena
Goleta WD	San Luis Obispo
City of Santa Barbara	Redwood City
City of San Diego	LADWP
City of San Jose	City of Long Beach
City of Palo Alto	City of Davis
City of Sacramento	Contra Costa WD
Marin Municipal WD	Coachella Valley WD
SFPUC	San Jose Water Company
City of Arroyo Grande	

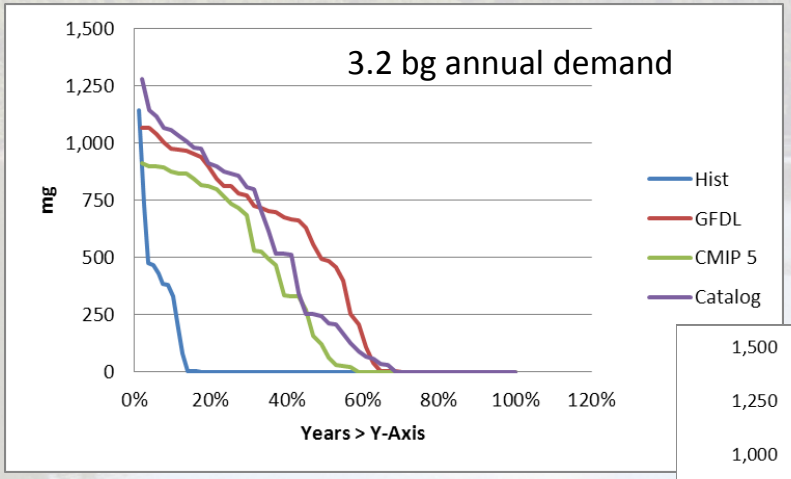
- Evaluating the new Alliance For Water Efficiency (AWE) work on the effectiveness of irrigation restrictions
- Recognizing that drought response planning is an art rather than a science

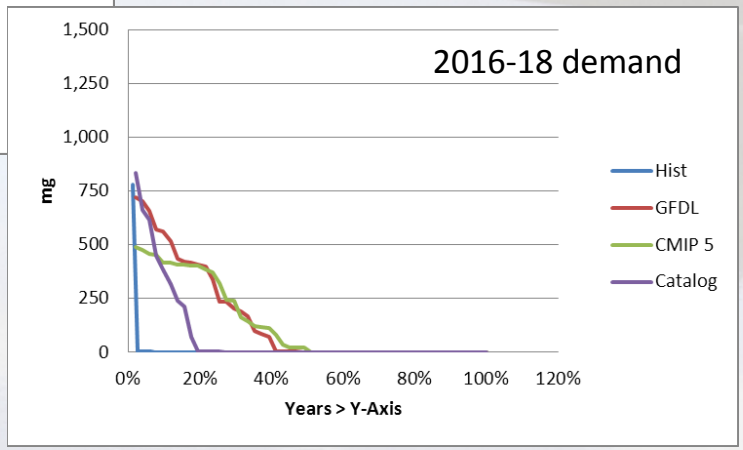
Questions?

Our Water, Our Future

SANTA CRUZ
Water Department

Peak-Season Shortage Distributions





Attachment 1-C
Confluence® Modeling – A Primer

Note: A lot of the information and analyses presented in this Tech Memo is based on Confluence® modeling runs performed by Gary Fiske. Additional attachments to Confluence modeling results are referenced in the memo, and for those less familiar with the model the results may require more background explanation than typically provided in those products. To facilitate greater understanding of the Confluence® modeling results, this primer is being provided as background.

The Confluence model isn't an operational model, but rather is a planning model that focuses on giving us information about the probabilities of various outcomes as well as giving us the ability to compare scenarios.

For runs based on historic hydrology, the model uses actual daily stream flows associated with each and every day of the historical period. For runs based on a climate change scenario flows for every single day of the period being modeled have been developed using precipitation and runoff, temperatures etc. that are created as part of the downscaling of global climate models or other approaches for projecting potential implications of climate change.

Here's a simplified example of how the Confluence model works: Assume that we're using a historical record flow set that covers 70 years. This record includes 25,550 daily records of unimpaired stream flow in which each record daily flow has been adjusted based on the agreed fish flow requirement for that day based on the actual conditions that would have been in place on that day in the historical record – so higher dedications of flow in wetter conditions and lower dedication of flows in drier conditions.

Assume that day one is October 1, 1948 and the final day is September 30, 2018 so we have 70 complete water years each with actual historic data to work with. On day one the water from the flowing sources (after fish flows have been subtracted) is used to meet projected water system demand using the water demand forecast. The forecast used by the WSAC was 3.2 billion gallons per year which is disaggregated into daily demands. (The more recent model runs were run using the reduced demand – more about that later).

