

# California Watersheds

## *Our Approach to a National Standard*

Lorri Peltz-Lewis, USBR for NRCS CalWater  
Status Report to DWR CALSIM III

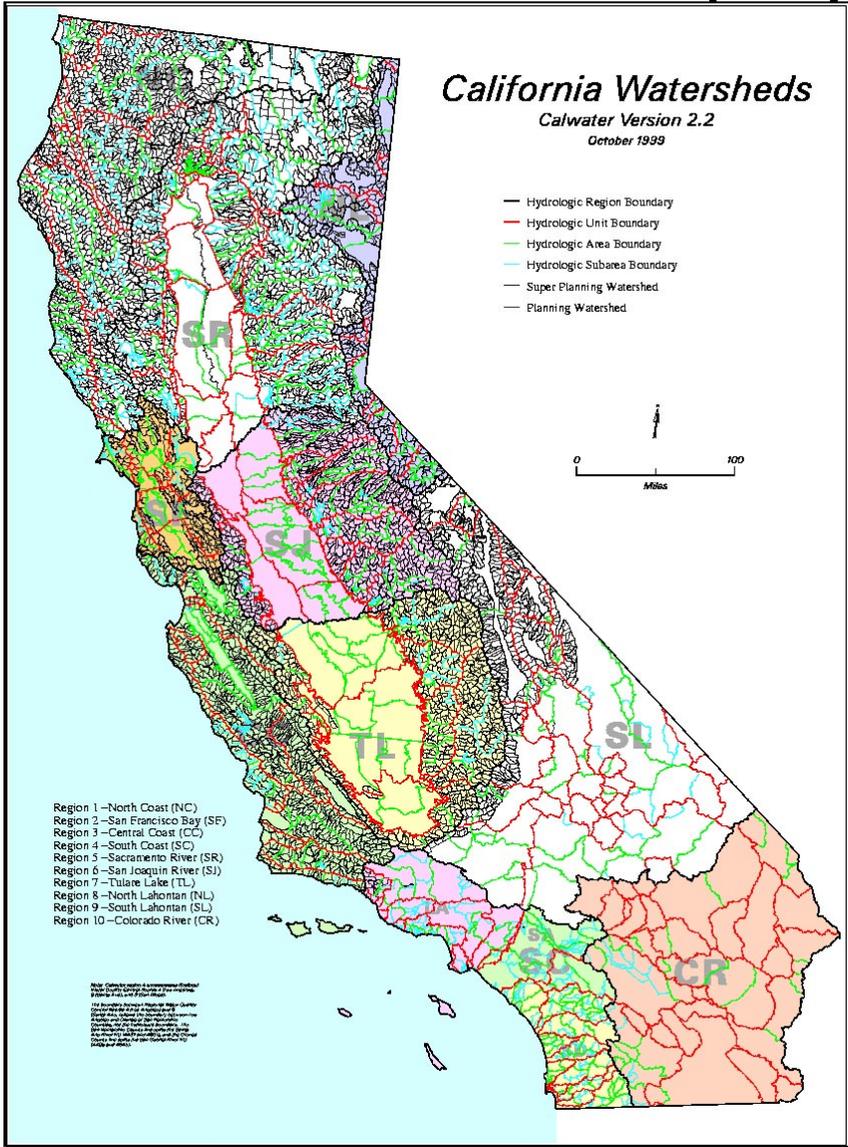
Hydrology Development Group Presentation

October 08, 2004  
Resources Building, Sacramento, CA

# California Watershed Map History

- 1970's USGS and Water Resources Council
  - State by State Map Publication (CA 1978)
- 1980's USGS Formal Publications
  - Standard Watershed Boundaries, Codes, Names
  - California State-Federal MOU's (1976, 1988)
- 1990's Digital Watershed Boundaries
  - National Dataset – 1:250,000-scale (USGS 1994)
  - California Dataset – 1:24,000-scale (CDF DWR DFG SWRCB 1995-99)
  - California Watershed Map (CalWater 2.0) MOU (DWR 1998)
- 2000's National Standards for Watershed Boundaries, Codes, Names
  - Need to incorporate Federal efforts...

