Attachment A

City of Santa Cruz

Water Supply Advisory Committee

Phase 2 Work Plan Status Report

June 15, 2015

The Water Supply Advisory Committee's (WSAC) Phase 2 work program has been designed around the use of scenario planning to explore and evaluate a range of alternatives. This status report of WSAC work during calendar year 2015 summarizes the basic work to date and provides an overview of the products developed to support the Committee's work. Several additional documents are attached to this status report as appendices to provide more detailed information where such information was thought to be relevant and potentially of interest.

The key ingredients of scenario planning include:

1. Problem definition
   A. Forecasts of current and future water demand;
   B. Analyses of supply available to meet current and future water demand; and
   C. Identification of probable and plausible challenges that will need to be addressed in the future, in this case these include a probable requirement for releasing water for fish flows and plausible impacts of climate change.
2. Solution development
   A. A range of demand management and supply augmentation alternatives that can be combined in various portfolios to meet the supply demand gap; and
   B. Evaluation criteria to use in considering the portfolios created.

This staff report will provide a high level summary of the Committee's progress in their work through the scenario planning phase and, where relevant, links will be provided to more detailed information, typically found in materials developed for committee meetings. In addition, comprehensive information about the Committee's work is available through its website: www.santacruzwatersupply.com.

1. Problem Definition

Over the many years that Santa Cruz has been studying ways to improve the reliability of its water supply, the problem has been defined in a variety of ways that were relevant at the time. Today, it is fair to say that the fundamental cause of the Santa Cruz water system's reliability problem is a lack of storage for available winter flows or the climate independent supply needed to ensure an adequate and dependable supply during water years classified as critically dry and, to some degree, dry.

Figures 1 and 2 show two versions of local, historical information for water years (October 1 to September 30) classified into water-year types. These are familiar figures to many, but the purpose of including them up front is to emphasize two issues:

- Figure 1 shows the data sorted chronologically. This view underlines the significant variability of the data.
- Figure 2 shows the data sorted into year types, showing the number of years that have historically fallen into each year type. As will be discussed later in this status report, a plausible impact of climate change on Santa Cruz's water supply would be an increase, perhaps significantly, in the number of dry and critically dry years that Santa Cruz will experience, thereby exacerbating the reliability issues the system currently faces.

