

Ctte Members-- This is a draft of a handout that would be given—preferably along with a handshake—to members of the public who come to your meetings. Let me know if you want to see any changes! The context part would be modified for each meeting. --Carie

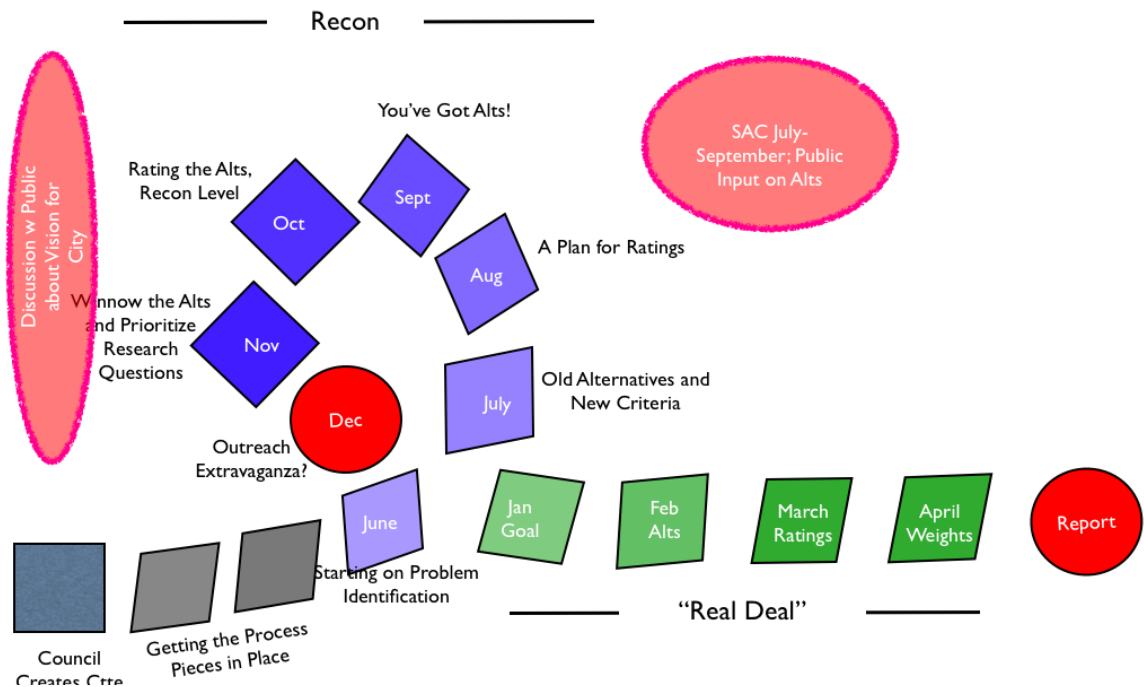
Welcome, Water Supply Advisory Committee Meeting Attendees!

Here are a few pieces of information that may enhance the value of your participation in our WSAC meeting. First, the food is for everyone. Enjoy. Second, the posters are *meant* to be written on. For instance, if there are words you hear in the meeting that aren't defined, add them to the "Glossary" poster! That word will then be defined in future documents. Committee members are asked to use blue pens and the public, black. [ditch this distinction?] There should be some pens available—ask any of the city staff, facilitators or committee members if you don't see one.

You can log onto the internet [login info] and get the projector images from the meeting to come straight to your screen. To do this, go to [link]. You don't need to download any software—you will essentially be looking at a temporary website that shows the facilitators' screen.

There are a few links you might find useful. The first is ///, the Committee's new website. The second is ///, where you can evaluate the meeting. The facilitators pay close attention to your evaluations and have already made several design changes to accommodate the public's suggestions. Please keep helping us improve.

About public comments: when the Committee developed its charter, they decided to have public comment at the beginning of each day's session and at the end of the entire two-day meeting, and also to have public comment on major decisions. Typically they would not have public comment for each agenda item, especially not on for information items. Committee decisions are made by consensus. [link to charter]



Ctte—Unless the graphics person comes up with a better idea, this is the way we might depict Recon and Real Deal. It is meant to look like a game board—I'll attach the 'real' graphic that inspired this to my e-mail so you can envision what it might be like. .

Mike Rotkin, the Committee's Corresponding Secretary, provides this context:

Our group has now met for three monthly meetings (each lasts two days with about three to six hours for each of the two sessions). Although everyone knows we are currently in a serious drought that will need solutions as soon as possible, our group has decided to take the time necessary to come up with a solution that is sustainable over the long haul and a solution that, as much as is possible, is made by consensus of the fourteen-member group. So we are taking the time necessary to build a solid foundation of knowledge among all of our members about the Santa Cruz water situation, past efforts to provide sufficient water for the community (and fish), and a full understanding of the widest possible variety of potential solutions to our water needs. The City Council has given us a year for this work up until April 2015.

Our first two meetings were spent developing decision-making structures for the group and for consultant arrangements that will maximize the likelihood of our finding a

consensus solution to our water needs. At our most recent meeting, we heard from City staff about the historical supply and demand issues confronted by our water system. We intend by the fall to have a Strategies and Ideas Convention at which time we will be welcoming presentations on every possible alternative with respect to meeting the community's water needs.

Our overall plan is to make two passes at the issue -- the first at a fairly general level so we are all aware of the full nature of the issues involved, the possible alternatives that exist and the priorities for research and discussion. Then we will get into a detailed study of the most promising alternatives. Alternatives will include options for increased conservation, management strategies and new water supply sources.

At the July 31-August 1 meeting, our emphasis will be on studying old alternatives, developing scenarios (alternate goals to embrace our uncertain future) and discussing the criteria by which we will judge the merits of different alternatives.

TO: WATER SUPPLY ADVISORY COMMITTEE (WSAC)
FROM: HEIDI LUCKENBACH
SUBJECT: UPDATE ON SOQUEL CREEK WATER DISTRICT ACTIVITIES
DATE: JULY 24, 2014

The attached document is included in the agenda packet at each meeting of the Soquel Creek Water District Board of Directors. This document is updated by staff at Soquel Creek Water District and summarizes completed, new and ongoing activities. This document, excerpted from the larger packet, is contained on pages 519-530 of that packet.

While the document is provided to the WSAC in its entirety, and will be at their future meetings, particular areas of interest to the WSAC given their charter and mission may include topics covered on pages 519-525 and the Conservation item on page 529.

Work Plan and Special Assignments Status Report
Updated as of July 15, 2014

ACTIVITIES RELATED TO WORK PLAN ITEMS

Key –

Regular Font = No Change

Red Italic or underlined = New Assignment or Activity

~~Blue Strikethrough~~ = Completion; Completed items are deleted the following month

INTEGRATED WATER RESOURCES PROGRAM (IRP)

The District's adopted multi-faceted program includes demand management, groundwater management, and supplemental supply (conjunctive use or local). Below includes a status or current activities of these components (*This section has been re-arranged (from how it organized in previous work plan updates to mirror the order as outlined in the IRP):*

1. Demand Management : Conservation

~~Water Use Reduction Plus Program. Staff continues to focus on the development of the Water Use Reduction Program (WURP) now rebranded as the Conservationplus program. Using focus group results, the board made changes to the details of the Conservation Plus program on June 17, 2014 and Board adoption by resolution at a public hearing is anticipated for August 12, 2014 with full launch in early 2015. Staff are now focusing on preparing the District to successfully implement the program including hiring additional staff and preparing billing software, forms and materials. Staff and consultants have named, branded, created key messages and drafted an outreach plan for the program which is being finalized and initial communications have begun. Focus group sessions were conducted and staff continues to refine the program looking for Board adoption by Resolution in August and full launch around January 1, 2015. This should allow sufficient time for outreach and shadow billing. This will be brought to the Board for a first reading and public hearing on August 12.~~

Water Waste Ordinance. Staff has made modifications to the water waste ordinance *as adopted by the board on June 17 and are working to update internal materials to reflect the changes.*

The interview process for a full-time, temporary Conservation Compliance Assistant has been completed and this person will come on board and begin patrolling for water waste shortly. This will be brought to the Board for a first reading and public hearing on May 20. The second reading of the ordinance is being brought back on June 17.

2. Groundwater Management

a. **Enhanced Recharge** (Admin) – No new information at this time.

~~b. **Cooperative Agreement with City of Santa Cruz (City)** (Admin) – Status: Negotiations have resumed and agreement now includes City participating in cutting back groundwater pumping if District enforces Mandatory Rationing. The City provided a revised agreement for Staff to~~

Project completed.

d. Groundwater Replenishment Powers and Zone of Benefit – Status:

The Basin Implementation Group discussed this item on May 24, 2011. As the next step in the evaluation, Staff will update information on non-District well locations and pumping within the SqCWD service area using metering information and water use factors and consider various zone of benefit scenarios based on pumping impacts. At the Strategic Planning Workshop on July ~~30th~~ **30, 2013**, the Board decided to look further at this option and we discussed replenishment powers under AB3030 at the March 4, 2014. The zone of benefit can be determined through a groundwater model determination of which wells influence seawater intrusion. This is not legally required, but is important if we hope to have cooperation on this issue. The Board will consider moving forward with a groundwater model at the July 15, 2014 meeting.

f. Basin Implementation and Advisory Groups - ~~The BIG meeting was held on November 12, 2013. The BAG meeting was held on October 29. The next most recent BIG meeting will~~ **was** ~~be held on June 24, 2014~~ **with the BAG meeting preceding it on June 4, 2014.** ~~A special meeting of the BIG was held February 10 to discuss a cost sharing arrangement with the County for the Private Well Stakeholder Group. It was determined that the City of Santa Cruz and the county should be invited to join the BIG. This was approved by the Board on March 18 and will be considered by the Central Water District Board on April 15, 2014. Letters of invitation have been sent to both the City and the County. They will be considered by their Council and~~ **Board** ~~Board~~ **in September and August** respectively. ~~Initially there was concern about the City being a financial partner due to their low pumping levels, but they actually pump as much or more than Central Water District annually and Central is a financial partner. The option was left open for consideration by the existing members if the City would like to request full partnership. Per the June 24th BIG meeting, PVWMA was also considered to be invited to the BIG and this will be brought to both boards of Central Water District and SqCWD to approve. The SqCWD board will consider this on 7/15 and, if approved, a letter of invitation to PVWMA will be sent out. If either any of the~~ of the entities governing bodies accept the invitation, the next step is to write an amendment to the existing partnership agreement. **The BIG also discussed the notion of changing its name and this will be further considered.**

g. Groundwater Stakeholder Committee: The District is working with Central Water District and the County of Santa Cruz to form a stakeholder advisory committee to broaden the engagement with all groundwater basin users (including private pumpers) to promote open and effective communication and explore issues related to groundwater rights, seawater

- b. Follow up and Evaluation: Projects, thus far, to include in a qualitative summary for the Board to consider at a future meeting include: District-only Desalination, Deep Water Desalination, Water Exchange, full 35% Mandatory Water Rationing, Recycled Water for seawater barrier, groundwater replenishment, and irrigation. Staff presented conceptual level information on the District-only desal project to the same level of detail as the recycled water options at the March 18 meeting.

Staff attended a meeting for potential JPA members for the Deep Water desal project on February 20, 2014. It was focused most on the formation of a JPA and the legalities involved. Some concerns raised specific to the project were the ownership of the intake/outflow, the bond rating if there are public private partners and concern over public agencies contracting with Deep Water desal for the management-construction of the plant rather than going through a design-bid-build or design build selection process.

Monterey Peninsula Water Management District would like to cost share with us for Kennedy/Jenks' financial review of the project. Todd Reynolds met with Deep Water Desal on April 23rd to go over their projections.

Staff also provided information on previous very preliminary ideas for pipeline routing that Deep Water Desal could roll into their Proponent's Environmental Assessment and application for the State Lands Commission.

District Board approved preparing a grant application for a study of regional recycled water projects at its May 20, 2014 meeting which will look at regional options that could possibly meet our recharge needs. The City of Santa Cruz approved to split the cost and prepare the grant application jointly at its June 17th meeting.

- c. To access the dedicated webpage on these back up evaluations, visit: <http://www.soquelcreekwater.org/exploratory-discussions> . This page includes meeting materials (presentation, minutes) and Community TV video footage.

4. Supplemental Supply: Regional Desalination Project with the City of Santa Cruz (Admin) –

- a. CEQA: Oral and written comments will be posted on the project website in September. Approximately 400 comments were submitted by roughly 300 commenters and URS has grouped comments by topics and is developing a budget and scope for a phased approach to address EIR comments.
- b. Permitting/Regulatory: No new information at this time.
- c. Public Outreach: With the close of the EIR comment period, scwd² outreach will primarily be supporting the District and City outreach and education efforts. No new information at this time.

than diverting some of it to partner agencies. Staff had a second phone call with legal counsel and Scott's Valley to discuss changes to the agreement. Those changes were submitted to the city on June 11. ~~and we are waiting to hear if the changes are acceptable. If not, we will request a face to face meeting. Once a draft is agreed upon it will be agendized for Board approval.~~ *Follow up discussions between the two agencies water rights attorneys did not go well. On July 11, 2014 the SqCWD General Manager met with the City's Water Manager and worked out some compromises. The agreement will be narrowed to address only water rights related to the conjunctive use study currently under discussion. In addition an agreement for the use of the City's treatment plant will be prepared and considered simultaneously.*

MISCELLANEOUS WORK PLAN ITEMS

1. Energy Work Plan

Status: Staff has developed an RFQ to hire a consultant to assist in creating an RFP for a solar installation at the District facility. The concept is to use a Power Purchase Agreement (PPA), which allow the District not to invest in capital costs, but still retain the offset credits power and the power at a reasonable cost. Effort on this item is on hold until after the June 5 Workshop, after which it will resume. In May 2013, staff is aiming to start this process back up again. An informational item on Community Choice Aggregation was presented at the April 2nd meeting. The CCSF department has transferred this project to the Engineering department. Assessment by ACWA's preferred provider, Solar City, is pending site information and historical power records. *Status-on hold due to higher priorities.*

2. Water Quality

- A) Hexavalent Chromium (O&M) – Status: The Water Research Foundation (WRF) Agreement for the chromium 6 pilot testing was approved by the Board on January 15th and the District has processed payment in the amount of \$150,000 to the WRF. The strong base anion exchange water treatment bench- and pilot-tests and the brine treatment studies have been completed. The draft final report has been submitted to the WRF for review.

The District approved a proposal by Ionex SG to rent a containerized strong-base anion exchange chromium 6 treatment system for a period of ~~21~~ 2 years beginning in ~~June~~ July 2014. The system ~~is being~~ will be installed at San Andreas Well. *Raw water line and on-site piping is complete and first delivery of equipment is was completed on 6/18, scheduled for 6/17. Construction of raw water line between Bonita and San Andreas Well underway. State Water Resources Control Board Division of Drinking Water will inspect the facility in late July or early August to finalize amending the District's water supply permit.*

- e. **Newsletter and Bill Inserts:** The board approved at its 2/18 board meeting to revise the format and frequency of the "What's On Tap" Newsletter to be quarterly and a four-page spread. The first 4-page spread was sent to customers beginning in April. We also generated an Annual Water Quality Report that is available on-line and to customers who requested a hard copy be mailed. A doublesided bill insert was also generated that featured conservation (promoting rebates) and the release of the annual water quality report. A doublesided bill insert was included with the June billing statements to alert customers that emergency rates would begin July 1. ~~Unfortunately there was a mix-up at the printers and a group of customers received envelopes with an alert to look for this information inside the bill, but there was no insert. The customers were slated to receive the insert at a later date, but they used the envelopes on the wrong bill run. Director Jaffe contacted the District about this, but this is the only contact we've received to date. The next newsletter will be for July-September 2014 and will be included in the 6/17 meeting for the board's review~~ *is attached.*
- f. **Advertisements:** The District has been running a series of advertisements in the Sentinel, GoodTimes, and Capitola/Soquel Times to promote water conservation/cutbacks/rebates and the Do More to Use Less message. Last ads featured a young surfer (promoting taking shorter showers) and Boots and Carm McGhee (turf replacement). Advertisements ~~will be running~~ *ran in the Sentinel and the Capitola/Soquel and Aptos Times* ~~to promote the Groundwater Stakeholder Advisory Committee Meeting on July 8.~~ *A copy of the ads attached. As part of the Conservation Plus program outreach plan, staff are developing an updated media advertising plan and will be negotiating new advertising contracts with local media outlets.*
- g. **Public Notices/Press Releases:** ~~No new info.~~ *The District issued a press release on June 17 addressing the release of the Grand Jury Report.*
- h. **Events and Presentations:** A current list of our events and presentations is included at the bottom of this workplan.
- i. **Banner:** Banners focusing on water conservation (Do More to Use Less) and Groundwater (Our Water is Groundwater) are currently hung in Capitola and at the Little League and Pony Fields of Capitola-Soquel, Aptos, and Polo Grounds. Our banner "Thank You for Conserving Water" is hung near our District headquarters.
- j. **"Doing Our Part to Use Less" Yard Signs** – We are working with the City of Santa Cruz, PVWMA, Scotts Valley WD, and San Lorenzo Valley WD on a regional campaign to promote using less water outside during this drought period. We are seeing great interest in these signs as a way for community members to encourage their neighbors to use less.

they can follow up. We hope to schedule a presentation for the September 16, 2014 meeting.

7. Agendize a follow-up discussion on water models. We planned to present a proposal from Hydrometrics at the July 15, 2014 meeting.
8. Staff was asked to prepare a Gantt Chart type report showing the items staff is working on. It was recognized that the work plan reflects a very high staff work load. A Gantt Chart may help the Board to prioritize staff efforts.
9. *Initiate a Board Training session and hold a workshop to develop a governance policy prior to the training session.*
10. *Agendize a conversation about a District name change – on hold due to higher priorities*

SPECIAL ASSIGNMENTS

ADMINISTRATION

A. County Outreach

1. See “Groundwater Emergency Criteria” Item 3.C. above

FINANCE

- A. Agendize leak adjustment policy per direction on (2-19-13). Staff will review leak adjustment policy in light of the Water Usage Reduction Program and plans to present recommendations in July.

~~B. Director Daniels noted that we received more WDO's than budgeted and less connection fees. He requested an explanation for the discrepancy. The difference is due to purchases of WDO's by Aptos Village prior to receiving their Unconditional Will Serve letter. The discrepancy will remain through the end of the fiscal year since they have guaranteed their connection fees with a bond rather than paying them upfront. The bond does not show up on our financials as income.~~

CONSERVATION

- A. **Focused on components on the Conservation Plus program, WDO program, and working with developers to adhere to our process and regulations.** Have been discussing the Conservation Plus program with many interested customers and how they will comply.

- B. Expanding CCSF office to accommodate new staff. Engineering and CCSF staff working with architect to start the process.

Water Supply Advisory Committee

Meeting

First session: Thursday July 31 5:00 p.m. – 9:30 p.m.

Second session: Friday August 1 2:00 p.m. – 6:00 p.m.

**Fellowship Hall, Peace United Church of Christ
(formerly the First Congregational Church)
900 High Street, Santa Cruz**

Flow Agenda¹

First Session:

Roll call

Welcome to the public and public comment (5:00-5:10)

The Committee encourages members of the public to attend its meetings and invites public comment about items on the agenda at the beginning of each session. It will invite additional comment during the session before making major decisions. Public comments about items relevant to the Committee's work but not on the meeting's agenda is invited during the Oral Communication section at the end of Friday's session.

Committee member updates (5:10-5:15)

Members provide news of significant communication between them and organizations with significant interest in the development of water policy in Santa Cruz.

¹ This is the flow agenda prepared by the co-facilitators. It includes information that is excluded from the official agenda about the timing of the meeting and the content of agenda items. We expect that, as much as we hope to stick to this flow agenda, we will have to make adjustments during the meeting to the schedule and the contents described here. The Committee is required to do pretty much exactly what the official agenda says, so we get the "wiggle room" we need in the official agenda by making the official version less specific about schedule and content. You will easily recognize the official agenda by the lighthouse logo on its first page.