# CalWater 2.2(.1)

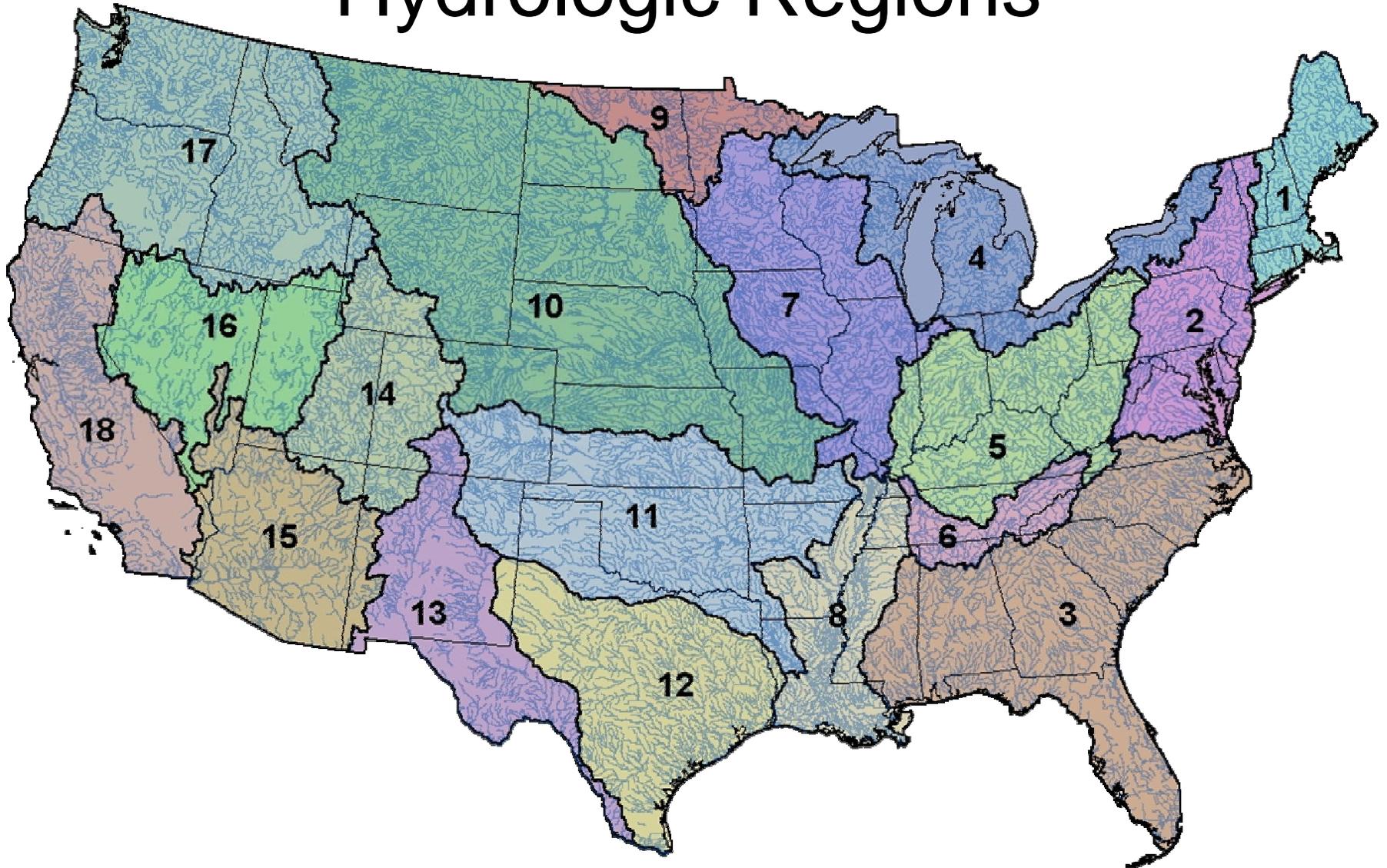


# National Watershed Map History

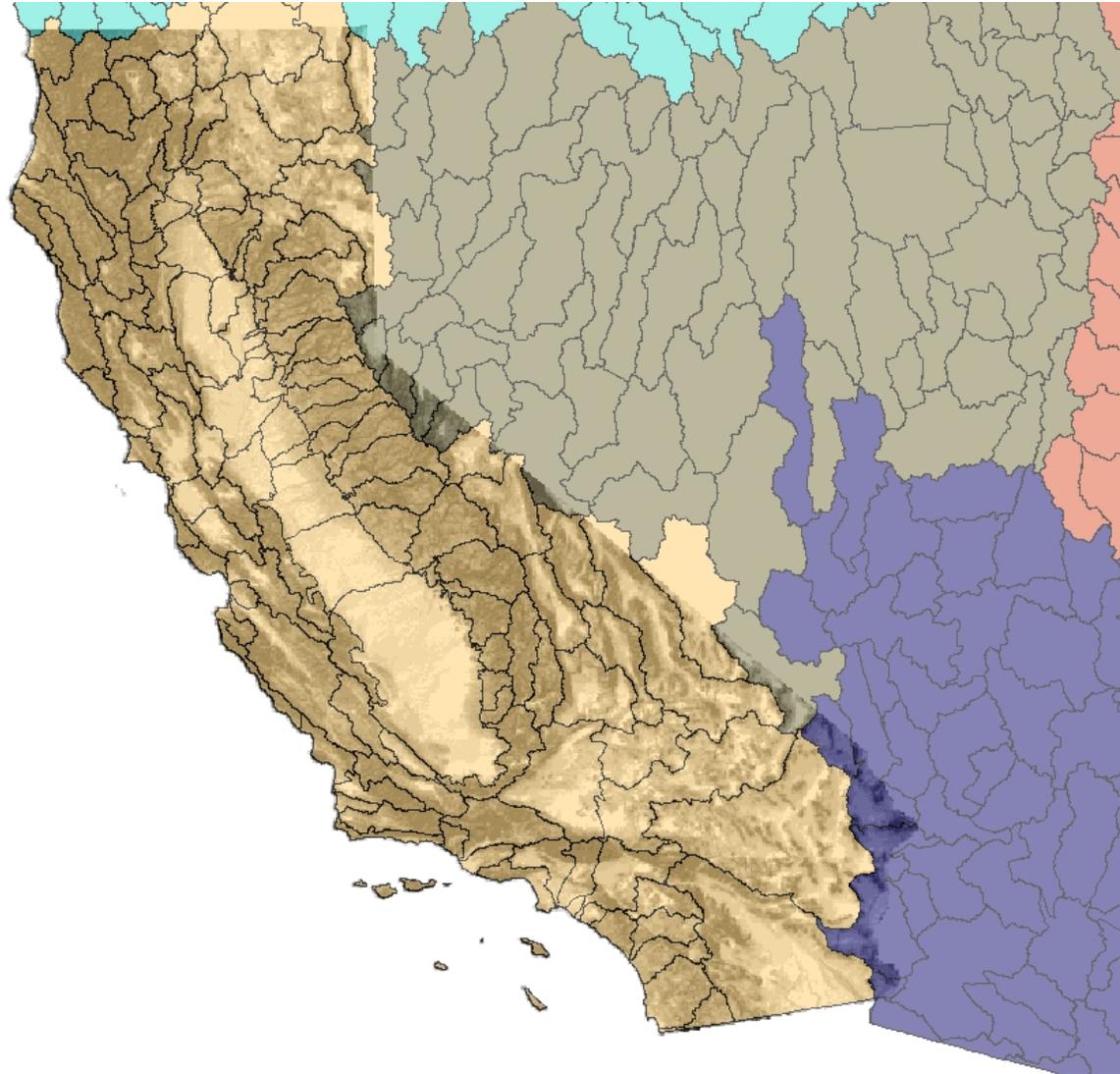
- 1974 – USGS and Water Resources Council maps 2-, 4-, 6-, and 8-digit Hydrologic Unit Code (HUC). State-by-State Release of maps.
- 1970's - 1980's NRCS (formerly SCS) maps Watersheds and Sub-Watersheds – standards lacking.
- 1992 – NRCS national Instruction (NI 170-304) released.
  - Comprehensive instructions and standards.
- 1996 – USGS, USFS, USBLM provide reviews
  - Two national delineation criteria exist.
- 2000 – Federal Standards for Delineation of Hydrologic Unit Boundaries
  - Out to review – FGDC Spatial Water Data Subcommittee
  - Need to incorporate State efforts...

