

2024年度 (R06年度)

地下水盆管理学

福島大学 共生システム理工学類
地球環境コース
柴崎 直明

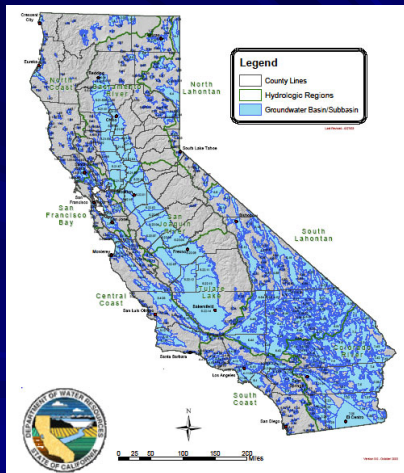
1

15. 地下水盆の評価と管理

カリフォルニア州



カリフォルニア州の地下水盆



Department of Water Resources, State of California

加州の地下水盆管理法律系統

CALIFORNIA WATER CODE

The Groundwater Management Act (AB 3030)

Local Groundwater Management Assistance Act

Amendments to Local Groundwater Management Water Code

Other legislation related to water supply planning

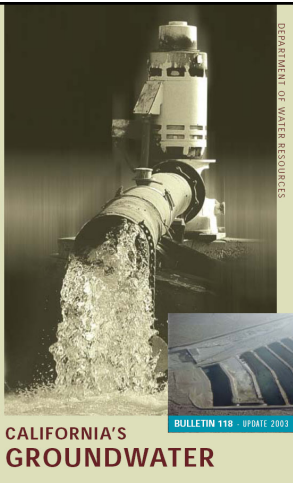
City and County Ordinances

加州 Groundwater Bulletin 118 (Update 2003)

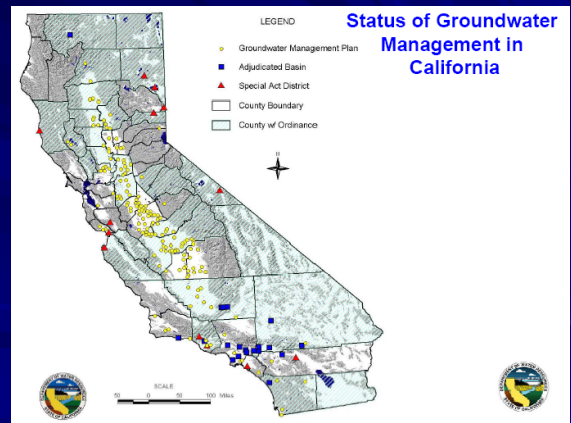
原版: 1953年

更新: 1975年
1980年

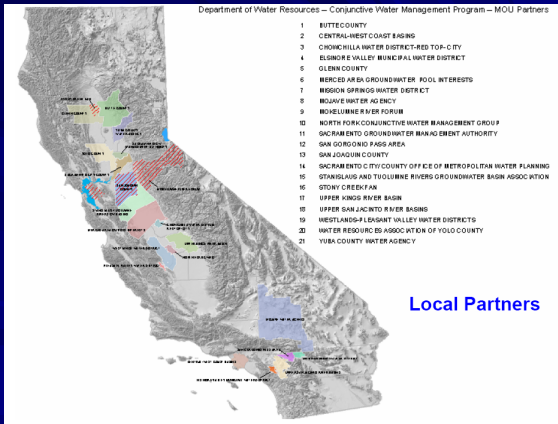
最新版: 2003年



加州の地下水管理状況



地下水管理のローカルパートナー



AB 3030 Procedures

1. 地下水管理計画採用公聴会実施(地方機関)
2. 地下水管理計画案作成
3. 地下水管理計画案公聴会(2回)
4. 反対意見考慮
5. 計画実施方法制定
6. 計画実施
7. 地下水盆地内関係機関協調会議(年1回)

AB3030 Technical Components (1)