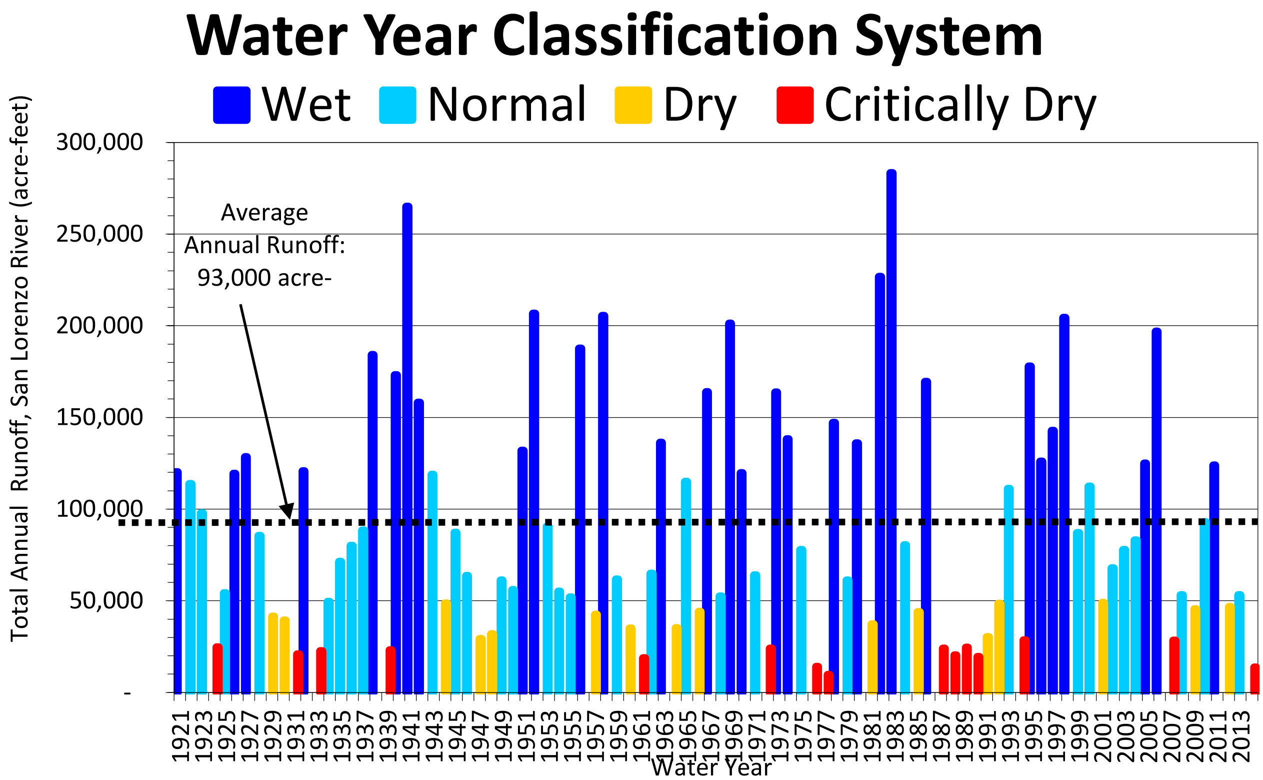


Figure 1: Water Year Classification System – Chronological Presentation

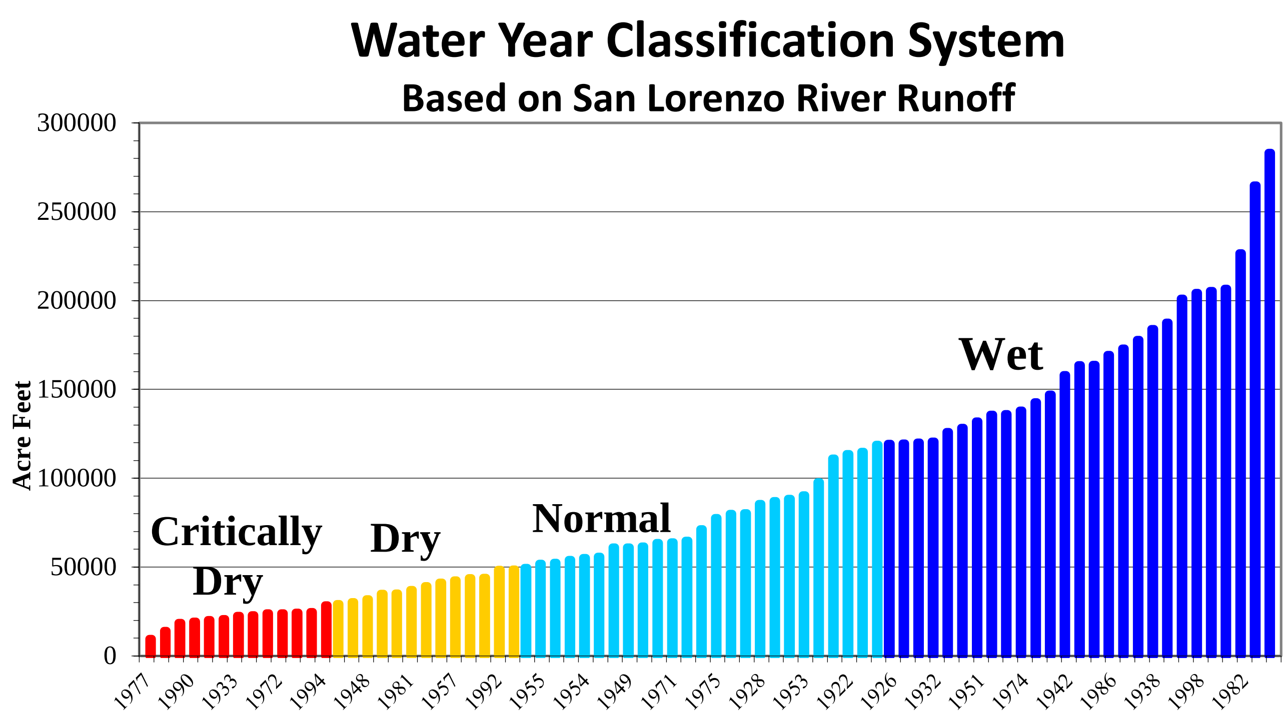


Figure 2: Water Year Classification System -- Year Type Presentation

A. Forecast of Current and Future Water Demand

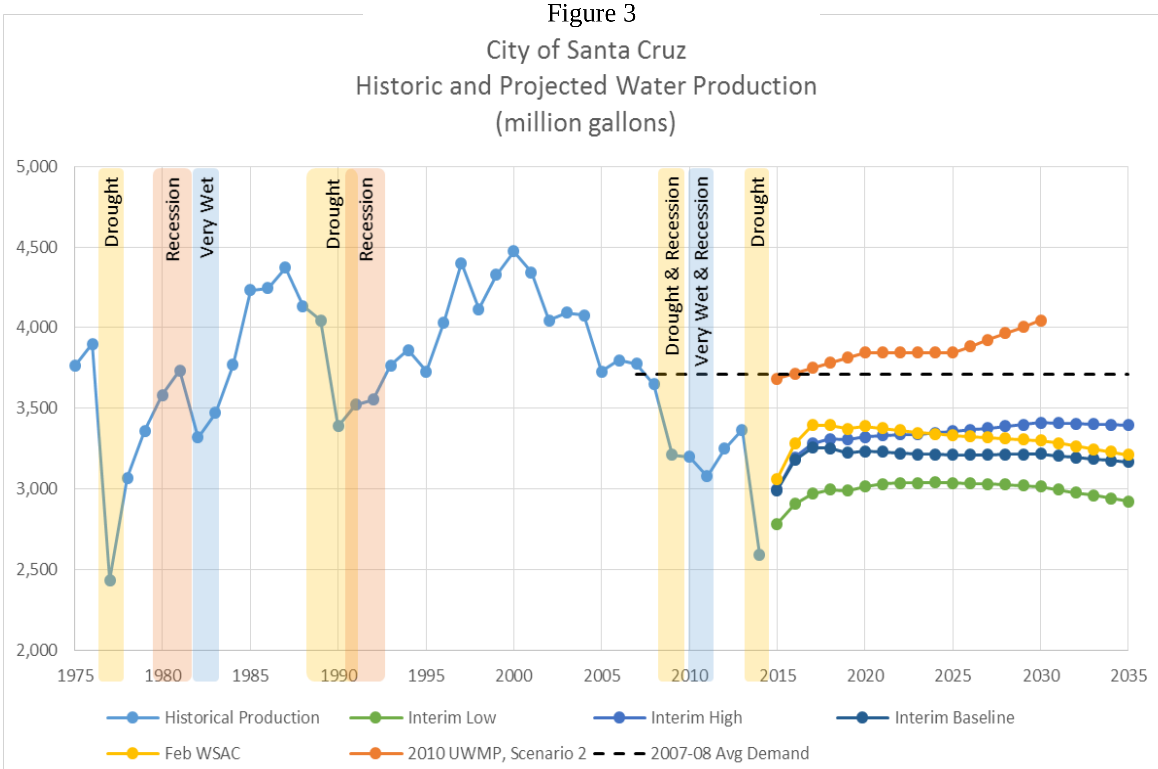
Significant work has been done to update the water demand forecast used in the 2010 Urban Water Management Plan. This demand forecast incorporates the changes in population and development that were part of the City's General Plan update as well as whatever up to date information was available at the time for the Water Department's outside-city service area. Key changes to the 2010 forecast include:

