

Bethany Reservoir Water Quality Workshop

December 11, 2007

10 a.m. to 1 p.m.

Tracy Sports Complex Meeting Room



East Bay
Regional Park District



CALFED
BAY-DELTA
PROGRAM



ALAMEDA COUNTY WATER DISTRICT

UC
CE
University of
California
Cooperative Extension



Santa Clara Valley
Water District



Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARD



Welcome

- Thank you for attending today's workshop!
- Today's speakers
 - Laura Hidas, ACWD
 - Laura Young, ACWD
 - Linus Paulus, DWR
 - Sheila Barry & Theresa Becchetti, UCCE
- Workshop Organizers
 - South Bay Aqueduct Watershed Workgroup
- Financial Support
 - Proposition 13 Non-point Source Pollution Control Grant from the State Water Resources Control Board for the CALFED Bay-Delta Program



The SBA Watershed Project & the Bethany Reservoir Watershed

Prop. 13 Funding – CALFED
Drinking Water Quality Program

Bethany Reservoir Workshop

December 11, 2007

SBA Watershed Project Goals

- Protect local drinking water from the identified contaminant sources
- Raise local awareness about watershed management and protection of water resources
- Recognize and respect the recreational, agricultural & environmental uses of SBA system water
- Provide educational benefits to the local community



SBA Watershed Project Activities

- Worked with a Watershed Workgroup of various stakeholders to identify conservation practices relevant to the area
- Wrote a Watershed Protection Program Plan guided by the Workgroup
- Developed educational materials and workshops
- Collected stormwater quality data and reviewed other water quality information



Harvey O. Banks Pumping Plant

Campbell



Bethany Reservoir



Lake Del Valle, Livermore

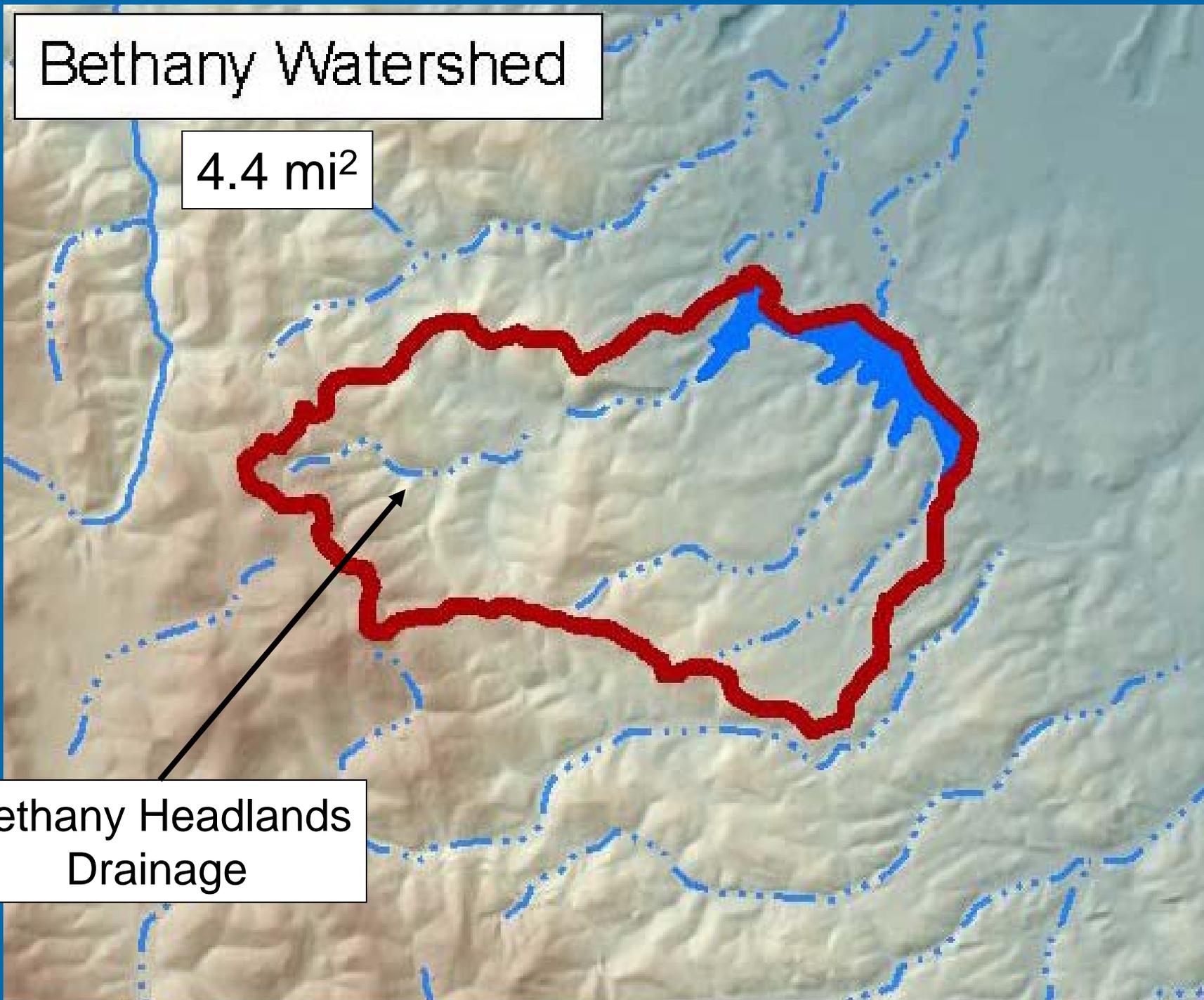


ACWD Water Treatment Plant No. 2

Bethany Watershed

4.4 mi²

Bethany Headlands
Drainage



Physical & Biological Attributes

- **Bedrock (USGS, 1995)**
 - Underlain by sandstone, mudstone and shale units of the Panoche formation
- **Soils (USDA, 1966)**
 - Altamont clay soil series - deep soil with high shrink-swell potential
 - San Ysidro loam - occurs in valley bottoms and alluvial fan deposits
- **Vegetation: Annual grasslands & freshwater wetland species**
- **Wildlife: Fish, red-legged frog, tiger salamander, American badger, kit fox (CNDDDB, 2005)**

Hydrology

- Average rainfall of 12-13 inches per year
- Highest precipitation during fall and winter
- Calculated peak discharge rate (Schaaf & Wheeler, 2004)
 - 834 cfs for 100-year event
 - 62 cfs for 2-year event
 - Bethany Headlands accounts for half

Bethany Reservoir: Multiple Uses

- California Aqueduct Beneficial Uses
 - Municipal and Domestic Water Supply
 - Agriculture
 - Industry
 - Recreation
 - Wildlife Habitat
- Bethany Watershed
 - Cattle Grazing
 - Wind Power Generation
 - Recreation



Monitoring Locations at Bethany Reservoir



0 1,000
Feet



**BR-1: Bethany Headlands
– Upstream**

**BR-2: Bethany Headlands
– Downstream**

BR-3: Dyer Canal

CA-1: California Aqueduct

Recreation at the Bethany Reservoir



Bethany Reservoir is a popular spot for windsurf enthusiasts.



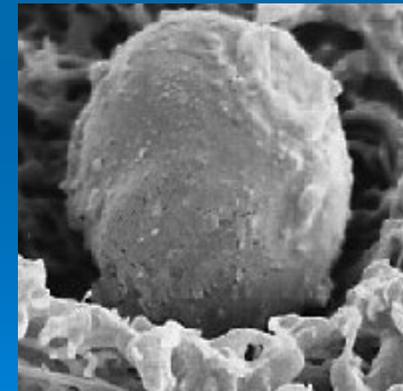
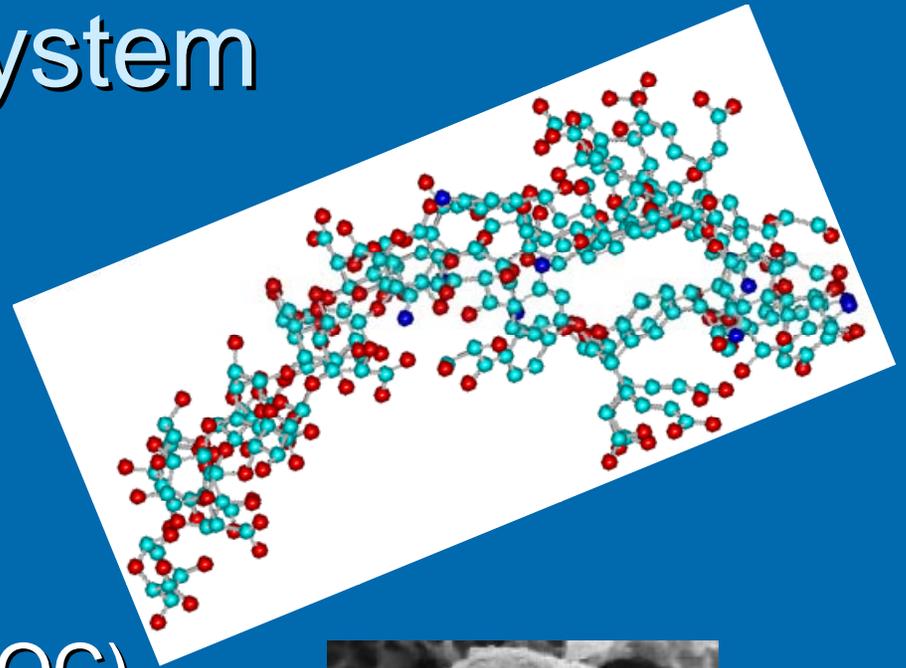
Around the reservoir are hundreds of windmills, generating electricity from the region's windy conditions.



