Using GIS to Create Efficiencies in Water Policy:
California Basin Plan Project

Presenters:

Danielle Bram, *Project Manager*
Joel Osuna, *GIS Analyst*

CGS
CENTER FOR GEOGRAPHICAL STUDIES
California State University, Northridge

presentation outline

- project overview and objectives
- related efforts
- creating efficiencies with GIS
- project design
- tributary rule
- database design
- project status
- future direction and considerations

Funding provided by:

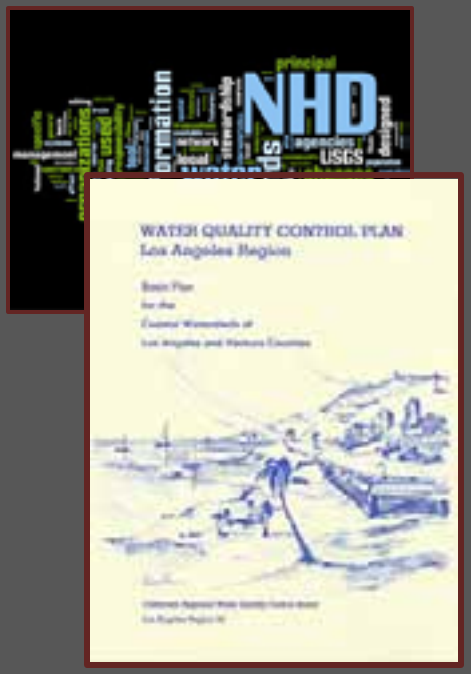
State Water Resources Control Board

overview and objectives

Create a geodatabase using National Hydrography Dataset (NHD) map layers updated with associated attributes of **Basin Plan** elements and other related Water Quality Control Plans.

Incorporates:

- Regional & Statewide Water Quality Objectives
- Beneficial Uses
- Applicable TMDL's
- Statewide and regional policies (CTR, NTR, NRWQC, Ocean, Delta and Thermal Plans, etc.)