1. 塩水浸入制御
2. 水源保護地域・涵養地域抽出・管理
3. 汚染地下水移動制御
4. 井戸利用停止・井戸撤去実施方法策定
5. 過剰揚水対策立案
6. 地下水位・地下水貯留量観測
7. 井戸複合利用方法確立

AB3030 Technical Components (2)

8. 地下水人工涵養
9. 井戸建設政策策定
10. 地方機関による汚染地下水浄化、涵養促進、貯留増加、水再利用、取水事業の運営・管理
11. 地方機関と州政府・連邦政府の技術連携

管理実施地下水位(Sacramento)

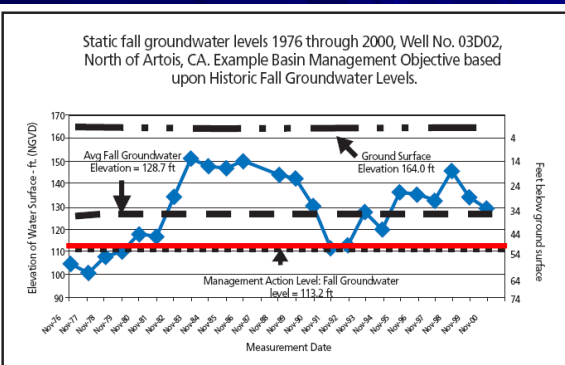
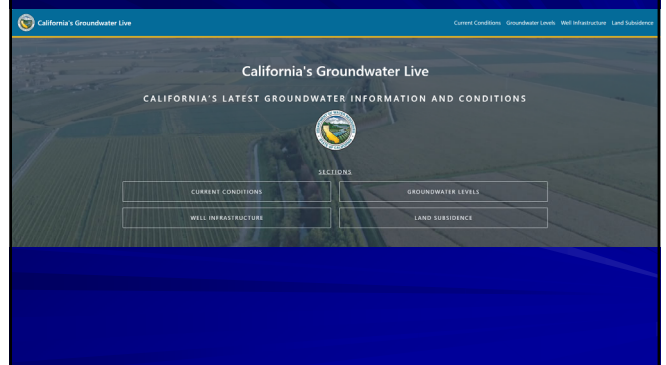


Figure 2. Example Basin Management Objective (BMO) for a specific well within a sub-area of Glenn County.

California's Groundwater Live



Current Groundwater Conditions

Current Groundwater Conditions

Groundwater is a vital resource in California. It sustains our ecosystems, supports our agriculture, fuels our economy, quenches our thirst, and reduces the impacts of drought and our changing climate. Groundwater accounts for 40 percent of the State's total annual water supply in normal years and almost 60 percent in drought years. This is why the California Department of Water Resources (DWR) is committed to protecting this precious resource and has developed California's Groundwater Live in conjunction with the public release of [California's Groundwater Update 2020](#). We welcome you to explore our newest groundwater tool which features the latest groundwater information, live statistics and a series of interactive dashboards that can be accessed by clicking the icons below.

Monitoring Wells Below Normal Level	Monitoring Wells at Normal Level	Monitoring Wells Above Normal Level
36%	32%	32%

These numbers are calculated from combining All-Time High, Above Normal, Normal, Below Normal and All-Time Low categories in the Current Groundwater Level Conditions dashboard below. [Learn more about the calculations](#)

California's Groundwater Informational Resources

California's Groundwater Informational Resources

Report Highlights **Full Report** **All Report Files**

California's Groundwater (Bulletin 118) Update 2020

California's Groundwater (CalGW) Update 2020 is the State's most up-to-date compendium of statewide data and information on groundwater resources and its management. CalGW consists of a summary Highlights (English, Spanish), a detailed Statewide Report, and a series of Appendices. Printed copies of the Highlights and Statewide report documents are available by e-mail request to CalGW@water.ca.gov.

Updated daily **Updated twice a year**

California's Groundwater Live
A user-friendly interactive website that allows users to explore, analyze, and visualize the latest groundwater data and information for California.