Shoreline fishing there is a relaxing sport for local anglers.

Contaminants of Concern in the SBA System

- Bacteria: *E. coli*, Total coliform, Fecal coliform
- Protozoa: *Giardia*, *Cryptosporidium*
- Bromide
- Total Organic Carbon (TOC)
- Total Solids (Dissolved & Suspended)
- Nutrients: Nitrate, Nitrite & Phosphorous



High Priority Watershed Areas and Activities

SBA Watershed Area	Potentially Contaminating Activities (PCAs)												
	Roads	Road crossings	Body contact & non-contact recreation	Lakeshore recreation	Grazing	Livestock concentrations	In-stream stock ponds	Pond(s)	Feral pigs	Residential & public development	Rural residential development	Mine tailings	
Bethany Reservoir	X	X			X			X					
Lake Del Valle	X	X	X	X	X				X	X			
Arroyo Valle: Lake Del Valle to San Antonio Valley	X	X			X	X	X		X		X		
San Antonio Valley & Upper San Antonio Valley	X	X			X	X	X				X	X	

Questions?



SBA Education Program

- Development of 3 brochures
 - Ranching/Rural Household Information
 - Recreation Stewardship
 - Overview of the SBA System
- Development of 4 signs
 - 3 at Lake Del Valle
 - 1 at Bethany Reservoir
- Workshops – Fall 2006 / Fall 2007
 - Lake Del Valle Water Quality Workshop
 - Community Stewardship for Clean Water Series
 - Bethany Reservoir Water Quality Workshop



Do not feed wild animals. Encouraging wildlife to gather near the lake can contribute to bacteria in the water supply.



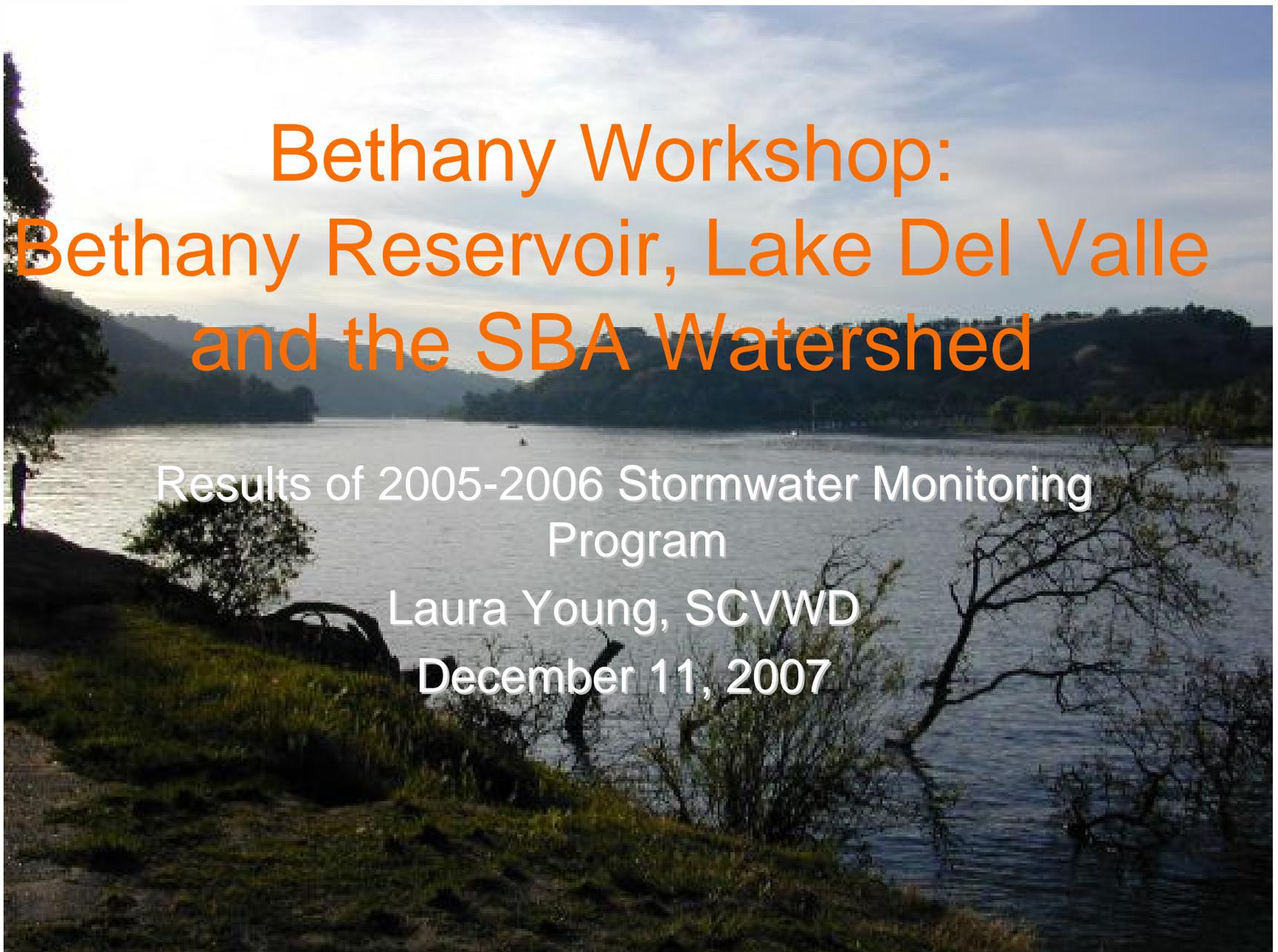
Dispose of trash properly. Litter can introduce a variety of pollutants to the water.



When swimming, take restroom breaks. That means getting out of the water and walking to the restroom. Need we say more?

Recreation Stewardship Messages

- **When hiking, prevent erosion by respecting park signage in environmentally sensitive areas.** Erosion contributes sediment to reservoirs, which makes the water cloudy, more difficult to treat, and raises treatment costs.
- **Help prevent wild fires,** which increase runoff and erosion. Have campfires and barbecues in designated areas only.
- **Keep diapers (and children wearing them) out of the lake.** Dirty diapers and drinking water don't mix!
- **Keep boats well-maintained.** Leaking fuel can contaminate the water.
- **Replace lead fishing weights with non-lead alternatives.** Lead weights can poison fish and wildlife and contaminate the drinking water supply.
- **Pack out your fishing line.** Tangled fishing line can trap birds and other wildlife.
- **Clean up after your horses and pets.** Disposing of their waste properly helps to keep bacteria out of the water.

The background of the slide is a photograph of a large body of water, likely a reservoir, under a cloudy sky. The water is calm and reflects the light. In the foreground, there are some trees and a grassy bank. The overall scene is a natural, outdoor setting.

Bethany Workshop: Bethany Reservoir, Lake Del Valle and the SBA Watershed

Results of 2005-2006 Stormwater Monitoring
Program

Laura Young, SCVWD

December 11, 2007



SBA System Stormwater Monitoring Program, 2005-06

Objectives:

- 1) Assess the significance of stormwater runoff as a contaminant source by sampling selected water quality parameters;
- 2) Compare pollutant concentrations in major inputs to the SBA system;
- 3) Assess the effectiveness of management practices currently implemented in the drainages contributing to the SBA.