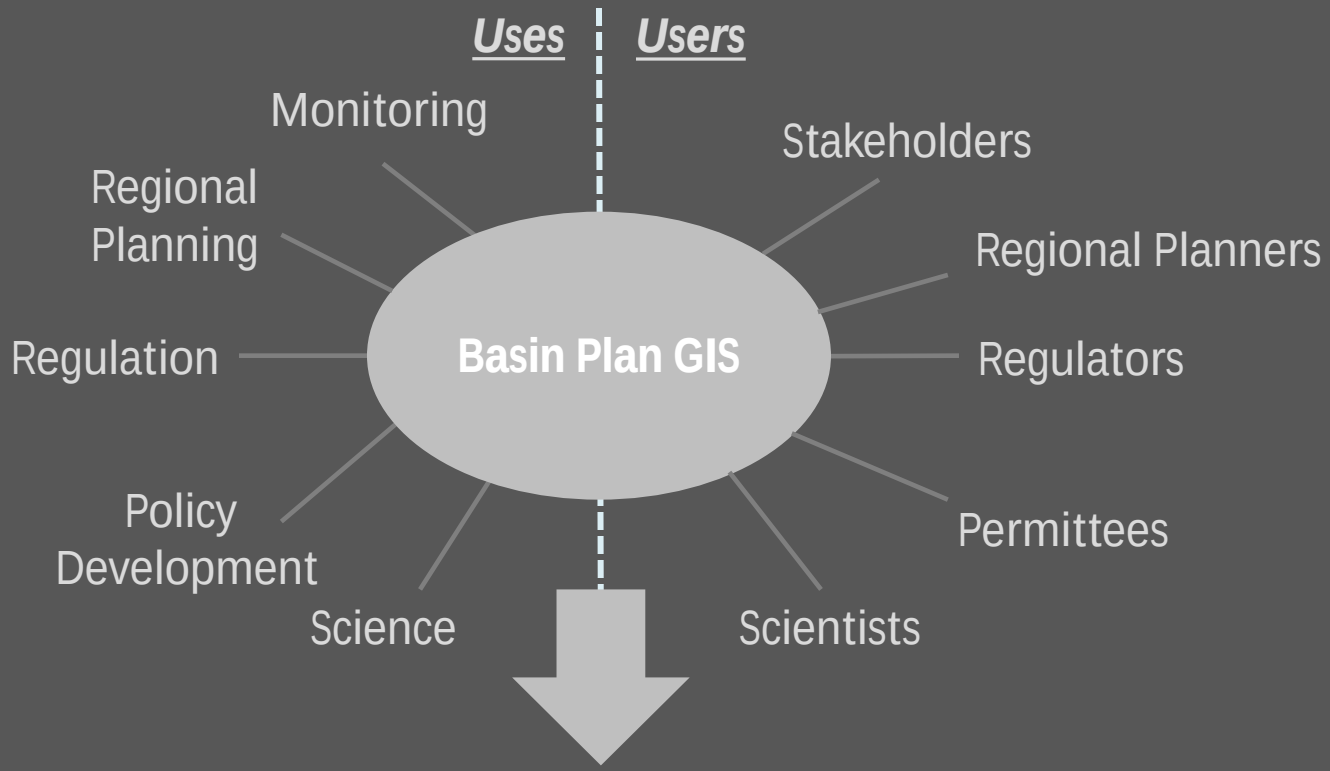


Related Efforts

Pre-existing Datasets\Related Efforts:

- CIWQS
- eWRIMS
- CalWQA
- SWAMP
- NHD (and associated CDFG updates)
- CA State Wetland Inventory
- CEDEN
- CARI
- Statewide Wetland Mapping and Classification Standards