Soquel updates (5:15-5:20)

Heidi Luckenbach updates the Committee on news from the Soquel Creek Water District.

Agenda Review (5:20-5:30)

Carie Fox facilitates the Committee's review of the agenda for both sessions of this meeting. This includes review of the Committee's Gantt chart.

Desired outcomes:

- Understanding of the relevance of this meeting's tasks to the Committee's work as a whole
- Agreement on the agenda for this meeting

Supply and Demand Update and Recon Report (5:30-5:40)

Rosemary Menard updates the Committee about the current status of the Supply and Demand information originally presented at the June meeting. Clark McIsaac leads a discussion about the Recon Report describing how it will support the Committee's work during Recon.

Desired outcomes:

- Understanding of the way these two documents support the Committee's work by providing a record of information requested by the Committee and obtained for it
- Understanding of the way these documents identify issues that will need to be addressed for the "Real Deal"

Previous Alternatives (5:40-7:00)

Bob Raucher, assisted by John Ricker and Terry Tompkins, leads a discussion about alternatives previously considered by Santa Cruz. Carie joins the presenters to lead an exploration of some of these previous alternatives using the MCDS decision model.

Desired outcomes:

- Understanding of the previous alternatives
- Understanding of the way MCDS can work using familiar alternatives
- Agreement on directions to Stratus regarding any further work on this topic

Strategies and Ideas Convention (7:00-7:20)

Rosemary and Sarah Mansergh review the status of the Strategies and Ideas Convention (SIC) and lead a discussion about the outlines received by the SIC Subcommittee and the next steps to be taken during the SIC process.

Desired outcomes:

- Understanding of the outlines received so that the Committee knows the scope, number and quality of outlines
- Agreement on any additional questions or guidelines to be given to the submitters before they prepare the full descriptions of their projects
- Agreement on the format(s) for the public review of submissions during September so that the Subcommittee and City staff can make the necessary preparations for any online platform or convention event that the Committee chooses
- Agreement on any direction to the SIC Subcommittee regarding their charge

Research for Scenarios (7:20-7:50)

Bob leads a discussion about the analysis needed to develop scenarios including key uncertainties such as climate change.

Desired outcome:

- Understanding of the analysis needed to model climate change and other key uncertainties incorporated into scenarios

Scenarios (7:50-8:50)

Bob presents the first draft of scenarios developed for use during Recon. Carie facilitates an exercise to help Committee members and members of the public explore these draft scenarios. Participants report on their experiences in the exercise. Bob leads a discussion about the draft scenarios and the questions and understandings that arise from the exercise.

Desired outcome:

- Understanding of the first draft of scenarios
- Agreement on directions to the consultant for further work to improve the scenarios

Independent Review Panel (8:50-8:55)

Rosemary updates the Committee on the progress towards creating the IRP.

Desired outcome:

- Understanding of the status of the IRP

WSAC Website (8:55-9:10)

Sarah leads Committee Members in an overview of the WSAC website and a discussion of its use and maintenance.

Desired outcomes:

- Understanding of the websites features and potential uses
- Agreement on whether or not to end the Website Subcommittee and, if so, whether or not to transfer website responsibilities to the Recon Outreach Subcommittee

Materials resulting from the previous meeting (9:10-9:15)

Nicholas Dewar facilitates the Committee Members' review of the Action Agenda and Meeting Summary prepared for the previous meeting.

Desired outcome:

- Agreement on final versions of the Action Agenda and Meeting Summary for June

Wrap up, plan for second session and evaluation of this session (9:15-9:30)

Adjourn (9:30)

Second Session:

Roll call

Public comment (2:00-2:10)

The Committee invites public comment about items on the agenda at the beginning of each session, and will invite additional comment during the session before making any significant decisions. Public comments about items relevant to the Committee's work but not on the meeting's agenda is invited during the Oral Communication section at the end of this second session

Reflections on yesterday's session (2:10-2:20)

Nicholas leads the Committee in consideration of the salient points from yesterday's session and a review of the agenda for today's session.

Desired outcomes:

- Understanding of the major achievements of yesterday's session
- Agreement on any changes to today's agenda

"Real" criteria (2:20-2:50)

Carie leads the Committee in a discussion about the draft criteria for Recon and their significance in the decision making process. (These are called 'real' criteria simply to distinguish them from the simplified criteria used in the alternatives exercise the day before.)

Desired outcomes:

- Understanding of the features needed in the criteria to be used in Recon so that the Committee will be able to run sensitivity analyses
- Agreement on directions to be given about changes to the draft criteria

- Agreement on directions to be given about definitions of the criteria so that the consultants' research can be tailored to suit the Committee's criteria

Correspondence received from the community (2:50-3:05)

Mike Rotkin reports on correspondence received from the community

Desired outcomes:

- Understanding of the correspondence received
- Agreement on any direction to be given to Mike

Recon Outreach Subcommittee update (3:05-3:50)

Charlie Keutmann, Peter Beckmann and Erica Stanojevic lead the Committee in a discussion about the Recon Outreach Subcommittee's progress.

Desired outcomes:

- Understanding of the Recon Outreach Subcommittee's work
- Agreement on directions to the Subcommittee

Ratings Scales (3:50-4:20)

The Committee discusses ratings scales to be developed for each subcriterion.

Desired outcomes:

- Understanding of the significance of ratings scales in the decision model
- Agreement on directions to Stratus for the development of ratings scales for use in Recon

Ratings in November (4:20-4:50)

Rosemary leads the Committee in a discussion of the Committee's process between now and the November meeting when alternatives will be sorted through and the Committee will agree on research priorities for the Real Deal. In these four months the Committee will develop ratings and other elements of the decision model.

Desired outcomes:

- Agreement on directions to Stratus and City staff regarding the development of decision model elements
- Agreement on direction to City staff and Stratus regarding the hiring of an engineer, a decision scientist, etc.

Agendas for August and September (4:50-5:10)

Nicholas leads the Committee in a discussion of the agenda outlines for the Committee's August and September meetings.

Desired outcomes:

- Understanding of the tasks anticipated for August and September
- Agreement on direction to the co-facilitators regarding the plans for Committee meetings in August and September

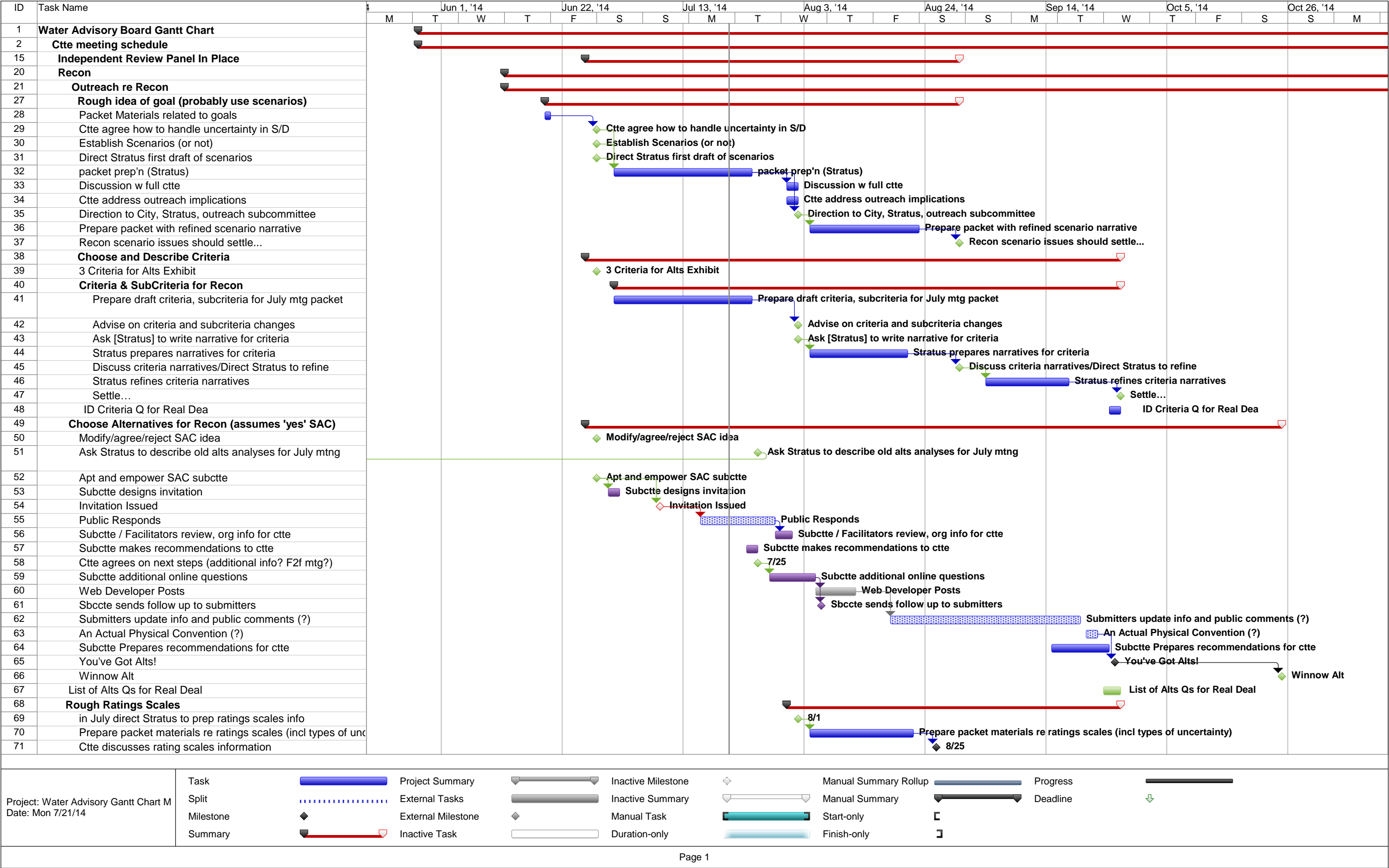
Oral Communication (5:10-5:25)

The Committee invites public comments about items relevant to the Committee's work but not on the meeting's agenda

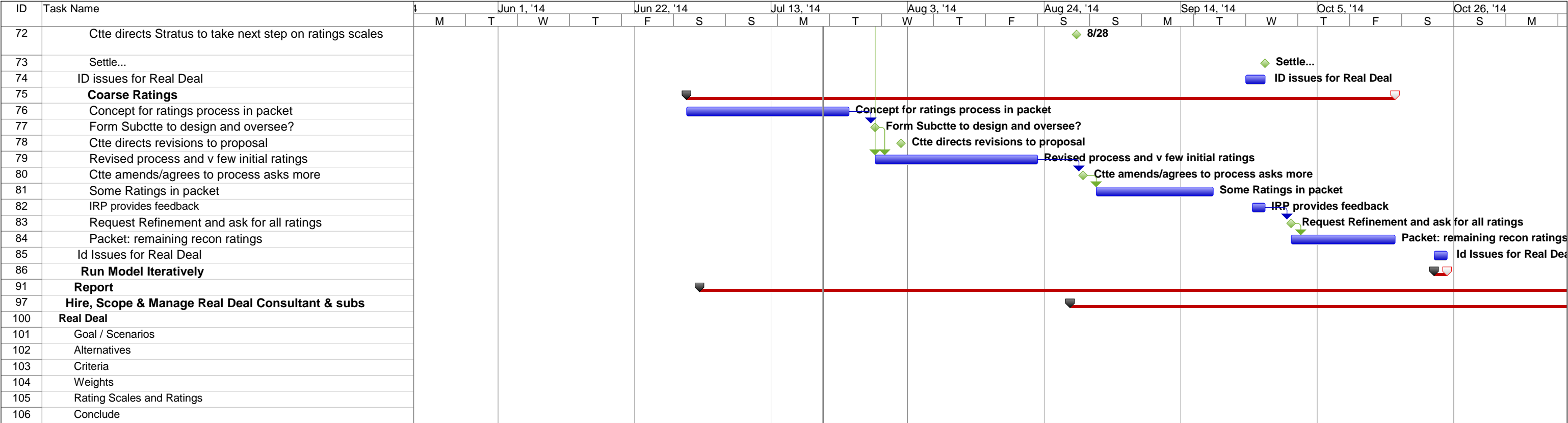
Written Evaluation and Wrap Up (5:25-6:00)

Review the session and consider items to be carried forward to the next meeting.

Adjourn (6:00)



Page 1



Project: Water Advisory Gantt Chart M
Date: Mon 7/21/14

Task

Split

Milestone

Summary

Project Summary

External Tasks

External Milestone

Inactive Task

Inactive Milestone

Inactive Summary

Manual Task

Duration-only

Manual Summary Rollup

Manual Summary

Start-only

Finish-only

Progress

Deadline



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Recon Report

Introduction:

Clark write towards end of Recon process?

Explain Recon and Real Deal:

Note: this material comes from the staff report prepared for the Council session on 6/24.

In its first meeting, the WSAC made a decision to use a two phased, iterative process to conduct its work. The first phase is basically designed to take the Committee through the range of pertinent issues at a coarse level of detail with a goal of using this first pass to familiarize WSAC members with the information and tools they can use to address uncertainty about the future as it considers options and develops recommendations. This phase is basically a reconnaissance effort, and is called "Recon," for short.

There are at least three significant benefits to the Committee's process from the Recon phase:

- 1. This approach uses a "learn by doing" approach to engage Committee members in working with the key content (i.e., current and future supply and demand and the uncertainty around each, values, evaluation criteria and rating scales) from the beginning, which is more engaging than more traditional methods for getting groups up to speed on issues;*
- 2. The Recon process helps the Committee become familiar with the issues of uncertainty and develop both the tools and perspectives they will need to develop recommendations for the City Council's consideration that*

appropriately take into account the uncertainties that exist today and that will continue to exist in the future; and

- 3. The Recon phase allows Committee members to learn about how sensitive various options are to changes in assumptions, which will help the Committee prioritize the key questions and information that its technical consultants will need to work on.*

The second phase of the work, called “The Real Deal” for short, takes all the learning and skill building developed in the Recon phase and applies it in a much more granular consideration and analysis of the options, including integrating results from the technical support consultant’s work on specific questions identified during the Recon phase.

This document summarizes the Ctte’s Recon and provides a foundation for the Real Deal.

Glossary

Clark there is a better glossary on EN in the June meeting folder.

Alternative

Criterion

Iterative

Normal

Precautionary Principle

Ratings

Ratings Scale

“Real Deal” (for purposes of this process)

Recon (for purposes of this process)

Resilience

Scenario

Subcriterion

Sustainability

Q&A

To be done much later (perhaps as Eileen develops the meeting summaries she can develop Q&A's and these can be dropped in?)

The Goal: More than just the Gap Between Supply and Demand

Introduction

The most important element of a decision is the problem statement, or goal. Yet one of the characteristics of complexity is that even the problem is difficult to define. This is true of Santa Cruz's water planning. Determining the expected gap between supply and demand is characterized by irreducible uncertainty. Nor is the problem statement solely about scientific questions such as "how much rainfall will we have in the future?" or "how much will demand be reduced when rates go up?" There are also policy questions such as "how much risk is too much?" or "what should Santa Cruz look like in 20 years?"

In short, defining a goal for the ctte is not a simple proposition.

To deal with the uncertainty, the ctte chose to use scenario planning—simultaneously examining several goals at once. But the central scientific questions—how much water will we have and how much will we need—must still be addressed. Since this is Recon, the ctte's job is to sift through what is known and to list the research needs related to supply and demand so that those issues can be prioritized at the end of recon and the desired information, to the extent possible, can be brought forward for the Real Deal.

Highlights of Past Research

At the June Ctte meeting Water Director RM presented a comprehensive overview of current understanding of water supply and demand in Santa Cruz. The Ctte followed up with questions and suggestions. The intention is that throughout Recon, this

series of slides well be improved and that gaps in understanding will be resolved to the extent possible. (See subsection on ‘research priorities.’) The full deck in its current form is available at [--](#).

The following key slides are presented here with a brief narrative:

RM pick faves for August

The Ctte had several questions about S/D. The long-term research issues can be found at ... The questions that are/will be answered during recon are presented here:

[Note to Ctte: as these answers come in this section will be updated—the red ink goes away and answers put in the appropriate spot.]

Can the Committee obtain details from Stratus about the key factors such as the assumptions that are used in the determination of when Loch Lomond will be used?

Gary Fiske can provide

Would the City provide parameters of the models used for fish flows such as DFG 5?

The City will provide a supply demand graphic similar to those on slides 54, 55, and 56 that shows the implications of the DFG 5 flow scenario.

Unclear the implications of the “provide parameters” unless what is being asked for is actual flow tables for the various options (tier 3; tier 3/2, DFG 5). Please clarify or confirm.

Why does the water in Loch Lomond contain more organic carbon than other sources?

Have Hugh Dalton and Terry Tompkins provide input on this

What is the status of the long-term water conservation plan?

A tech memo on work done to date is being prepared and will be brought to the Water Commission for review and discussion at its August 25th or October 6th meeting

How does current actual water use compare to the representational data for water demand shown on the early graphs in the presentation?

The representational graphs shown on pages 5 through 15 in the presentation were based on a composite of several recent water years and supply situations. The system demand lines on the graphs on pages 54, 55, and 56 use 2013 demand data.

How was the water usage survey conducted, and what do we know about the surveyed accounts?

At the moment, I can't put my fingers on a detailed report, but I have attached a presentation Toby gave at a conference that goes into a lot more detail than I covered in the presentation. We could provide this (or something similar—Toby is back next week and we could ask him what he might suggest) that should go a long way to providing additional information about what was done and how it was done.

Why does the list of conservation ideas not include the reduction of outdoor water use?

First, the list of long term conservation measures does include programs targeting landscaping and irrigation uses. See slide 83 of the presentation for the list.

Second, the basic strategy behind the long term conservation planning work is that long term programs need to focus on producing savings through dissemination of more efficient technology and fixtures and that curtailment of outdoor water use/irrigation demand is used as a short term demand management strategy to get the system through droughts and other short term emergencies. This point has been made in multiple public forums during the last 6 months, and was made again as part of the presentation to the Committee on 6/26/14, see slides 16 through 19 of the presentation.

Does the City have a counter-proposal to CDFW? If so, what does the model show for that flow regime?

No counter proposal to DFG 5 has been developed to date.

Rosemary Menard 7/24/14 3:16 PM

Comment: I'm sending something that will respond to this question today.

Carie Fox 7/24/14 6:17 PM

Comment: I'll add them to the packet.

What does the model show when production from Beltz #12 (coming online in 2015) is figured in?

Yes, this information can be provided.

Might make sense to start a list of modeling runs that will be useful when we get to the Real Deal phase of the work.

Storage capacity for treated water has been reduced. Should the Committee consider needs for this storage capacity too?

As I believe I mentioned in my response at the meeting – WSAC's plate is very full; decisions about sizing distribution storage are driven by fire flow requirements and diurnal flow patterns. Distribution storage does not play any significant role in making sure we have enough water overall to meet demand, so should not be drawn into the WSAC discussion.

What are the assumptions about use of Loch Lomond that have informed the most recent supply estimates? For example, does the model assume use of 1 billion gallons of Loch Lomond water in normal years? What would the model show for a different assumption about Loch Lomond allocation, e.g. 500 million gallons per year, which is closer to actual use?

Gary Fiske can explain what parameters he used in developing the graphics on pages 54-56 – also staff can clarify the difference between the water rights we have (see slide 49) and the operating strategy we use.

List of S/D Policy Questions:

Note to Ctte: this is a new subsection since you last saw the outline. It needs a definition of 'policy.' For next time...

In discussing demand, several policy issues arose. These include:

In discussions at the June meeting and in follow-up questions, several options for affecting demand were surfaced. Eventually these belong in an alternative because they are about ways to affect demand rather than problems with predicting demand absent any policy. But for now, it makes sense to keep them in the S/D section. They are:

- *(When will we or should we) Implement tiered rates for multi-family and non-residential users?*

Note: The Water Department committed to the Water Commission on 7/7 that it would develop a work plan for the Commission's October meeting (10/6) that would look at rate design, including the potential for establishing inclining block rates (tiered) for multi-family and non-residential customers.