Water Quality Parameters

- Basic chemistry and physical properties
- Pathogens
- Nutrients



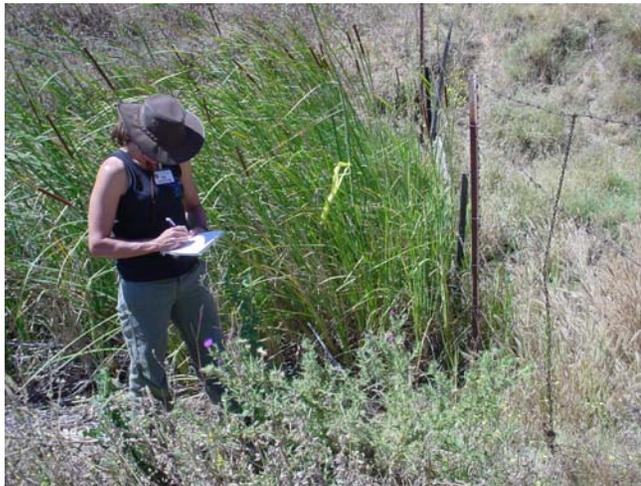
Key Water Quality Indicators

- Microbial Indicators
- Pathogens
- Bromide
- Total Organic Carbon
- Nutrients
- Turbidity
- Total Solids

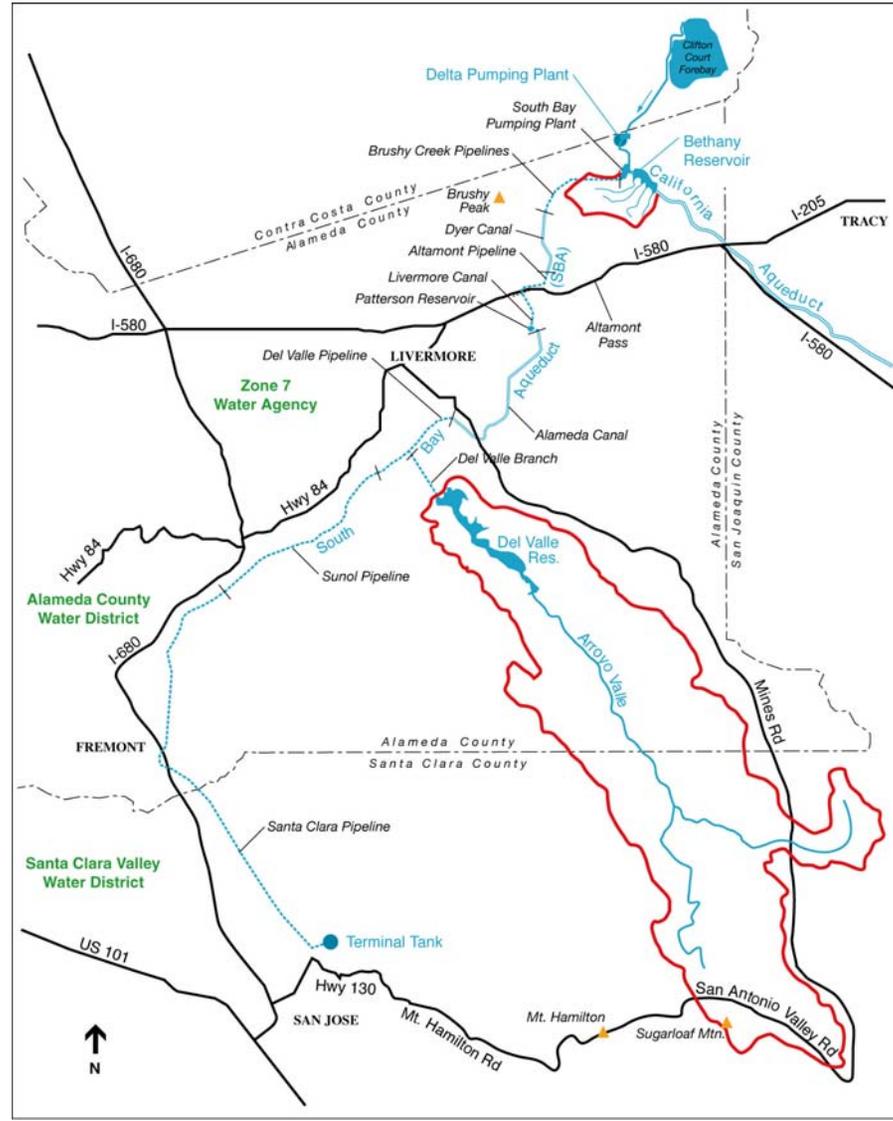


Sampling Program

- Runoff Events during Winter '05-'06
- 5 Storm Events
- 7 Sampling Stations
- Field and laboratory analysis



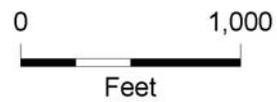
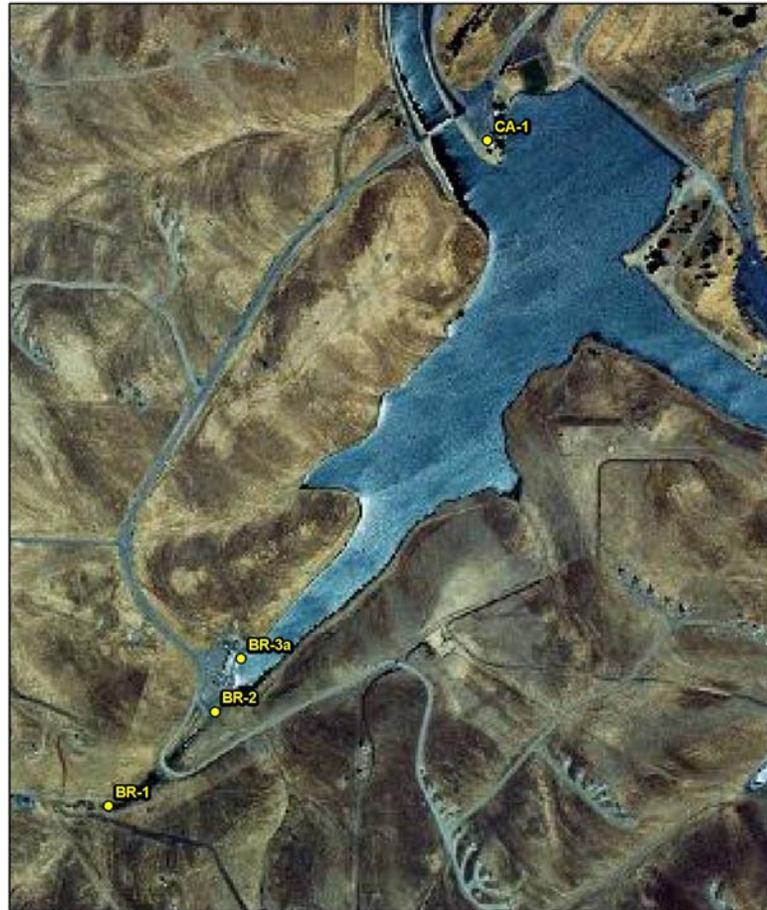
SBA System