creating efficiencies with GIS

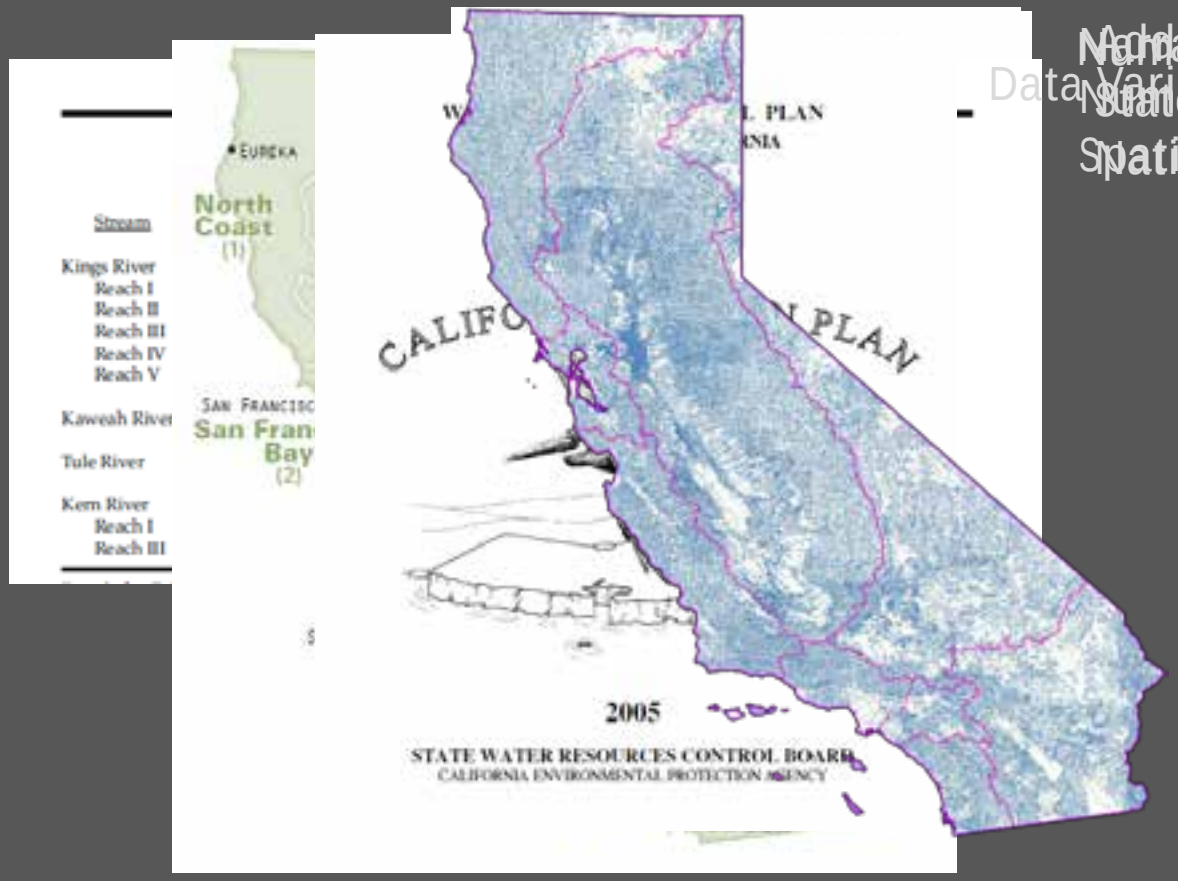


Opportunity:

- Standardize Basin Plans (reporting format, data, etc.)
- Share associated information in a more intuitive format (particularly in web-based portal)
- Develop statewide “buy-in” on maintaining data in a standardized and spatial format
- Demonstrate the value of managing water quality data geospatially
- Provide useful tool for stakeholders

creating efficiencies with GIS

Ultimately, the goal is to create a more efficient and intuitive system for tracking water quality policies in the state of California.

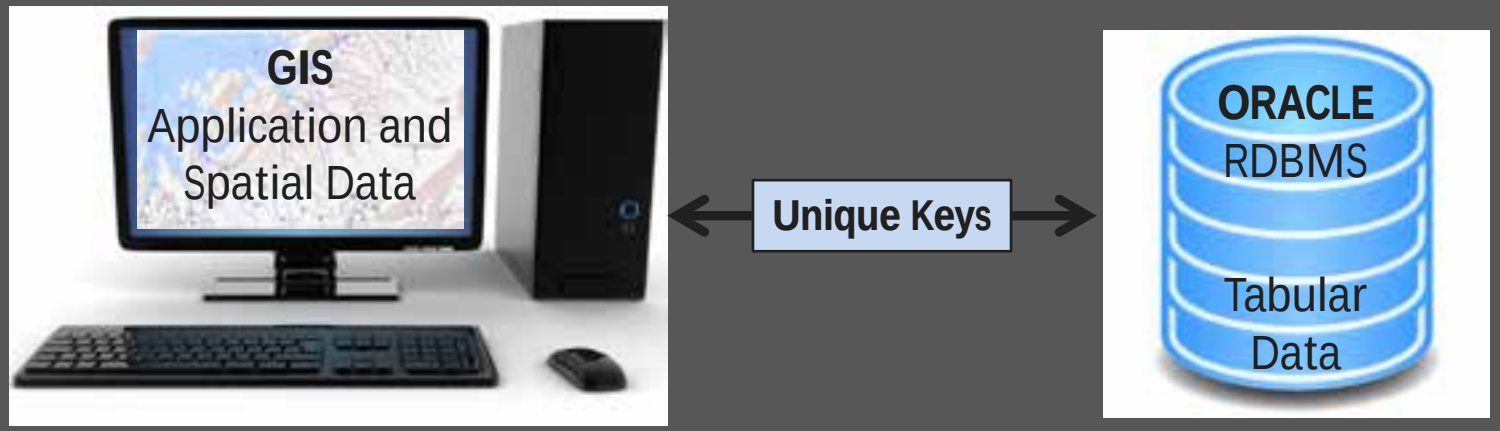


Additional Plans:
Statewide (Bena, Ocean,...)
Statewide (NTR, Thermal, ...)