Semi-Annual Conditions Updates
Semi-annual Conditions Updates are more frequent supplements to the comprehensive 5-year CalGW Updates, and also provide additional perspective on the near-real-time data availability through CalGW Live.

California's Groundwater Live: Groundwater Levels

Monitoring Wells Total: **8.4k**

Monitoring Wells Based on Selection: **8.4k**

NORTHERN SACRAMENTO VALLEY CHANGE IN GROUNDWATER ELEVATION MAP FALL 2013 TO FALL 2014 DEEP AQUIFER ZONE (Well depths deeper than 600 ft bgs)

Monitoring Well

County Boundaries

Redding GW Basin

Sacramento Valley GW Basin

Groundwater Elevation Change

- > 40 feet higher
- > 35 to 40 feet higher
- > 30 to 35 feet higher
- > 25 to 30 feet higher
- > 20 to 25 feet higher
- > 15 to 20 feet higher
- > 10 to 15 feet higher
- > 5 to 10 feet higher
- 0 to 5 feet higher
- > 0 to 5 feet lower
- > 5 to 10 feet lower
- > 10 to 15 feet lower
- > 15 to 20 feet lower
- > 20 to 25 feet lower
- > 25 to 30 feet lower
- > 30 to 35 feet lower
- > 35 to 40 feet lower

Tehama County - Sacramento Valley GW Basin

Maximum Increase GWE (ft)	6.0
Maximum Decrease GWE (ft)	-15.1
Average Change GWE (ft)	-4.7
Average Well Depth (ft)	880
Number of Wells Monitored	15

Glenn County - Sacramento Valley GW Basin

Maximum Increase GWE (ft)	16.7
Maximum Decrease GWE (ft)	-26.9
Average Change GWE (ft)	-3.7
Average Well Depth (ft)	1020
Number of Wells Monitored	23