- incorporating effects of existing, ongoing water conservation programs,
- integrating the expected impacts of changes in the State's building and plumbing codes that will affect future water use in both existing and new construction,
- adding into the forecast the effects of price increases on water use, and
- retaining the University's projection of its ultimate build-out demand but extending its time for completion.

The result is a demand forecast for current and future demand that looks substantially different from the 2010 Urban Water Management Plan forecast, particularly because the revised forecast is no longer showing an increase in water demand during the coming 20 years.

Figure 3 is the updated forecast presented to the Committee in April.

Figure 3



B. Analysis of Supply Available to Meet Current and Future Water Demand

The projected change in demand has had an immediate and important impact on the analysis of the adequacy of current supply to meet demand. Essentially the projected stabilization and longer term reduction in demand would allow the water system to fully meet customer demand, <u>under natural flow conditions</u>, even in historically worst case conditions such as the 1976-1977drought.

City staff and members of the technical team have discussed this result and recognize that modeled results based on historic hydrological information will tend to underestimate the number of curtailments implemented. The key driver of this tendency is that water managers making decisions in the late winter and spring of one water year are unable to know what the next water year will bring and so will act conservatively to conserve storage in the face of this unknown. (In fact, this reality is behind City staff's recommendation for implementing Stage 3 water restrictions in this year.) In the end, when the water year is completed, the curtailment will turn out not to have been needed, but there was no way of knowing that 10 months earlier.

The key assumption of using natural flow conditions is an important one. Natural flows mean no externally driven constraints on the City's ability to withdraw water from its existing sources, except for those associated with the City's water rights. The likelihood of this condition being the case in the future is low. The more likely case is that the City's ability to withdraw water from its supply sources will be affected by both the need to release water for fish flows (to meet the federal and state requirements for the protection of threatened and endangered coho salmon and steelhead trout,) and the impact climate change will have on available resources resulting in either changed hydrology, extended droughts or both. The implications of both of these factors on the City's future supply are discussed in more detail in the next section.

C. Identification of probable and plausible challenges that will need to be addressed in the future, in this case these include a probable requirement for releasing water for fish flows and plausible impacts of climate change.

In spite of the positive assessment of the available supply described above, two factors will influence water availability in the future. One factor is the commitment of water the City will make for fish flow releases.

The City has not yet finalized a flow agreement with state and federal fishery agencies. Two flow regimes have been identified and are being used by the WSAC as potential supply implications of a lower-bound and upper-bound flow release. The lower bound flow regime is called "City Proposal" and the upper bound flow regime is called "DFG-5." These two flow regimes have different impacts on the long-term availability of water to meet City needs, with the impact of the lower bound proposal being around half of the impact on supply of the upper bound proposal.

i) Potential implications of Fish Flow Releases on the Frequency and Severity of Water Shortages

Table 1 and Table 2 respectively show the forecasted peak-season shortage profiles in 2020 and 2035.[1,2]

Table 1 -- 2020 Shortage Profiles

FLOWS	Likelihood of Peak-Season Shortages				
	0%	<15%	15%-25%	25%-50%	>50%
	0	<300 mg	300-500 mg	500-1000 mg	>1000 mg
Natural	100%	0%	0%	0%	0%
City Prop	92%	7%	0%	1%	0%
DFG-5	90%	1%	4%	3%	1%

Table 2 -- 2035 Shortage Profiles

FLOWS	Likelihood of Peak-Season Shortages				
	0%	<15%	15%-25%	25%-50%	>50%
	0	<285 mg	285-475 mg	475-950 mg	>950 mg
Natural	100%	0%	0%	0%	0%
City Prop	97%	1%	0%	1%	0%
DFG-5	90%	1%	4%	3%	1%

Several conclusions can be drawn from these profiles:

- With natural flows, there are no shortages of any magnitude under any hydrologic condition. Since we saw above that there are no expected shortages under worst-year conditions, this is not surprising.

- As expected, the DFG-5 profile is worse (i.e. results in a higher likelihood of larger shortages) than the profile for City Proposed flows. For example, in both forecast years, there is about an 8% likelihood (6 out of 73 years) of a peak-season shortage larger than 15% under DFG-5. This compares to around 1% (1 out of 73 years) under the City Proposal.