- *How might the Ctte explore Water Neutral Development Policy?*

Note: The Long Term Conservation Master Plan work indicates that any one of a number of packages of additional long term conservation measures would result in flat demand at least through 2035. Adjusting system connection fees to include a cost component to support implementing long term conservation measures is under review in the Water Department, but implementation of new system development charges is likely at least a year away due to workload constraints.

- *Can savings produced by conservation be applied to reduce over-all water consumption rather than to facilitate additional development and increase the number of residents?*

Since LAFCO requires water-negative growth as a condition of water service expansion, shouldn't the growth assumptions for UCSC in the Water Supply Assessment (2011) be revised? CF note: premise of this question needs to be checked.

Note to Ctfe: do you wish to have a discussion about growth and water-neutral permitting during Real Deal?

Research Questions Prior to Sensitivity Analysis

One of the most important products of Recon is a rigorous research agenda, taking questions from various topics and prioritizing them as a whole in order to provide the maximum possible strength to the decision model. The questions related to supply and demand are:

- *What information is available about increasing incidence of drought resulting from climate change?*
- *Do water users grow accustomed to raised prices and revert to increased water use?*
- *How will the demand forecast reflect the impact of price increases?*
- *How would the demand forecast change with different scenarios of increases in price, e.g. increasing the price on dedicated landscape accounts?*

- Actual water demand has differed significantly from past demand projections. In terms of methodology, what can be done to make future demand projections more accurate?

Growth as it is factored into Demand Calculations

- Can demand projections discount full GP build-out figures or must they assume GP levels will always be met?
- What is "full build-out"? Does it mean that existing buildings in zones that allow increased density are torn down and new, more dense buildings replace them?

Outreach Accomplishments and Needs in Recon and Real Deal

Note to Ctte members: this will be a discussion item for your Recon Outreach Subctte when we meet on the 30th. Ideally they would drop in outreach ideas specific to supply and demand in this section.

Types of Uncertainty Associated with Supply and Demand in Recon

Examples of major uncertainty associated with supply and demand in recon are:

- *Climate*
 - *Amount rainfall in a year*
 - *Seasonal distribution rainfall*
 - *'Intensity' (big deluge w no rain for weeks, or gentle pitter patter throughout rainy season...)*
 - *Temperature*
- *Demand*
 - *Growth projections*
 - *Demand 'hardening' or not?*
 - *Future or novel conservation strategies/technologies*
 - *Response to rate increases*

And much more (this isn't an attempt to make a comprehensive list)

- *In stream water requirements for fish*
-

Brief Summary of Ctte Discussions and Conclusions

.... Will appear in August (Nicholas?)

Areas of Agreement SD

The areas of agreement for S/D are/might be:

- 1. To use scenarios rather than trying to arrive at a single SD 'gap' number for the problem statement. (See section on scenarios.)*
- 2. ????? To accept a flat demand rate as a working assumption. [This has been mentioned but not thoroughly discussed nor agreed to—it is here only to provoke that discussion.]*

Discussions you haven't had yet or haven't fully had

- 1. Discussion involving planning folks about growth. But when? Real Deal or Recon? And if Recon, when exactly? Who? How?*
- 2. Discussion about water-neutral growth policies. But... same questions.*

What this Means for Recon

The decision to use scenarios rather than attempting to pick a single problem statement has several ramifications. First, it allows the ctte to move forward. Defining a single problem statement would be very time-consuming. Second, scenarios are a good technique for complex planning involving high levels of uncertainty (this is discussed in greater detail in the following section). And third,

The decision to assume flat demand [if it is made] has the effect of...

References and Additional Reading Materials

Steinitz

Reports RM relied in in putting together her deck

Summary of Water Supply Alternatives Considered in Santa Cruz

Prepared July 2014

This technical memorandum provides an overview of the wide array of water supply enhancement options considered for the City of Santa Cruz, beginning in the late 1960s. Overall, there has been considerable interest in a broad variety of supply and demand management alternatives, and more than two dozen options have been explored at various levels. The vast majority of these alternatives have fallen by the wayside, being passed over for a variety of reasons. Most often, options have been set aside because of limitations on how much water supply (or water savings) could be generated, or because of technical and cost limitations, or lack of support from relevant entities. There are also a few options that have been implemented, and several that remain under consideration.

1960 – 1986

A proposal to build a dam on Zayante Creek was pursued by the City beginning in the late 1960's with the purchase of most of the property needed. It was again discussed in the North Santa Cruz County Water Master Plan (NSCCWMP), prepared in 1985. The City investigated this project but there was concern over the environmental impacts. Environmental issues included, but were not limited to: (1) the proposed location on an earthquake fault; (2) flooding of an area and its associated effects on flora and fauna; and (3) the growth inducing potential of providing a large new source of water. Additionally, Zayante Creek is a known habitat for steelhead and is also a priority Coho recovery stream. Based on preliminary fish studies substantial amounts of winter and summer flow would be required to be released to maintain and enhance downstream fish habitat to mitigate the impact of the dam. This would significantly reduce the yield and increase the unit cost of the water.

In 1986, the City ultimately relinquished its water rights of 5,000 million gallons of water from Zayante Creek with the request that the State Water Resources Control Board reserve this amount in the name of North Santa Cruz County.

Given the conclusions made in prior studies and decisions made by the City to relinquish the water rights, this alternative was not evaluated in the Integrated Water Plan (IWP) developed in

2003. The alternative was eliminated from further consideration from the desalination Environmental; Impact Review (EIR) as it could not be implemented in a timely manner.

1970 – 1976

Felton Diversion Pump Station, located on the San Lorenzo River in Felton, was put into service in 1976. This pump station moves water from the San Lorenzo River to Loch Lomond Reservoir. The pump station was designed to also pump water from the San Lorenzo River to Zayante Dam. Because the Zayante Dam project was eventually abandoned, the Felton Diversion was never retrofit with additional pumps and pumping capacity.

In general, yield of Felton can be limited: during normal and wet years, Loch Lomond can spill without any additional pumping from Felton and in dry years, the amount that can be pumped is limited by the requirement to maintain downstream fish flows.

1985 – 1989

The following three exhibits (prepared previously by the Water Department) provide a concise overview of the options considered over the past 30 years, leading up to the EIR developed for the desal project.

Exhibit 1 indicates an initial suite of activities, between 1985 and 1989.

- In June 1985, a Joint Powers Authority representing the water agencies and land use agencies in North Santa Cruz County prepared the North Santa Cruz County Water Master Plan (NSCCWMP). The report focused on regional opportunities to augment supplies, but also proposed some City-only alternatives.
- City Council expressed its preference for groundwater alternatives and directed staff to investigate the feasibility of developing 2500 acre-feet (AF) of groundwater.
- A subsequent groundwater investigation (Luhdorff and Scalmanini, initiated in 1987) revealed that the desired 2500 AF/yr of groundwater was not available. At best, only a couple of small well projects were viable, one would have required considerable treatment, and the max yield would be 550 AF/Yr.

1989 – 1997

Exhibit 2 summarizes the activities between 1989 and 1997, starting with a *Water Master Plan* commissioned by the City from Leedshill-Herkenhoff, and culminating in the *Water Supply Alternatives Study* developed by Camp Dresser and McKee (CDM, 1994).

- In the initial effort by Leedshill-Herkenhoff, several new dam projects were considered and rejected, with the Waterman Gap Reservoir as the only on-stream storage project remaining for consideration at that time.
- The *Water Master Plan* also included an option to upgrade to the existing supply system (which has been implemented) and a few other alternatives that would similarly improve system reliability (but these options do not enlarge supply *per se*).
- Additional options considered in the *Water Master Plan* include enlarging Loch Lomond, creating interties to other water districts in the region, water reclamation (nonpotable reuse), and others – most of which were dropped from further consideration for a variety of reasons (most often, set aside due to insufficient yields, or lack of support).

The 1994 *Water Supply Alternatives Study* prepared by CDM narrowed the list of *Water Master Plan* alternatives for further consideration, and also included some new alternatives:

- Groundwater options were eliminated as providing too small a yield, while also being too costly
- Wastewater reclamation was rejected due to its relative cost (at the time), especially for the “purple pipe” distribution network.
- Loch Lomond expansion was set aside due to likely fish release requirements
- Waterman Gap Reservoir (on-stream storage) and North Coast off-stream diversion and storage (off-stream storage) were *not* eliminated as options, but were not pursued further at that time
- Brackish Groundwater Well development along the North Coast was rated by a Technical Advisory Committee as the most feasible alternative, and was selected for additional study.

Carollo Engineers was commissioned in 1995 to design the Brackish Wells project, including test well development.

- The Water Commission and City Council decided to drop the Brackish Wells project due to local opposition (residents concerned the test well pumping would lead to a project harming their own wells).
- This project may be technically feasible (but test pumping data are still required to assess the feasibility of this option).

1997 – 2005

Exhibit 3 provides an overview of the efforts to identify and evaluate options from 1997 up to approximately 2005. The efforts in this timeframe begin with a redirecting of 1995 work scope for the Carollo assessment, with an amended scope aimed at identifying new alternatives in the wake of the Brackish Wells project being dropped. Carollo's *Alternative Water Supply Study* was issued in November, 2000.

- Options identified in the Carollo (2000) effort, but dropped from further consideration include several groundwater alternatives (brackish groundwater wells near the mouth of the San Lorenzo River, fresh groundwater wells in the San Lorenzo Alluvial Plain, wells and recharge near the Wilder Ranch gravel quarry, groundwater supplies from the Purisima Aquifer near the Beltz wells, and tapping the Santa Margarita Aquifer). These groundwater-based projects were rejected because of the limited yields anticipated, and possible conflicts with existing groundwater users.
- Other projects dropped from consideration in the *Alternative Water Supply Study* include reservoir storage in Olympia Quarry, and conjunctive use with Soquel Creek Water District (SCWD).
- Options remaining as viable alternatives from the *Alternative Water Supply Study* were
 - Seawater desalination (though extensive and uncertain permitting issues were noted)
 - Maximizing use of existing sources and storage in Loch Lomond (though limited new yields, coupled with extensive potential environmental reviews, were anticipated)

- Wastewater reclamation (nonpotable water reuse, including exchanges with farmers for entitlements to groundwater)

Following the *Alternative Water Supply Study* (Carollo 2000), a further study was commissioned jointly by SCWD and the City. The resulting Black and Veatch Engineers report (also titled *Alternative Water Supply Study*) was issued in March 2002. This 2002 Black and Veatch study examined:

- Implementation and design issues related to a potential seawater desal facility, including siting, sizing, regulatory and other institutional factors, and process components (intakes, pipelines, treatment processes, brine management, costs, and so forth).
- Water reclamation options for the City and District, noting that exchanges for North Coast farmers' groundwater rights appeared the most viable reuse alternative for the City.

The *Integrated Water Plan* (IWP), developed by Gary Fiske and Associates, was issued in June 2003. As implied by the title, the IWP reflects an attempt to consider combinations of water conservation, use curtailment in drought periods, and development of more modest supply enhancing alternatives. The IWP options for balancing supply and demand included:

- Full implementation of the City's Water Conservation Plan
- Development of a curtailment strategy to manage the level and allocation of shortages in drought years in which available supplies would not satisfy all normal demands (with an objective of limiting the extent of curtailment to no more than 25%).
- Exploration of a limited suite of potential supply options – including regional (with SCWD) and City-only versions -- based on the previous studies. The supply-enhancing options include:
 - Seawater desal (at a site to be determined)
 - Water reclamation to enable North Coast groundwater exchanges
 - Groundwater from the Santa Margarita Aquifer at Live Oak (with limited anticipated yields)

Based on criteria applied in the study, the 2003 IWP concluded that the best strategies included desal coupled with a curtailment profile that limited shortfalls to 15%.

2005 – 2013 – Evaluation of Desalination

Based on the adoption of the IWP and the Final EIR for the IWP, the City began to implement all three components of the IWP. With regards to the water supply component, the City began with the design, construction and operation of the Seawater Reverse Osmosis (SWRO) Pilot Project located at the UCSC Marine Science Campus. This pilot project was followed by numerous investigations into the feasibility of each facet of the proposed desal project. The Draft EIR for the proposed project was completed in May 2013, at which time it was released for a public comment period.

The Draft EIR evaluates alternatives to the proposed desalination project on the basis that they could feasibly attain most of the basic objectives of the project while avoiding or substantially lessening any significant impacts. The Draft EIR's range of water supply alternatives includes those considered and rejected based on the above criteria, and those evaluated in the Draft EIR in further detail. Exhibit 4 outlines these alternatives.

2011 – present - Conjunctive Use (Water Exchange)

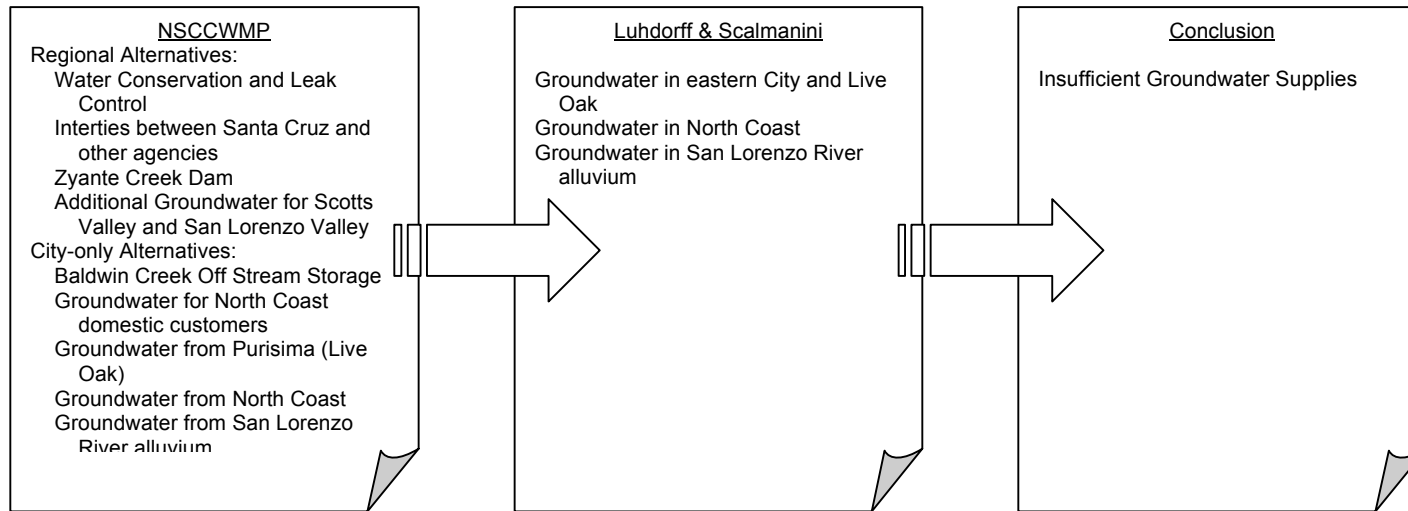
The City of Santa Cruz has been working with the County of Santa Cruz, Scotts Valley Water District, San Lorenzo Valley Water District and Soquel Creek Water District to evaluate the potential for winter-time water transfers from the City to neighboring water agencies. The concept proposes treating potentially available surface water in the San Lorenzo River, through the City's Graham Hill Water Treatment Plan and sending the water to neighboring water agencies to offset groundwater pumping. Several variations of this concept continue to be evaluated including the following.

- Current Infrastructure/Water Rights
- New Interties to SVWD & SqCWD
- New Water Rights with increased treatment capacity
- Upgraded diversion and treatment capacity
- Treatment of higher turbidity water.

This alternative continues to be evaluated, including the ability of neighboring agencies to provide water back to the City.

Attachments: Exhibits 1-4

Figure 1
1985-1989 SUPPLY STUDY



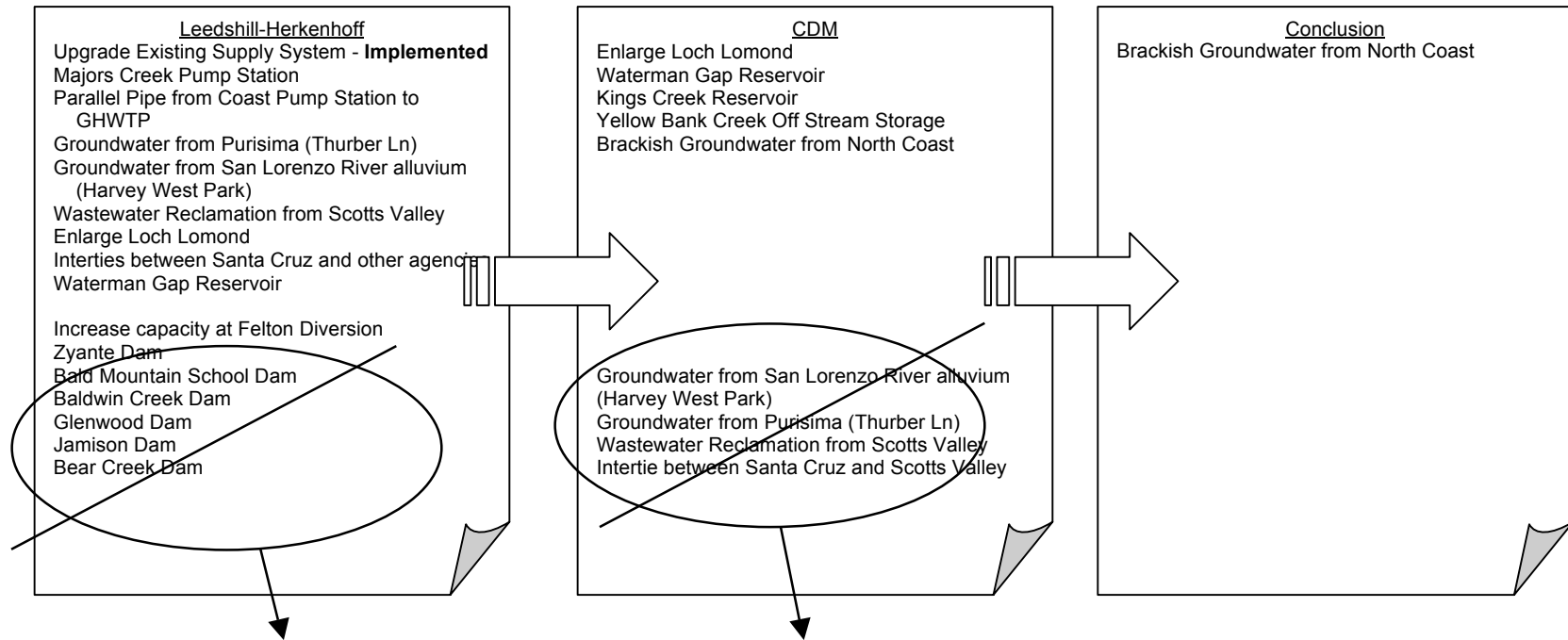
In June 1985, a Joint Powers Authority representing the water agencies and land use agencies in North Santa Cruz County prepared the North Santa Cruz County Water Master Plan (NSCCWMP). The report focused on regional opportunities to augment supplies, but also proposed some City-only alternatives.

Following the completion of the NSCCWMP, City Council expressed its preference for groundwater alternatives and directed staff to investigate the feasibility of developing 2500 acre-feet of groundwater.

At the same time, the City Council relinquished its water rights to 15,000 acre-feet of water from Zyante Creek with the request that the State Water Resources Control Board reserve this amount in the name of North Santa Cruz County.

The conclusion of this groundwater investigation was that there were not 2500 acre-feet of groundwater available to the City. There was only potential for a 100 gpm well in Harvey West Park and a 250 gpm well on Thurber Lane that would require considerable treatment. At best, these two wells could yield only 550 acre-feet annually.