キューバでの地下水管理の事例

Canada

United States

キューバ

GW Modeling Seminar in CUBA

Proyecto de Desarrollo y Manejo del Agua Subterránea

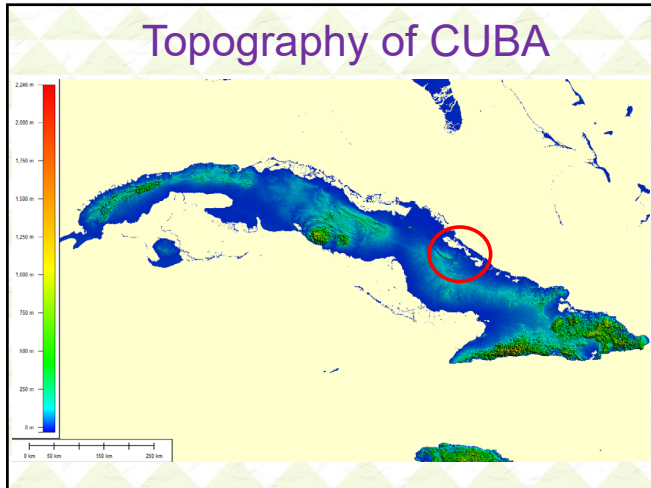
SEPR

SEMARIO

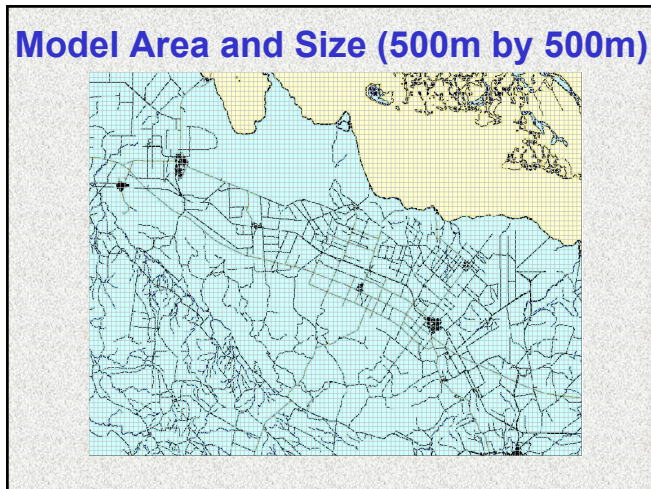
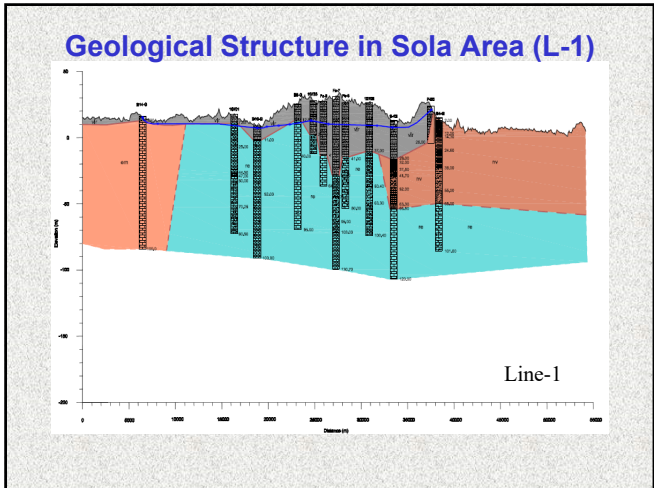
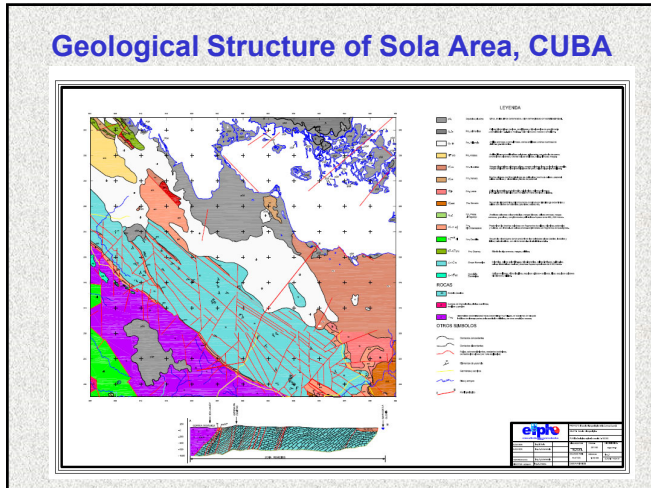
MODELO DE AGUA SUBTERRÁNEA

CITA - Junio 2009

JICA

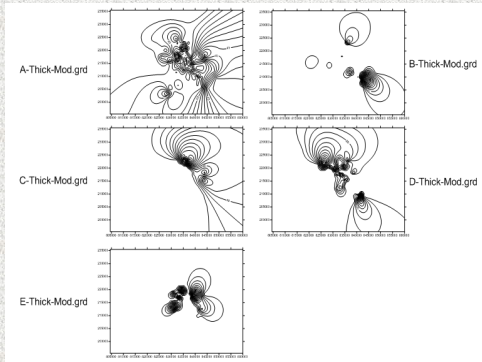


- ### Main Goals of GWM Seminar
- Create Sola Groundwater Model**
 - Input Actual Hydrogeologic Data
 - Assign Salt Concentrations of GW from Resistivity Data
 - Simulate Flow and Solute Transport**
 - Use MODFLOW and SEAWAT Codes
 - Model Calibration by Historical Match
 - Prepare Future Prediction**
 - Instruct Future Scenarios & Cases