— Watershed Boundary
 — SBA Pipeline Sections
 — Canal Sections

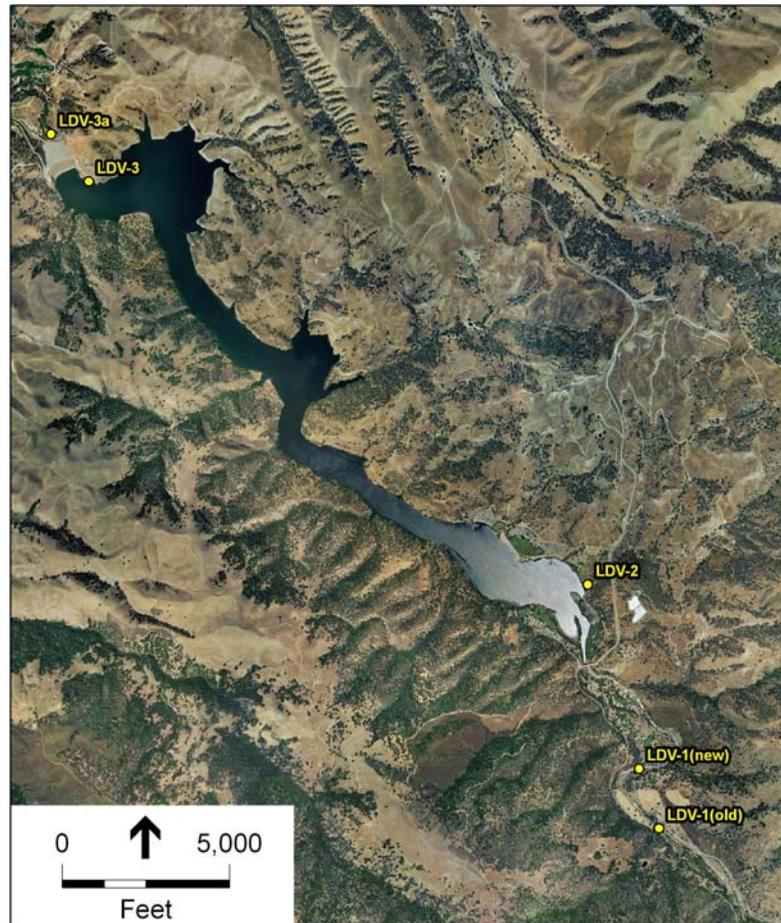


Monitoring Locations at Bethany Reservoir





Monitoring Locations at Lake Del Valle





Station ID's

LDV-1: Arroyo Valle

LDV-2: Cedar Creek

LDV-3: Lake Del Valle near the dam

BR-1: Bethany Headlands – upstream

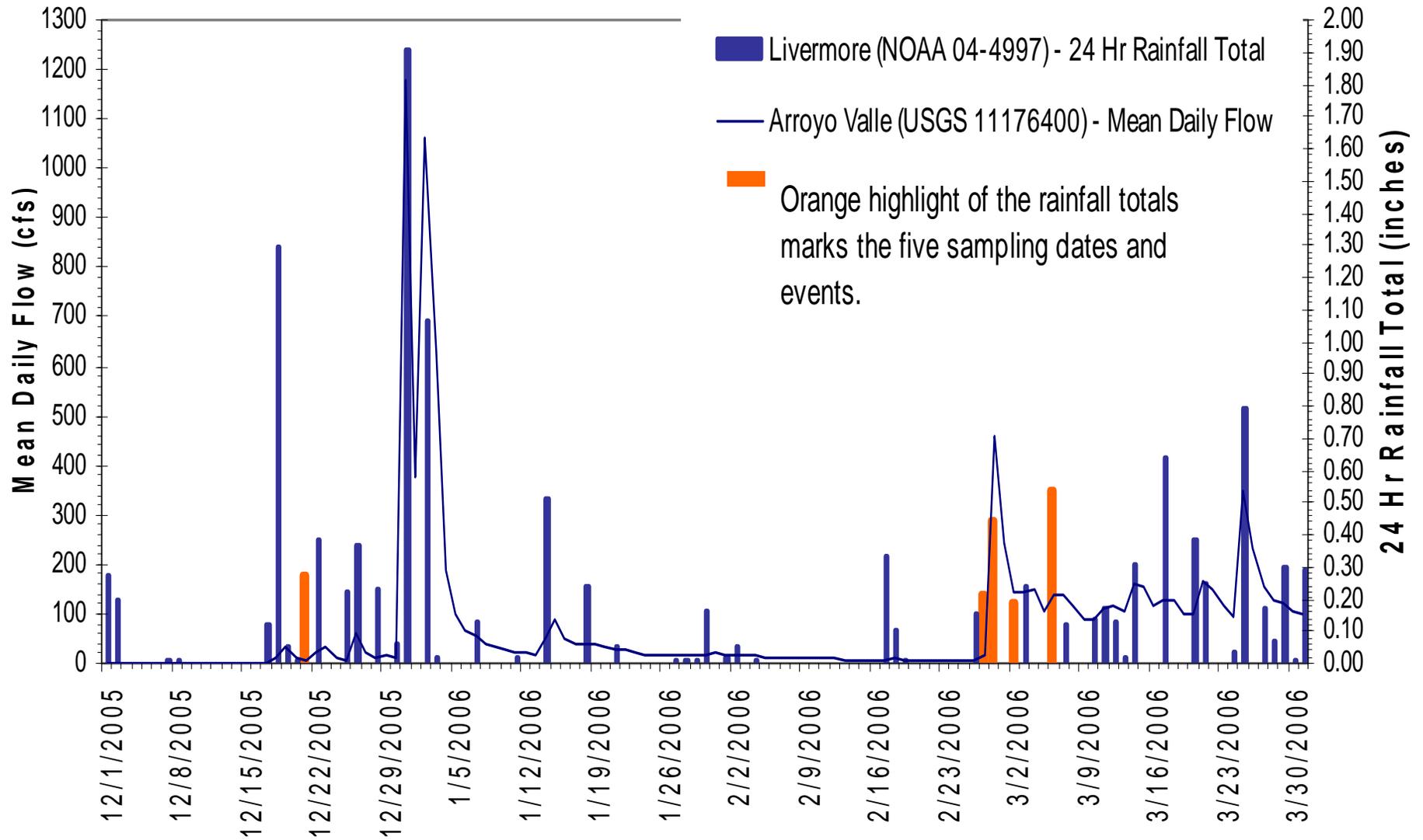
BR-2: Bethany Headlands – Downstream

BR-3: Dyer Canal

CA-1: California Aqueduct

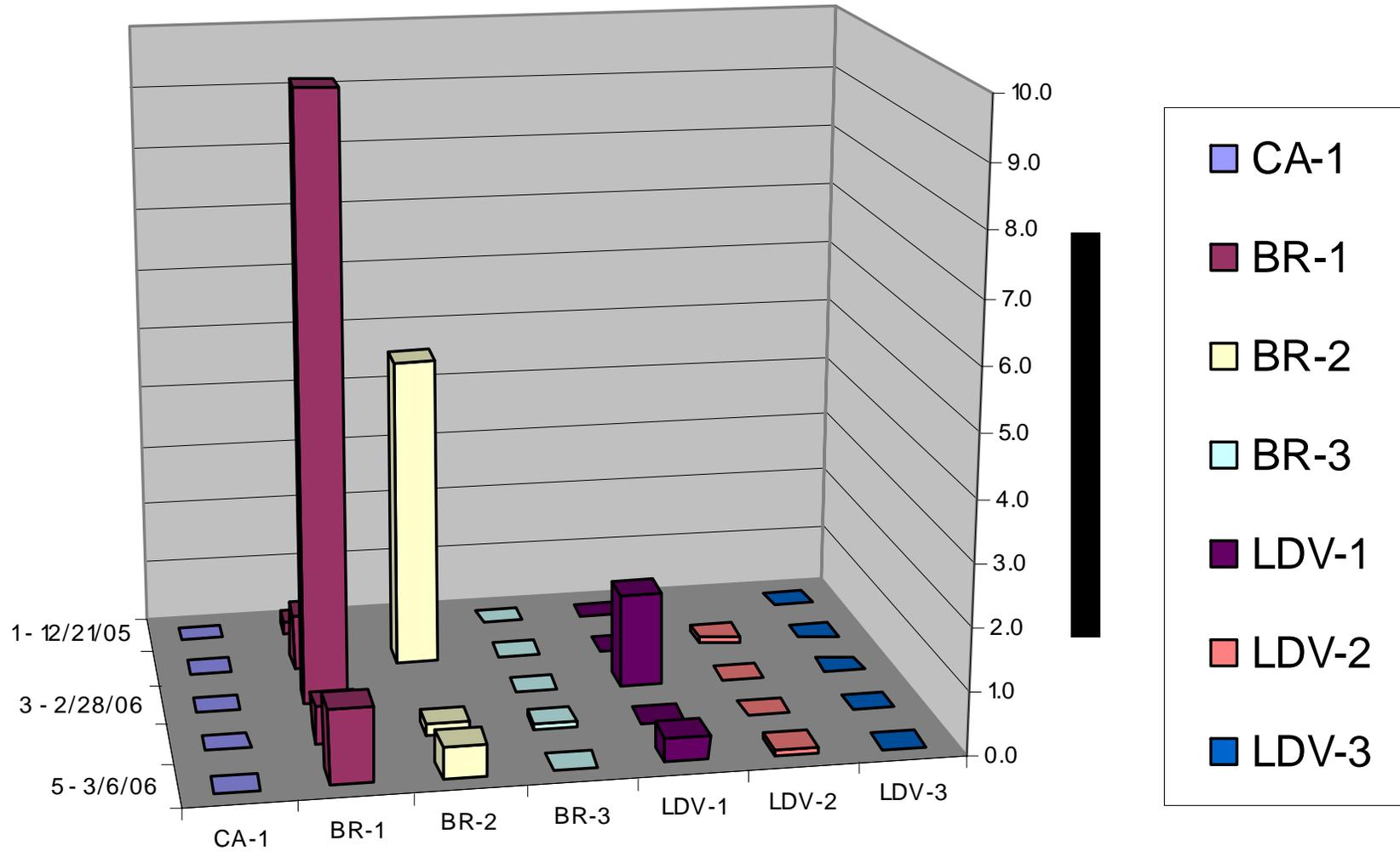


2005-2006 Rainfall and Streamflow



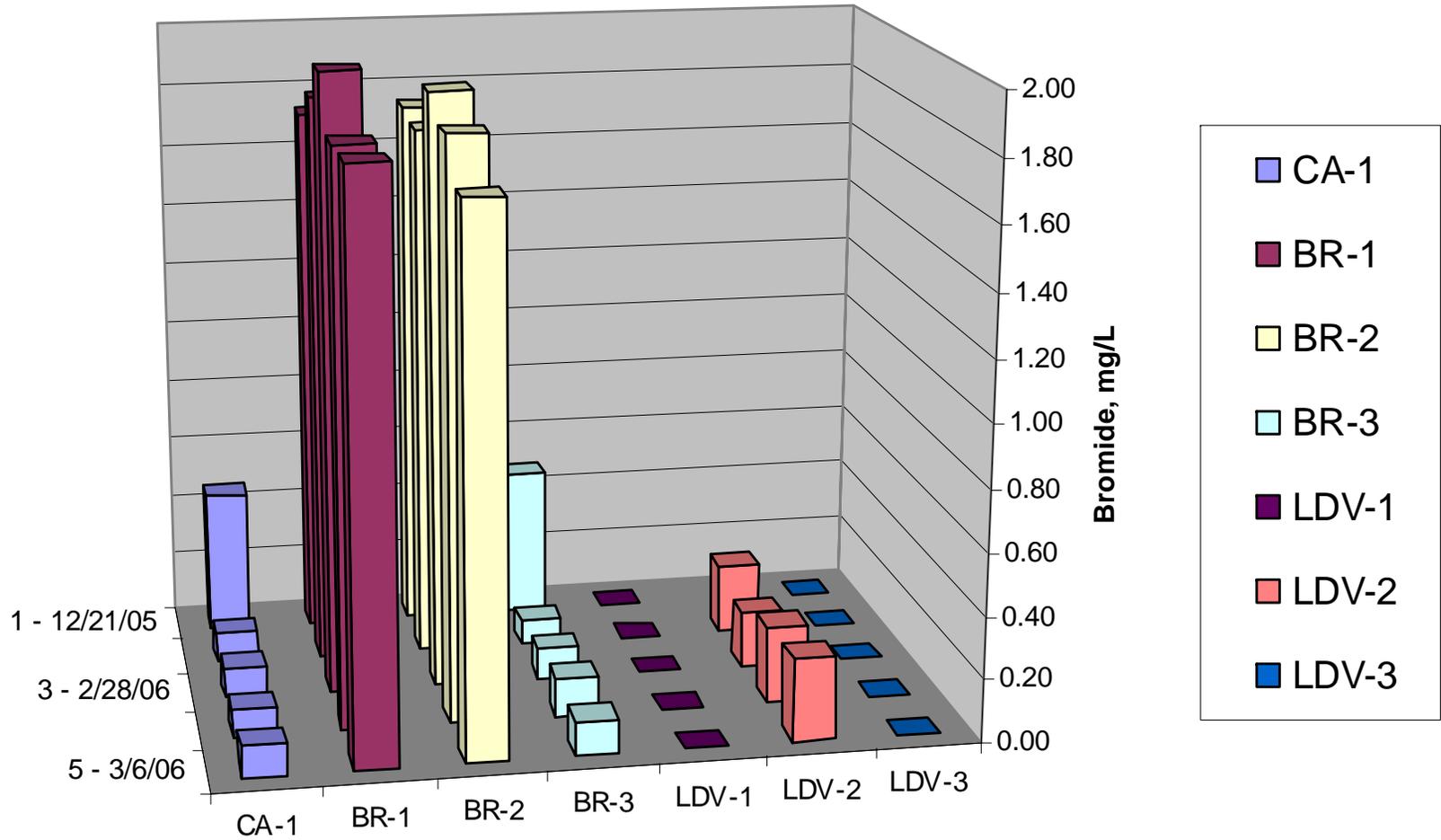