- Even under the most stringent flow regime (DFG-5), there are no expected shortages in 90% of historic hydrologic conditions. Without taking into account the possible impacts of climate change, the City's supply reliability challenges have been and will continue to be in the driest years.

[1] Note that the totals in any row may not add to 100% due to rounding.
[2] The data in Tables 1 and 2 was developed for the February version of the demand forecast and have not been adjusted to reflect the changes incorporated and reflected in the April forecast shown in Figure 1. Thus the results here are slightly overstated as the April demand forecast is slightly lower than the February one.

- While similar, the 2035 profiles are slightly more favorable than the 2020 profiles due to the somewhat lower forecast demand.

- The key conclusion is that under baseline conditions, and assuming that future hydrology looks like the historic record, the City would have sufficient supply to serve its demands in the absence of any HCP flow restrictions. Under either of the proposals, the City faces peak-season shortages in the driest hydrologic conditions. In those driest years, those shortages can be significant, around 600 million gallons under City-Proposed flows and close to 1.4 billion gallons under DFG-5 flows.

The second potentially significant factor to impact the City's current water system is climate change. With California in the throes of a deep multi-year drought, some would say that the City's water system has already been experiencing the impacts of climate change. For example, with the exception of the summer of 2011, the City has imposed some form of water restrictions on its customers every year since 2009. And this year's second consecutive year of rationing is entirely unprecedented.

The Water Supply Advisory Committee has been exploring the potential impacts of climate change on future water supply availability using two different considerations:

- Extended drought; and
- Hydrologic change.

ii) Extended Droughts

Recent evaluations of paleoclimate records and future climate model projections indicate that longer-term drought conditions have occurred in the past and are likely to occur again within the next century. In this section we review paleoclimate and climate change projection studies relevant to drought planning in California and the Santa Cruz region. Several publications, including some very recent ones, compare modern climate observations to historical records and to future climate projections.

Fritts (1991) shows that droughts in the Santa Cruz region were frequently much longer than three to eight years. Paleoclimate reconstruction for the California valleys show that precipitation from the 17th century until the 20th century was consistently below average 20th-century values, with long periods of relative drought and short periods of high rainfall. These data show that cycles of below-average precipitation have commonly lasted from 30 to 75 years (Fritts, 1991)[3].

Other paleoclimate analyses, summarized in Fritts (1991), have concluded:

- "The variability of precipitation was reconstructed to have been higher in the past three centuries than in the present" (p. 7).
- "Lower variability occurred in twentieth-century precipitation. Reconstructions of this kind should be used to extend the baseline information on past climatic

[3] Fritts, H.C. 1991. *Reconstructing Large-Scale Climatic Patterns from Tree-Ring Data: A Diagnostic Analysis*. University of Arizona Press, Tucson, AZ.

variations so that projections for the future include a more realistic estimate of natural climatic variability than is available from the short instrumental record" (p. 8).

A recent publication by Cook et al. (2015)[4] compares paleoclimate drought records with future predicted conditions based on climate change models. Using tree ring data and current climate models, the authors found that drought conditions in the coming century are likely to be as bad as or worse than the most severe historical droughts in the region, with severe dry periods lasting several decades (20–30 years). In some cases, winter precipitation may increase, but gains in water during that period will most likely be lost due to hotter, drier summers and greater evaporation.

Other recent studies linking climate change, precipitation changes, and drought conditions have found that warming temperatures greatly increase drought risks in California (Diffenbaugh et al., 2015)[5].

Because the "historical record" assumption used in WSAC's Baseline Scenario may not adequately identify droughts the City of Santa Cruz may face in the future, and therefore needs to prepare for, the WSAC technical team created an extended-drought planning sequence that represents a discrete plausible future event that can guide water resource planning in Santa Cruz.

Building on examples from utilities around the state, the Santa Cruz extended drought planning sequence combines and places back to back the City's two worst drought sequences: 76-77 and 87-92. This eight year drought sequence was combined with each of the fish flow proposals discussed above and evaluated for the frequency and severity of the shortages that would be produced. Table 3 summarizes these results.

Table 3. Extended drought peak-season shortage statistics

	City Proposal	DFG-5
Total 8-year (mg)	702	5,108
Average	4%	32%
Maximum	32%	67%
Minimum	0%	6%
Years > 20%	1	6

[4] Cook, B.I., T.R. Ault, and J.E. Smerdon. 2015. Unprecedented 21st century drought risk in the American southwest and central plains. *Science Advances* 1(1):e1400082. doi: 10.1126/sciadv.1400082
[5] Diffenbaugh, N.S., D.L. Swain, and D. Touma. 2015. Anthropogenic warming has increased drought risk in California. *PNAS.* doi: 10.1073/pnas.1422385112.