Water from the department's sources is "dispatched" to meet daily demands in the following order: North Coast, San Lorenzo source (including Tait wells), Beltz (typically only during the summer/fall) and finally Loch Lomond[1,2]. If Loch Lomond water was used on day 1, the amount of available water from Loch Lomond to meet demand on day 2 will be lowered by the amount used on day 1 as adjusted by whatever inflows to the reservoir have occurred.

[1] With the potential addition of stored groundwater to the system, Gary has developed a strategy for optimizing the use of stored water from both surface and groundwater reservoirs.
[2] The Confluence model does include an ability to deploy the water available from the Felton Diversion and includes other operating constraints such as amount of draw-down of Loch Lomond allowed in a given year, but those details have been left out for the sake of simplicity.

Days 2 through 25,550 of the model run in the same way with the model keeping track of any days in which there is not enough water to meet daily demand, if any, using all available resources. At the end of the water year any annual shortage of water needed to meet that year's demand is accumulated into a single number by volume.

Water year #2 picks up exactly where water year #1 left off with respect to reservoir levels, and the model runs again and so on until every year of the historical flow set (or climate change alternative flow sets) has run. The model results tell us the percent of all years in which system demand is not met as well as the size of the shortages, creating a probability distribution that is useful in understanding the reliability of the system.

As noted in the footnote #2 on the previous page, the Confluence model has been adapted to integrate the idea of filling a "virtual" reservoir with water from either passive or active recharge.

One other important Confluence assumption is related to the benefit of planning to accumulate water in groundwater storage over several years so that an appropriate amount of water is available to provide drought supply. This approach is beneficial and has been being used in all the Confluence analyses we've been doing to test the feasibility of groundwater storage for meeting our drought supply needs. A three year "fill" cycle before a drought has been used in most of the analyses, but in one analysis presented to the Water Commission in October 2017, both a 3 year and a 7 year fill cycle to bank water before we needed to withdraw it.

Another assumption has been a 20% loss of stored groundwater – This is how a 1.2 billion gallons worst year shortage turned into 3 billion gallons of needed stored water: historic drought was 2 years x 1.2 billion gallons = 2.4 billion gallons. Assuming a 20% loss, to be sure you have 2.4 billion gallons available you need 3 billion gallons to start with.

A January 2015 version of the assumptions being used in Confluence and how they have changed over the years is shown here. There is likely a more up to date version of this somewhere, so I'm not suggesting that things haven't changed, but I do want to provide this so you can see some of the additional details about assumptions.

WATER COMMISSION
INFORMATION REPORT

DATE: 6/29/2020

AGENDA OF: July 6, 2020

TO: Water Commission

FROM: Rosemary Menard

SUBJECT: Proposed Ad Hoc Subcommittee to Work With Staff on Revenue Forecasts and Financial Planning Scenarios

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RECOMMENDATION: That the Water Commission approve the creation of an ad hoc subcommittee of three commissioners to be appointed by the Chair for the purpose of working with staff to develop revenue forecasting and financial planning scenarios for consideration by the full Water Commission