Cryptosporidium



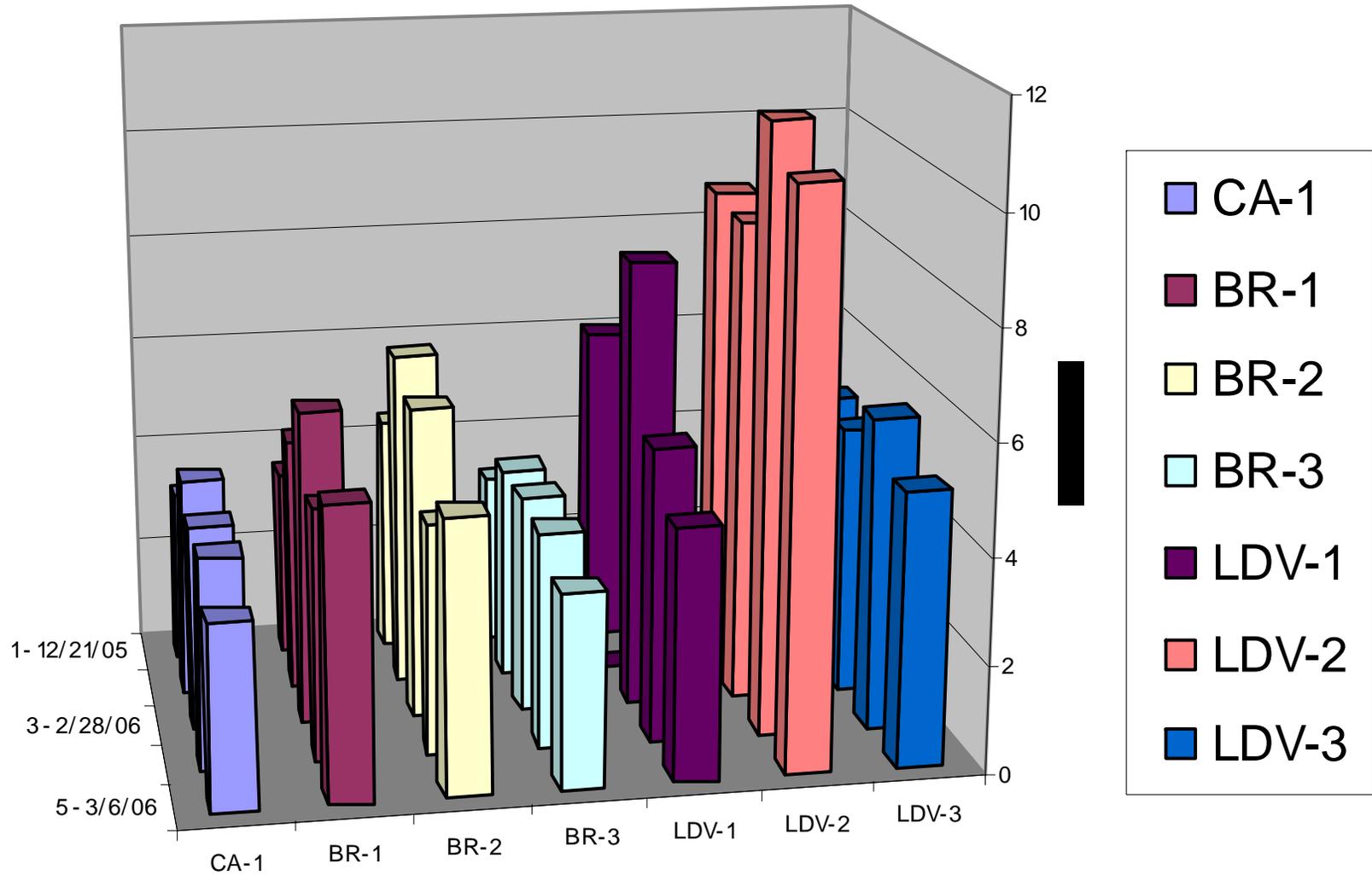


Bromide



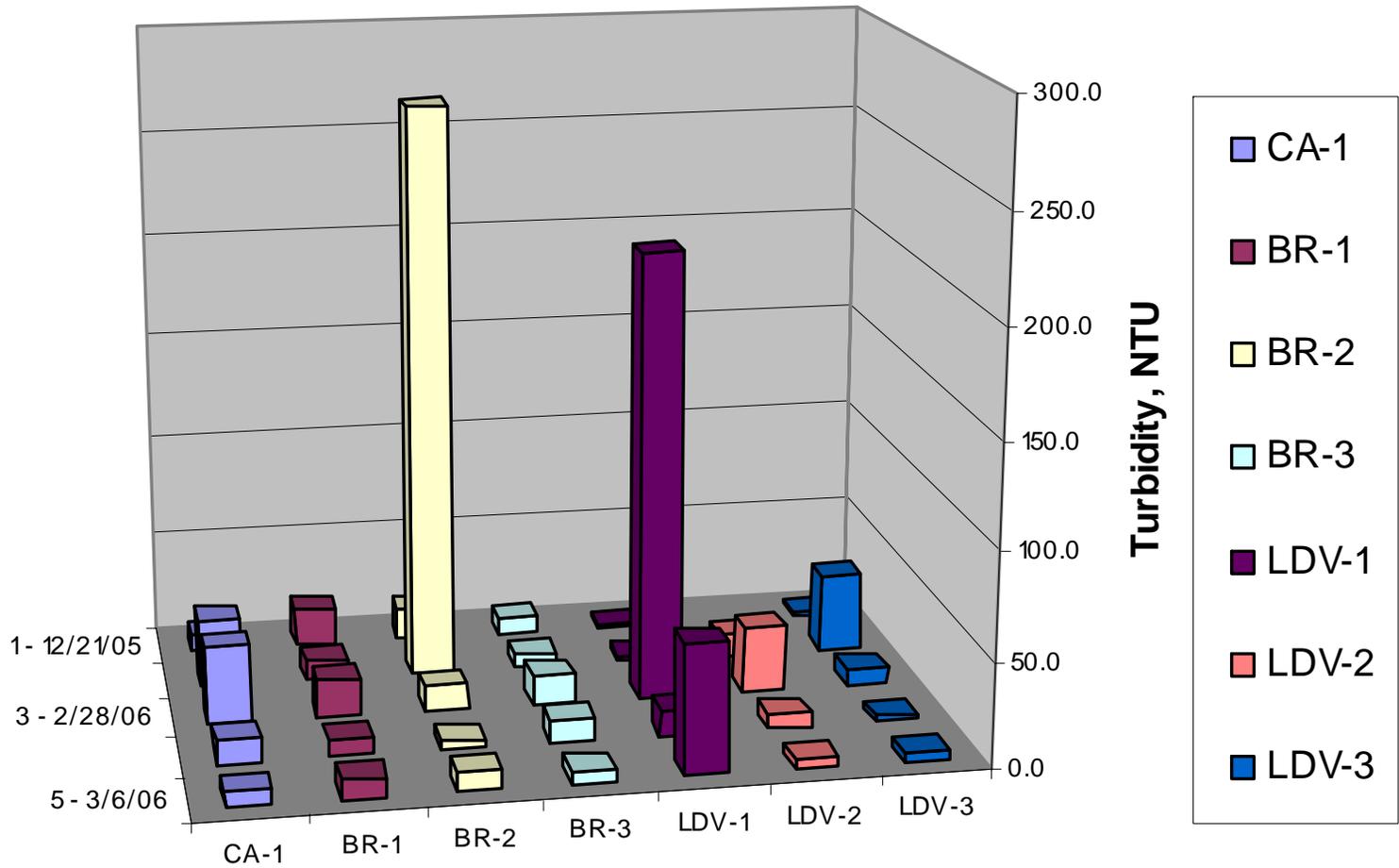


Total Organic Carbon



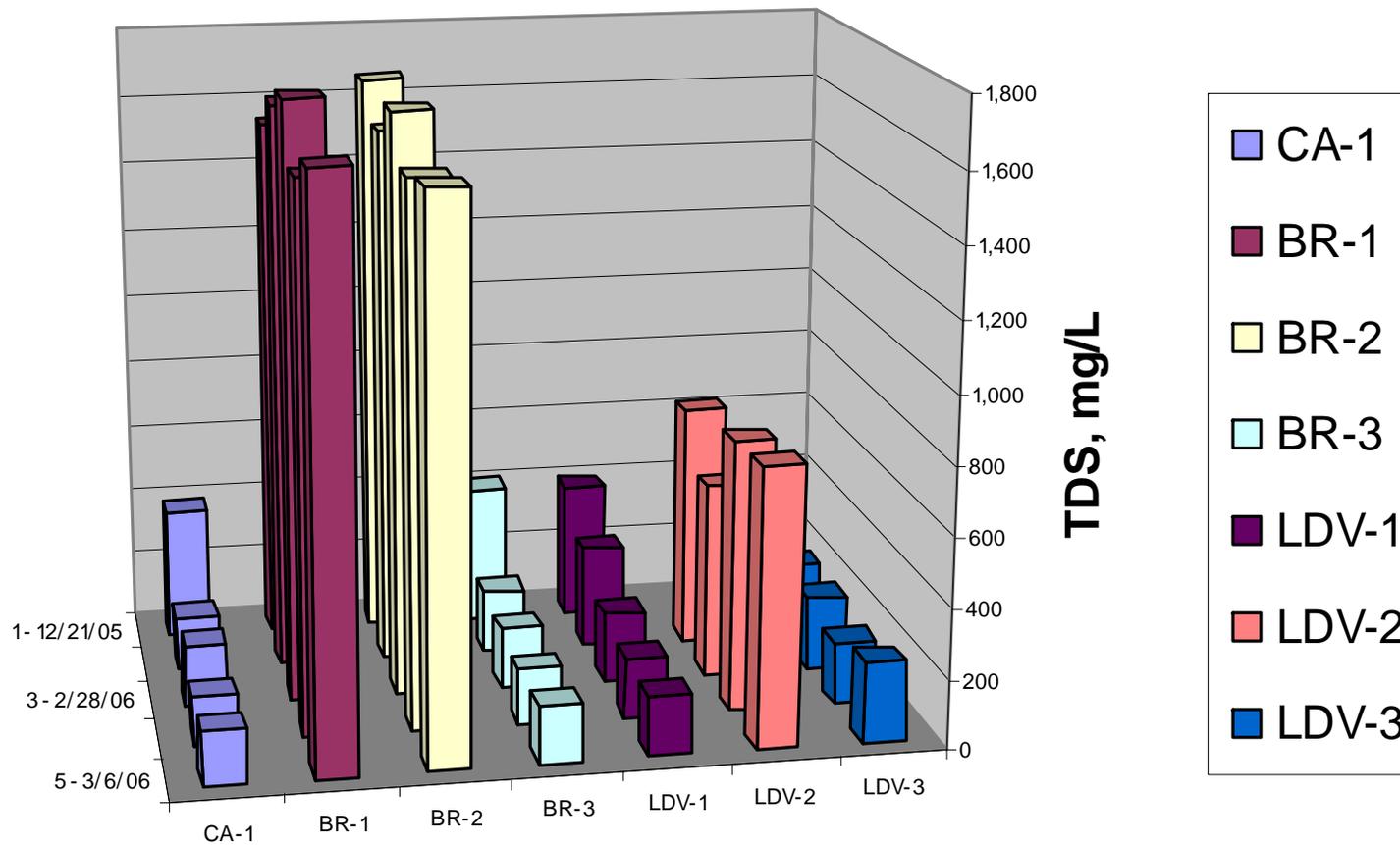


Turbidity

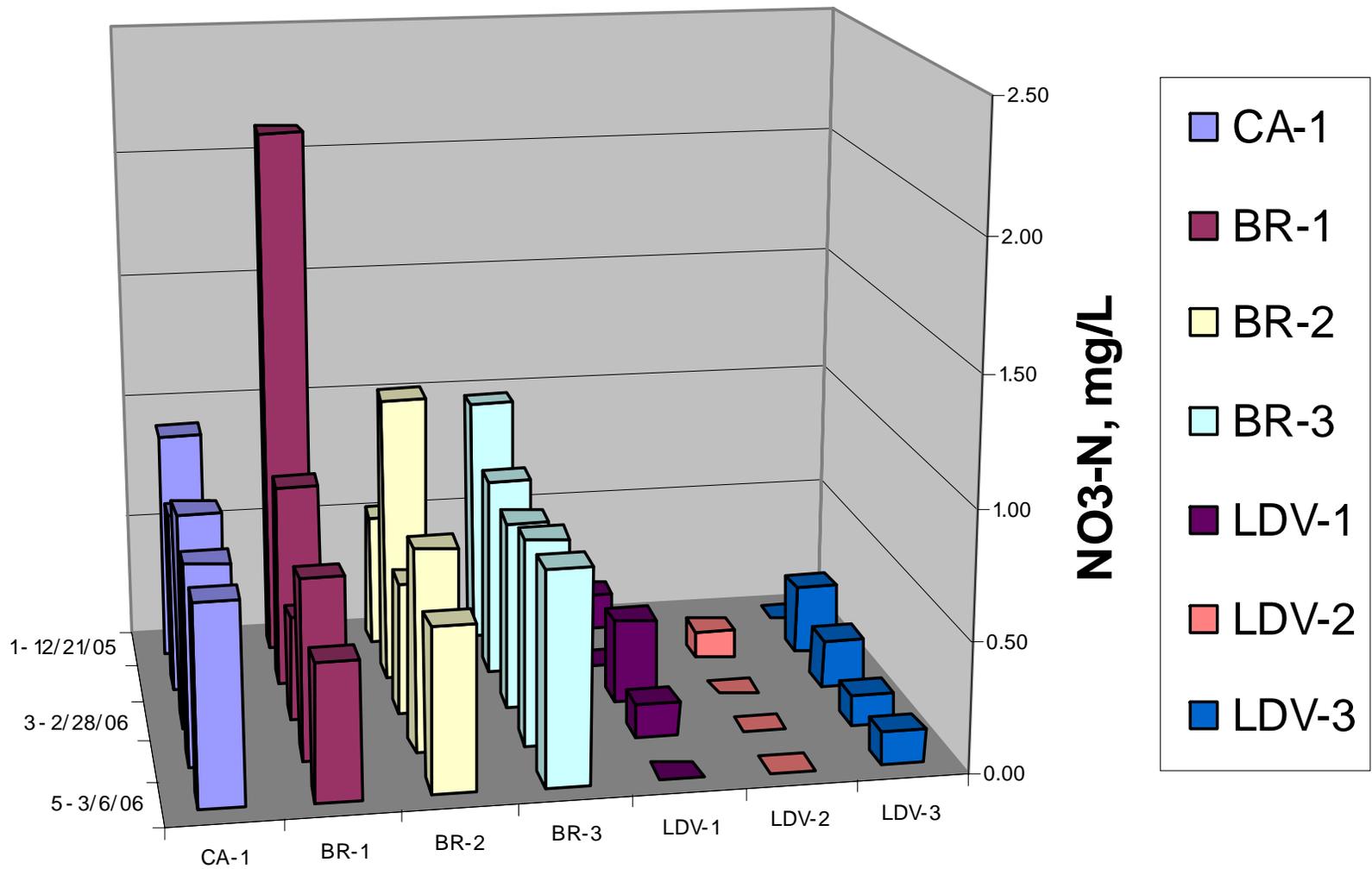




Total Dissolved Solids

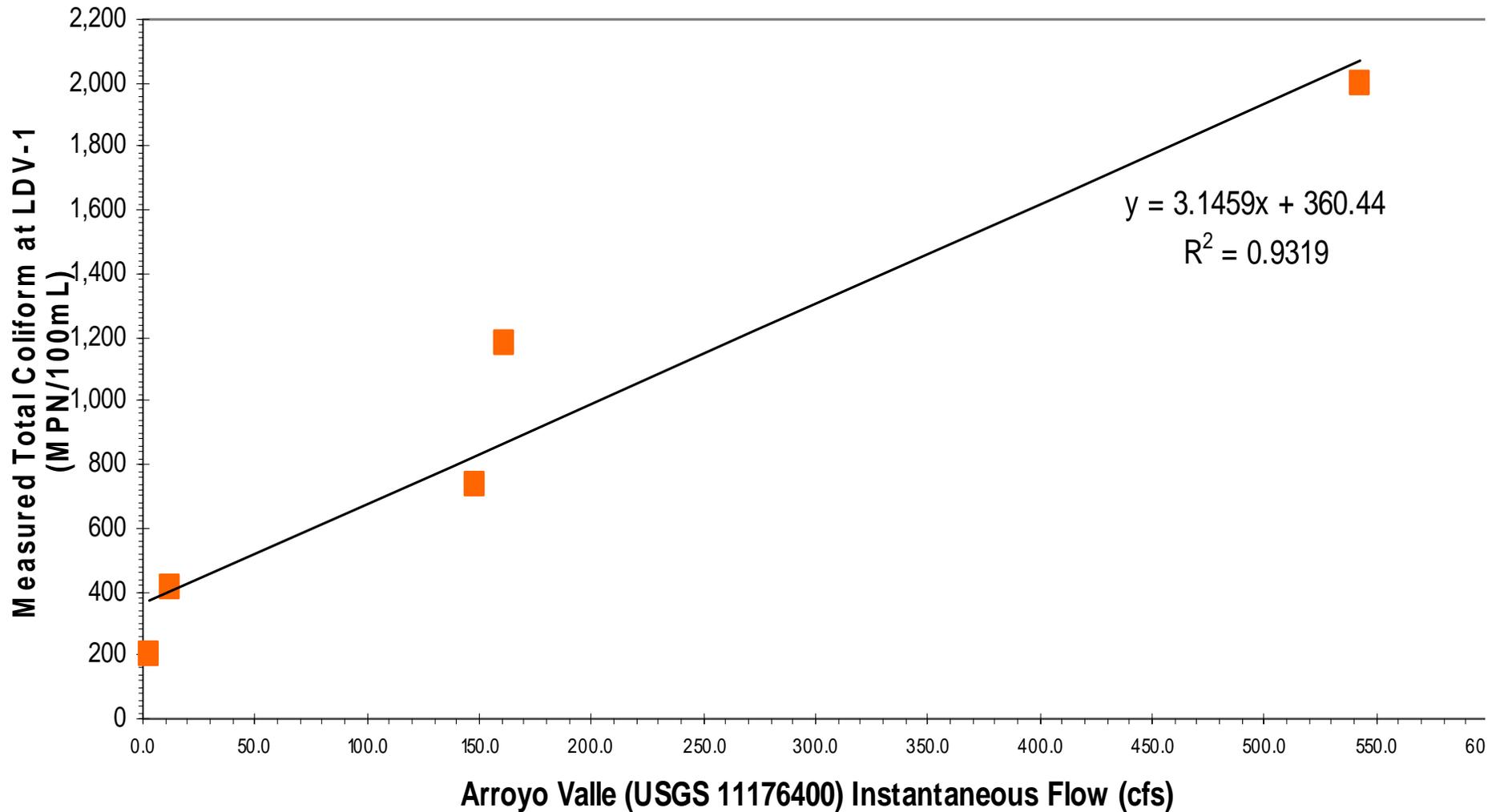


Nitrate



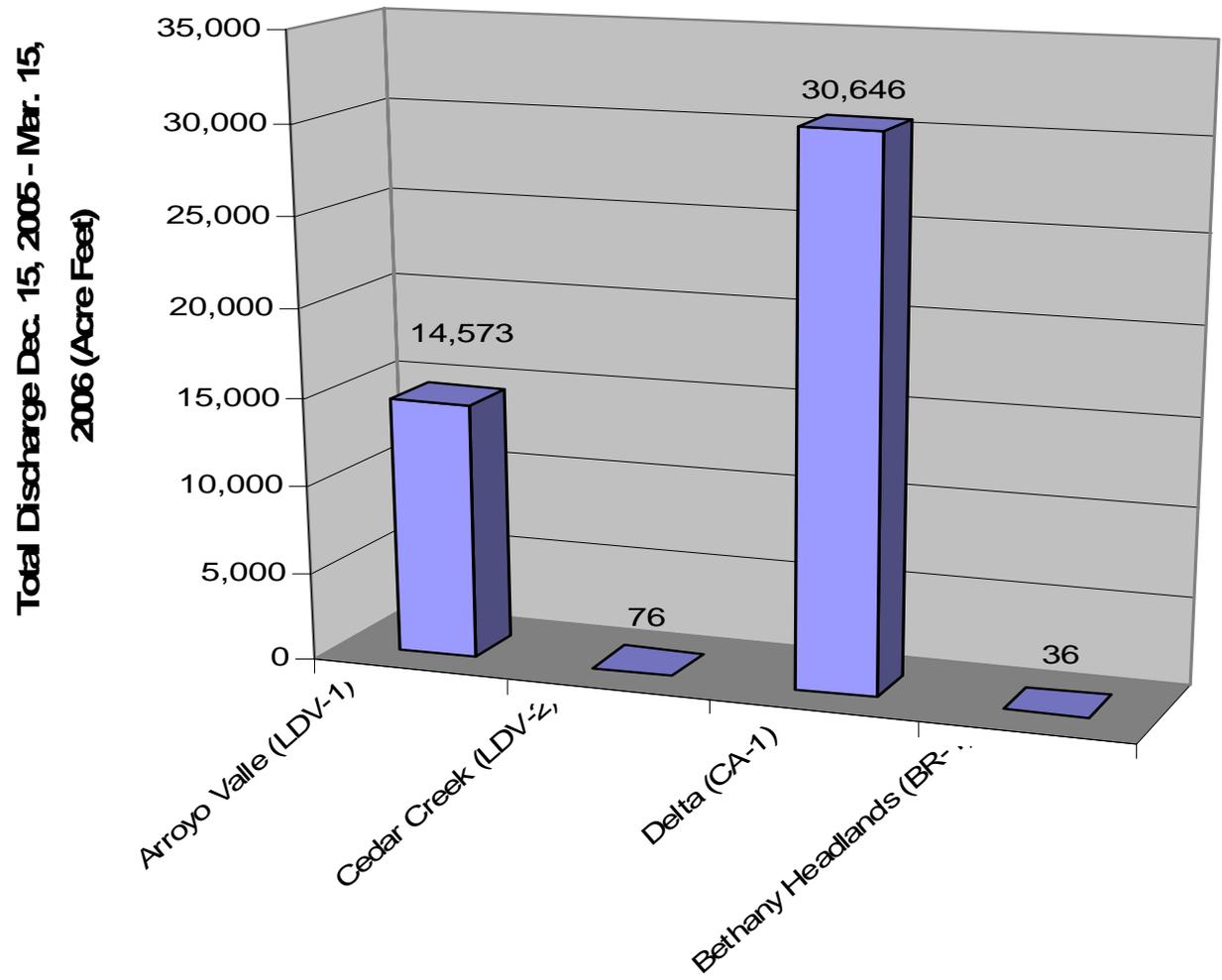


Correlation: Total Coliform vs. Flow





Relative Contribution of Monitored Sources to the SBA



Conclusions



- Bethany headlands water quality:
 - pathogens
 - bacteria
 - chemical and nutrient