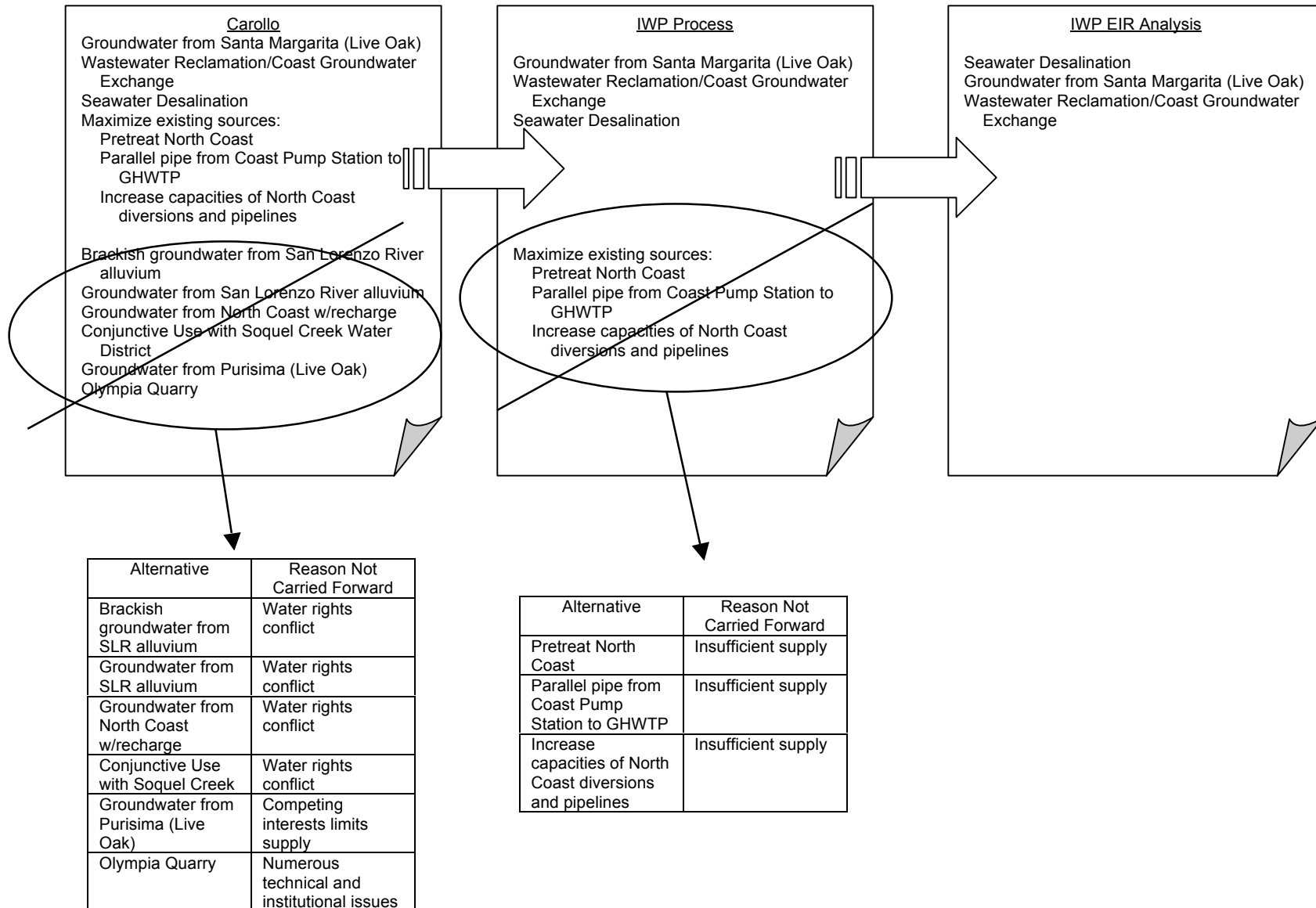
Figure 2
1989-1997 SUPPLY STUDY



Alternative	Reason Not Carried Forward
Increase Felton Div	Insufficient supply
Zyante Dam	Council unwilling
Bald Mtn School Dam	Geologically poor site
Baldwin Cr Dam	Insufficient supply
Glenwood Dam	
Jamison Cr Dam	Move to Waterman Gap site
Bear Cr Dam	Move to Waterman Gap site

Alternative	Reason Not Carried Forward
Groundwater from San Lorenzo River alluvium (Harvey West Park)	Insufficient supply
Groundwater from Purisima (Thurber Ln)	Extensive treatment required
Wastewater Reclamation from Scotts Valley	Limited due to extraordinary cost of distribution system
Intertie between Santa Cruz and Scotts Valley	Scotts Valley opposed

Figure 3
1997-Present SUPPLY STUDIES



**CITY OF SANTA CRUZ ALTERNATIVES
TO THE PROPOSED DESALINATION PROJECT**

Alternatives Considered but Eliminated within the EIR
Groundwater Alternatives
Brackish groundwater supply from wells in the San Lorenzo River Alluvial Plan near the mouth of the river
Fresh groundwater supply from wells in the San Lorenzo Alluvial Plain
Groundwater supply from the Purisima Aquifer near the Beltz wells
Groundwater supply from the Santa Margarita Aquifer near Wilder Ranch State Park and near downtown Santa Cruz
Groundwater Supply near the Wilder Ranch gravel quarry
Reservoir Alternatives
Zayante Creek Dam
Baldwin Creek Off Stream Storage
Enlarge Loch Lomond
Olympia Quarry
Bald Mountain School Dam
Baldwin Creek Dam
Glenwood Dam
Jamison Dam
Bear Creek Dam
Waterman Gap Reservoir
Kings Creek Reservoir
Yellow Bank Creek Off Stream Storage
Reclaimed/Recycled Water Alternatives
Reclamation/Coast Groundwater Exchange
Indirect Potable Reuse: Groundwater Recharge and Reservoir Augmentation
Direct Potable Reuse
Urban Landscape Irrigation
Recycled Water Exchange with Scotts Valley Water District
Alternatives Considered in Detail within the EIR)
City No Project Alternative
City-only Desalination Alternative
Desalination plus DPR Pilot Alternative
Regional Recycled Water for Irrigation Alternative
City Package Alternative

Committee Members—

You asked to see the research done on previous alternatives and strategies. Bob Raucher will give you a presentation: part lecture and part participatory exploration, along with commentary by John Ricker and Terry Tompkins. In the exploration, you will take Bob's, John's and Terry's information and tinker with it in a decision model.

To feed the decision model, we prepared a bunch of assumptions or exercise-worthy ingredients, which are described below. These are meant to be changed in the participatory exploration. This is your chance to ask "what if?"

What if we reduced demand and only needed a smaller supply?

What if we weren't worried about transporting the supply?

What if I care more about greenhouse gas emissions than I do about the other criteria?

What if.... ?

This exercise will also address something else you asked for, to see a multi-criteria decision model at work in a real context that you know pretty well. It is a good what-iff.

This is an exercise, so I hope that you won't get too caught up in the details. But it is an important exercise, so I hope you will be assertive tinkerers. And finally, this is also a trial run for how you might approach your decision (whether or not you choose to use MCDS) so please do note the way, for instance, the scales are written. When you write the scales for your real decision model you will essentially be writing the researchers' scope of work. The scales need to be good; they need to be yours.

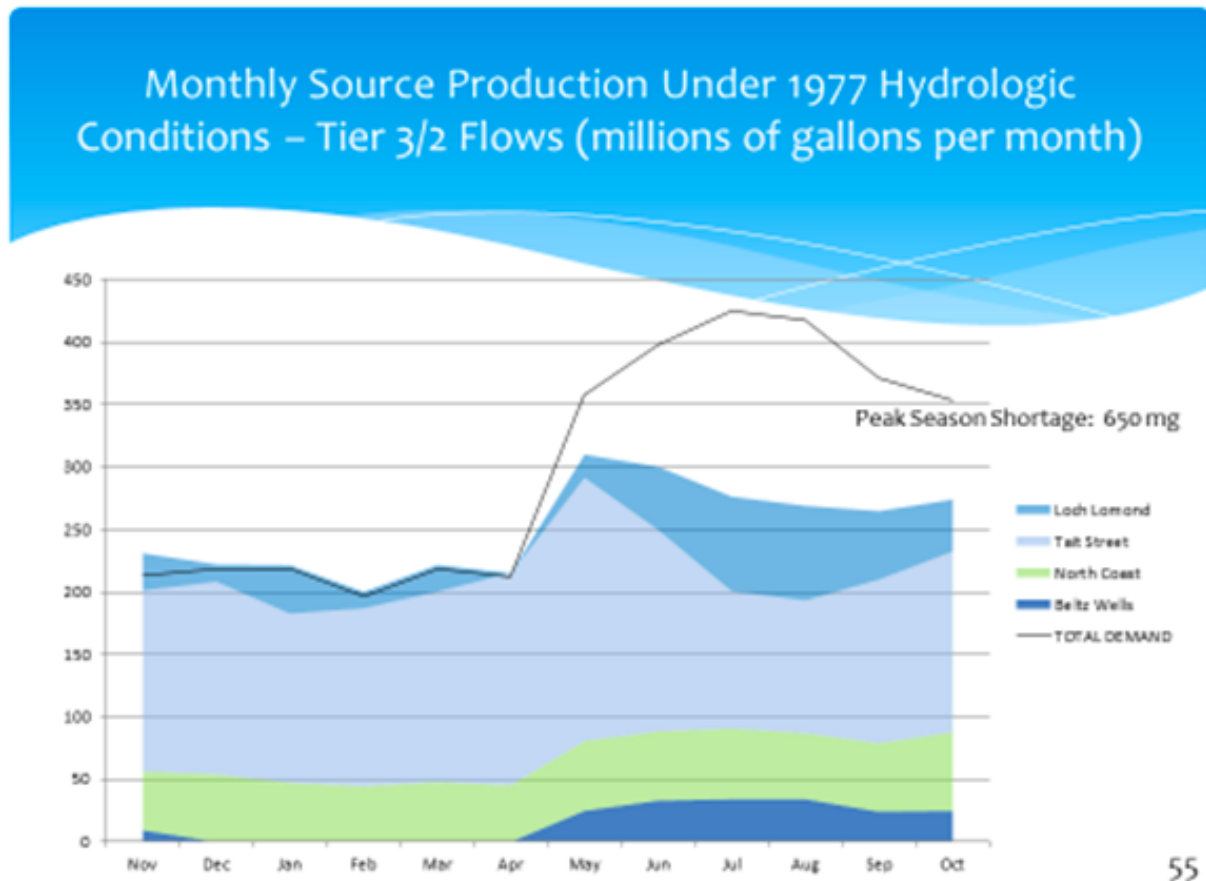
Below, please find the decision model elements we will use for this exercise. You aren't stuck with them. Nothing that happens in this exercise has the power to kill an alternative. All 'results' are transient and for illustration purposes only. Think of this as your playdough and get ready to manipulate it.

Below, then, please find the elements of the "Old Alts" decision model exercise.

Carie

The Goal

Rosemary picked this goal from her S/D deck because it describes the likely low end of the problem we will have with fish flow releases but without any potential impacts of climate change.



The Alternatives—the “Old Alts”

Bob sent you some preliminary information about the “Old Alts,” which you asked for in the last meeting. He’ll also present a power point about the wide range of alternatives previously studied, with the backup of John Ricker and Terry Tompkins. Like Rosemary’s Supply-Demand presentation, this is just a start.

Bob is planning on using 4 or 5 alternatives to feed into the decision model test. You’ll get to know those in greater depth and John and Terry will continue to provide the counterpoint and occasional harmony.

**Simplified Criteria for the Exercise with
Rosemary's Rather Sophisticated Ratings Scales**

- **Aligns Supply and Demand** – supply meets demand under agreed upon terms and conditions, for example, taking into account agreed upon levels of curtailment during water shortage (drought) conditions, and implementing agreed upon demand management (conservation) goals.
 - 3 = Available supply can meet expected demand to the desired degree under all reasonably expected climatological and fish flow release conditions
 - 2 = Available supply can meet expected demand to the desired degree under most reasonably expected climatological and fish flow release conditions
 - 1 = Available supply can meet demand to the desired degree under only some of the reasonably expected climatological and fish flow release conditions

- **Affordable**¹ – water for basic necessities, i.e., cooking, drinking, personal hygiene and sanitation, is available at a reasonable cost.
 - 3 = water for basic necessities is provided at a cost that covers the cost of service and costs no more than 1% of Santa Cruz's median household income.
 - 2 = water for basic necessities is provided at a cost that covers the cost of service and costs no more than 1.5% of Santa Cruz's median household income.
 - 1 = water for basic necessities is provided at a cost that covers the cost of service and costs no more than 2% of Santa Cruz's median household income.

- **Implementable** – actions required to carry out or operationalize the alternative or strategy, such as environmental review and permitting, land use decisions, property acquisitions, participation rates, compliance with regulatory programs or requirements, and project financing, can reasonably be expected to be achievable, timely and, when completed, the alternative or strategy will still be viable.
 - 3 = high confidence that project implementation requirements can be met in a timely and cost-efficient manner, and that the resulting project or strategy will still be viable.
 - 2 = medium confidence that project implementation requirements can be met in a timely and cost-efficient manner, and that the resulting project or strategy will still be viable.

¹ Discussion of EPA drinking water affordability criterion:
<http://www.ae2snexus.com/TheSource/2010/November/AssessingAffordability.htm>

- 1 = low confidence that project implementation requirements can be met in a timely and cost-efficient manner, and that the resulting project or strategy will still be viable.

- **Reliable** – the degree to which available supply can meet existing and future demand under a range of foreseeable and unforeseeable, but probable circumstances or conditions:
 - 3 = water produced from the alternative or strategy has a high probability of being available under a range of potential future conditions.
 - 2 = water produced from the alternative or strategy has a medium probability of being available under a range of potential future conditions.
 - 1 = water produced from the alternative or strategy has a low probability of being available under a range of potential future conditions.

- **Environmentally Sound** -- Several environmental facets of a project or strategy are worth exploring independently. Taken together the various sub-criteria contribute to a determination of whether a strategy or alternative is acceptable from an environmental perspective. Three examples include:
 - **Greenhouse Gas Emissions** – Use of fossil fuel based power plants to meet energy requirements generates greenhouse gases that are major contributors to global warming and climate change.
 - 3 = project or strategy is not energy intensive and does not result in any significant increase in greenhouse gas emissions
 - 2 = project or strategy is moderately energy intensive and results in moderate increases in greenhouse gas emissions.
 - 1 = project or strategy is energy intensive and results in a significant increase in greenhouse gas emissions.

- **Endangered Species Act** – Extraction of water from the natural environment, or disruption or destruction of natural ecosystems for aquatic, riparian or terrestrial species can result in impacts to threatened or endangered species.
 - 3 = project or strategy does not disrupt or destroy ecosystem values for threatened or endangered species.
 - 2 = project or strategy results in moderate disruption or destruction of ecosystem values for threatened or endangered species.
 - 1 = project or strategy results in significant disruption or destruction of ecosystem values for threatened or endangered species.

- **Sustainability** – Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, and that permit fulfilling the social, economic and other requirements of present and future generations.
 - 3 = project or strategy is highly sustainable.
 - 2 = project or strategy is moderately sustainable.
 - 1 = project or strategy is not sustainable.

Ratings

Bob will provide more contemporaneous ratings for the alternatives we will use in the exercise. (Again, remember, this is a first pass at the old alts and an exercise to play with a decision mode--no alternatives will be harmed in this exercise.)

Uncertainty

Bob will provide estimates of uncertainty. There will be a lot of it.

Weights

The decision model is going to be prepared with all the elements described above but the weights will just be left equal among the criteria unless you ask to change them in the 'what if?' session.

This might be fun.

Background information on some of the uncertainties related to fish flow requirements and climate change (CC), and how they might interact within plausible future scenarios

Two key uncertainties related to Santa Cruz's water future pertain to:

1. How restrictive fish flow requirements may be under the HCP, and the associated implications for the potential quantity, quality, and timing of City surface water extractions; and
2. How the local climate will change, and the associated implications these changes will have for instream conditions and, hence, water supply yields, water quality, and water demands.

Each of these two key sources of future uncertainty requires further, in-depth evaluation to provide a more informative assessment of the range of possible outcomes and their associated implications for City water. In the interim, a draft matrix is provided below to offer an initial glimpse of how these two key uncertainty factors might interact to collectively impact local conditions and options.

The material is provided here as food for thought. It is intended to stimulate discussion that may guide the direction of future analysis (e.g., on how climate change may impact in-stream conditions, and how these climate-related stream impacts might then interface with fish flow regimes to impact extractable yields).

The rows in the matrix reflect two possible scenarios related to fish flow requirements (represented here by Tier 3/2 and Tier 3). The columns reflect two aspects of anticipated climate change: general trends (e.g., warming), and potential changes in extreme events (e.g., more frequent and/or severe droughts).

Within each cell of the matrix (labeled 1 through 4 for easy reference), the text attempts to characterize some of the potential implications of the combined CC and fish flow scenarios. Some of the statements pertain to implications for the physical environment (e.g., fish subject to additional stress), and some pertain to potential implications for water management options (e.g., potential to store water if/when there are relatively wet periods). None of these statements should be taken as definitive (they are subjective). Also, the cells provide relative statements, reflecting comparisons to the other cells (ideally, these comparisons would pertain to relative changes from the "baseline" of current climate and flow requirements, but those comparisons can only be properly assessed with additional analysis).

<p>Climate Change →</p>	<p>General CC trends: Elevated temperatures and ET rates, likely extended dry season, possibly wetter wet season, more variability year-to-year. Sea level rise (SLR) gradually impacts shoreline and related infrastructure.</p>	<p>CC and Extreme Events: More frequent (and severe/extended) droughts, possibly coupled with periodic intense precipitation and flooding, periodic heat stress. SLR impacts exacerbated by episodic high storm surge events.</p>
<p>Flow requirements for HCP:</p>		
<p>Tier 3/2: moderately protective fish flow requirements</p>	<p>1: Potential to capture and store more surface water in wet months or wet years (if and when they occur). Seasonal water use demands increase. Fish face heightened stress. Coastal groundwater facing salinity risks.</p>	<p>3: Heightened need for larger-scale storage, perhaps with some potential to capture and store more surface water during wet periods. Increased water quality challenges for City and fish (from nonpoint source runoff, elevated temperature, etc.). Long-term viability of coldwater fishery challenged (perhaps the “use designation” is abandoned as coho and steelhead are no longer viable instream or no longer arrive at river mouth). Infrastructure and coastal groundwater vulnerable to periodic inundation and salinity. Periodic reliance on high curtailment levels.</p>
<p>Tier 3: highly protective fish flow requirements</p>	<p>2: Very limited (if any) ability to store more surface water, regardless of wet periods. Seasonal water use demands increase. Fish stress heightened by temperatures and declining DO, but somewhat mitigated by the mandated instream flow requirements.</p>	<p>4: Surface water yields highly variable, with virtually no ability to increase storage. Possibly, extended periods of very low permitted extractions (concurrent with periods of heightened City water demands). Absent alternative water supply options, periodic and extended high-level curtailments likely. Water quality and other impacts similar to cell 3, and potentially significant.</p>

Revised Independent Review Panel Concept Paper

Panel Role: The role of the Independent Review Panel (Panel) would be to assist the Water Supply Advisory Committee (WSAC or Committee) in effectively interacting with its consultant support team. To achieve this goal, the Panel would:

- Provide critical review, on an as assigned or as needed basis, of products created by the WSAC technical support team. The goal of the Panel's work is to offer feedback to the Committee on the work provided by its technical support team, including City staff. Specifically, review of the work produced by the technical support team would focus on:
 - The accuracy and appropriateness of analytical, scientific, and technical methods;
 - The clarity and accuracy of statements of assumptions; and
 - The appropriate characterization of the strengths and weaknesses of the analyses, especially with respect to uncertainty, data quality, or other factors that, if different, could affect the results in a significant manner.
- Offer advice or suggestions to the WSAC regarding lines of inquiry or technical questions that should be evaluated by the technical team.

The Panel would work together as a team, or be individually assigned, to review products prepared or created by the technical team and report their findings to the Committee.

