

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

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## 15. 地下水盆の評価と管理



## 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

The cover of 'California's Groundwater Bulletin 118 (Update 2003)'. It features a photograph of water being pumped from a well. The text on the cover includes 'DEPARTMENT OF WATER RESOURCES', 'CALIFORNIA'S GROUNDWATER', and 'BULLETIN 118 - UPDATE 2003'.

## 加州 Groundwater Bulletin 118 (Update 2003)

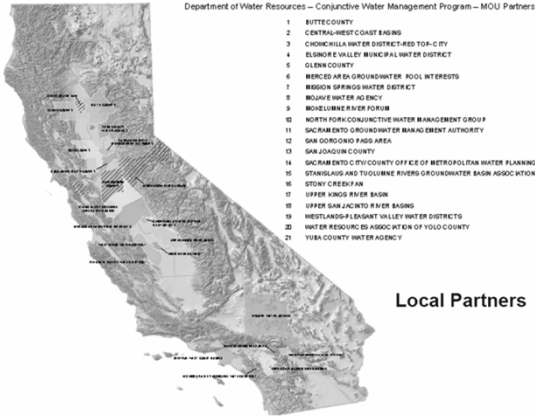
原版: 1953年

更新: 1975年  
1980年

最新版: 2003年



# 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)

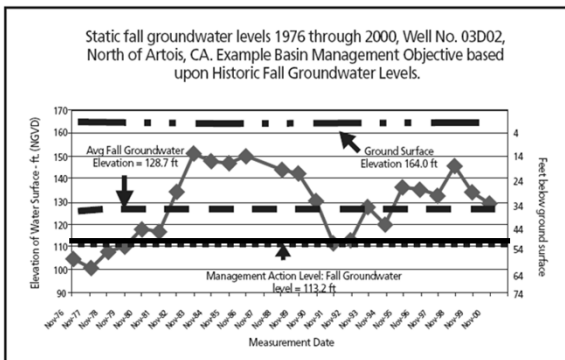
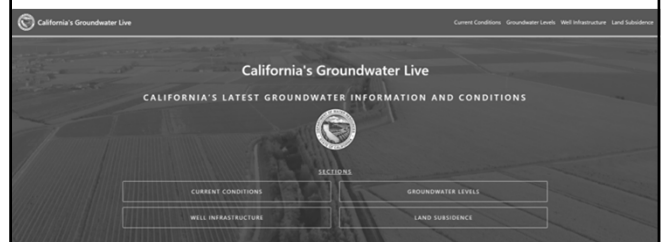


Figure 2. Example Basin Management Objective (BMO) for a specific well within a sub-area of Glenn County.

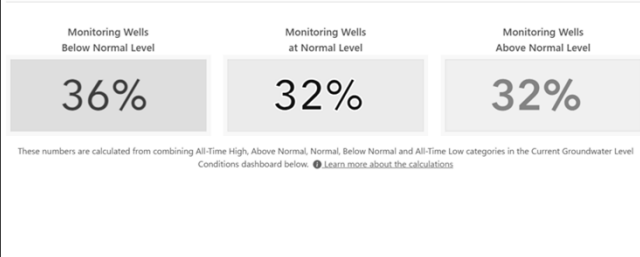
# California's Groundwater Live



# 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.



# California's Groundwater Informational Resources

## California's Groundwater Informational Resources



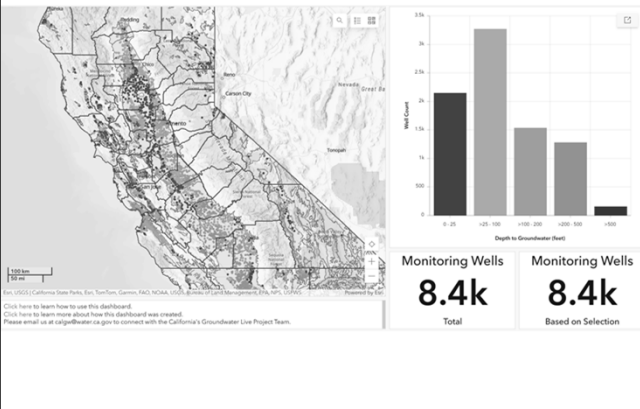
California's Groundwater (Bulletin 118) Update 2020  
California's Groundwater (CaGW) Update 2020 is the State's most up-to-date compendium of statewide data and information on groundwater resources and its management. CaGW consists of a summary Highlights (English, Spanish), a detailed Statewide Report, and a series of Appendices. Printed copies of the Highlights and Statewide report documents are available by e-mail request to [CaGW@water.ca.gov](mailto:CaGW@water.ca.gov).