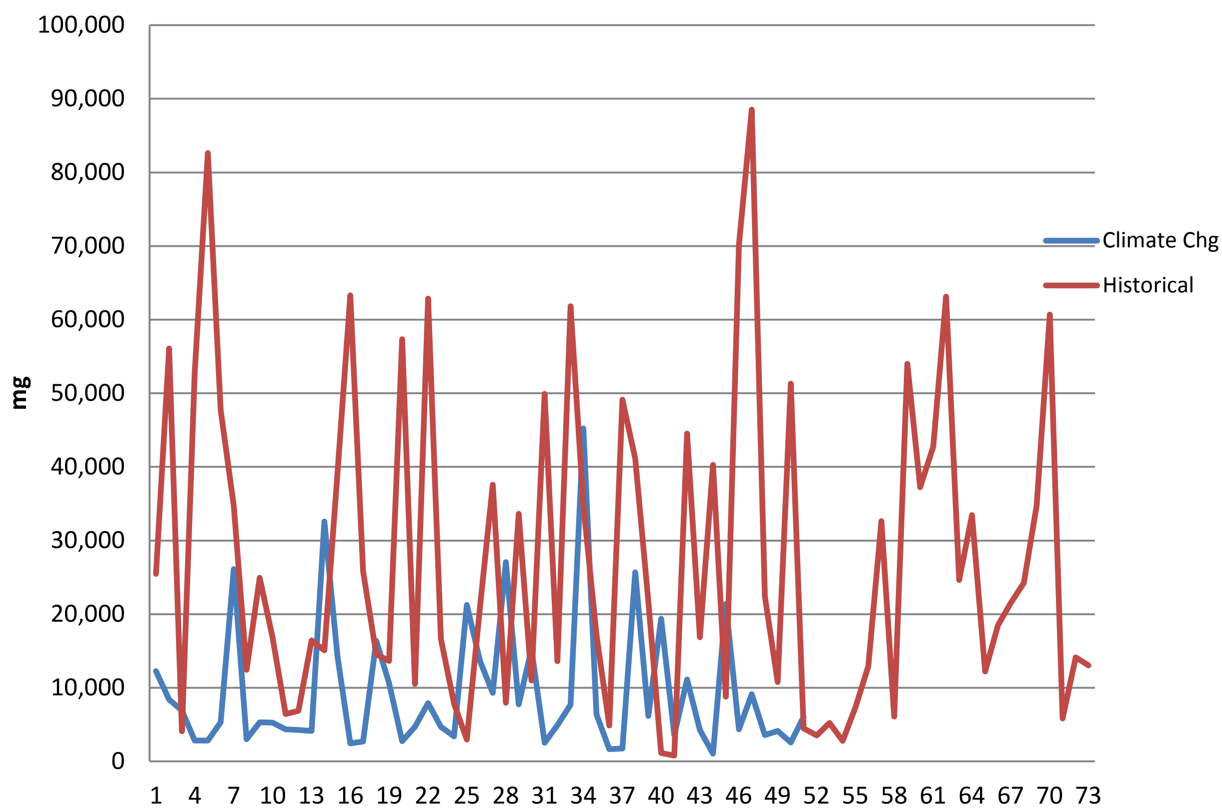
iii) Climate Change Resulting in Changed Hydrology

Across hundreds of modeling runs, the essential characteristics of the historic, hydrologic flow record have remained constant. The worst drought event was 1976–1977. The 1987–1992 period represented another major drought. And it was clear which years in the record were very wet and which were exceptionally dry.

This strong foundation on which to plan and operate no longer applies when analyzing how the system will respond to potential changed hydrology driven by climate change. The essence of analyzing this type of climate change is the assumption that future weather and stream flows will not be the same as the past.

To effectively analyze this plausible impact of climate change, a new 51 year flow record has been produced by working with hydrologic conditions that would occur in a selected global climate model and downscaling those conditions to Santa Cruz's sources and local conditions. In the resulting flow projection, there is no longer a 1976–1977 worst-case drought benchmark or a 1987–1992 sequence. As is illustrated in Figure 4 for City proposed HCP flows at Big Trees, the distribution of flows is completely different from that of the historic record.

Figure 4 -- Comparison of annual flows at Big Trees: City proposal.



The key conclusions that can be drawn from Figure 4 is that while the historic variability continues, the lows are not demonstrably lower than those occurring historically, but that the high flow events are considerably lower, meaning that there may be less water in the system overall.

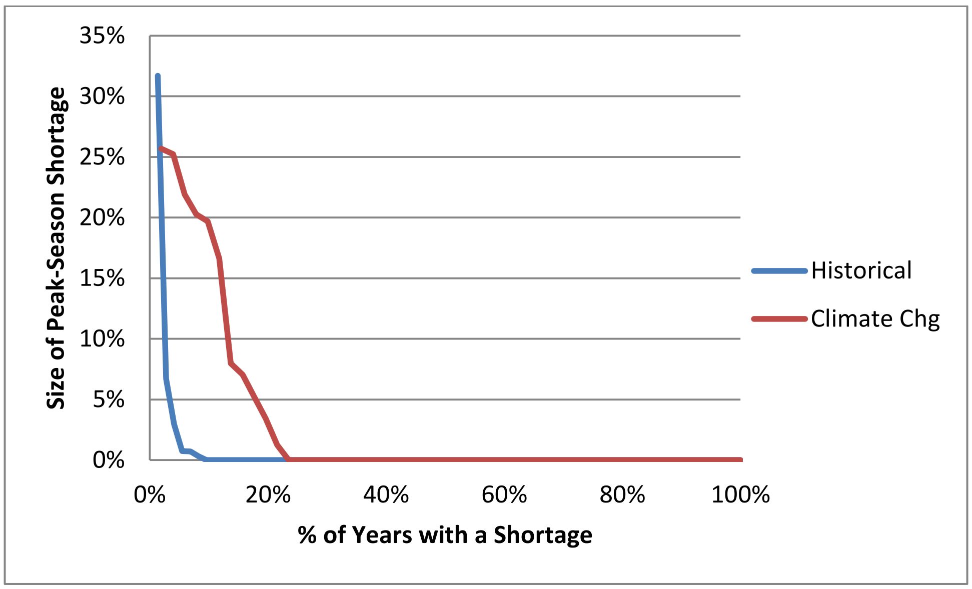
iv) Modeling Results Looking at Climate Change/Hydrologic Change with City Proposed Flows:

Climate change increases the likelihood of larger shortages. These results are shown in Figures 5 and 6.