Panel Characteristic: Panel characteristics would include the following:

- The Panel would include 3 to 5 members;
- Panel members would have scientific or technical training and substantial practical experience in scientific or technical disciplines relevant to the work of the WSAC.
- Panel member experience and expertise would be diverse with the experience and expertise of each panel member complementing and supplementing the experience and expertise of the other. An example of an effective Panel would be made up of:
 - An environmental engineer/scientist, especially with experience related to climate change, watersheds, fisheries, hydrology, hydrogeology, permitting or related issues;
 - A civil engineer with experience related to municipal water systems and resource planning, management, treatment technology, facilities design and operations; and
 - A public policy expert, especially related to environmental and community sustainability issues and decision-making by local governments in light of significant uncertainty.

Other combinations of expertise will be evaluated by the Panel selection team.

- Panel members would be expected to bring their broad knowledge and experience to the process and apply this expertise to the topics the WSAC will be dealing with.
- Panel members would have reasonable availability to work with the WSAC during the coming year, including being willing to at least occasionally attend WSAC monthly meetings, being willing to commit the time needed to review documents, and being willing to prepare and personally present to the WSAC summaries of their review efforts.

- Panel members would have demonstrated ability to explain complicated topics in terms non-technical people can understand as well as the ability to present facts without concealing values and with clear articulation of assumptions.

Additional Panel characteristics that would be desirable include:

- Panel members would have demonstrated skills as technical and/or scientific reviewers through experiences such as providing peer review for articles or other publications on scientific and technical topics; and
- Panel members would have some previous experience supporting, advising, and engaging with citizen groups on topics with public policy implications.

Panel Compensation: Compensation would be provided in the form of an honorarium only. The honorarium amount would be limited to \$5,000 per panel member. Direct expenses (mileage, other transportation, per diem, if and as needed) would be reimbursed.

Panel Selection Process: Selection would be done using a qualifications based selection process.

The Request for Qualifications (RFQ) would be developed by City staff and would include background information on the WSAC's process and a description of the Panel Role, Desired Panel Characteristics, and Panel Compensation.

The RFQ would include criteria for evaluating submittals that would emphasize the Panel Characteristics. The RFQ would be provided to WSAC members for review prior to being issued.

Those interested in responding to the RFQ would be asked to submit resume or curriculum vitae and a cover letter describing:

- How they fit the Panel Characteristics;
- Their interest in working with the Committee on this project;
- Their availability to work with the WSAC over the coming year; and
- Their willingness to accept the offered compensation.

Prior to issuing the RFQ, City staff will receive suggestions of individuals who will be sent the RFQ and, in addition, the RFQ will be posted on the City's purchasing websites where RFQs and RFPs are typically posted.



Request for Qualifications for an Independent Review Panel

Water Supply Advisory Committee
City of Santa Cruz Water Department



Vern Fisher/Herald Archive

Qualifications Due: 3:00 PM, Thursday August 14, 2014

I. Request for Qualifications

The City of Santa Cruz Water Department is soliciting Statements of Qualifications (SOQs) from individuals with expertise in assisting citizen advisory bodies in effectively interacting with a technical consultant support team.

II. Water Supply Advisory Committee Overview

A. Project Description

The City of Santa Cruz Water Department (SCWD) is a municipal utility that provides water service to a geographic area that includes the entire City of Santa Cruz, adjoining unincorporated areas, a small part of the City of Capitola, and coast agricultural lands north of the City limits. The current population served is approximately 94,000.

The SCWD's water supply comes entirely from local sources. Surface water accounts for over 95% of the SCWD's total water supply. Groundwater pumped from wells comprises the remaining 5% of SCWD's water sources. Due to this, the region's water supply is extremely vulnerable to fluctuations in seasonal rainfall. Frequent water shortages and restrictions exemplify the region's vulnerability.

In response to the region's water supply reliability issues, the City has spent decades observing, researching, and reporting on new water supply opportunities and conservation methods. In 2010, after multiple studies, evaluations and reports, SCWD (partnered with Soquel Creek Water District) proposed a sea water reverse osmosis desalination plant (desal) as a potential solution to the region's water shortages.

The public responded to the proposed desalination plant by requesting that it be put to a vote, and gathered enough signatures to qualify a measuring requiring a public vote before funding for construction or acquisition of a desal project could commence. This measure, known as Measure P, was placed on the November 2012 ballot and passed with 72% of the vote.

In the fall of 2013, following continuing expressions of concern about a possible desal project by community interests, the City stepped back from the path it had been on and decided to create a citizens committee to consider the water supply issues, alternative strategies and solutions, and the public policy implications for Santa Cruz and provide recommendations to the Santa Cruz City Council. The Water Supply Advisory Committee (WSAC or Committee) was formed in early 2014 and began meeting in late April. It is made up of 14 citizens with diverse backgrounds and professions and the Santa Cruz Water Department Director is an ex officio member of the committee.

The Committee will have the support of a team of technical consultants throughout its process and the role of the proposed Independent Review Panel (IRP or Panel) is to support the committee by providing critical review of the work products produced by the technical support team and to provide suggestions to the Committee lines of technical inquiry that would be helpful in completing their work.

IRP Role Description

The role of the IRP would be to assist the WSAC in effectively interacting with its consultant support team. To achieve this goal, the Panel would:

- Provide critical review, on an as assigned or as needed basis, of products created by the WSAC technical support team. The goal of the Panel's work is to offer feedback to the Committee on work provided by its technical support team. Specifically, review of the work produced by the technical support team would focus on:
 - The accuracy and appropriateness of analytical, scientific, and technical methods;
 - The clarity and accuracy of statements of assumptions; and
 - The appropriate characterization of the strengths and weaknesses of the analyses, especially with respect to uncertainty, data quality, or other factors that, if different, could affect the results in a significant manner.

- Offer advice or suggestions to the WSAC regarding lines of inquiry or technical questions that should be evaluated by the technical team.

The Panel would work together as a team, or be individually assigned, to review products prepared or created by the technical team and report their findings to the Committee.

For more information on the WSAC please see the following website:

<http://www.cityofsantacruz.com/index.aspx?page=2018>

B. Panel Characteristic:

Panel characteristics would include the following:

- The Panel would include 3 to 5 members;
- Panel members would have scientific or technical training and substantial practical experience in scientific or technical disciplines relevant to the work of the WSAC.
- Panel member experience and expertise would be diverse with the experience and expertise of each panel member complementing and supplementing the experience and expertise of the other. An example of an effective Panel would be made up of:
 - An environmental engineer/scientist, especially with experience related to climate change, watersheds, fisheries, hydrology, hydrogeology, permitting or related issues;
 - A civil engineer with experience related to municipal water systems and resource planning, management, treatment technology, facilities design and operations; and
 - A public policy expert, especially related to environmental and community sustainability issues and decision-making by local governments in light of significant uncertainty.
 Other combinations of expertise will be evaluated by the Panel selection team.
- Panel members would be expected to bring their broad knowledge and experience to the process and apply this expertise to the topics the WSAC will be dealing with.
- Panel members would have reasonable availability to work with the WSAC during the coming year, including being willing to at least occasionally attend WSAC monthly meetings, being willing to commit the time needed to review documents, and being willing to prepare and personally present to the WSAC summaries of their review efforts.
- Panel members would have demonstrated ability to explain complicated topics in terms non-technical people can understand as well as the ability to present facts without concealing values and with clear articulation of assumptions.

Additional Panel characteristics that would be desirable include:

- Panel members would have demonstrated skills as technical and/or scientific reviewers through experiences such as providing peer review for articles or other publications on scientific and technical topics; and
- Panel members would have some previous experience supporting, advising, and engaging with citizen groups on topics with public policy implications.

C. Panel Compensation

Compensation would be provided in the form of an honorarium only. The honorarium amount would be limited to \$5,000 per panel member. Direct expenses (mileage, other transportation, per diem, if and as needed) would be reimbursed.

D. Schedule

The WSAC meets at least monthly and is scheduled to complete its work by spring of 2014 unless the work

is extended by the City Council.

III. RFQ Process

A. Process

Parties interested in being considered to provide these services are requested to submit their SOQs on or before 3:00 pm, Thursday, August 14, 2014. SOQs will be evaluated by a Panel selection team made up of City of Santa Cruz staff and WSAC members using the criteria established in Section V. The panel selection team may make its selection entirely based on the SOQs or top rated candidates may be asked for supplemental information or may be invited to interview with the panel selection team. During the interview phase, if it is used,, semi-finalists may be asked to:

- Make an oral presentation, and/or
- Respond to pre-established questions.

All responsive teams will be given equal opportunity to provide any requested additional information to the City. Any interviews will be scheduled on a mutually agreed upon date and will be at no cost to the City. The Evaluation Committee will use all available information to rank the semi-finalists in order of their ability to best meet the needs of the City.

B. Timeline

The tentative timeline for the selection process is as follows.

3:00 pm, Thursday, August 14, 2014 -----	SOQs Due
Week of August 25, 2014 -----	Interviews, if applicable
Friday, September 19, 2014 -----	Contracts with Panel in place

C. Information Disclosure to Third Parties

SOQs are a matter of public record and are open to inspection under the California Public Records Act. If any respondent claims any part of its SOQ is exempt from disclosure and copying, they shall so indicate in the transmittal letter. By responding to this RFQ, respondents waive any challenge to the City's decision in this regard.

If any SOQ contains confidential information, the respondent shall clearly label and stamp the specific portions that are to be kept confidential. The respondent is urged to identify the truly confidential portions of the SOQ and not simply mark all or substantially all response as confidential. Notwithstanding the foregoing, respondents recognize that the City will not be responsible or liable in any way for losses that the respondents may suffer from the disclosure of information or materials to third parties.

D. City Rights and Options

The City, at its sole discretion, reserves the following rights:

1. To reject any, or all SOQs or information received pursuant to this RFQ;
2. To supplement, amend, substitute or otherwise modify this RFQ at any time by means of written addendum;
3. To cancel this RFQ with or without the substitution of another RFQ or prequalification process;
4. To request additional information and/or schedule interviews as part of the selection process;
5. To verify the qualifications and experience of each respondent;
6. To require one or more respondents to supplement, clarify or provide additional information in order for the City to evaluate SOQs submitted;
7. To hire multiple contractors to perform the necessary duties and range of services if it is determined to be in the best interests of the City; and
8. To waive any minor defect or technicality in any SOQ received.
9. City reserves the right to determine the extent, duration and limit of Panel member service

E. Questions/Clarification Request

For the City, the primary contact is:

Rosemary Menard
Water Director
City of Santa Cruz Water Department
212 Locust Street, Suite C, Santa Cruz CA 95060
Email: RMenard@cityofsantacruz.com
Phone: (831)420-5205

During the SOQ process, interested parties shall direct all questions via email to the City's primary contact listed above.

IV. Submittal of SOQs

The SOQs shall provide the information requested and be organized into sections as follows:

- Cover letter describing:
 - How they fit the Panel Characteristics
 - Their willingness to accept the offered compensation
 - Their availability to work with the WSAC over the coming year
- Resume or curriculum vitae.

V. Evaluation Criteria and Selection

The City will evaluate each respondent's experience and expertise in relation to the panel characteristics described in section II B above. Candidates will be evaluated on the information presented in the SOQ. Final selection may be based on the SOQ as well as any supplemental information or interviews conducted. Evaluation factors used to select the semi-finalists shall include the following:

1. Experience and qualifications as they relate to this project (100%).
 - a. The match of individual qualifications and experience to the Panel characteristics described in this RFQ, and
 - b. An individual's availability to participate.

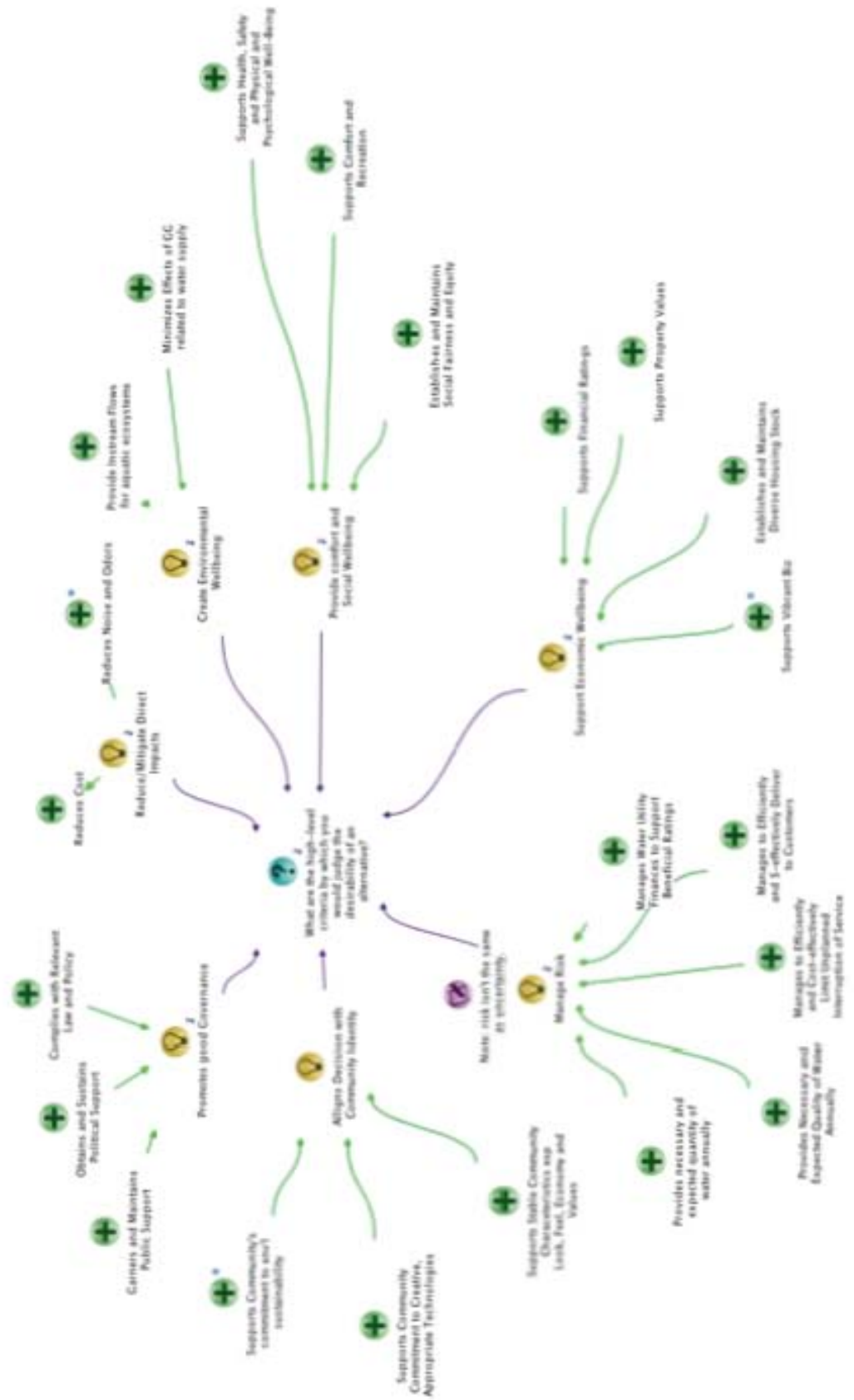
If a clear choice is not evident, interviews will be scheduled with those semi-finalists of exceptional rating.

VI. Response Format

One copy of the Statement of Qualifications shall be submitted and are to be no longer than 20 individual sheets in length (proposal may be printed on both sides of sheet), including resumes and attachments. Submitters are encouraged to use a double-sided format and recycled paper when possible.

Parties interested in being considered for this project are requested to submit their Statements of Qualifications **by 3:00 pm, Thursday, August 14, 2014**

to: City of Santa Cruz Water Department
212 Locust Street, Suite A
Santa Cruz, CA 95060
Attention: Rosemary Menard



DATE: July 28, 2014

TO: Water Supply Advisory Committee

FROM: Nicholas Dewar and Carie Fox

SUBJECT: Concept Paper on Potential Criteria for Evaluating Alternatives during Recon

The purpose of this concept paper is to give the Committee the beginnings of a potential list of criteria for use in evaluating water supply or demand management alternatives or other strategies during the Recon phase of its work. The criteria included on this list (and in the graphic on the first page) were gleaned from the assessment process that involved interviews of WSAC members and others by the process facilitators Nicholas Dewar and Carie Fox. Nicholas and Carie started with over 100 nodes and reduced them to the 31 you see in the attached graphic. As you hammer away on these, the number likely will (and definitely should) go down dramatically again.

There is one thing missing from this graphic and in the narrative below: the option of using water scarcity as a lever to reduce growth. This is a tricky thing to use in a shared decision model because you don't have shared values about that objective. And it is also a deeply controversial issue because it is not certain that growth is part of your Committee's decision space. Luckily, Recon is a highly iterative process, so it made sense to flag this issue for you and ask your guidance about whether, where and how you want to represent this issue.

Again, luckily, the decision about growth doesn't need to be made this month. It is important to get a good start on the criteria now, however. Why? Because ratings scales drive the research, and in turn ratings scales hang on the criteria. If you as a Committee want influence over the research, getting the criteria going is a very good strategy.

To assist the Committee in getting its head around the criteria, Rosemary Menard created a preliminary definition for each and included a brief discussion of relevant subcriteria. The same rules apply as for all the other Concept Papers. Dig in and make changes!

Promotes Good Governance – Actions or ideas that achieve or support achievement of this criterion are transparent, fiscally responsible, aligned with community values and priorities, and provide long-term community benefits. Examples of sub-criteria would include:

- Complies with relevant federal, state, and local law and policy
- Garners and maintains public support
- Obtains and sustains political support
- Supports decision-making approaches that attempt to optimize the value added from the action taken for the investments (time, money, community energy) being made

Mitigates Direct Impacts – Almost any action or plan can have impacts. Impacts can be general or localized. An example of a direct sub-criterion would be:

- Minimizes and equitably distributes rate impacts, and maintains affordability of water service
- Makes investments in a manner that protects and supports the viability and vitality of the local economy as well as the financial health and well-being of the City

An example of a localized sub-criterion would be:

- Reduces noise and odors from the project during both construction and ongoing operations

Promotes Environmental Well Being – Our long history of federal and state environmental laws such as NEPA and CEQA make this criteria a familiar one. These laws require that a wide range of potential environmental impacts be analyzed and evaluated prior to the authorization of any project. Impacts associated with a project that can't be avoided are mitigated. A common example is wetland impacts that are mitigated through constructing or improving wetlands elsewhere. Examples of sub-criteria for this criteria would include:

- Minimizes effects of greenhouse gas emissions related to water supply
- Provides instream flows to support aquatic ecosystems

Provides Comfort and Social-Well-Being – This criteria encompasses a range of social and community value issues that are important in establishing and maintaining a strong and socially viable community. Included in this criteria are basic human needs and values, as shown, for example, in lower three levels of Maslow's hierarchy of need:



Sub-criteria for this criterion include:

- Provides for and sustains individual and community health, safety and physical and psychological comfort
- Establishes and maintains social fairness and equity
- Supports comfort and Recreation

Supports Economic Well-Being – A strong and resilient economy is the needed foundation on which to build and sustain any community. Such an economy plays an important role in supporting a community

in establishing and maintaining the social conditions that are necessary for a quality community as described in the criteria above. Examples of sub-criteria for this criteria include:

- Supports a vibrant and diverse regional and local business community that provides a solid and resilient tax base
- Establishes and maintains a diverse housing stock
- Supports retention of property values and allows for maintaining or improving curb appeal
- Supports financial ratings for the City that provides for access to capital markets on favorable terms
- Directs growth in a manner that minimizes negative impacts to the community and its values and character

Manages Risk – Effectively managing risk to support its ability to consistently deliver water that meets both quality and quantity standards and expectations is one of the Water Department’s major functions. Sub-criteria relevant to this criterion would include:

- Provides necessary and expected quantity of water annually
- Provides necessary and expected quality of water annually
- Manages the water system to effectively limit unplanned interruptions in service
- Manages the water utility to efficiently and cost-effectively deliver water service to its customers
- Manages the water utility’s finance to support financial ratings for the Water Department that provide for access to capital markets on favorable terms

Aligns decisions with community identity – Each community has its own character and value system. Decisions made by community elected or appointed decision-makers should reasonably align with the community’s identity. Sub-criteria related to this criterion would include:

- Supports the community’s commitment to environmental sustainability
- Supports the community’s commitment to embracing and applying creative appropriate technologies to address community challenges
- Supports maintaining stable community characteristics, particularly related to the community’s look, feel, economy and value system

DATE: July 28, 2014
TO: Water Supply Advisory Committee Members
FROM: Rosemary Menard
SUBJECT: Concept Paper on Recon Activities and the Technical Resources needed during the Recon Phase

This is an exciting time for all of us! With the June meeting we've all begun to work together on the real issues the Committee has been established to address, and in the next few Recon meetings we'll be moving from abstraction to real work. As we make this transition, we also need to establish and maintain effective lines of communication between the Committee, city staff and researchers. To further the effective communication between the Committee and the technical and City staff team, I wanted to provide some additional details about the work ahead during Recon and describe the additional technical resources we need to get on board to support the Recon process. This concept paper is meant to inform and facilitate communication about what we want to build together, not to be a hard proposal.

