**DATE: October 23, 2014**

**TO: Members of the Water Supply Advisory Committee, the Santa Cruz Water Commission and Interested Members of the Public**

**FROM: Rosemary Menard, Director, Santa Cruz Water**

**SUBJECT: Modeling and Forecasting Working Group**

The Santa Cruz Water Department is sponsoring a Modeling and Forecasting Working Group in the coming weeks. The purpose of the working group is to create a planned and organized way for interested members of the WSAC and their constituent groups, members of the Santa Cruz Water Commission, and interested members of the public to develop a greater level of understanding and confidence in the modeling, forecasting and analytical tools the City uses in its water planning efforts.

I propose the following schedule, subject to availability of presenters and of appropriate facilities, to support the working group effort. The work plan follows.

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| **Session Number** | **Session Title** | **Proposed Date/Time**  **(All Wednesdays)** |
| 1 | Overview of Work Plan and Modeling and Forecasting Tools | November 5,  4 pm to 6 pm |
| 2 | Modeling and Forecasting Flowing Source Supply and Groundwater Resources | November 12  4 pm to 8 pm |
| 3 | Current and Proposed Future Approaches to Forecasting Water Demand | December 3  4 pm to 7 pm |
| 4 | Demand Management Decision Support System Model | December 10  4 pm to 7 pm |
| 5 | Confluence Modeling and Supply Forecasting | January 7  4 pm to 8 pm |
| 6 | Shortage Contingency Planning | January 14  4 pm to 7 pm |
| 7 | Parking Lot Issues | January 21  4 pm to 7 pm |
| 8 | Modeling and Forecasting Products to be used in Phase 2 of the WSAC work | February 4  4 pm to 7 pm |

In order to ensure that we have an adequate location for these sessions, **REGISTRATION** is required. To register, simply send an email to my assistant, Gloria Rudometkin ([grudometkin@cityofsantacruz.com](mailto:grudometkin@cityofsantacruz.com) ), with the Subject Line: Modeling and Forecasting Working Group, and indicate in the email message that you want to participate in the Modeling and Forecasting Working Group. Please provide an email address and a telephone number where you can be reached or messages can be left. Registrations must be submitted by close of business on Monday, November 3, 2014.

**Modeling and Forecasting Work Group Work Plan**

**10-23-14**

**Session 1: Overview of Work Plan and Modeling and Forecasting Tools 2 hours**

Rosemary Menard

Focus: The models and forecasting tools the City uses for water supply planning, how they are used and the types and sources of data inputs.

Presentation and discussion will cover:

* Overview of work plan and schedule
* Overview presentation and discussion will cover the following modeling and forecasting tools:
* Hydrologic model of flowing sources
* Fish flow regimes
* Current demand forecasting methodology, and planned econometric demand forecasting model
* Demand Management Decision Support System Model
* Confluence model – system reliability and forecasting
* Big picture discussion of how the tools fit together and are used in water planning

**Session 2: Modeling and Forecasting Flowing Source Supply and Groundwater Resources 4 hours**

Shawn Chartrand, Jeff Hagar and Kevin Crossley

Focus: Detailed analyses of the hydrologic data used in modeling and forecasting flowing source supply and groundwater resources, and how they are used, and the fish flow regimes that have been developed historically along with the scientific basis for developing fish flows.

Presentation and discussion will cover:

* Data sources
* Data quality
* Hydrologic flow forecasts – how they are developed, how they are used in supply modeling and forecasting
* Fish flow regimes and options (2014 drought flows, Tier 3/2, DFG 5, Tier 3) and the level of protection provided to fish under these various flow scenarios
* Groundwater resources, including wells and well operation

**Session 3: Current and Proposed Future Approaches to Forecasting Water Demand 3 hours**

Toby Goddard, David Mitchell

Focus: Current approach to forecasting demand, data types and sources, and econometric demand models, how they are developed, data types and sources, and timeframe for model development and use.

Presentation and discussion will cover:

* Demand forecast development for the 2010 Urban Water Management Plan and the Water Supply Assessment developed for the General Plan
* Data types and sources used in demand forecasting
* Demand forecasts versus actual demand – trends over time
* Approach to disaggregating an annual demand figure, for example, 3.5 bgy, into daily demands for use with the Confluence model
* Key factors, for example temperature and precipitation, used in disaggregating demand, and the types and sources of these data.
* Benefits and uses of an econometric demand forecast model
* Discussion of types and sources of data to be used in the development of an econometric demand model for Santa Cruz
* Areas of particular interest, e.g., incorporating price and income into water demand models

**Session 4: Demand Management Decision Support System Model 3 hours**

Lisa and Bill Maddaus

Focus: Evaluation of programs and projects to reduce or manage water demand.

Presentation and discussion will cover:

* Sources and types of data used in evaluating water demand management programs and projects
* Assumptions and basis for assumptions used in evaluating demand management programs and projects
* Applicability of experience and trends elsewhere to the Santa Cruz situation

**Session 5: Confluence Modeling and Supply Forecasting 4 hours**

Gary Fiske

Focus: How the Confluence model works and the outputs of the Confluence model.

Presentation and discussion will cover:

* Data inputs to Confluence
* Municipal and Industrial (M&I) supply source dispatching protocol and operating rule curve for Loch Lomond
* Architecture of the Confluence model
* Confluence processing steps
* Confluence outputs and what they mean
  + Using Confluence to estimate the size of a shortage under a given set of past, current, or future annual conditions versus using Confluence to estimate the frequency and severity of shortages over the entire period of record or forecast period
* How Confluence will be used in creating the “baseline”

**Session 6: Shortage Contingency Planning 3 hours**

Toby Goddard

Focus: Session will cover the analytical framework used to develop the 2009 Water Shortage Contingency Plan.

Presentation and discussion will cover:

* Sources of data
* Policy Framework
* Review of recent experiences implementing the plan
* List of potential issues to be addressed in planned revision following the end of the current drought

**Session 7: Parking Lot Issues 3 hours**

Focus: Throughout sessions 1 through 6, items that come up and can’t be responded to during the sessions will be placed on a parking lot list. In session 7, staff and various technical consultants will present and discuss results of follow up work done to address parking lot issues.

**Session 8: Modeling and Forecasting Products to be Used in Phase 2 of the WSAC Work 3 hours**

Focus: A range of modeling and forecasting products will be used in Phase 2 of the WSAC work. In this session, the various forecasts will be presented and discussed.

Presentation and discussion will cover:

* Potential range of impacts on hydrologic models due to various climate change scenarios
* Baseline water demand forecast without climate change or water demand management actions
* Baseline water demand forecast with water demand management actions but without climate change[[1]](#footnote-1)
* Baseline water demand forecast with water demand management actions and with the most optimistic (least impactful) version of climate change
* Confluence reliability forecasts under various agreed upon fish flow and climate change assumptions

Additional modeling will be occurring throughout the second phase of the WSAC’s work plan as options are developed and evaluated. The modeling products identified above are intended to be part of the initial analytical baseline. The methodologies used in creating these baseline products would be applied in any further analyses needed by the WSAC.

1. It may well be that there would be several versions of this with different sets of water demand management actions in different forecasts. [↑](#footnote-ref-1)