City Proposed Flows

Figure 5 compares the peak-season shortage duration curves for City Proposed flows with and without climate change.

Figure5 -- Peak-season shortage duration curves with and without climate change: City proposed flows



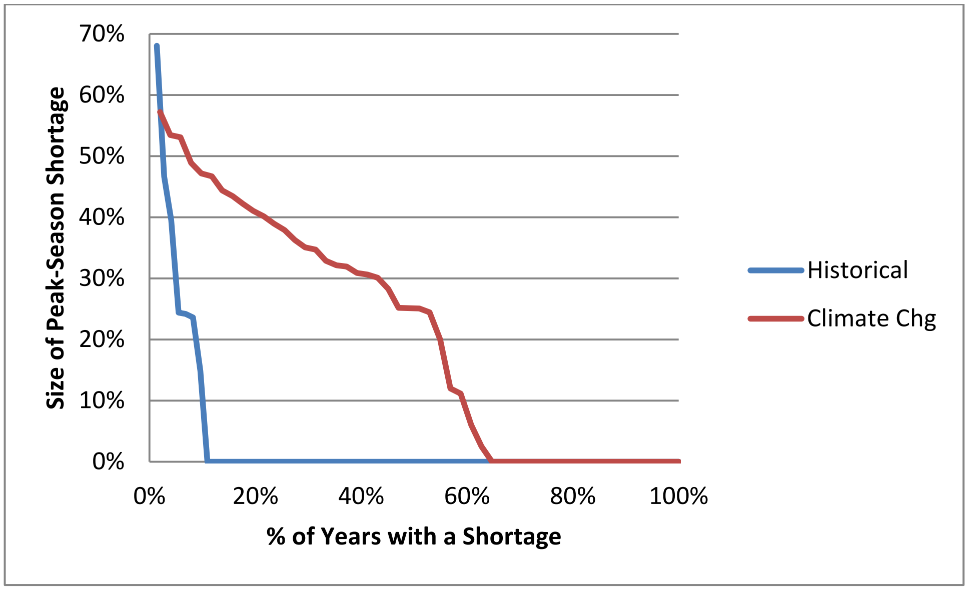
The differences between the two curves are immediately noticeable:

- Climate change shifts the curve upward and to the right, meaning there is an increased likelihood of larger shortages. Whereas with historic flows, there is a small chance (< 10%) of any shortage at all, this rises to more than 20% with climate change. The probability of a shortage greater than 20% increases from about 1% with historic flows to about 8% with climate change.

DFG-5 Flows

Figure 6 shows the same system reliability comparisons for DFG-5 flows.

Figure 6 -- Peak-season shortage duration curves with and without climate change: DFG-5 flows.



While the types of impacts are similar, their magnitudes with DFG-5 are much increased. For example, under more than 60% of hydrologic conditions, there will be a peak-season shortage. In fact, a shortage exceeding 25% can be expected in just over half the years.

The foregoing results highlight the importance of considering climate change as Santa Cruz plans for its water supply future. Even under the City's proposed HCP flows, which represent the potential lowest impact to Santa Cruz's water supply, water customers would have to contend with frequent shortages under this climate change scenario. If the outcome of the HCP negotiations are closer to the California Department of Fish and Wildlife's (CDFW's) DFG-5 proposal, the frequency and magnitude of shortages becomes much more onerous.

Thus with climate change, the City's water future will look qualitatively different. With historical flows, while there is a real possibility of large peak-season shortages, these are generally confined to the driest years with the large majority of conditions having no shortages. This is clearly not the case with climate change. Instead, significant shortages can be expected in many years. With DFG-5 flows, large shortages can be expected in the majority of years. The pattern of water availability to customers will be markedly altered.

2. <u>Identifying and Evaluating Solutions:</u>

Beginning with their work in the summer and fall of 2014 to identify a full range of demand management and water supply options for consideration, the WSAC, City staff and the technical team supporting the WSAC have invested considerable resources in developing and fleshing out demand management and supplemental water supply options.

A. Consolidated Alternatives

From more than 80 suggestions and proposals presented by community interests, project proponents, and City staff during the October 16, 2014 Water Supply Convention, the technical team created 20 Consolidated Alternatives. "Consolidated Alternatives" are groups of alternatives with similar concepts and attributes, which include a range of alternatives such as additional demand management activities, approaches to improving storage for available system flows in the winter, to developing climate independent sources using purified recycled water.

Tables 4 and 5 provide summary information on Consolidated Alternatives provided to Committee Members during the April 30th/May 1st meeting, and more detail on each alternative is available in Attachment 1 to this document.

During the first half of 2015, the technical team has been continuously developing and refining their work on the Consolidated Alternatives, making it possible for the Committee to use them as building blocks in the two rounds of scenario planning the Committee has engaged in.