Additional Data:
Statewide Data
Varies By Region
Statewide (NTR, Thermal, ...)
Spatial Variation within Region

project design

- Relational database using Oracle and ArcSDE software.
- Spatial data entered and updated using ArcGIS software and USGS NHD Edit and HEM tools.
- Non-spatial data entered into an Oracle relational database using a web-based User Interface (UI).
- Unique ID's provide a relationship between the 2 components.



project design

translating basin plan data into our database

Region 6 Basin Plan:

TABLE 2-1. BENEFICIAL USES OF SURFACE WATERS OF THE LAHONTAN REGION

Unless otherwise specified, beneficial uses also apply to all tributaries of surface waters identified in Table 2-1.

HU No.	HYDROLOGIC UNIT/SUBUNIT DRAINAGE FEATURE	WATERBODY CLASS MODIFIER	BENEFICIAL USES: MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	RARE	MIGR	SPWN	WQE	FLD	RECEIVING WATER
634.20	NORTH TAHOE HA (continued)																							
	GRIFF CREEK	PERENNIAL STREAM	X				X				X	X	I			X		X			X			LAKE TAHOE
	MINOR SURFACE WATERS		X	X			X	X			X	X	I			X		X			X			LAKE TAHOE
	MINOR WETLANDS	SPRINGS/SEEPS/EMERGENT MARSHES	X	X			X	X			X	X	I			X		X			X	X	X	
634.30	TAHOE (ARE BODY HYDROLOGIC AREA																							
	LAKE TAHOE	LAKE	X	X			X		X		X	X	I			X		X	X		X			TRUCKEE RIVER
	[illegible]		X	X			X	X			X	X	I			X		X			X			

Table 3-12
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES
LAKE TAHOE HYDROLOGIC UNIT

See Fig. 3-6	Surface Waters	Objective (mg/L except as noted) [1,2]						
		TDS	Cl	SO_4	B	N	P	Fe
1	Lake Tahoe	60 65	3.0 4.0	1.0 2.0	0.01 -	0.15 -	0.008 -	-

Project Database:

GIS Spatial Data:

Lake Tahoe Unique Key

Oracle Tabular Data:

WATERBODY NAME: Lake Tahoe

TYPE: Main

REFKEY: G6L025600000000

BENEFICIAL USES

MUN	ARG	NAV	REC-1	REC-2	COMM
E	E	E	E	E	E

WATER QUALITY OBJECTIVES

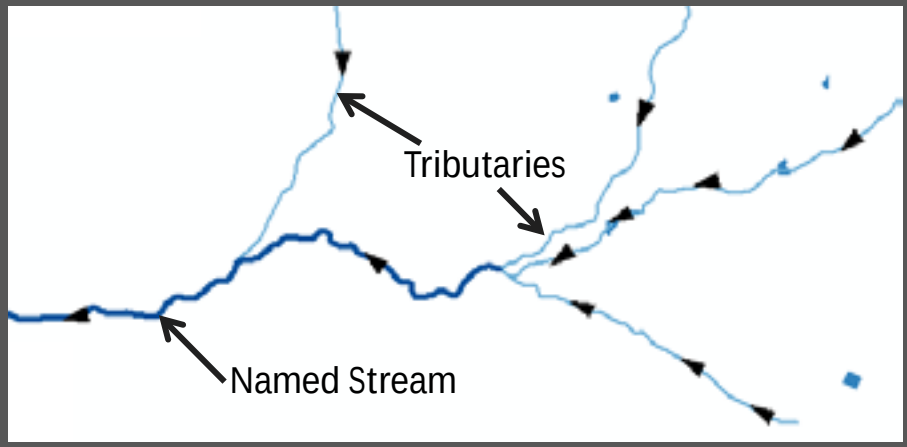
TDS	Cl	SO4	B	N
60/65	3.0/4.0	1.0/2.0	0.01/-	0.15/-

Tributary Rule

Tributary: A surface waterbody whose water flows into another (typically) larger surface waterbody.