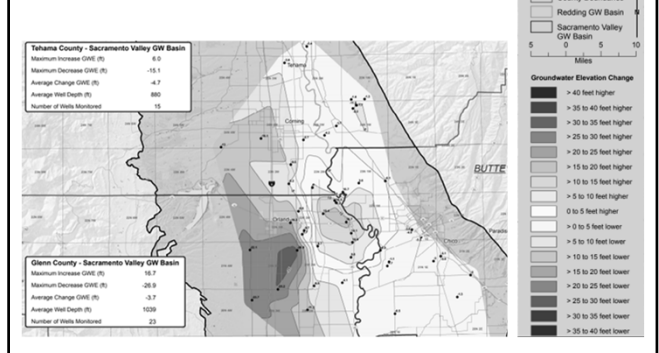
**California's Groundwater Live**  
A user-friendly interactive website that allows users to explore, analyze, and visualize the latest groundwater data and information for California.

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

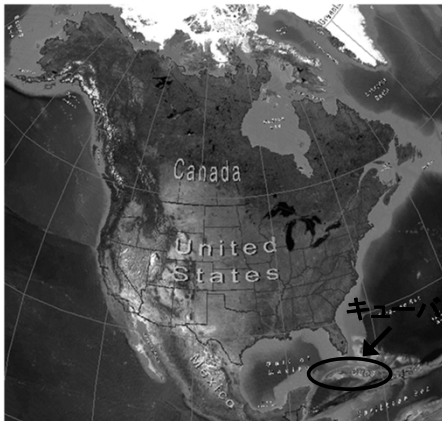
# California's Groundwater Live: Groundwater Levels



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



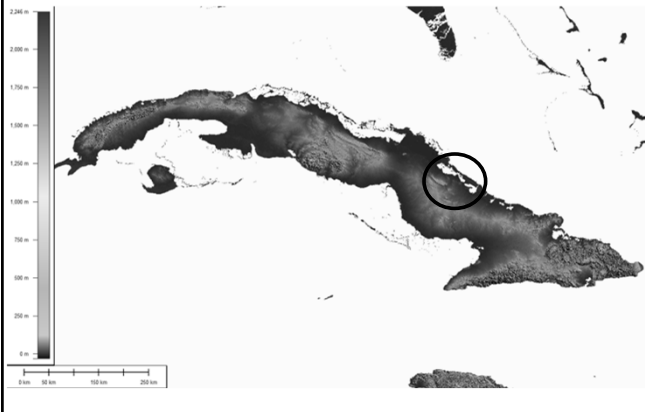
# キューバでの地下水管理の事例



# GW Modeling Seminar in CUBA



## Topography of CUBA



## Main Goals of GWM Seminar

### Create Sola Groundwater Model

- Input Actual Hydrogeologic Data
- Assign Salt Concentrations of GW from Resistivity Data