Working backward from the end of Recon in November, the outcomes from Recon we're shooting for include a complete run through of the analytical process: identifying alternatives and evaluation criteria, developing rating scales, individually weighting criteria, actually rating alternatives, and then using the multi-criteria decision support tool to help us do a sensitivity analysis and direct the technical team in conducting the research and analytical work needed for the Real Deal.

Recon: The Big Chunks

Alternatives:

You have developed a system for bringing alternatives to the Committee. In November you will winnow those alternatives down. Depending on how things work out through the Strategies and Alternative Convention (SAC) process and the the number and quality of alternatives that are still of interest following the planned September SAC public event, you may want a fatal flaw analysis by the Stratus team, which would help the Committee focus its energy on more completely applying the evaluation process during Recon. Winnowing the alternatives will require you to have Recon-level criteria, ratings scales, ratings and weights.

How will Recon-level criteria, rating scales, ratings and weights be produced? Here's one approach that is intended to maximize your management without unduly burdening you.

Criteria

The packet for the July meeting includes a first run at the criteria, based on Carie and Nicholas's early assessment and information you have provided in the meetings. The current thinking of the facilitation team is that these criteria will probably be as important to your deliberations as the actual alternatives you will be evaluating, but my sense is that you don't have a lot of appetite for a long discussion about criteria at the full Committee meeting, so it may be useful for a small team to work with Carie and Nicholas to beat these criteria into better shape and bring them back to the August meeting--and the fewer the better!

Ratings Scales

Eventually, the ratings scales will be a communication tool for you to use with the public because they explain how the criteria apply in real life. But for now, you might want to think about the ratings scales as the way that you give direction to the technical team that would guide their research and analytical work. For instance, if you choose "supply produced under the worst case potential impacts from climate change must meet 90% of all customer demand as well as tier 3/2 fish flow requirements" for the bottom of the reliability scale, that drives a different research approach than if you choose "supply produced can be interrupted for periods as long as 24 hours and for as many as 48 hours per week."

If you are able to give sufficient direction about the criteria in the July meeting, it would be helpful if you also gave the technical team instructions about at least some of the features of the ratings scales you want to consider using. Then in August, the team would bring back some examples of rating scales for discussion and based on that direction work would continue at a relatively rapidly pace to further develop and refine the rating scales for all the criteria.

Why rapidly? Because the nature of the scales focuses the research and the Recon-level research needs to be clipping along as well. For that reason, it might be a good idea for the Committee team that was talked about earlier would actually work with the technical team, facilitation team, and city staff to provide guidance between the July and September meetings as the scales are developed.

Weights

Carie's concept for Recon is that you explore your weights anonymously (she would collect your weights and show you the distribution, but without attribution). The purpose of Recon is to test out your decision model, winnow the alts and prioritize your Real Deal efforts. You do not need to surface or resolve your weights to accomplish these objectives. But you do need to have a sense of the spread and the ways your ultimate decision likely will be sensitive to that spread.

Carie says you will have plenty of time to hammer out your individual and collective Committee values during the Real Deal.

Rating Recon-level Strategies and Alternatives

The denouement of Recon brings all the analytical and evaluative pieces together and actually applies them to Recon-level alternatives to produce ratings. The ratings let you compare the strengths of the alternatives based on the information you now have. MCDS lets you look at those comparisons, unpack them, bang on them, tweak them and otherwise test and retest them. It also helps you see what the decision model is most sensitive too. Is the uncertainty about demand muddling the decision model most, or is it the uncertainty about whether local aquifers will or will not work as new storage for water produced from any number of supply augmentation alternatives? Is the difference in weights regarding Santa Cruz's aesthetics driving the differences in your preferences most, or is it the emphasis on economics? Having answers to these questions drives your design for the Real Deal.

To assist the Committee in rating the Recon-level strategies and alternatives, the technical team would develop various products presenting the analysis of Recon level alternatives. We're still working on defining the specific forms of these products, but at this point our thinking is that they will not include recommendations and will be written in a way that maximize neutrality and is focused on sharing analytical results.

Technical Team Resources Needed to Support the Work

Even though the bulk of the technical work is planned to be done to support for the Real Deal phase of the work, the work outlined above demonstrates that technical resources are needed during the Recon phase.

In particular, the Stratus team needs to be augmented by expertise in the following areas:

Water Resources Engineering: There will be a number of water supply alternatives to be analyzed in terms of yield, construction feasibility, regulatory issues, cost estimating, etc. An engineering firm with expertise in infrastructure, water resources, stormwater, wastewater, reclamation, drinking water supply and treatment, will be a valuable addition to the team.

Resource Economist and Demand Management Planning and Analysis: Analysis of several issue areas will likely be important to understand. These include but are not limited to:

1. The effectiveness and costs of demand management programs
2. Economic impacts of water shortages to the community
3. Evaluation of alternative water supply and conservation options for the City.

David Mitchell (M-Cubed) is an Oakland-based resource economist with extensive experience in California water sector issues and analyses. He adds important breadth and depth to the Stratus Consulting team.

Bill Maddaus and Lisa Maddaus of Maddaus Water Management are nationally known for their work in demand management and planning. Maddaus Water Management is already under contract with the City for work related to the Long Term Conservation Master Plan and their participation in the WSAC work would be an asset to the process.

Hydrogeologist: Storage of water underground in local aquifers is an element of many of the water supply alternatives that have been discussed over the years. The Stratus team would benefit from having access to a hydrogeologist to support the analytical work, particularly in the Real Deal phase of the work. Stratus and the City would benefit from a discussion and agreement on selection criteria acceptable to the Committee to be used in identifying hydrogeology resource (firm and/or individual) to support this work.

Decision Scientist: To get the greatest benefit out of using the multi-criteria decision support tool that has been identified for potential use in the Recon phase of the Committee's work, having an expert who can work with the Committee to develop the tool will greatly improve the potential for the tool to be used successfully. A colleague of Carrie's, Philip Murphy of Infoharvest, has submitted a proposal to provide support for this effort.

At the Committee's May 29-30, 2014 meeting, the Committee agreed that anyone who will be providing technical assistance to the Committee will be asked to disclose the trade organization they belong to as well as any direct lobbying activities related to any water supply or treatment options relevant to the Santa Cruz water supply issues that they are currently or have in the past engaged in.

Stratus and City staff are currently reviewing potential individuals or firms to provide engineering and hydrogeology support expertise and will be discussing recommendations with the Committee at this week's meeting.

As the Committee's work gets underway in earnest and as the staff and technical and facilitation teams work together to effectively support the Committee's work, I think we are all beginning to see both the challenges and the opportunities that we face. But I don't think of what we face as daunting, but rather as a very exciting opportunity to work together to build an understanding and agreement that will serve our community well for years to come.

Water Supply Advisory Committee

Meeting June 26 – June 27, 2014

Fellowship Hall, Peace United Church of Christ

Meeting Summary

Use and Meaning of the Meeting Summary:

The Summaries of the Water Supply Advisory Committee are intended to be general summaries of key issues raised and discussed by participants at meetings. The presentation of issues or items discussed is not designed to be totally comprehensive, or reflect the breadth or depth of discussions. However, it is intended to capture the gist of conversations and conclusions.

Where a consensus or other agreement was reached, it will be so noted. Where ideas or comments are from only one or several participants, or where a brainstormed list is presented the content of which was not agreed to by all Committee members, the co-facilitators will to the best of their abilities note these qualifiers. Where the co-facilitators believe that the insertion of additional information would be useful to the group they insert it in this summary and indicate that the insertion comes from them, rather than from the Committee.

An early draft of this summary is sent to Committee Members so that they may provide comments to the co-facilitators and permit the preparation of a more reliable Presentation Draft for review at the Committee's next meeting. If the Members' comments conflict with each other the co-facilitators do their best to resolve the conflict in the Presentation Draft. When Members raise comments about the meeting Summaries, or make other suggestions or comments following meetings that propose changes that are more than "corrections" to the Summaries, the facilitators add these in a section at the end of the meeting Summary captioned "Post Script".

This meeting consisted of two consecutive daily sessions. The first lasted 4½ hours, the second last 4 hours. Here is a list of the members of the Committee. All members attended both sessions except as specified

Peter Beckmann, David Green Baskin, Dana Jacobson, Charlie Keutmann, Rick Longinotti, Sarah Mansergh, Rosemary Menard, Mark Mesiti-Miller, Mike Rotkin, Sid Slatter, Erica Stanojevic, Doug Engfer (Attended the first session electronically. Absent from the second session), Greg Pepping (Attended the first session electronically. Absent from the second session), Sue Holt (Absent from both sessions), David Stearns (Absent from both sessions).

First Session, Thursday June 26

Public Comment

- Studies of Santa Cruz's water supply that have been conducted in the past should be easily available while the Committee carries out its work, but appear to be unavailable.

Committee member updates

Members provided the following news of significant communication between them and organizations with significant interest in the development of water policy in Santa Cruz:

Rick announced that Desal Alternatives will hold a meeting on July 18 from 7:00 to 8:30 describing conservation lessons learned in Australia.

Agenda Review

The Committee agreed to move the agenda item "Presenters and Subcontractors" from the first session to the second session and to move the item "Report to the Council and Correspondence from the Community" from the second session to the first.

Summary Review

The Summary of the May meetings was approved with an amendment proposed by Doug.

Website and Curated History

Sarah provided an update of the work of the Website Subcommittee. She expects the Committee's website to be up and running by the end of July. She will provide Committee Members with a link to visit the site during construction.

The Committee reviewed the timeline that is included in the website and raised the following points:

- Some items in the timeline appear to be editorial rather than simply factual and seem out of place in a factual document
- The use of pie charts would effectively illustrate changes to the source of supply over time
- The timeline should specify when the Zayante dam project was considered
- The timeline should include the fisheries HCP
- The timeline does not include every possible relevant document. The website should include a comprehensive catalog of documents. Perhaps there should be a list of relevant documents attached to each period on the timeline.
- Committee Members should review the timeline and tell the Subcommittee of any documents that they believe need to be included.

Report to the Council and correspondence from the community

Mike reported that the Committee's report to the Council was considered at its meeting on June 24. The Council approved it unanimously without much discussion and expressed appreciation for the work that the Committee is doing.

Nicholas reported on requests received for Committee meetings to be held in Live Oak. The committee agreed by consensus to hold at least one meeting in Live Oak.

Water supply and water demand in Santa Cruz

Rosemary made a presentation about water supply and demand. The Committee agreed by consensus to take on the evolution of these presentation materials as one of its tasks and to get help from Stratus to do this. In this way the presentation materials will become a more useful document that can be used as a source for information during the Committee's work. Rosemary invited Committee Members to send her questions about this document after the meeting.

Facilitator's note: even during the meeting the document was changed, so users of it should be sure that they are using the latest version. You will find the latest version at the following page:

<http://www.cityofsantacruz.com/index.aspx?page=2065>

Scroll to the bottom of the page and click on "Water Supply and Demand Overview."

During the presentation the following questions were raised.

Facilitator's note: Most of these questions will form the starting point for questions to be given to Stratus to provide the Committee with the information needed to improve the document. Committee members may also submit questions to Rosemary by July 7th to be included in this round of Stratus work. Be assured, review of this document will be an ongoing activity for the Committee for several months; there will be other opportunities to raise issues about this.

- Can the Committee obtain details from Stratus about the key factors such as the assumptions that are used in the determination of when Loch Lomond will be used?
- Would the City provide parameters of the models used for fish flows such as DFG 5?
- What information is available about increasing incidence of drought resulting from climate change?
- Why does the water in Loch Lomond contain more organic carbon than other sources?
- Storage capacity for treated water has been reduced. Should the Committee consider needs for this storage capacity too?
- Do water users grow accustomed to raised prices and revert to increased water use?

- What is the status of the long-term water conservation plan?
- What can we do to reduce summer water use?
- How could non-residential users pay graduated rates?
- Could we adopt a water-neutral development policy so that developers pay fees to offset the cost of additional water demand?
- Can savings produced by conservation be applied to reduce over-all water consumption rather than to facilitate additional development and increase the number of residents?
- Why does the list of conservation ideas not include the reduction of outdoor water use?
- How does current actual water use compare to the representational data for water demand shown on the early graphs in the presentation?
- How was the water usage survey conducted, and what do we know about the surveyed accounts?

Understanding the elements of a decision

Committee members were joined by members of the public to play a serious game designed to facilitate exploration of the meaning and significance of terms such as Scenario, Alternative and Criterion and the ways that these can fit together in the decision making process.

Multi Criteria Decision Support

Carie made a presentation about MCDS and led a discussion about its use by the Committee. No decision was reached about using MCDS but the Committee was interested in seeing the model work on simplified WSAC issues at its next meeting.

Independent Review Panel

Committee members considered the paper prepared by Rosemary with input from some other Committee members describing a possible approach to the creation of the IRP and the RFQ also prepared by Rosemary.

The Committee discussed the section describing the required experience and developed alternative wording that emphasized experience commensurate with the experience of the experts whose work they would be reviewing, rather than specifying a number of years' experience.

The Committee also developed wording to make it explicit that the IRP will review information received from staff not just from its technical support team.

The Committee clarified that there was no disagreement about the section of the paper dealing with the scope of the IRP's work, so the IRP's scope of work will not include review of the Committee's work plan.

The Committee agreed by consensus to the paper prepared by Rosemary as amended.

The Committee also agreed by consensus to the formation of an IRP Selection Subcommittee as follows:

- Charge: review IRP applicants and make recommendations to staff
- Duration: short-term
- Members: Sarah, Rick, David B

Written Evaluation and Wrap Up

Nicholas asked all participants (Committee members and members of the public) to complete evaluation forms and hand them in.

Six participants contributed to the evaluation survey at SurveyMonkey.

- Most reported that the meeting met their needs excellently or satisfactorily. Particular appreciation was reported for Rosemary's presentation on Water Supply and Water Demand.
- Most reported that the meeting was going in the right direction, was a step in the right direction or was fundamentally useful toward achieving the Committee's long-term goal. Specific appreciation was reported for the game about elements of decision-making.
- Regarding the strengths and weaknesses of the meeting, several participants reported dissatisfaction with the microphone set-up, but some appreciated the

substance of the meeting. Some expressed concern about poor time-management and the length of the meeting although others appreciated its pace.

- All respondents rated the meeting as Above Average, Good or Great.
- Requests for future meetings included requests for presentations of former studies, requests for more opportunities to move around during the long meeting, requests for a wider selection of juices and requests for better microphones and a resolution of technical problems.

Second Session, Friday June 27

Public Comment

The Committee agreed to allow the following public comment about an item not on the agenda:

- The Committee should hold at least two of its meetings in Live Oak.

Committee correspondence with the public

Members asked for an opportunity to discuss the correspondence received from the public because this had not been described fully at the first session. The Committee discussed the exchange of correspondence between Bill Tysseling and Rick. They discussed the tensions that exists in a collaborative organization such as this Committee between expressing personal opinions or advocating specific positions and supporting an environment that will lead to consensus building. Several members spoke up to support the importance of expressing personal opinions, some described the importance of some self-censorship when necessary to support the Committee's capacity to build consensus, some explained the importance of subordinating personal anecdotes to the available scientific data so that the Committee's work will be built on a more substantive basis. Members recognized that they must live with the conflict between the urge to share or participate in ongoing correspondences and the need to limit or avoid such correspondence in compliance with the Brown Act or to resist indulging in off-topic discussions during meetings that distract from the current work of the Committee.

Presenters and Subcontractors

The Committee considered whom to recommend for selection as the consultant to provide confluence modeling. All agreed to the quality of Fiske's expertise and agreed by consensus to recommend to the City that Fiske & Associates should be a subcontractor to Stratus to provide confluence modeling.

The Committee considered whom to propose as presenter at the July meeting. They decided to wait until discussion of the July and August agendas later in the session to finalize this, but recognized that John Ricker and Terry Tompkins would be suitable presenters.

Scenarios

Carie led a discussion of the use of scenarios in the Committee's work during Recon. The Committee agreed in concept that using scenarios to handle massive uncertainty is a worthwhile approach. The Committee agreed to ask Stratus to prepare some preliminary materials describing various scenario points

Outreach

The Committee discussed the City's outreach plans and the need for a strong outreach effort so that the community understands the work that the Committee is carrying out and is not surprised by any outcome next year.

The Committee agreed by consensus to create a Recon Outreach Subcommittee as follows:

- Charge: help the public to understand the full complexity of Santa Cruz's water issues by, among other things,
 - monitoring management of the website,
 - informing the public about the activities of the Committee and the agenda of meetings
 - highlighting interesting presenters
 - taking every opportunity to invite public participation at Committee meetings.
- Duration: through the end of Recon

- Members: Charlie, Peter, Erica
- External communication: Communicate with the broadest possible spectrum of the community. Report on the work of the Committee rather than engaging in debate on behalf of the Committee. Invite the community to participate in meetings.

Strategies and Alternatives Convention

The Committee discussed the paper prepared by Rosemary describing the SAC. Members discussed the value of inviting everyone with an interest in this issue to provide a comprehensive list of alternatives to ensure that all who are interested will recognize that their ideas have been appropriately considered. Members also discussed the value of clearly stipulating criteria to ensure that all participants are aware of the major concerns of the Committee and that the Committee will have bases on which to evaluate the proposed alternatives. At least for the first phase, very few constraints will be put on the submissions, but in the second phase the Committee may ask the applicants to consider certain criteria or other limiting issues. Members felt that participants should be able to submit alternatives without having to use the web if they prefer not to. They also noted that the invitation should make it clear that this convention solicits ideas for water conservation as well as for water supply.

The Committee agreed by consensus to create the SAC Subcommittee as follows:

- Charge: work with staff to implement the SAC concept paper with the addition of a non-web method of submitting entries and the explicit inclusion of any alternatives that resolve the problem including conservation, supply and system management alternatives. This includes preparing and issuing the invitation for submission of alternatives.
- Duration: through September
- Members: Sarah and Sid

Agendas for July and August

The Committee discussed the agenda for the next two meetings. They agreed that the Committee needs an opportunity to familiarize itself with those significant alternatives (approximately ten projects) that have already been extensively considered by the City. The Committee agreed to ask Stratus to prepare a presentation summarizing these projects and explaining why each was not implemented. It was agreed that this presentation would be supplemented by commentary from John Ricker, Terry Tompkins

and possibly other staff. In order to fit this into July's schedule the agenda will include less attention to the SAC and to the development of criteria.

The Committee also requested that the July agenda include a plan showing the meetings at which each presenter will appear.

Oral Communication

- Appreciate the Committee's attention to public participation, and enjoyed listening to the Committee at work.

Written Evaluation and Wrap Up

Nicholas asked all participants (Committee members and members of the public) to complete evaluation forms and hand them in.