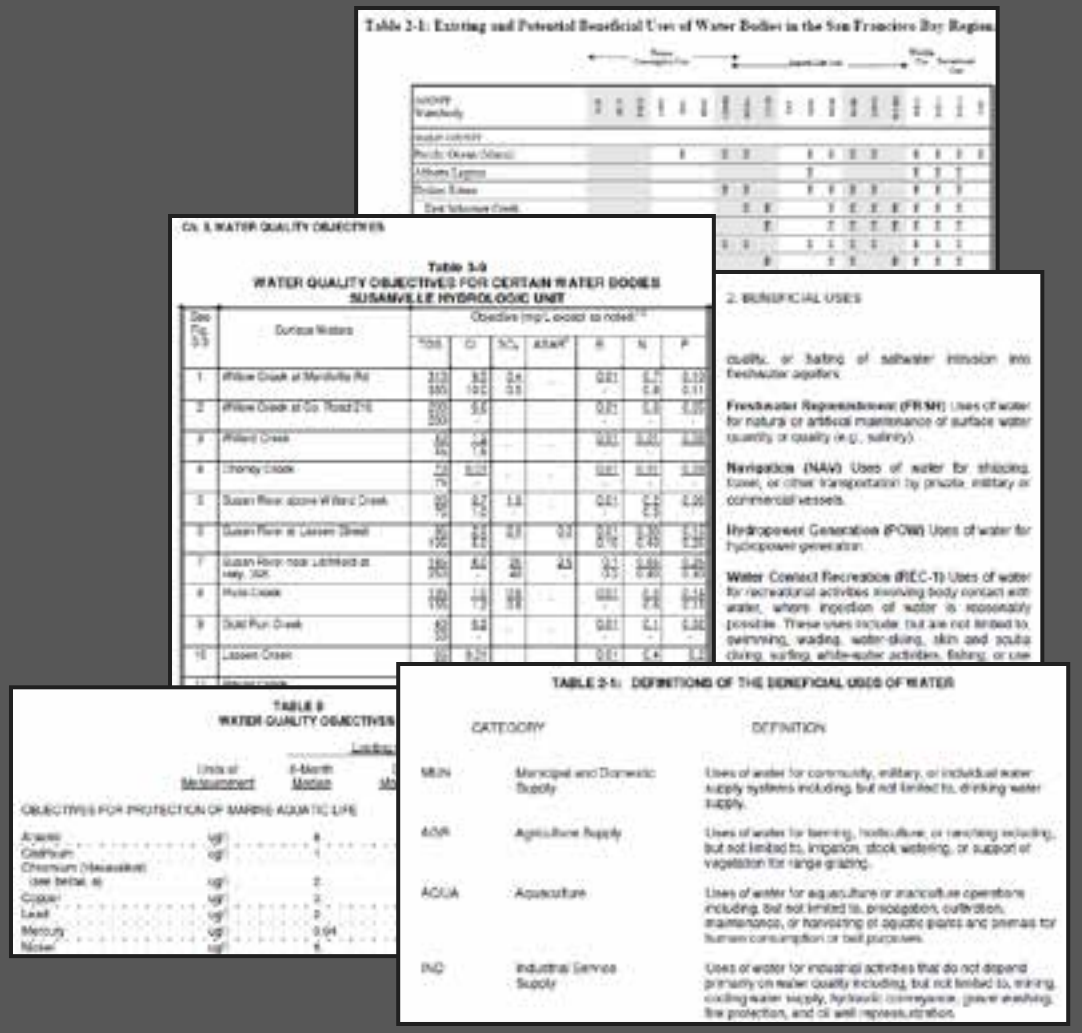
Tributary Rule: Any surface waterbody that *is not* specifically identified or listed in a regional basin plan **AND** is an upstream tributary of another surface waterbody that *is* identified and assigned water quality designations in a regional basin plan acquire the same set of designations as that identified waterbody.

Challenges: Establishing a comprehensive and region-specific tributary rule methodology while considering assigned priority, overlap, and conflicts between: site-specific waterbody designations, reach/event designations, grouped waterbody designations and others.