Goal – National, consistent, seamless, and hierarchical watershed boundary based on hydrologic features

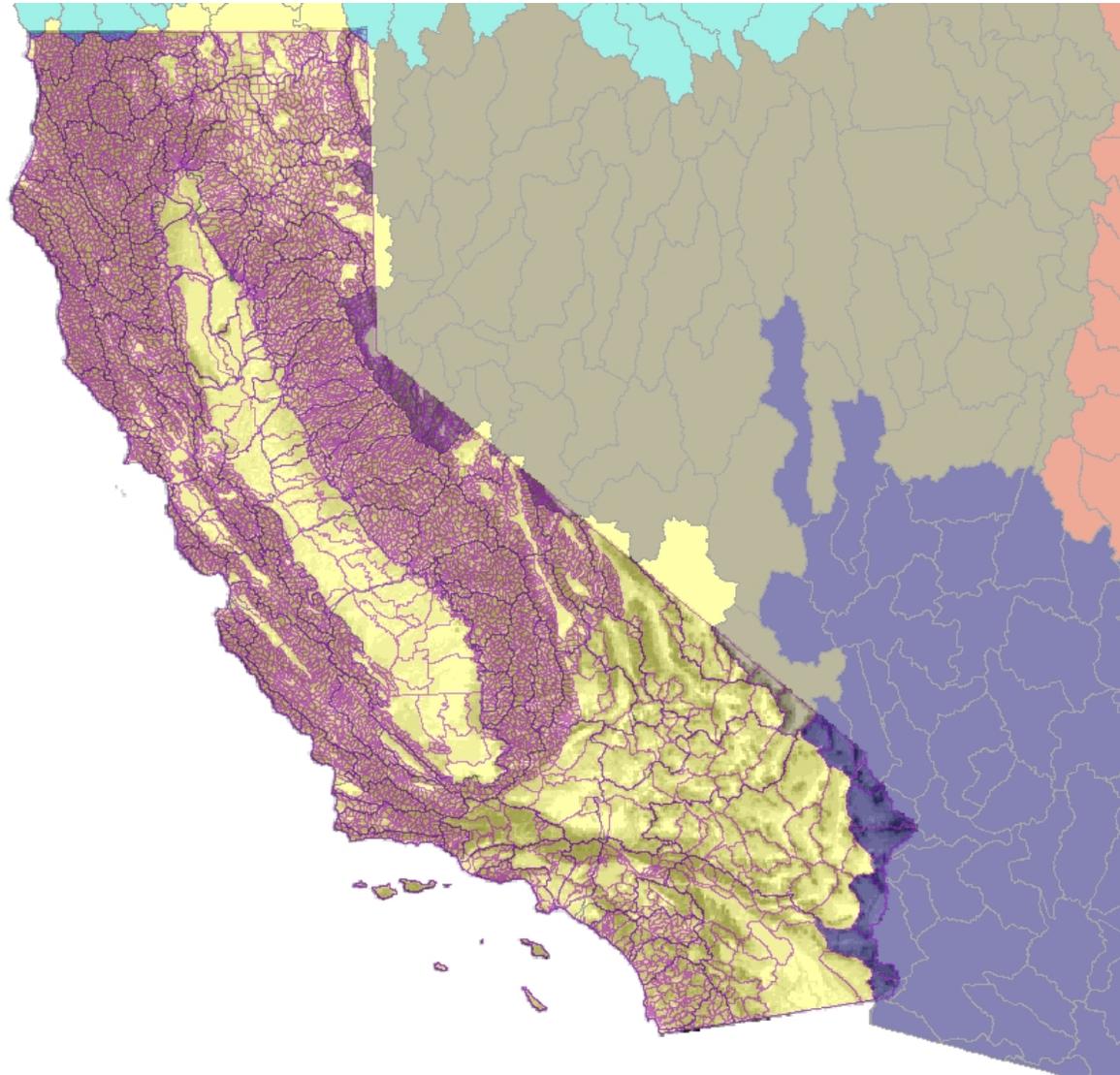
# Watershed Boundary Dataset Hydrologic Regions



# Watershed Boundary Dataset USGS HUC 1:250,000



# Watershed Boundary Dataset USGS HUC & CALWATER 2.2



# Watershed Standards

- **GOALS**

Coordination of water information

Seamless high-resolution topographically correct database

Provide accurate watershed maps to all users

Deliverable product = Nationally Certified WBD

- **Federal Watershed Boundary Dataset (WBD)**

Workshops for development of concept lines

- Local expertise
- Integration of existing datasets
- Minimize agency/application bias
- Reduce duplication of effort
- Independent quality assurance/quality control (QA/QC)

# Watershed Boundary Dataset (WBD)

A **single, seamless, hierarchical** hydrologic unit dataset based on scientific, hydrologic mapping principles.

- Consistent base scale of **1:24,000**
- Cohesive **GIS** dataset with multi-functional attributes
- Served and maintained by a single entity
- Vertically and horizontally **integrated** with other key national datasets
- **Common reporting unit** for different levels of management needs