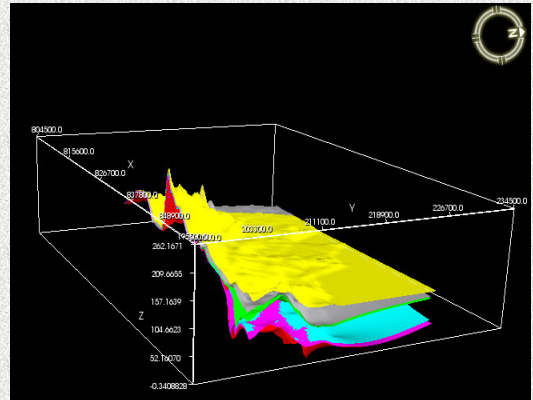


- ### Model Extent
- Analysis area**
 - X: 804,500 – 860,000
 - Y: 195,500 – 235,500
 - Mesh size (Grid size)**
 - X: 500m (1 – 111 Column)
 - Y: 500m (1 – 80 Row)
 - Vertical extent (25 layers)**
 - Model Top: +200 m
 - Model Bottom: -300 m

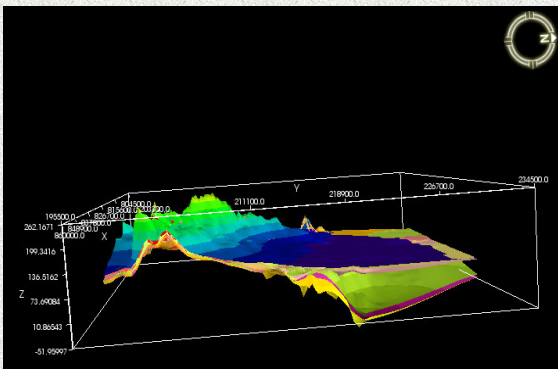
Thickness of A to E Layers



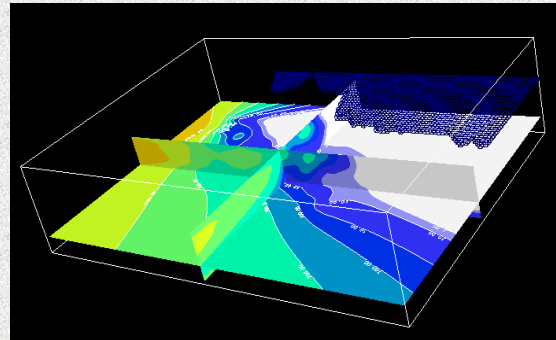
Input Aquifer Structure



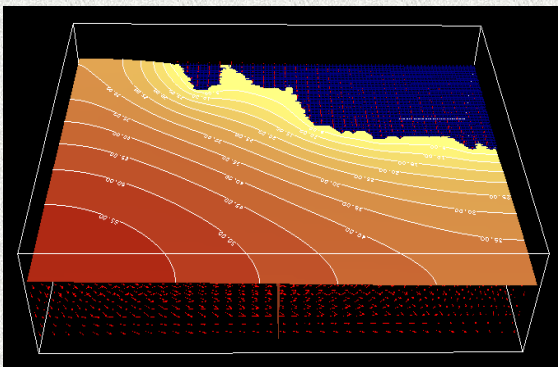
Bottom Elev. of A to E Layers



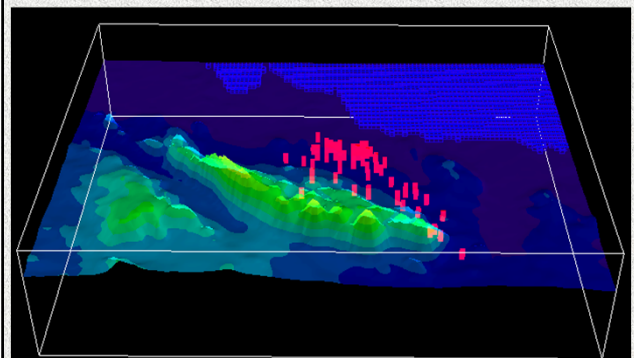
Process 3D Resistivity Data



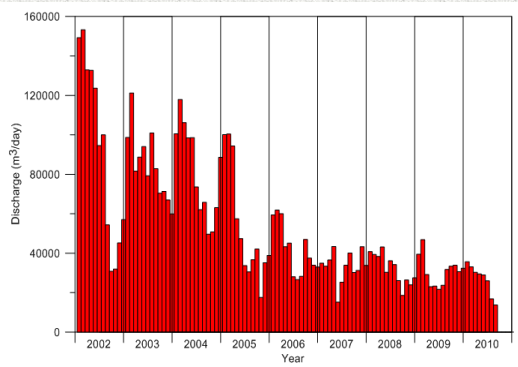
Steady-State Simulation



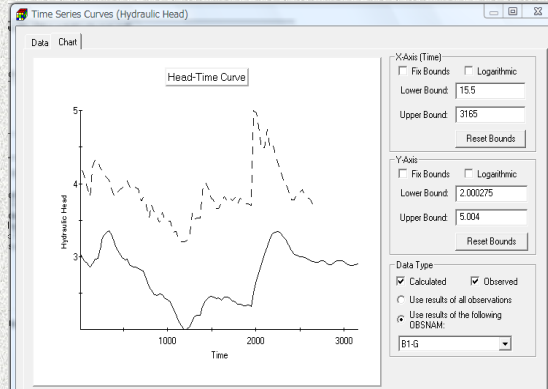
Prepare Well Discharge Data