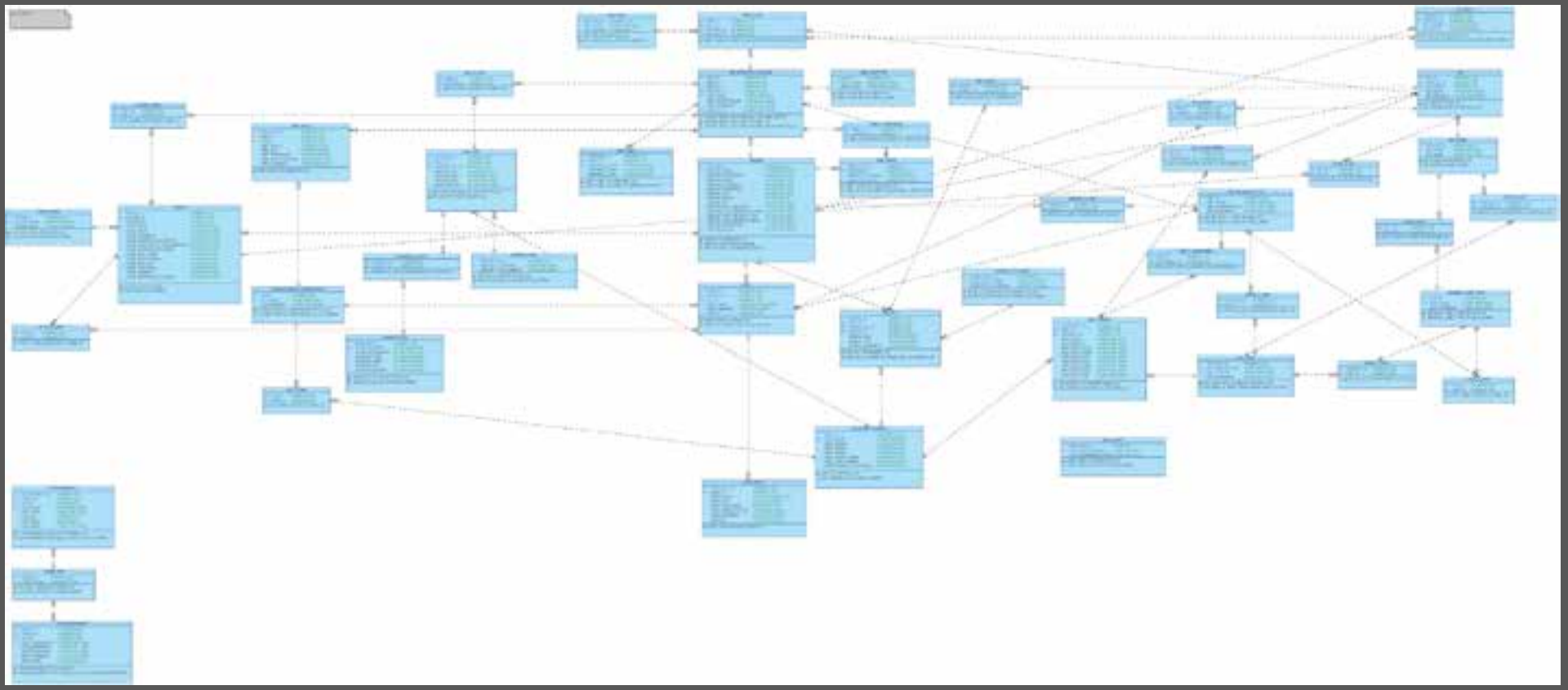
database design non-spatial data

- Beneficial Uses
- Water Quality Objectives (WQO's):
  - Basin Plans
  - NTR (National Toxics Rule)
  - CTR (California Toxics Rule)
  - Others….
- TMDL's
- Thermal Plan
- Ocean Plan
- State and Regional Board policies
- Water Body Type
- WBD Watersheds
- CalWater Watersheds