# WBD New Names and Numbers

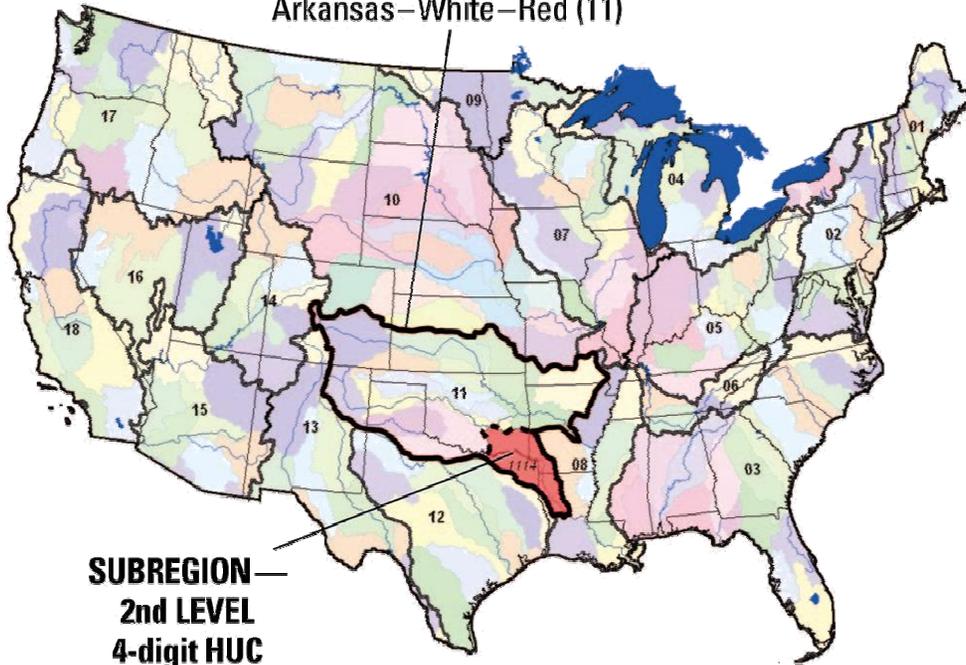
- Level 1 - Region – 2-digit HUC
- Level 2 - Subregion – 4-digit HUC
- Level 3 - Basin – 6-digit HUC (was "accounting unit")
- Level 4 - Subbasin – 8-digit HUC (was "cataloging unit")
- Level 5 - Watershed – 10-digit HUC (was 11-digit in NRCS)
- Level 6 - Subwatershed – 12-digit HUC (was 14-digit in NRCS)

\*\*For local planning and mapping purposes, California plans to extend the watershed hierarchy down two more levels, to include Levels 7 and 8. This will require additional funding and commitment to complete.  
Funding costs and sources = unknown

**REGION — 1st LEVEL**

**2-digit HUC**

Arkansas-White-Red (11)



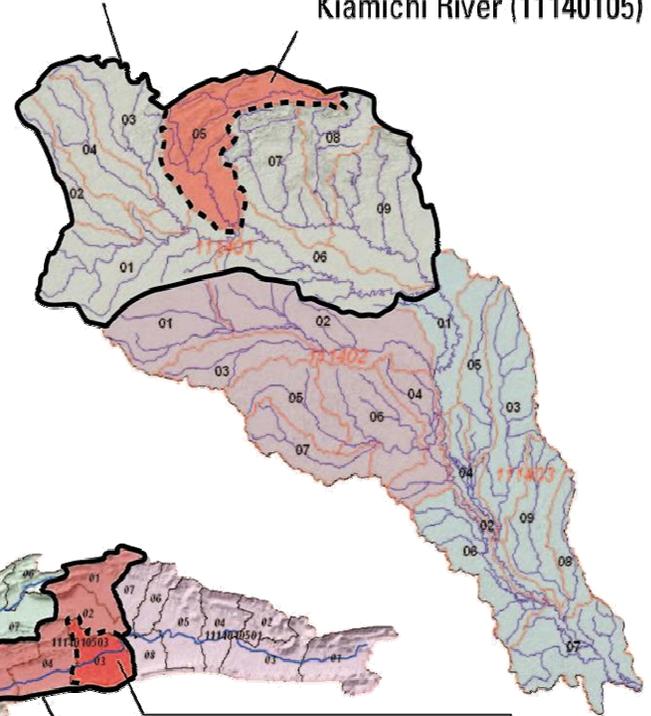
**SUBREGION — 2nd LEVEL**  
**4-digit HUC**

Red-Sulphor (1114)

**BASIN — 3rd LEVEL**

**6-digit HUC**

Little Red (111401)



**SUBBASIN — 4th LEVEL**

**8-digit HUC**

Kiamichi River (11140105)

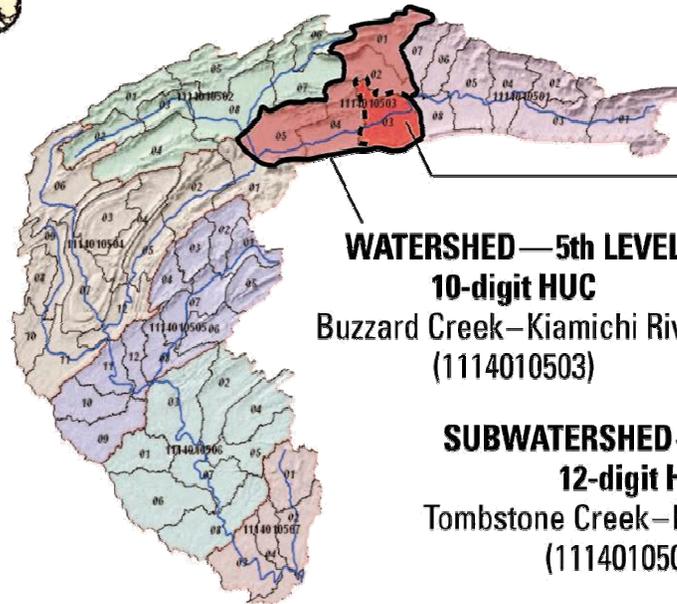
**Hydrologic Unit**

Level	Name	Digits	Average Size, in mi <sup>2</sup>	Units
1	Region	2	177,560	21
2	Sub-region	4	16,800	222
3	Basin	6	10,596	352
4	Sub-basin	8	703	2,149
5	Watershed	10	63–391 (40,000–250,000 acres)	22,000 (estimate)
6	Subwatershed	12	16–63 (10,000–40,000 acres)	160,000 (estimate)

**WATERSHED — 5th LEVEL**

**10-digit HUC**

Buzzard Creek-Kiamichi River  
(1114010503)