Members noted that the Committee is now starting to work on the substantial subject matter of its task, is headed in the right direction, that its members are working well together and that they are showing a productive approach to collaboration.

Five participants contributed to the evaluation survey at SurveyMonkey.

- Most reported that the meeting met their needs at least "reasonably well". Others reported dissatisfaction because the location of the meeting was too far from Live Oak or because public comment about items not on the agenda was scheduled for the end of the meeting.
- Most respondents reported that the meeting helped the Committee to work towards its long-term goal. Some reported that the meeting should have emphasized science instead of organizational issues.
- Respondents reported a good process with solid facilitation that permitted consideration and discussion about presentations. Others considered the facilitation to be too directive, constraining and unresponsive to public participants.
- Most respondents gave the meeting an overall rating of at least Average. Ratings were spread from "Poor" to "Could not have gone better."
- Recommendations for future meetings included requests for more discussions about water supply, improvements to the microphones, less direction from the facilitator and less discussion about organizational issues.

Outline of Agendas for August and September
For discussion only

Wed Aug 27 and Fri Aug 29

Session 1, Wednesday

Roll Call

Public Comment

Ctte Member Reports of Communication

Soquel Report

Agenda Review/Cttee Work Plan/Gantt chart

Summary and Action Item Approval

IRP progress report

Website Progress Report (other than SIC/AltsEx)

if there still is a Website Subctte

SIC/Alts Ex

Criteria

- Agree provisionally on Criteria and sub criteria for Recon (agreement on Recon Criteria will be in Sept.)
- Understanding of criteria narratives
- Direction for refining Criteria narratives
- Probable public comment

Scenarios

- Agree on Scenarios for Recon
- Understanding of refined scenario narratives
- Probable public comment

Update presentation to Council on Sep 9th

- Agree whether or not to present an update to Cncl describing SIC/Alt Ex plans, Outreach efforts and other progress
- Select spokesperson and give directions re preparation of presentation

Wrap-up / Plan for tomorrow

Adjourn

Session 2, Friday

Roll Call

Public Comment

Ctte reflection on day before

Public correspondence requiring ctte review

S/D presentation

- Understand changes made to S/D presentation
- Direction to Stratus/Staff re further refinements

Recon Outreach Subctte update

Review ratings scales

- Understanding of ratings scales
- Understanding of types of uncertainty and its interaction with ratings scales
- Direction to further develop ratings scales

Review Update of plan for ratings

- Understanding of plan for development of ratings
- Direction to consultant/staff

Consultant for Real Deal

- Agree whether or not to start recruiting consultant for Real Deal
- Agree on criteria for RFQ
- Agree on any necessary categories of subcontractor

Review Agenda outlines for Sept and Oct

Public Comment

Wrap Up

Adjourn

September Wed 24 and Fri 26

Session 1, Wednesday

Roll Call

Public Comment

Cttee Member reports of communication

Soquel update

Agenda review/Cttee Work Plan/Gantt chart

Summary and Action Item approval

Recon Outreach Scttee update

SIC/Alts Exh

- Reflect on alternatives exhibited
- Agreement whether or not to do coarse winnowing of proposed alternatives
- Agree on coarse winnowing
- Identify questions for Real Deal concerning alternatives
- Probable public comment

Criteria

- Understanding of refined Criteria narratives
- Agreement on Criteria for Recon
- Identify Criteria questions for Real Deal
- Probable public comment

Planning for Real Deal

Evaluation and wrap up

Adjourn

Session 2, Friday

Roll Call

Public Comment

Cttee reflection on Session 1

Public correspondence review

Ratings (update on development/direction)

- Understand development of Ratings since August
- Direction re further refinement of Ratings

Rating Scales

- Understanding of refined Rating Scales
- Agreement on Rating Scales for Recon
- Identify questions about Rating Scales for Real Deal
- Probable public comment

Supply/Demand presentation update

- Understand changes made to S/D presentation
- Direction to Stratus/Staff re further refinements

Review Agenda outlines for Oct and Nov

Oral Communication

Evaluation and wrap up

Adjourn

for DISCUSSION only

Meeting Evaluation Form

Thursday, July 31

1. Are you here as a member of the public ☐ or a Committee Member ☐ ?

2. Please describe how well the meeting met your needs.

3. How did this meeting help the Committee to work towards its long-term goal?

4. What were the strengths and weaknesses of the meeting, taking into consideration the Committee needs as a whole?

5. On a scale of 1 to 5 (5 = *Perfect!*), how would you rate this meeting?

① ————— ② ————— ③ ————— ④ ————— ⑤

Failed to meet all expectations.	Needs serious improvements.	It satisfied expectations.	It surpassed expectations!	Ok... That was <i>Perfect!</i>
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6. What would you like to see at the next meeting(s)?

Link to this evaluation:

Please hand paper copies in to Clark McIsaac

Thanks for completing this evaluation.

Meeting Evaluation Form

Friday, August 1

1. Are you here as a member of the public ☐ or a Committee Member ☐ ?

2. Please describe how well the meeting met your needs.

3. How did this meeting help the Committee to work towards its long-term goal?

4. What were the strengths and weaknesses of the meeting, taking into consideration the Committee needs as a whole?

5. On a scale of 1 to 5 (5 = *Perfect!*), how would you rate this meeting?

① ————— ② ————— ③ ————— ④ ————— ⑤

Failed to meet all expectations.		Needs serious im- provements.		It satisfied expect- ations.		It surpassed exp- ectations!		Ok... That was <i>Perfect!</i>
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6. What would you like to see at the next meeting(s)?

Link to this evaluation:

Please hand paper copies in to Clark McIsaac

Thanks for completing this evaluation.

Climate Change Projections for Santa Cruz

This technical memo is provided in two parts. Part 1 provides a cursory overview of climate change issues and recent studies as may be relevant to discussions of water issues for Santa Cruz. Part 2 provides a brief overview of the methods, data, and preliminary results from an initial examination by Stratus Consulting of potential climate change impacts for the Santa Cruz region. The intent of the latter investigation is to develop a range of projected changes in precipitation and temperature, so that these can be considered in the context of water supply availability and water demand.

Part 1: Overview of Climate Change Issues and Studies for Santa Cruz

Introduction

Climate change is expected to bring higher temperatures and sea level rise (SLR) to Santa Cruz. There is uncertainty about the pace of temperature increases and SLR, and both climate phenomena may have significant impacts on water availability, water quality, water demands, and infrastructure.

Changes in future precipitation patterns are more uncertain, but a range of future precipitation patterns can be developed, and are discussed in the two recent studies summarized below. In addition, Part 2 of this memorandum provides an overview of the methods, data and initial climate projections we have developed to date to explore climate change for the region. In terms of *average annual precipitation*, some of these projections are based on models that suggest a “wetter” future, and some indicate a “drier” future. However, even with models that predict higher average annual rainfall, other climate-related factors -- such as elevated temperatures and higher rates of evapotranspiration (ET) -- suggest that overall, the climate and local water resources will be “drier” in the future.

The anticipated changes in climate – although highly uncertain -- are very likely to impact instream flows, water quality (e.g., turbidity and TOC levels, dissolved oxygen), and water temperatures. These impacts will very likely have *direct* implications for the City and the quantity, timing, and quality of its extractable yields. Further, these climate changes may well have negative implications for the special status fish species (Coho and Steelhead) being protected by the HCP. Consequently, climate change may also *indirectly* (via the HCP) impact the quantity and quality of the City’s future water supply.

Existing Studies: Flint and Flint (2012)

Flint and Flint (2012), in their USGS study, *Simulation of Climate Change in San Francisco Bay Basins, California: Case Studies in the Russian River Valley and Santa Cruz Mountains*, use regionally downscaled results from two Global Climate Models (GCMs) selected to provide a representation of a range of relatively warm and wetter projections (PCM model) and warmer and drier results (GFDL model) for the region. The results are downscaled to a grid size of about 7.2 miles by 7.2 miles (in contrast to the GCM grid scales of about 150 miles per side).

The climatic model results are then coupled with a regional water-balance model. This coupling of climate and hydrologic models enabled the authors to examine changes in climate, potential

evapotranspiration, recharge, runoff, and climatic water deficit. Their results indicated large spatial variability in climate change and the hydrologic response across the greater Bay Area region, including a specific examination of the Santa Cruz Mountains and associated watersheds. They conclude that:

...although there is warming under all projections, potential change in precipitation by the end of the 21st century differed according to model. Hydrologic models predicted reduced early and late wet season runoff for the end of the century for both wetter and drier future climate projections, which could result in an extended dry season. In fact, summers are projected to be longer and drier in the future than in the past regardless of precipitation trends. While water supply could be subject to increased variability (that is, reduced reliability) due to greater variability in precipitation, water demand is likely to steadily increase because of increased evapotranspiration rates and climatic water deficit during the extended summers (emphasis added). Extended dry season conditions and the potential for drought, combined with unprecedented increases in precipitation, could serve as additional stressors on water quality and habitat.

By focusing on the relationship between soil moisture storage and evapotranspiration pressures, climatic water deficit integrates the effects of increasing temperature and varying precipitation on basin conditions. At the fine-scale used for these analyses, this variable is an effective indicator of the areas in the landscape that are the most resilient or vulnerable to projected changes. These analyses have shown that regardless of the direction of precipitation change, climatic water deficit is projected to increase, which implies greater water demand to maintain current agricultural resources or land cover (emphasis added). ... This type of modeling and the associated analyses provide a useful means for greater understanding of water and land resources, which can lead to better resource management and planning. (p.1).

Some specific findings for Santa Cruz include projected large reductions in runoff and recharge, even with the “wetter” climate projections: “There are subtle trends in the mountains of the region that could lead to dramatic changes in runoff or recharge. Declines in runoff and recharge for the GFDL model are particularly large ... along the coast in the mountains near Santa Cruz, where there are decreases of nearly 250 mm/yr. Even the PCM model, which projected a general increase in precipitation, shows declines in recharge up to 200 mm/year in the Santa Cruz area” (p.15).

Their conclusions are as follows:

Hydrologic models predict reduced early and late wet season runoff during the next century, which potentially results in an extended dry season in both climate models. Projections that estimate increased precipitation show it concentrated in midwinter months, December and January, a trend that could increase risk of floods. In both the wetter and drier futures, potential evapotranspiration and associated climatic water deficit (CWD) are projected to steadily increase as much as 30 percent between the 2071–2100 period in comparison to the 1971–2000 period, which means approximately 200 millimeters of additional water needed on average to maintain current soil moisture conditions in some locations to maintain the current CWD levels.

Summers are projected to be longer and drier in the future than in the past regardless of precipitation trends.

While water supply could be subject to increased variability (that is, reduced reliability) resulting from higher variability in precipitation, water demand is likely to steadily increase relative to increased rates of evapotranspiration and climatic water deficit during extended summers. Extended dry-season conditions and potential for extended drought combined with unprecedented precipitation events could serve as additional stressors on water quality and habitat. Real-time monitoring of hydrological variables can be one of the most prudent planning efforts and could be central to testing hypotheses about potential climate change demonstrated in this report and equipping managers to respond. (p.42).

Existing Studies: Grigg and Haddad (2011)

Another locally-focused climate change study was a “vulnerability assessment” developed by Greg Grigg and Brent Haddad, titled *City of Santa Cruz City Climate Change Vulnerability Assessment*. The authors do not rely on a suite of Global Climate Models (GCMs) or other empirical projections. Rather, they use generalized insights about anticipated climate change and associated impacts to provide an overview of the range of risks in the City likely to be associated with the changing climate. They note that “climate changes are already underway within California and in Santa Cruz and are likely to increase in the years ahead. Expected changes to local climate include: 1) higher temperatures, 2) water shortages, 3) longer droughts and more flooding, 4) increase in wild land fires, and 5) sea level rise and larger storm waves.”

Grigg and Haddad (2011) discuss a range of climate-related changes, including sea level rise (SLR), increased storm surge (from increased storm intensities) and acidification of the oceans. Potential risks to the region’s natural coastal features and infrastructure in shoreline and low lying near-coastal areas are described, including flooding risks. They cite a state-sponsored study that observed that, in combination with SLR of 1 foot, the 100 year flooding event could become a 1 in 10 year event (p.44, referring to a 2009 *California Climate Adaptation Strategy* prepared by the California Natural Resources Agency, which in turn refers to a Pacific Institute report from 2009). They also observe that SLR could introduce ocean water into the freshwater aquifers currently tapped by the Beltz Wells, and that the wells may have to be relocated further inland to avoid saltwater intrusion (p.52).

Regarding precipitation and water resources, the authors note that some models project slightly higher average annual precipitation and some lower rainfall than the historic record. However, they also note that “the natural variability of precipitation is what makes attributing significance to the changes difficult... Observations of changes in circulation patterns, cloudiness and the water vapor content of the atmosphere would seem to point to wetter winters and more intense storms”(p.36).

The authors note that “changing precipitation patterns ... could significantly alter the amount of water available to the city, both surface and groundwater. More intense winter precipitation may result in lower summer base flows reducing the time window during which water can be diverted from streams. Elevated winter flows may also limit diversions because of high sediment loads” (p.48). Grigg and Haddad also observe that:

Another water-related natural resource impact has to do with potential increases in the intensity of storms and subsequent sediment runoff in the San Lorenzo River. The San Lorenzo River is the City's primary source of drinking water. The Graham Hill Treatment Plant is able to treat water with up to 25 NTU of turbidity, a measure of the cloudiness of water due to siltation. Major storms mobilize sediment that far exceeds 25 NTU. If storm intensity and frequency increase, the length of time the City can draw water from the San Lorenzo River will decline. This situation will call for adaptations that either enable the city to draw siltier water into its system and thoroughly treat it, or draw and store more raw water when it is available in anticipation of the longer periods when water is not available. Expanded storage for treated water is also a possibility (p. 53).

Regarding the likelihood of rising average temperatures and the possibility of extended periods of high heat during crucial growing periods, the authors note that "the City shares part of its water supply, originating along the north coast, with coastal growers. If coastal growers increase their irrigation intensity as a result of increasing temperatures, the City would have less water for its own use. This scenario was nearly reached in July, 2009, during the third year of [that] recent drought. In terms of urban water demand, high temperatures occurring during May and June, when residential gardens are planted and are sprouting, produce increases in water demand. This is a valued amenity to residents who own or rent homes. Currently the City has sufficient normal-year water supplies to provide water during May/June heat waves. However, the combination of heat waves and extended (two or more year) droughts raise a more generalized water sufficiency problem" (p. 51).

Increased fire risk and fire intensity could also adversely impact the City's water supply system, due to potential for the clogging of intakes in the North Coast water supplies used by the City. The authors note that: "Three streams, Liddell, Laguna, and Majors, provide roughly 25% of the City's water and have been in service since the 1880s. Following a major fire in the 1910s, Laguna Creek was not usable as a city water supply due to silting and clogging of intakes" (p. 52).

Finally, Grigg and Haddad describe several climate-related vulnerabilities faced by the Loch Lomond reservoir and associated water transmission network:

Loch Lomond Reservoir, the City's primary water supply in the event of a drought, faces numerous climate-change-related challenges including maintenance of a 9-mile long pipeline that delivers water to the City from the reservoir along with other transmission pipes throughout the system. Climate change could increase the risk of wild fires along transmission lines, which, combined with subsequent flooding, could destabilize the steep slopes along the transmission lines. For example, slope failures during the heavy rains of 1982 damaged the pipeline leading to shut down of flow. Additionally, supporting roadways used to transport maintenance and repair equipment may be unstable and unusable. This scenario is roughly equivalent to what the Water Department could face following a major earthquake. A similar scenario could occur due to climate change, emphasizing the importance of advance preparation of transmission lines for multiple types of emergencies (p. 53).

They also point out that “increased fire potential in the Loch Lomond watershed means a greater chance that post-fire rains could introduce a much more rapid influx of sediment, reducing the storage capacity of the reservoir” (p.53). And, they observe that another climate-change related risk to the reservoir “concerns the increasing rate of evaporation caused by increased air temperatures and higher insolation (influx of sunlight) due to a decline in coastal fog. The Reservoir currently loses 3 to 4 inches of water per year to evaporation, as much as 20 million gallons of water. Increased evaporation could affect the amount of water available to the City to respond to extended droughts” (p.54).

Ultimately, the authors rank water supply shortages as the highest climate change-related risk faced by the City in both the near- and longer-term. This rating is based on their perception that water shortage is a high probability as well as a high consequence event (p. 56).

Conclusions

The two recent Santa Cruz-specific climate studies described above are quite different in approach and objective, yet both reveal similar implications and associated challenges for the region’s water supply and demand management. Both sets of authors recognize that regardless of the projected changes in annual average precipitation, other factors (e.g., ET and seasonal shifts) will likely result in an overall drier climate (even if annual rainfall increases, on average), more constrained water supply yields, and higher demands. Additional challenges -- including heightened risk of wildfire, floods, and sediment runoff -- are also identified as more likely under the range of plausible future climate projections. While climate change embodies numerous large uncertainties, there is a general agreement that it will be increasingly difficult to provide reliable, high quality supplies and manage demands as our climate changes in the decades ahead.

Part 2: Preliminary Climate Change Assessment by Stratus Consulting

Methodology

Several key steps are involved in developing climate change projections. Each is discussed in turn with respect to how we developed a coarse initial assessment of potential climate change for the Santa Cruz region.

1. Selection of applicable Global Climate Models (GCMs).

With the recent International Panel on Climate Change (IPCC), *5th Assessment Report*, there are now over 40 GCMs that the Panel considers for making climate change projections. A recent investigation on behalf of the State of California Department of Water Resources (Cayan and Tyree, 2013) identified 11 of these GCMs as most suitable for application in the state. We ran projections for these 11 models and selected the 3 GCMs that span the range of projected changes in terms of annual average precipitation (see Figure 1). The selected GCMs applied in our analysis for Santa Cruz are:

- Wet: CNRM-CM5, with a 2100 projected increase in mean annual precipitation of 46% (and represented by the red bars in the bar charts that are appended)
- Neutral/median: GFDL-ESM2M, with a projected 0.4% increase in projected 2100 mean annual rainfall (depicted by the green bars throughout the charts that follow)
- Dry: MIROC5, with a projected 11.5% decrease in annual average precipitation by 2100 (and depicted with purple bars in the charts that follow).

2. Selection of Emission Scenarios and Climate Sensitivity Factor

Each GCM run requires an input for the anthropogenic forcing scenarios that are assumed, which include projections of greenhouse gas (GHG) emissions. The IPCC's *5th Assessment Report* uses a new suite of anthropogenic forcings, called "RCPs" (Representative Concentration Pathways) instead of the SRES emission scenarios used in the *4th Assessment Report*. The RCPs developed by IPCC range from 2.6 to 8.5. The lower end of the RCP range assumes a fairly green path associated with relatively lower GHG emissions, whereas RCP 6.0 and RCM 8.5 appear more consistent with recent GHG emissions trends. We used RCP 6.0 and RCM 8.5 in our evaluation.

The GCM results also depend on the climate sensitivity factor applied (low, medium, or high), reflecting the extent to which global warming is believed to be impacted by atmospheric levels of GHGs. We opted to run the medium sensitivity factor.

3. Selection of time frame and time steps

GCM runs can be selected for different years, and generate results in different time increments. We opted for 2040 and 2060 as relevant time frames for the analysis, as they reflect future years that are

within the typical water utility planning horizon of 25 to 40+ years. We also portray the results on a monthly basis (e.g., a projection for each month of the year) plus an annual average.

Outputs

Outputs from the above exercises were produced using SimCLIM 2013 software (Yin et al., 2013; Warrick, 2009). The approach entails a “Bias-Correction Spatial Disaggregation” (BCSD) which is a commonly used method to increase the resolution of the GCM data and “correct” for biases in the GCM. “Biases” are identified by examining differences between climatological mean values for the observed data and GCM-generated values for a historical reference period. This correction is done at a higher spatial resolution than provided by the GCM (with GCM grid sizes typically over 100 miles by 100 miles). The “correction” is then applied to future GCM-generated projections.