ü The current database design will incorporate components for surface waters, bays and estuaries and wetlands. Design will be flexible enough to allow for the future inclusion of groundwater features.

database design
draft database design



database design
spatial data: overview

- Base Data: NHD Dataset
- Collateral Datasets:
  - Regional Board datasets and input
  - Most recent NAIP digital orthophotos
  - Assessed/303D water body layer
  - USGS Topographic Maps
  - And more…
- GIS Design:
  - Data will be contained in an SDE Geodatabase.
  - 1 feature class for linear water bodies.
  - 2 feature classes for polygonal water bodies.
  - 1 feature class for points features (i.e. springs).
  - Multiple event FCs for polygonal, linear, and point features.
- Linear Referencing/Dynamic Segmentation will be applied to the linear water bodies. Events will also be created for point and polygon features.

database design
spatial data: linear referencing

Why?

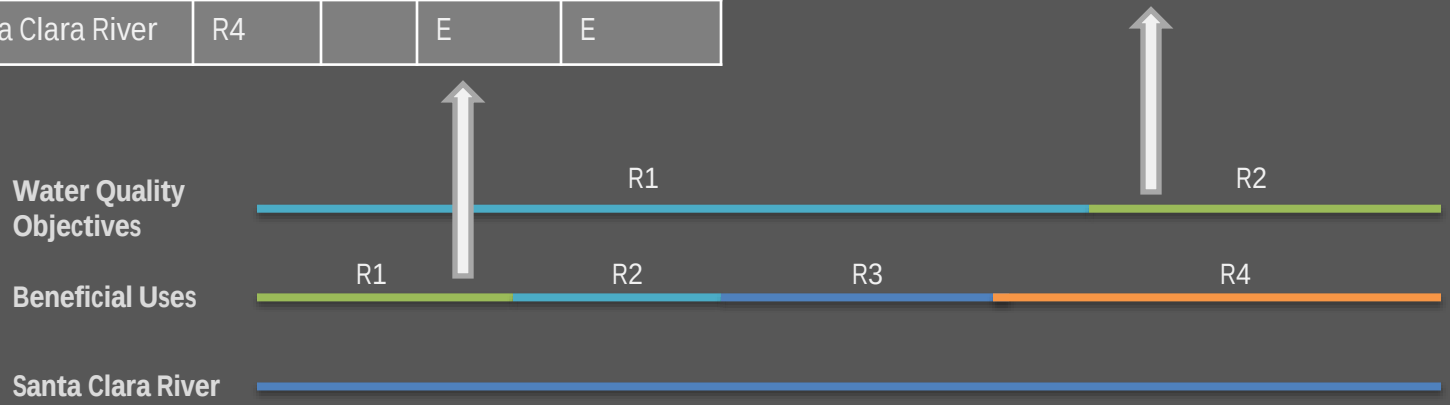
- Differences in *reach* locations between site specific beneficial uses and site specific water quality objectives.
- Prevents overly segmented data and complex attribution.

Beneficial Uses

Water body	Reach	AGR	GWR	FRSH
Santa Clara River	R1	E	E	E
Santa Clara River	R2	E		E
Santa Clara River	R3	E	E	I
Santa Clara River	R4		E	E

Water Quality Objectives

Water body	Reach	TDS	Sulfate	Chloride	Boron
Santa Clara River	R1	500	100	50	.5
Santa Clara River	R2	800	150	100	1.0



project status

- Approximately 85% complete
- Target Completion Date: September 2014
- Next Steps: Web Portal Development

future direction and considerations

- GIS can improve efficiencies when enacting environmental policy at local, regional, statewide, and federal scales.
- Increase transparency for government agencies and the public.
- Database design, integration with GIS and web-based visualization are powerful tools.
- Modeling and analysis tools (potentially online)
- Attribution with other associated data such as climate, infrastructure, land use, land ownership, etc.

Questions?

http://www.csun.edu/~centergs

Danielle Bram, danielle.bram@csun.edu

Joel Osuna, joel.osuna@csun.edu