The Confluence analysis concluded that the key outcome of is that the harvesting and storage of winter flows has the potential to completely address the City's water supply challenges and enable the City to meet projected future demands. This is the case even with current water rights, DFG-5 instream flows, and climate change. To achieve these benefits, the "virtual reservoir" used in the analysis would have to become real, i.e. suitable infrastructure improvements and institutional arrangements would have to be made to have a place to reliably store at least 3 billion gallons of water. In addition, the capacities of various current infrastructure would have to be increased.

Table 4 -- Summary of CAs 01-05 with Preliminary Water Savings and Costs						
CA-# and Title	30-Year Present Value Savings (MG)	30-Year Present Value Cost ($)	30-Year PV Cost/30-Year PV Saved ($/MG)	30-Year Average Savings (MG per Year)	30-Year Average Cost ($/yr)	Energy Saved (MWh over 30 yrs)
CA-01 Peak Season Reduction	In progress	In progress	In progress	In progress	In progress	In progress
CA-02 Water Neutral Development	N/A	N/A	N/A	N/A	N/A	N/A
CA-03 Water Conservation Measures (Program C Rec)[1]	2,788	$23.1 million	8,301	173	$1.31 million	6,318
CA-04 WaterSmart Home Water Reports	770	$3.17 million	4,119	37	$151,529	1,766
CA-05 Home Water Recycling	229	$7.8 million	34,061	11.9	N/A	571
1 Values reported for CA-03 are for a 25-year period, rather than a 30-year period						

Table 5 -- Summary of CAs 07-19 with Preliminary Source Production, Yields, and Costs												
CA-# and Title	Added Source Production		Yield (Peak-Season Shortage Reduction) with Historic Flows		Yield (Peak-Season Shortage Reduction) with Climate Change			Discounted 30-Year PV Cost				
	Average Year	Worst Year [1]	Average Year	Worst Year	Average Year	Worst Year	Capital Cost	Total	Unit Cost per MG of Worst-Year Yield: Historic Flows	Unit Cost per MG of Worst-Year Yield: Climate Chg.	Preliminary Annual O&M Cost Estimate	Preliminary Energy Estimate
	MG/yr	MG/yr	MG/yr	MG/yr	MG/yr	MG/yr	$ million	$ million	$/MG/yr	$/MG/yr	$ million	MWh/MG
CA-07 Deepwater Desalination	550	1,100					53 **	116			3	13+
CA-08 Water from Atmosphere	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CA-09 Winter Flows Capture	See CA-16											
CA-10 Water Reuse for Aquifer Recharge	1,300	1,300	60	1,360	420	1,150	191	358	12,600	14,900	8	10 [2]
CA-11 Water Reuse for Direct Potable	1,300	1,300					91	166			3.6	6
CA-12 Water Reuse for Indirect Potable	1,300	1,300					218	341			5.9	10
CA-13 Water Reuse for Non-Potable	770 [3]	770 [3]	45	530	410	850	60	106	9,600	6,000	2.2	3
CA-14 Desal Using Forward Osmosis	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CA-15 Desalination Using Reverse Osmosis	550	1,100					107 [4]	149			2	13
CA-16 Aquifer Restoration/Storage	560 [5]	1,100 [5]	60	1,360	420	1,150	34	55	1,900	2,300	1	2
CA-17 Expand Treatment Capacity	560	1,100					58	142			4	3
CA-18 Off-Stream Water Storage	260	260					155	176			1	12
CA-19 Ranney Collectors	560	1,100	60	1,360	290	115	17	38	1,300	15,800	1	4

*** Likely significantly low (estimate from previous work that does not directly compare. This value is being recalculated from site-specific assumptions.*

[1] Number of years when water is available will vary among CAs.

[2] Based on recharging at Hanson Quarry and extracting and returning water to Santa Cruz from Scott's Valley.

[3] A recent report lowered the projected likely yield from 770 MG to 500 MG. A value of 770 was maintained in the analysis for consistency. This issue will be addressed in the next step of the project. Will be adjusted pending additional Confluence run.

[4] 2013 scwd^2 Desalination Program study values used, scaled to March 2015 dollars and then scaled for size using the 6/10 power rule.

[5] Assumed 80 percent withdrawal from extraction wells to calculate per unit volume cost.

B. Scenario Planning

Scenario planning is a tool often used to facilitate planning in the face of uncertainty. A goal of scenario planning is to explore a range of futures that are different from what would occur if current trends continue, but not so unlikely as to be a waste of time. One way to maximize the benefits of scenario planning is to create scenarios based on what are called "deep drivers of change." For Santa Cruz, the obvious deep drivers of change are climate change and fish flows.

In the first round of scenario planning which occurred during the March meeting, Committee members broke into small groups, with each group working on one of three scenarios:

- City proposed flows and changed hydrology;
- DFG-5 flows and changed hydrology; and
- DFG5 flows and extended drought.

Following several hours of work in their small groups, Committee members presented the demand management and water supply improvement measures they had created to address the conditions described in their scenario. These groups of measures are called a portfolio.

Two key themes emerged from this work:

- Committee members created water supply portfolios which included additional investments in demand management; and
- Each of the groups gravitated to some form of winter flow capture and storage as a key strategy for meeting future water supply needs for Santa Cruz. One group acknowledged the potential need for a supplemental supply to help get the aquifer storage program going before it could be completely filled by available winter flows, and chose to fill that potential gap with recycled water.