 - turbidity and solids
- Lake Del Valle sites: Arroyo Valle and Cedar Creek relatively good water quality, with exceptions
- Benefits of low density and dilution

Conclusions (continued)

- Several parameters correlate with rainfall and flow;
- Higher pollutant concentrations in Bethany Headland sites reflect watershed uses;
- Points to need for careful, comprehensive land management on a watershed scale



Division of Engineering – Real Estate Branch



Bethany Reservoir Water Quality Workshop

Linus Paulus

December 11, 2007



DEPARTMENT OF
WATER RESOURCES
PUBLIC AFFAIRS

State Water Project Water Facilities

**SWP FACILITIES IN THE
SOUTH BAY AREA**



South Bay Aqueduct

Water Contractors Served

- **SANTA CLARA VALLEY WATER DISTRICT**
- **ALAMEDA COUNTY WATER DISTRICT**
- **ALAMEDA COUNTY FC&WCD ZONE 7**

Municipalities served include: Livermore, Pleasanton, Dublin, San Ramon, Fremont, Newark, Union City, Milpitas, Santa Clara, San Jose, and others including Wente

South Bay Aqueduct Improvement and Enlargement Project

- Replacement or refurbishment of existing valves, blow-off structures, manholes, and appurtenant structures. Completed 2005.