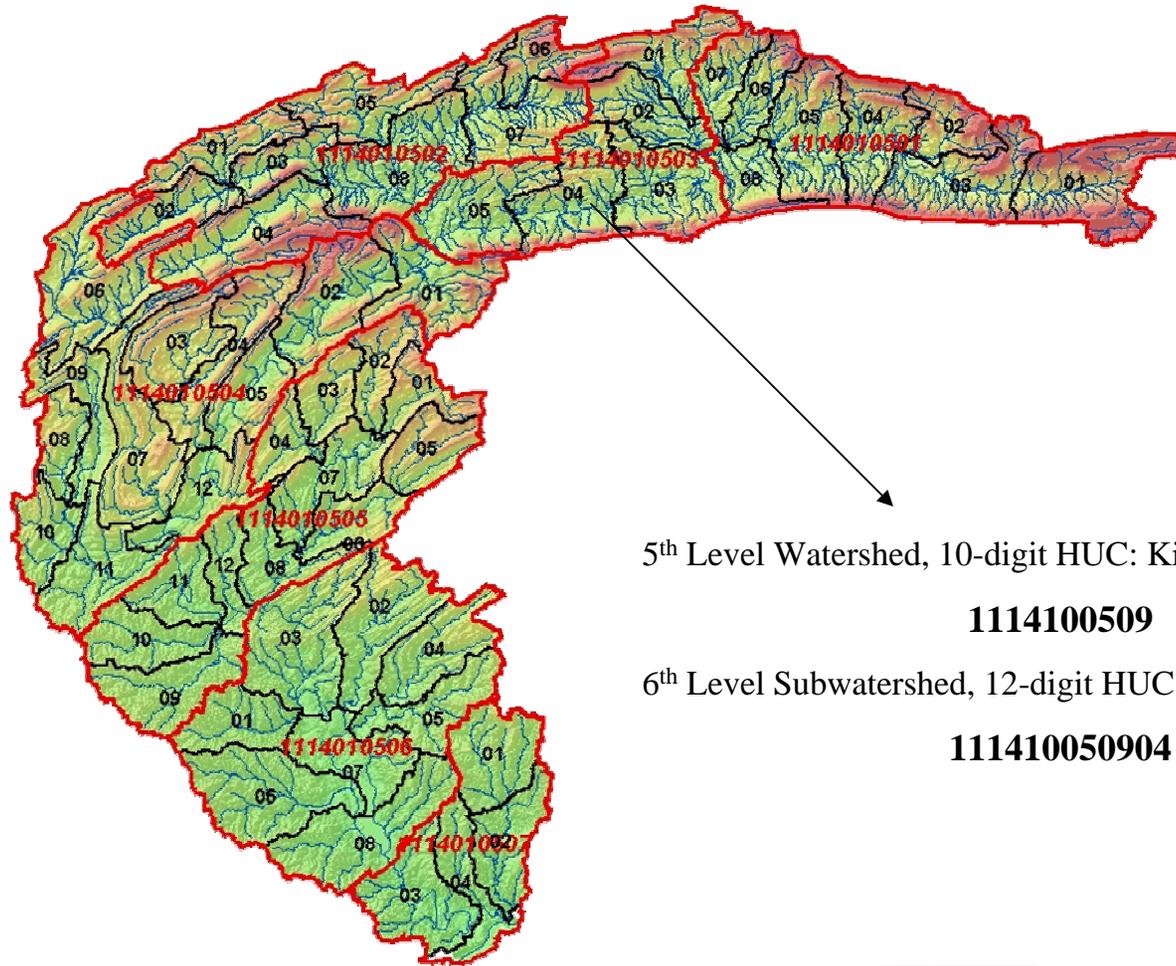


**SUBWATERSHED — 6th LEVEL**

**12-digit HUC**

Tombstone Creek-Kiamichi River  
(111401050303)

# 5<sup>th</sup> and 6<sup>th</sup> Level, *Watershed* and *Subwatershed* Hydrologic Units



5<sup>th</sup> Level Watershed, 10-digit HUC: Kiamichi River Basin

**1114100509**

6<sup>th</sup> Level Subwatershed, 12-digit HUC: Unnamed

**111410050904**

# Hydrologic Unit Levels

Hydrologic Unit Level	Name	Digits	Size	Units
1	Region	2	Average: 177,560 sq. miles	21
2	Sub-region	4	Average: 16,800 sq. miles	222
3	Basin	6	Average: 10,596 sq. miles	352
4	Sub-basin	8	Average: 703 sq. miles	2,149
<b>5</b>	<i>Watershed</i>	<b>10</b>	63-391 sq. miles (40,000-250,000 acres)	22,000 (estimate)
<b>6</b>	<i>Subwatershed</i>	<b>12</b>	16-63 square miles (10,000-40,000 acres)	160,000 (estimate)

# California Agencies Involved

- Federal Geographic Data Committee
  - USGS - NRCS Watershed Leads
  - USFS, BLM, Reclamation, BIA, and other
- California – Interagency Watershed Mapping Committee (CalWater)
  - 4 State Agencies
  - 6 Federal Agencies

# Requirements for Standard Watershed Boundaries

- Watershed Management Council (U.S.)
- California Watershed Council (State)
- Regional GIS Councils (State)
- California Bay-Delta Authority (CALFED)
- California Watershed Network
- Local Watershed Groups

# Parallel Efforts for National Standards

National Hydrologic Database (NHD)

National Elevation Database (NED)

Elevation Derived National Applications (EDNA)