The results described below are based on and reflect the following:

1. Baseline results reflect annual averages drawn from the historic records for the 30-year period 1981 – 2010, based on PRISM data (PRISM, 2013) as provided in the SimCLIM software. This is sometimes portrayed as reflecting results for 1995, though it is actually an *average* derived from results across the 15 preceding and 15 subsequent years. The results reflect average monthly precipitation (in mm) and the max temperature (in degrees Celsius).
2. Results for 2040 reflect a 20-year annual average, based on results that span from 2031 through 2050. Results for 2060 are also 20-year averages spanning the preceding and subsequent decades. Results are developed as changes from a 1986-2005 modeled baseline (e.g., as % change in monthly precipitation). These changes are combined with the PRISM baseline results to develop the estimated levels of precipitation and max temperatures for the future time periods.

Results

The empirical results are displayed in the series of bar charts provided below, starting with Figure 2.

Figure 2 indicates the percent change in monthly precipitation for the 3 selected GCMs, for 2040, based on RCP 6.0.

Because percent changes can be misleading when baseline precipitation varies considerably across months, we developed Figure 3 to reveal the absolute precipitation amounts projected for each month. In Figure 3, the blue bar reflects baseline levels of precipitation (i.e., average month results over the 30-year span of 1981-2010). As in all the figures, the red bars reflect outputs from the relatively wet model, green bars reflect results from the precipitation neutral model, and the purple bars the relatively dry model outcomes.

Figure 4 shows the estimated increase in the maximum temperature for each month, across the 3 selected GCMs, for 2040 (at RCP 6.0). Figure 5 shows the baseline and projected 2040 levels of max temperature (at RCP 6.0).

Additional results have been developed for a higher emissions scenario (RCP 8.5) and for 2060. In both instances, similar patterns emerge, though the changes from baseline grow with higher emissions and/or years further into the future.

Interpretation and Caveats

The results developed so far, and portrayed in the figures, offer a limited glimpse of the potential impact of climate change on water supply and water demands. For example, the temporally averaged results reveal the range in projected changes in *average* annual precipitation, but not the anticipated increase in *variability* in rainfall patterns (e.g., the likely increase in precipitation intensity, the likelihood of more frequent return periods for severe droughts, or the potentially higher variability in precipitation across seasons or from year to year). The results also indicate anticipated temperature increases, which will have impacts on both water supply and demands.

More detailed assessments are possible using some of the models and outputs described here, and are also available from other studies that have been undertaken of the region (e.g., Flint and Flint, 2012, where climate projection results were then used as inputs to hydrologic models to predict changes in regional water balances). In the future, it may be valuable to conduct additional work in which: (1) a broader array of projected climate change outcomes are estimated (e.g., projections that better reflect possible changes in precipitation variability and extreme events rather than long-term averages), and (2) the climate projection results are used as inputs for relevant instream flow and water supply yield models in order to ascertain what the key water system implications are of the estimated range of future local climate changes.

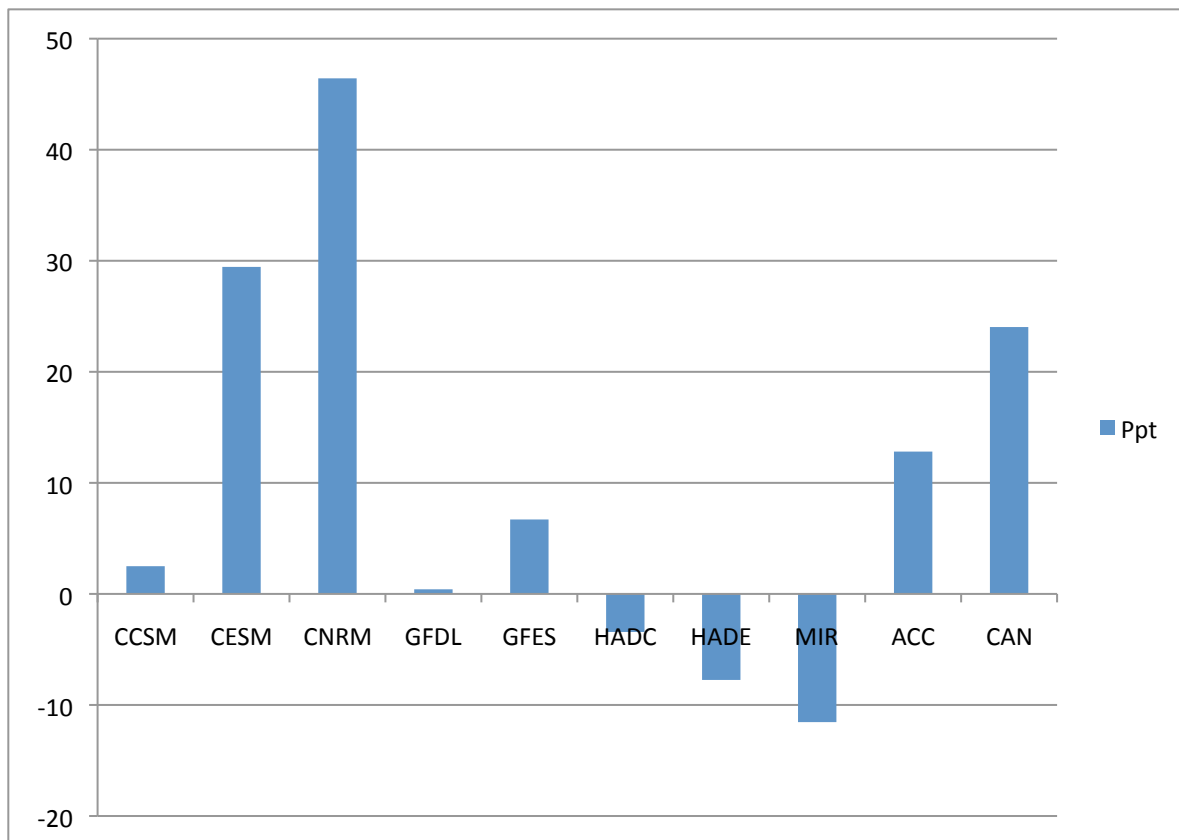


Figure 1: Percent change in 2100 annual average precipitation (Ppt) across 11 GCMs identified as suitable for CA by Cayan and Tyree (2013).

The high, low, and median outcomes were used to select the 3 GCMs applied in the analysis:

- Wet: CNRM-CM5, with a 2100 projected increase in mean annual precipitation of 46% (and represented by the **red** bars in the figures that follow)
- Neutral/median: GFDL-ESM2M, with a projected 0.4% increase in projected 2100 mean annual rainfall (depicted by the **green** bars throughout the charts that follow)
- Dry: MIROC5, with a projected 11.5% decrease in annual average precipitation by 2100 (and depicted with **purple** bars in the charts that follow).

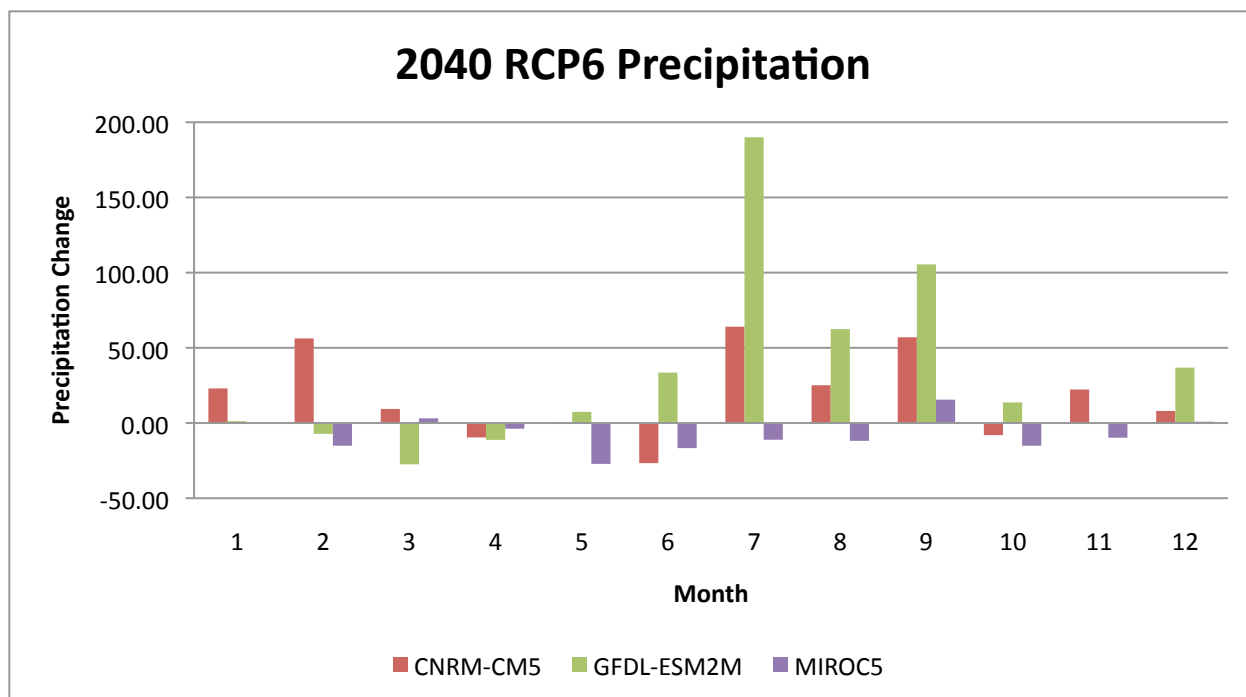


Figure 2: Percent change in monthly precipitation, for 2040, based on RCP 6.0. Red bars reflect the “wet” model in terms of annual average change, green bars reflect the precipitation “neutral” model, and purple bars the “dry” model for this region.

Note that although the GFDL model (green bars) shows the greatest variability in projected rainfall changes across months, it is nearly precipitation neutral on an annual basis.

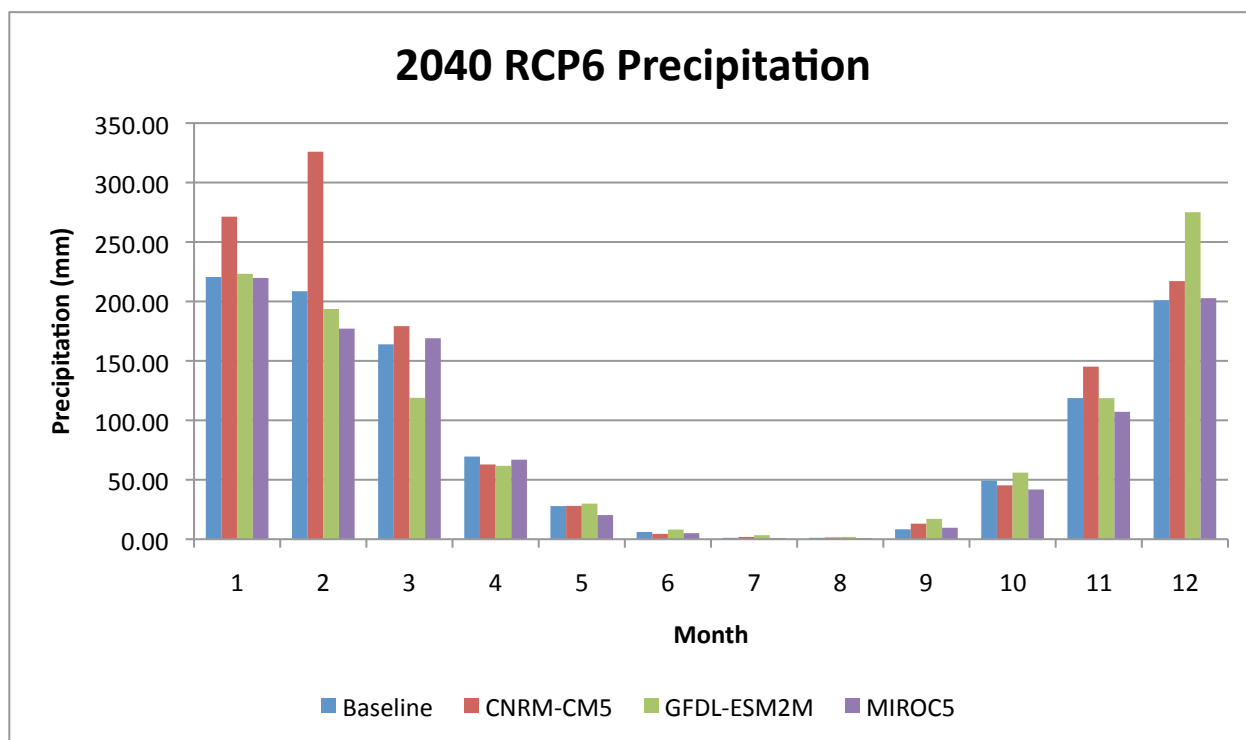


Figure 3: Baseline (blue bars) and projected average monthly precipitation, for 2040, across 3 GCMs (at RCP 6.0).

Average annual changes in precipitation for 2040 for the 3 models, under RCP 6.0, is: +20.4% (wet), +3.0% (neutral), and -5.1% (dry).

Note that the projections suggest a slight exaggeration of the baseline seasonal pattern of rainfall being concentrated in the winter months, and perhaps a somewhat extended dry season.

Also note that Flint and Flint (2012) also anticipate an extended dry season and, in combination with elevated temperatures and evapotranspiration rates, suggest a climatic water deficit even for models that project increases in average and annual precipitation.

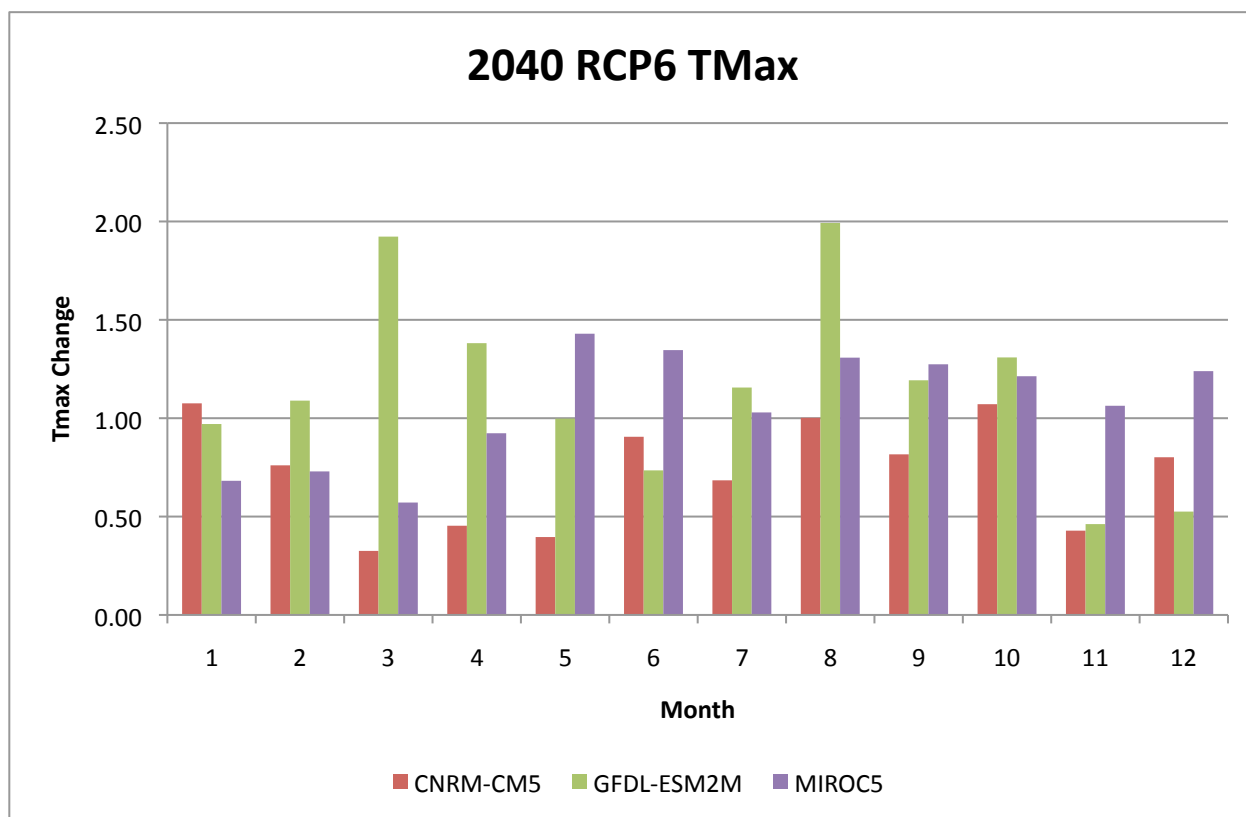


Figure 4: Projected change in Max temperature, degrees Celsius, for 2040 (RCP 6.0)

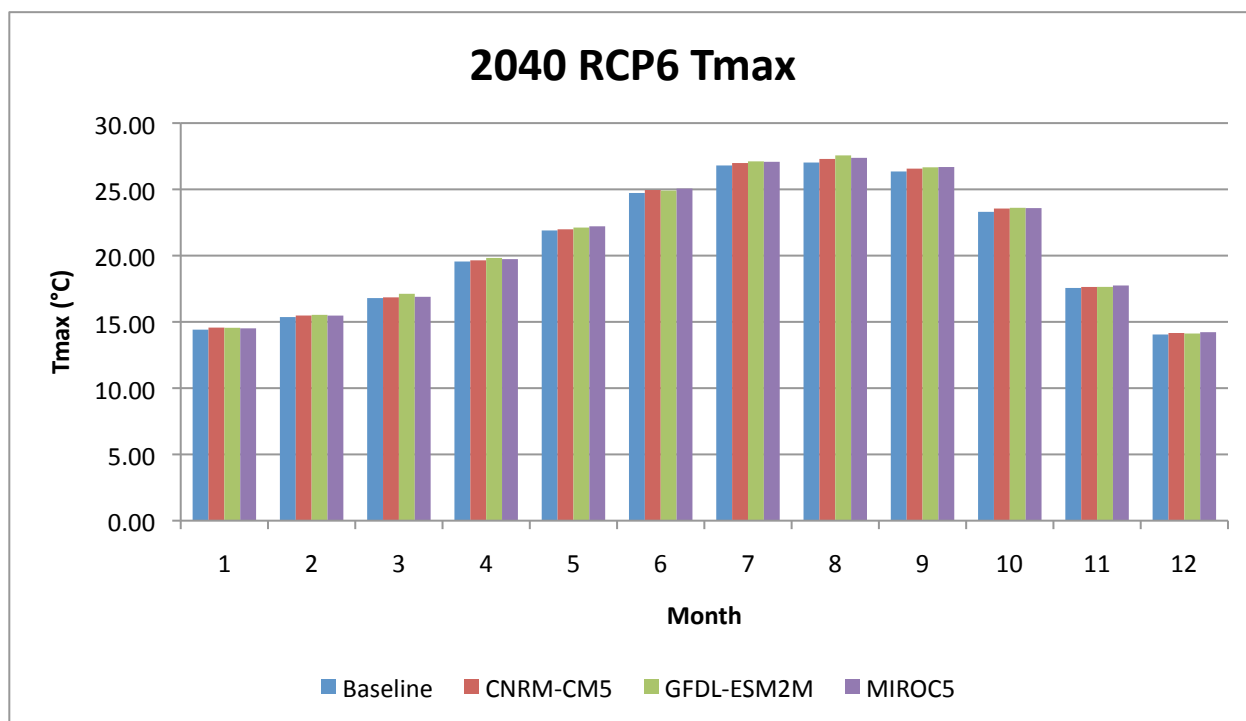


Figure 5: Max temperature for Baseline and for 3 GCM projections for 2040 (RCP 6.0)

Note that additional temperature metrics (beyond monthly max temperatures) can be developed, and these may be more relevant to water demand, evapotranspiration, and fish habitat. For example, average monthly daily high (and low) temperatures can be estimated, and these may be more indicative of how climate change may impact water-related issues.

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