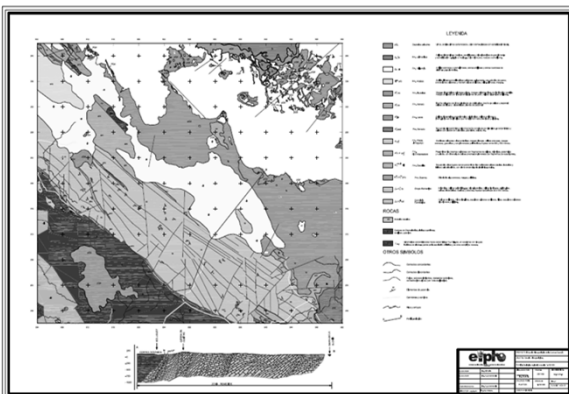
### Simulate Flow and Solute Transport

- Use MODFLOW and SEAWAT Codes
- Model Calibration by Historical Match

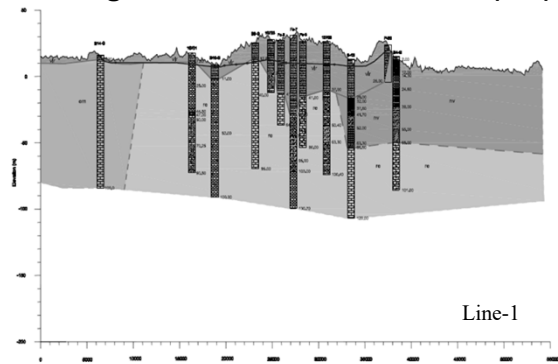
### Prepare Future Prediction

- Instruct Future Scenarios & Cases

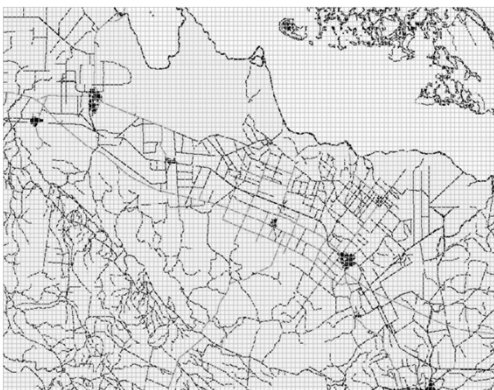
## Geological Structure of Sola Area, CUBA



## Geological Structure in Sola Area (L-1)



## Model Area and Size (500m by 500m)



## Model Extent

### Analysis area

- X: 804,500 – 860,000
- Y: 195,500 – 235,500

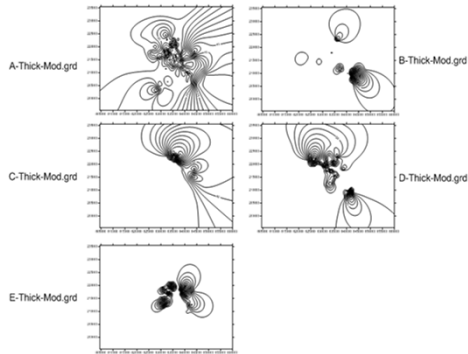
### Mesh size (Grid size)

- X: 500m (1 – 111 Column)
- Y: 500m (1 – 80 Row)

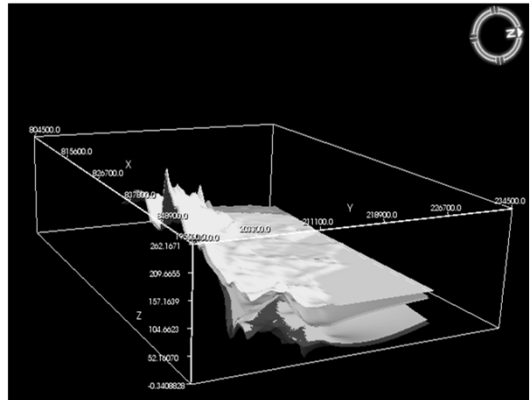
### Vertical extent (25 layers)