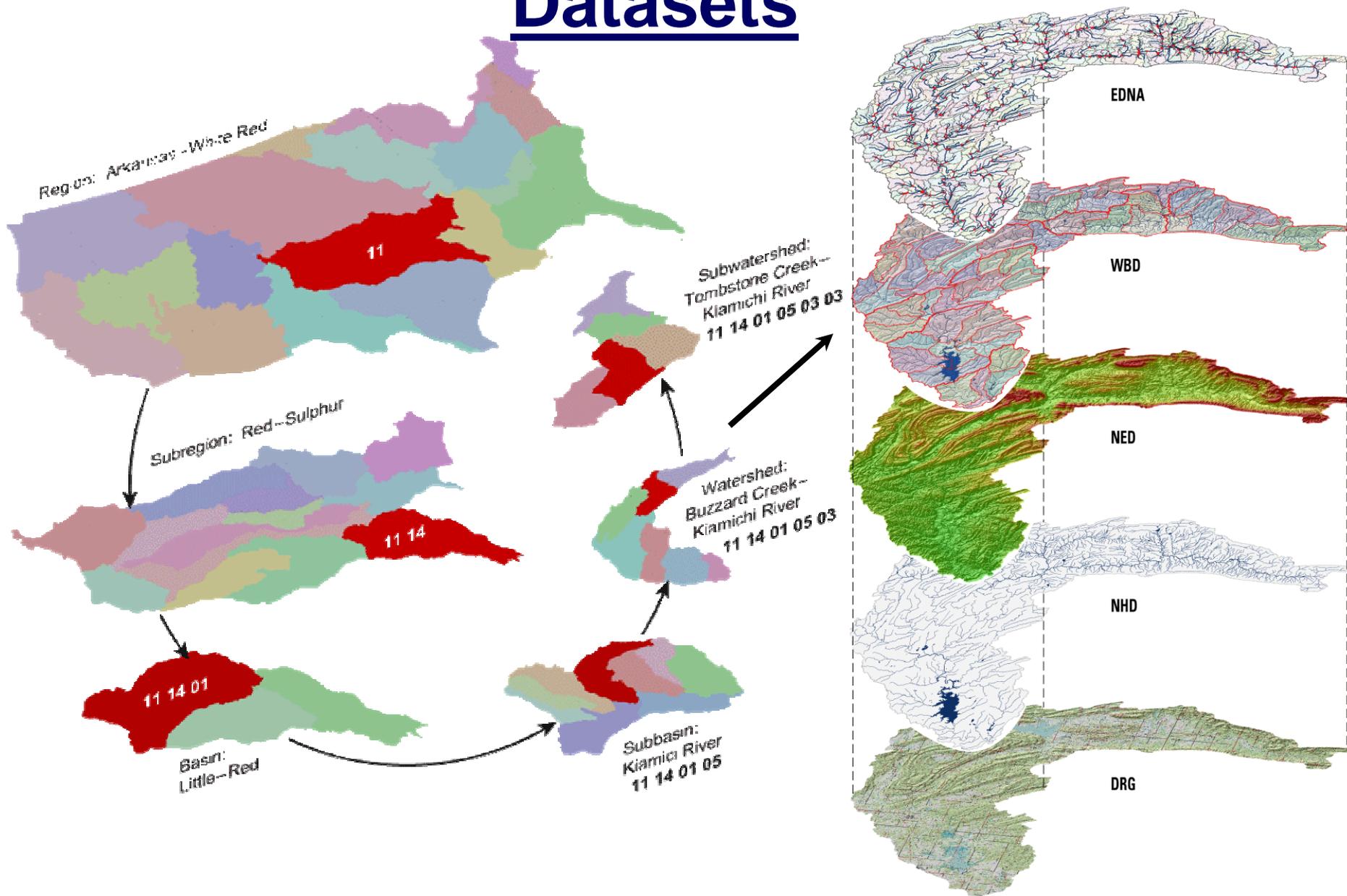
National Wetlands Inventory (NWI)

National Census Database

Soil SURvey GeOgraphic (SSURGO)

National Digital Orthophoto Program (NDOP)

# Integration of Key National Datasets



# Selected Watershed Issues

*Geography is our Common Language*

**Local:** Streambed alteration agreements (DFG)

**Regional:** Inter-basin water transfers

**State:** Forest practice regulation; fire hazard assessment; flood forecasting and operations; Prop 13 & 50 grants

**Federal:** Total Maximum Daily Loads (TMDL); Conservation Security Program (CSP)

# Watershed Concept Examples

- **Bottom Up:** Indicator species for watershed assessment
- **Top Down:** Old growth retention – forest practice regulation
- **“Sideways”:** Data dissemination and integration

# Watershed Applications

Function → Agency	Water Quality / Water Supply	Safety
<b>Regulatory</b> US EPA SWRCB Local Governments	CWA 303d/305b Pesticides Abandoned Mines	Toxic clean-up Spill prevention
<b>Water &amp; Land Mgt</b> USBR, BLM, USFS CDF, DWR Local Governments	Drainage Management Habitat Assessment Snowpack Water availability	Flood operations
<b>Scientific and Technical Services</b> NRCS, USGS, DFG Local Governments	PL566 NRCS Small Watershed Program	Flood Forecasting

# Current Issues

- Multiple representations of the same drainage boundaries
- Conflicting interpretations of drainage boundaries – **topographic vs administrative**
- Incompatible addressing conventions and naming standards
- Lack of watershed information

# Use of DEMs, LIDAR, etc.

- Resolution issues – 30 m, 10 m, 1 m, less?
- Results fail in predictable locations
- Line pixellation, smoothing required, etc.
- Agreed upon pour-point snap locations
- Accuracy of base datasets – temporal, resolution, model
- Local expertise, QA/QC, Stewardship, etc.

# Watershed Delineation Workshops

- Workshop 1: Portland (May - June 2001)
- Workshop 2: Sacramento (December 2001)
- Workshop 3: Fresno (March 2002)
- Workshop 4: Shasta (June 2002)
- Workshop 5: Reno (November 2002)
- Workshop 6: San Bernardino (March 2003)
- Workshop 7: San Francisco Bay Area (August 2003)