In preparation for the second round of scenario planning, sets of Consolidated Alternatives with different focuses were analyzed using the Confluence Model that the City uses to assess how different water supply alternatives could affect the frequency and duration of shortages.

Round two of scenario planning occurred at the Committee's April/May meeting and included two scenarios:

- DFG-5 flows with extended drought,
- DFG-5 flows with climate change.

Two working groups of Committee members were assigned to each scenario. Again, winter flow harvest was the center piece of each group's solution to the scenario they were given, and again, purified recycled water played a role if and as needed as a back-up resource.

At the Committee's June meeting, Committee members worked with a set of four different staff-created water supply portfolios. Each included some form of winter water harvest, allowing Committee members to consider the risks and uncertainties related to each approach. The analytical tool used to support this exploration was a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis.

In addition to a winter water harvest approach provided as a "Plan A", each portfolio contained a proposed "Plan B" and a "trigger" that would define the conditions for moving from Plan A to Plan B. In part, the addition of a Plan B and a trigger was designed to get the Committee members thinking about and working with ideas related to "what ifs."

The four portfolios developed were:

1. Plan A: In lieu recharge of regional aquifers by providing winter flows to Soquel Creek and Scotts Valley to meet their off-peak demand allowing them to rest their wells. Additional infrastructure or operating rule changes would be implemented to extend the season during which in lieu recharge could be provided, thereby increasing the rate of recharge. *The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it.*

   Plan B: Purified recycled water piped back to and mixed with Loch Lomond supply (a technique called indirect potable reuse, known as IPR).

2. Plan A: Active recharge of regional aquifers using injection wells (a technique called Aquifer Storage and Recovery, known as ASR). *The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it.* Using ASR would accelerate the timeline when this source could fully meet Santa Cruz's needs.

   Plan B: Purified recycled water piped to and mixed with North Coast and San Lorenzo River supplies, retreated at Graham Hill Water Treatment Plant and delivered to customers (a technique called direct potable reuse, known as DPR).

3. Plan A: ASR along with using purified recycled water to create a sea water barrier along the coast to manage and impede salt water intrusion. *The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it.* Creating a salt water intrusion barrier would accelerate the timeline when this source would fully meet Santa Cruz's needs. Should the ASR program ultimately completely solve Santa Cruz's problem, the stranded assets in this plan would be a complete advanced treatment plant for producing purified recycled water and related infrastructure.

   Plan B: Converting the purified recycled water plant to a source of water for DPR use..

4. Plan A: ASR coupled with desalinated water from the proposed DeepWater Desal plant at Moss Landing. *The ultimate goal would be for groundwater to come back to Santa Cruz from regional aquifers when Santa Cruz needs it.* Creating a supplemental source of potable water could result in a combined ASR and in lieu recharge strategy that would accelerate the restoration of regional aquifers,

condensing the timeline when this source could fully meet Santa Cruz's needs. Should the ASR program ultimately solve Santa Cruz's problem, the stranded assets in this plan would be a share of a regional desalination facility that might be sold to another party and a pipeline that might be repurposed for a different use.

Appendices 3 through 6 provide additional summary information about these portfolios, including costs, energy consumption and yields.

None of these portfolios were designed to be the best one. Rather, they were designed to be purposefully different from each other so that the Committee could explore the risks and uncertainties associated with different approaches. It was not part of the goal of the Committee's June meeting to select one of the portfolios as the preferred approach.

The focus on risks and uncertainties associated with the performance of these portfolios is an important one. At the level of analysis and information currently available, it is inevitable that there will be questions about actual performance of various approaches. The Committee has been discussing using what is known as a contingent agreement as an approach to dealing with this uncertainty. What this means is that major recommendations will be developed, but the Committee recognizes that there is still a lot of unknowns about some of the approaches. The agreement will likely include triggers that begin with an "IF" and include a "Then." For example,

> "If by 2025 aquifer storage and recovery using winter water isn't reliably producing 500 million gallons a year of recoverable water (for use as drought supply) then, develop a recycled water source as a supplemental supply."

A good contingent agreement of this sort requires anticipating and imagining that things might turn out in expected and unexpected ways, and then making a plan to deal with that outcome by creating a specific trigger. By including triggers and a Plan B in the portfolios, staff introduced the idea of a defined way to move through the "expected unexpected" and gave the Committee a chance to work with these ideas.

Part of the elegance of a well-crafted contingent agreement is that it prepares people in advance that things might not go as planned, and gives people some say in what will happen if they don't. A well-crafted contingent agreement also helps set realistic expectations, and establishes and maintains buy-in to the path laid out in the agreement. Creating a contingent agreement is more work than some other options, but if done well, can be a real asset for helping to create and maintain momentum toward a larger goal.

The Committee had a very productive session at their June meeting and delved deeply into the tasks of assessing the SWOTs of the various portfolios. Their next two steps are: to:

- Use the multi-criteria decision support model they have developed to do individual evaluations of the risks and uncertainties associated with the set of six portfolios that emerged from the June meeting. The result of these evaluations will be reported back to and discussed by the Committee at their July 23rd and 24th meeting; and

- Discuss their progress and the issues they're working with the City Council during the June 23rd Joint Study Session.

Following these two efforts, the Committee will turn its attention to developing their agreement, which is due to the Council following their September 30th/October 2nd meeting.