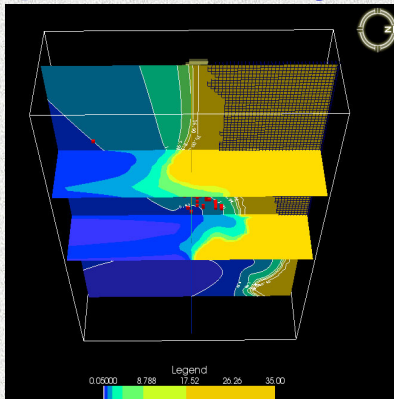
Well Discharge from 2002 to 2010



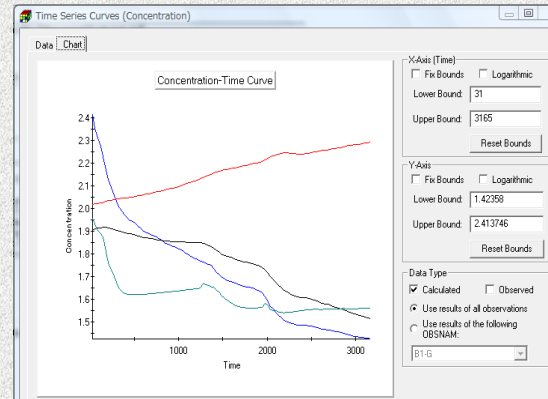
Actual Head and Simulated Head



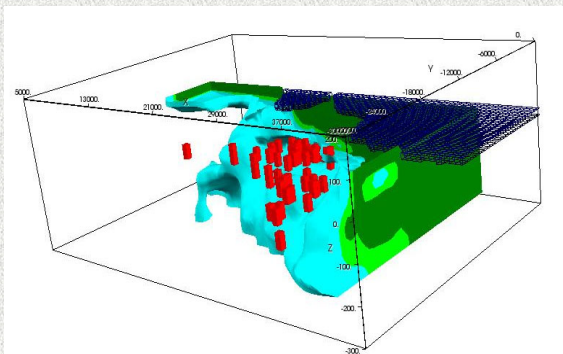
Prepare GW Salinity Data



Simulate Salt Concentrations



Simulated Salt Concentration Isosurface



地下水資源の管理のために

- ✦ 地下水盆構造の把握
- ✦ 水文地質特性の評価
- ✦ 地下水位分布と変動の把握(モニタリング)
- ✦ 水質分布・変動の把握
- ✦ 地下水盆ごとの揚水量把握
- ✦ 水収支の解明
- ✦ 地下水障害の監視

参考文献

JICA, 国際航業株式会社
「Proyecto para el Fortalecimiento de las
Capacidades del Manejo del Agua
Subterránea y el Control de la Intrusión
Salina en la República de Cuba」
独立行政法人国際協力機構 (JICA), 2009年

DWR
「California's Groundwater (Bulletin 118)
Update 2020」
カリフォルニア州政府、2024年