- Model Top: +200 m
- Model Bottom: -300 m

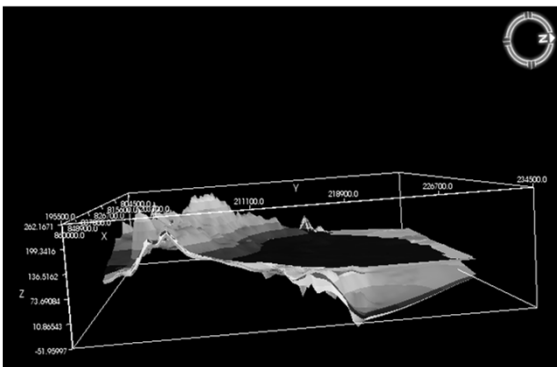
### Thickness of A to E Layers



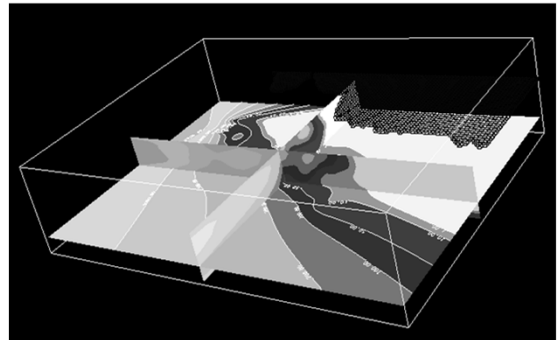
### Input Aquifer Structure



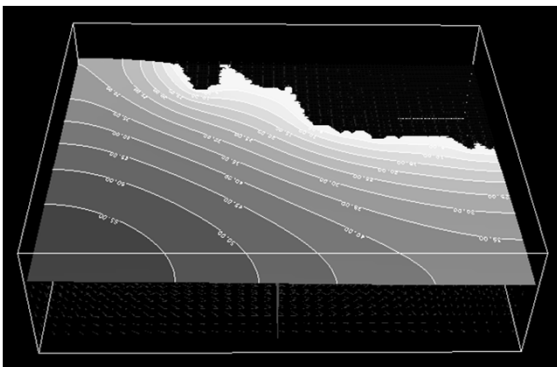
### Bottom Elev. of A to E Layers



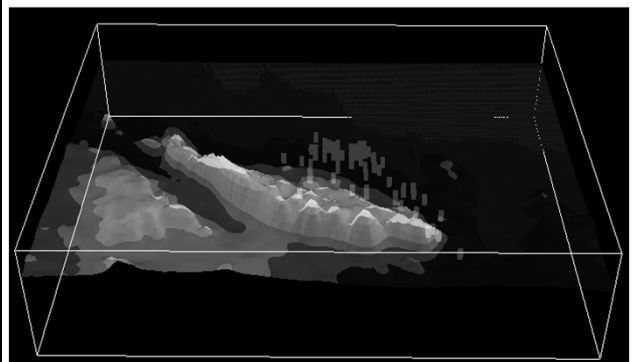
### Process 3D Resistivity Data



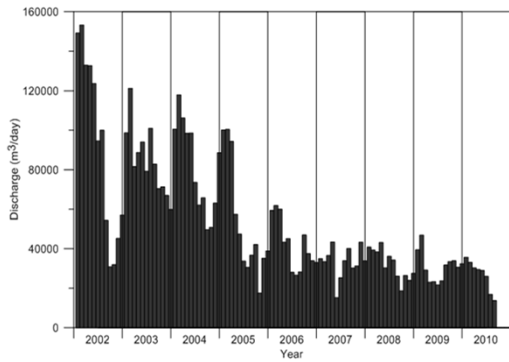
### Steady-State Simulation



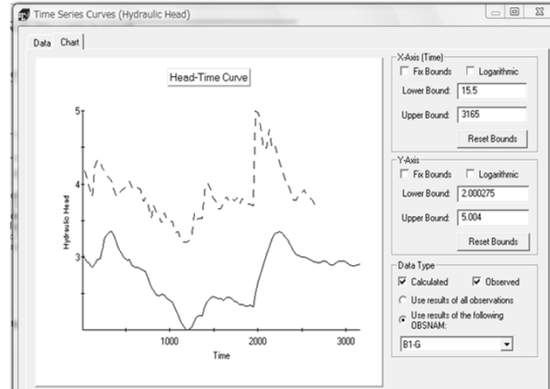
### Prepare Well Discharge Data



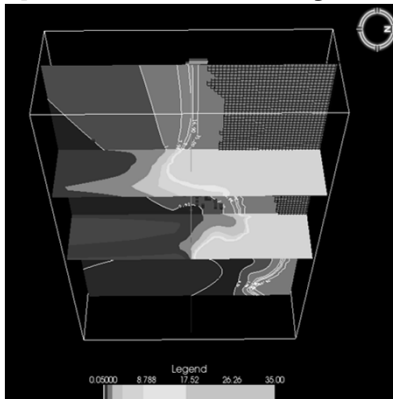
## Well Discharge from 2002 to 2010



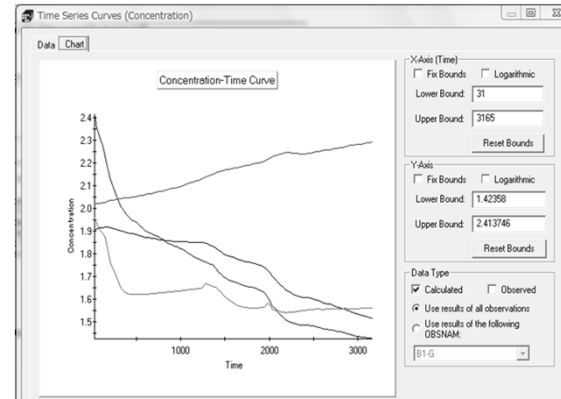
## Actual Head and Simulated Head



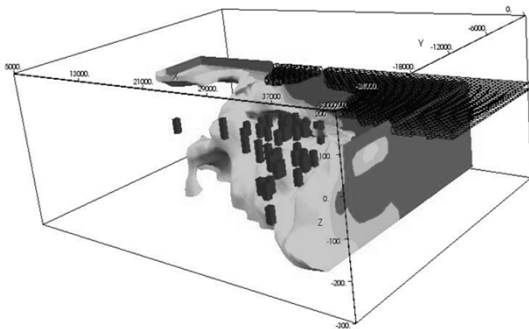
## Prepare GW Salinity Data



## 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

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Capacidades del Manejo del Agua  
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独立行政法人国際協力機構(JICA), 2009年

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カリフォルニア州政府、2024年