Department of Water Resources

Modeling Tools Fact Sheet

The California Department of Water Resources (DWR) has prepared this fact sheet to inform local agencies and stakeholders about DWR's integrated hydrologic modeling code and applications, including their current status and plans for future development. Note that future timelines mentioned in this fact sheet are subject to change.

The modeling applications described below were generally developed for regional-scale groundwater analysis. Use of the model applications for local-scale analysis should only be done after understanding the limitations and assumptions of each application. In many cases, the applications described below can be used as the foundation for local-scale analysis suitable for developing information for a Groundwater Sustainability Plan as required by the Sustainable Groundwater Management Act (SGMA).

Modeling Code

DWR's Modeling Support Branch of the Bay-Delta Office developed and provides ongoing support for the Integrated Water Flow Model (IWFM) code[1]. IWFM is a water resources management and planning model that simulates groundwater, surface water, stream-groundwater interaction, and other components of the hydrologic system. A unique feature of IWFM is the land use based approach of calculating water demand. IWFM simulates stream flow, soil moisture accounting in the root zone, flow in the vadose zone, groundwater flow, and stream-aquifer interaction. Agricultural and urban water demands can be pre-specified, or calculated internally based on different land use types. Water re-use is also modeled as well as tile drains and lakes or open water areas. IWFM Version 2015 is the actively developed version of the code, and will be the version most agencies use for developing new models. Although older versions of IWFM (e.g., Version 4.0 and 3.02) are still in use by some model applications and are available for download, DWR is not planning to develop new features for these older versions.

Modeling Applications

Although the code has been used by others for model applications throughout the state, DWR's applications of IWFM are focused on California's Central Valley. The table on the following page describes the current status and expected future updates to DWR's IWFM-based models: the California Central Valley Groundwater-Surface Water Simulation Models (C2VSim) and the new Sacramento Valley Groundwater-Surface Water Simulation Model (SVSim).

Additional Resources

SGMA Modeling Best Management Practices Document:
http://bit.ly/sgma-bmp-modelling

SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

United States Geological Survey Interactive Model Map:
https://ca.water.usgs.gov/sustainable-groundwater-management/california-groundwater-modeling.html

Contact Information

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[1] http://baydeltaoffice.water.ca.gov/modeling/hydrology/IWFM/

Model Application Details

Application Name	Release Date or *Anticipated Release Date*	IWFM Version	Historical Simulation Period	Comment
C2VSim Coarse Grid, Version R374[2] *(C2VSim-CG_R374)*	June 28, 2013	3.02	1922 - 2009 1973 - 2009	• Existing, calibrated version of C2VSim • Average element size of 14.0 sq. miles (range 2.1 to 33.0 sq. miles) • Crop distribution specified by sub region
C2VSim Fine Grid, Version R374g (C2VSim-FG_R374g)	Beta version, not released	3.02	1922 - 2009 1973 - 2009	• Fine-grid version of C2VSim • Average element size of 0.6 sq. miles (range 0.006 to 2.8 sq. miles) • Crop distribution specified by sub region • Development version, not released
Coarse Grid C2VSim Version 2015 *(C2VSim-CG-2015)*	*Fall 2018*	2015	1922 – 2015 1973 - 2015	Key enhancements relative to existing C2VSim: • Change to IWFM Version 2015 • Improved crop water demand and land surface flow simulations • Crop distribution specified by element, rather than by sub region • Refined surface water deliveries
Fine Grid C2VSim Version 2015 *(C2VSim-FG-2015)*	*May 2018 – beta version*	2015	1922 – 2015 1973 - 2015	
SVSim	*Summer 2018*	2015	1973 - 2015	New model of the Sacramento Valley based on C2VSim-FG, but with a more refined grid and layers and updated representation of aquifer properties based on an extensive lithologic texture analysis. Developed for local-scale analyses, including streamflow depletion.

Supporting Tools

In addition to the IWFM code and applications noted above, DWR has developed tools that may be relevant to local agencies and their consultants desiring to build new IWFM applications.

Tool	Functionality	Status
C2VSim GIS/GUI	Graphical user interface (GUI) for visualizing C2VSim Coarse Grid (v. R374) information and results in ESRI's ArcGIS	Available for download[3] (see link to resources below)
IWFM Mesh Generator	Finite element mesh generator integrated into ESRI's ArcMap software. Supports triangular, quadrilateral, and mixed triangular-quadrilateral meshes.	
IWFM Tools Add-in for Excel 2007-2013	Utilities to import IWFM model results into Microsoft Excel	
Soil Data Builder and Soil Data Builder with GIS	Tools for processing NRCS SSURGO soil database information into inputs for IWFM models. Includes integration with ESRI's ArcMap software.	
IWFM PEST Utilities	Tools for integrating IWFM models with the parameter estimation software PEST	
Land Use Adjustment Preprocessor	Tools for generating elemental land use areas for input to IWFM	
Online viewer for C2VSim	An online interface to view selected data from C2VSim, including water budget information and calibration data	Available online[4] (see link below)
IWFM-2015 GUI	ArcGIS-based IWFM GUI	Planned to be available by December 2018

[2] http://baydeltaoffice.water.ca.gov/modeling/hydrology/C2VSim/index_C2VSIM.cfm
[3] http://baydeltaoffice.water.ca.gov/modeling/hydrology/IWFM/SupportTools/index_SupportTools.cfm
[4] http://c2vsim.water.ca.gov