# WBD/CalWater Efforts

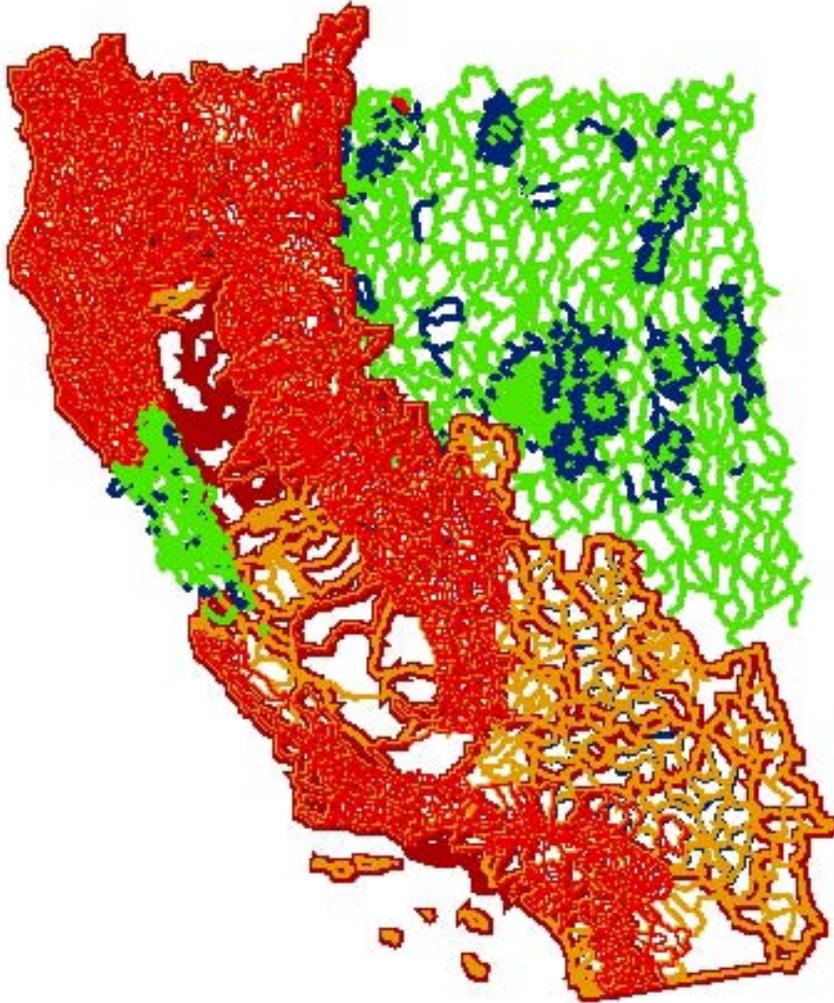


- 82 Participants
- “Hands on” delineation
- Consensus on boundaries

# Watershed Workshops



# Watershed Workshops Status June 2004



82 Participants

51 Federal

9 Local

8 State

7 County

7 Non-Profit

# Watershed Workshop Accomplishments

- Seven workshops held throughout state
- All of California has “first pass” delineation
- Interagency staff networking and in-kind contributions

# National WBD Process Steps

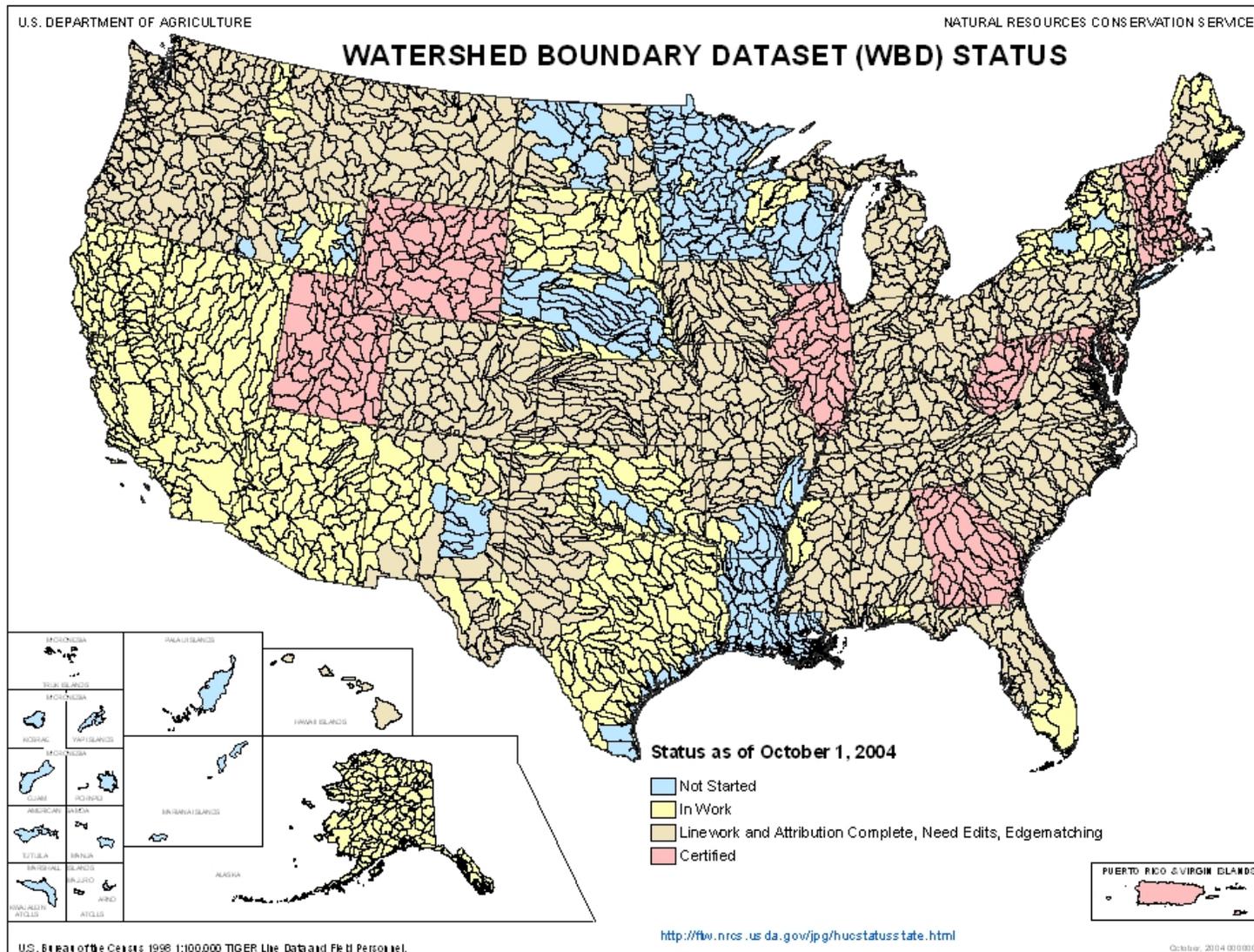
Review Procedure (FGDC Guidelines):

- State reviews and assembles dataset - [HERE](#)
- State Coordinator submit completed dataset (linework and names) to NCGC
- Review Committee checks dataset (pass/fail)
- Problems fed back to state until dataset passes
- State makes final corrections and submits dataset and FGDC metadata
- Dataset accepted and integrated
- Official release as National WBD

# Deliverables

- WBD – Viewable version for review purposes via ArcIMS Image Server (Spring 2004)
- WBD – Level 4 pre-release after FGDC review (Fall 2004?)
- WBD – available on National WBD website, and CaSIL (ETA – Early 2005)
- CalWater 3.0 – WBD linework with both Federal WBD and California State watershed names and numbers. (Late 2005)
- Web based Watershed map, clickable to find your watershed by name and number. (2006)
- Legacy data – CalWater 2.0 and 2.2 will continue to be available. (Currently on CaSIL)