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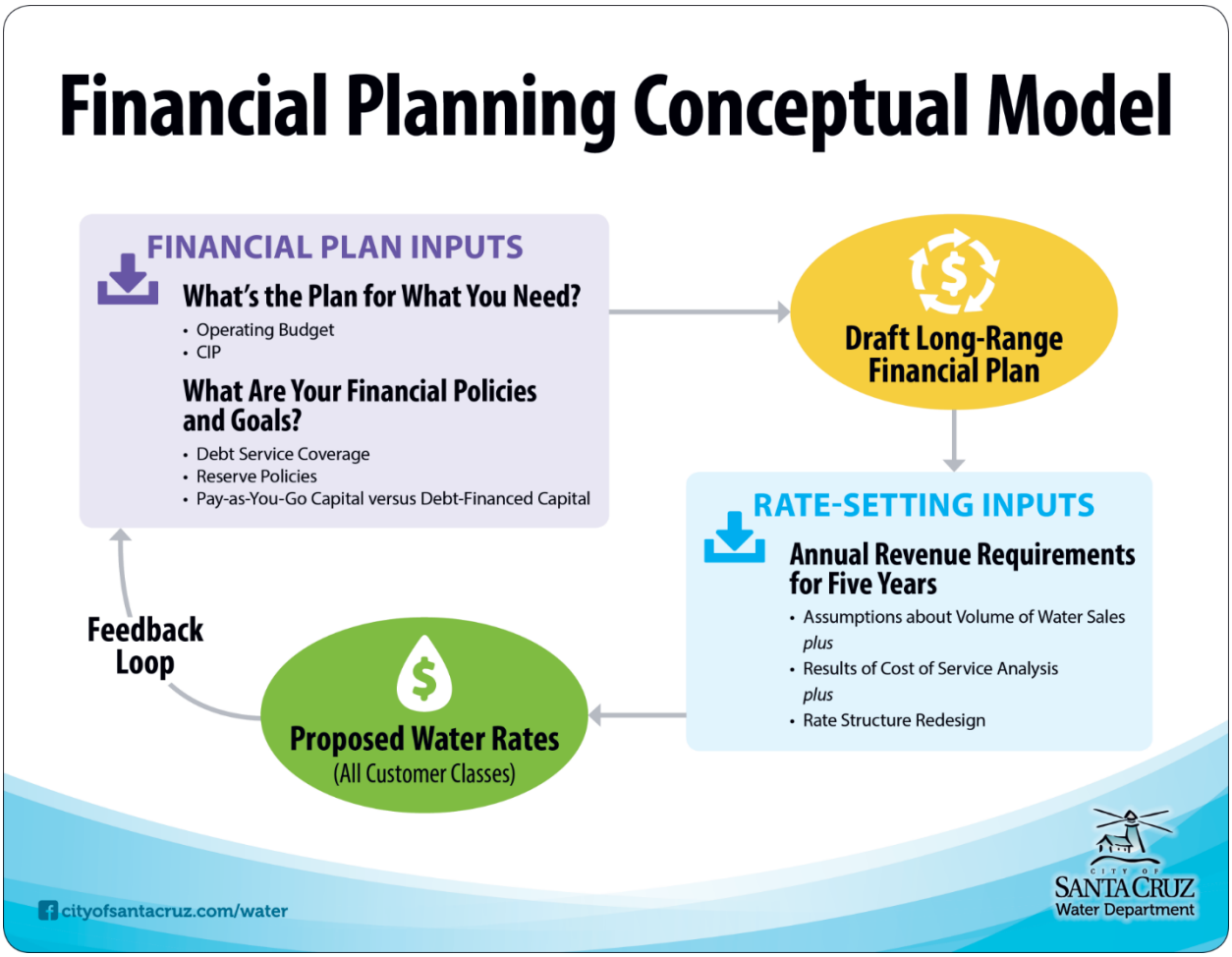
BACKGROUND: As Water Commissioners are aware, the Department is in the early stages of updating its Long Range Financial Plan and developing a multi-year water rate proposal. A major part of this work is forecasting water revenues. For the Santa Cruz Water Department, revenue requirements and associated water rates needed to produce the required revenues have been and will continue to be heavily influenced by the Department's need to reinvest in water system infrastructure.

Following the recent presentation and discussion of the Department's FY 2021 Budget and Capital Investment Program (CIP), Water Commission Chair Doug Engfer approached the Water Director with a number of "what if" questions related to future revenue requirements. After reviewing the questions raised and discussing with the Chair how responding to the questions fit with the larger financial planning and rate-setting process, Department staff are recommending that the Water Commission establish an ad hoc subcommittee to work with staff in identifying and modeling a variety of future financial scenarios. Work products developed in this effort would be shared with the full Commission later in the fall as further financial planning and rate development work is prepared for presentation to and discussion by the Commission.

DISCUSSION: Revenue forecasting is an important step in the financial planning and rate-making process. The Water Commission has seen the graphic on the next page on numerous occasions, but it is useful to include it here because it shows what the inputs are to revenue forecasting. These include the operating budget and CIP as well as policy goals such as financial metrics and how much of the CIP to debt finance versus pay for with annual rate revenues.

Realistically, the range of "what if" financial scenarios that can be evaluated are limited to those that involve modifying one or more of these financial plan inputs in some fashion.



The Department's financial pro forma model is a useful tool for conducting "what if" analyses. Water Commissioners are familiar with the output from the pro forma financial model, as it is included in the Department's annual budget materials which are reviewed by the Commission.

The work of the subcommittee would involve identifying a set of "what if" scenarios, adjusting model inputs to reflect the scenario being run and then running the model to how the Department's financial metrics (debt service coverage, days of cash) and customer rates are affected by scenario conditions. The model cannot explicitly estimate customer rates but it can identify the "year-over-year" revenue increase (decrease) that would result from the scenario.

Ultimately the Department will need to recommend to the Water Commission and thence the City Council a revenue forecast for use in developing proposed water rates for the future. Staff believes that having an ad hoc subcommittee participate with staff in understanding and exploring how various assumptions affect future revenue requirements, and the subcommittee's subsequent sharing of its perspectives with the full Water Commission, will be valuable in informing the Commission's recommendation to the Council.

FISCAL IMPACT: None

PROPOSED MOTION: Motion to approve the creation of an ad hoc subcommittee of three commissioners to be appointed by the Chair for the purpose of working with staff to develop revenue forecasting and financial planning scenarios for consideration by the full Water Commission

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