# WBD National Status October 2004



# What Do We Need to Get to Certified WBD for CA?

- Funding for completion of certifiable WBD (\$\$)
- Staff time for Reviewing, QA/QC, (i.e. \$\$)

## FUTURE -

- Stewardship - Updates and Maintenance
- Storage and Distribution

# Watershed Boundary Dataset (WBD)

A Multi-Agency Effort to Create a  
Seamless, Hierarchical and  
Integrated Hydrologic Units for the  
Nation

Michael T. Laitta, USGS, S.E Region

Kenneth J. Legleiter, NRCS-NCGC

Karen M. Hanson, USGS, UT





**Based on an average price across the nation  
for 4<sup>th</sup> level completion \$4,200**

**Includes:**

- **Compilation of base data: *existing datasets, Digital Raster Graphics, Digital Orthophoto Quads***
- **Development of concept lines**
- **Digitizing 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> level linework**
- **Attribution: *coding, modification to natural flow, names, etc.***
- **Review**
- **Metatdata to Federal Geographic Data Committee guidelines**

# National WBD Cost Estimates

**Average cost for 4<sup>th</sup> level completion \$4,200**

## **Includes:**

- **Compilation of base data: *existing datasets, Digital Raster Graphics, Digital Orthophoto Quads***
- **Development of concept lines**
- **Digitizing 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> level linework**
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# Watershed Workshop

## Cost Estimates

- Funding from USGS, BLM, NRCS, & USFS
- **Total spent to date: \$390,000**
- **Estimate to complete contract work: \$250,000**
  
- **Estimate to complete reviews by state representatives: \$100,000**
  
- Stewardship costs: Unknown - researching
- Migration costs to Level 7 & 8: Unknown - researching

# Watershed Workshop Timeline

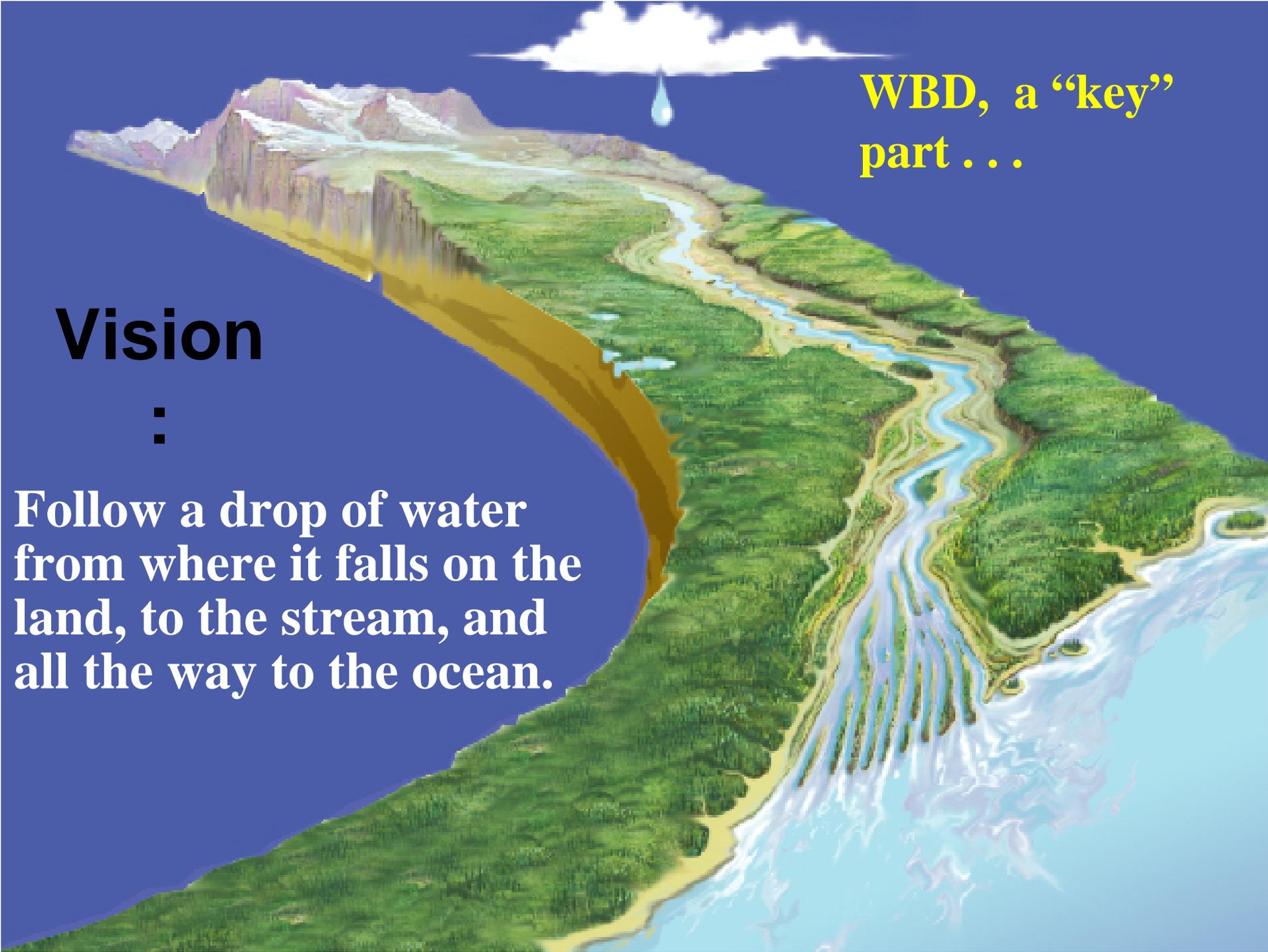
- Funding available by November/December 2004
- Datasets out to contractor by January 2005
- Contractor completion expected by January 2006
- Review by State representatives – 6 months
- WBD Certification possible by January 2007

# California Watershed Effort

- Administrative and technical issues
- Coordination efforts in California
- National Watershed Boundary Dataset (WBD)

# Manager Input

- Policy Direction
- Funding Opportunities
- Cross-jurisdictional
- In-Kind Networking



WBD, a “key”  
part . . .

## Vision

:

Follow a drop of water  
from where it falls on the  
land, to the stream, and  
all the way to the ocean.