- 4 new pumps and expansion of South Bay Pumping Plant Facilities. 45 cfs each for a total of 180 cfs additional capacity – current.
- 3rd Brushy Creek Pipeline. 3.8 miles long, 78-inch RCP.

Excavation of New SBPP



16 3:43PM

New 3rd Brushy Creek Pipeline 78-inch RCP





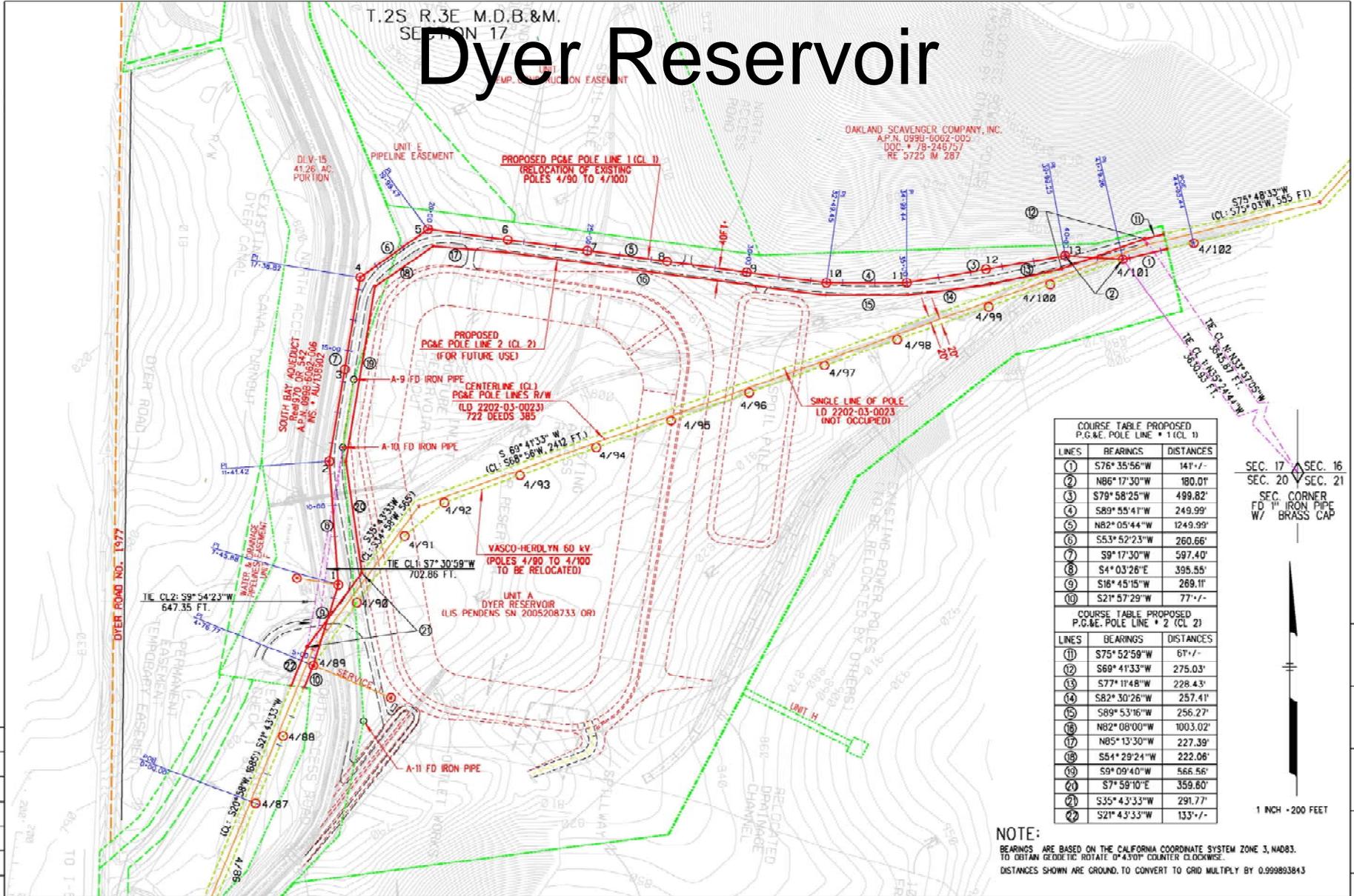
South Bay Aqueduct Improvement and Enlargement Project

- Construction of 325 acre foot Dyer Reservoir.
- Raising canal embankments, canal lining, and canal over-crossings (structures and bridges). Dyer, Livermore and Alameda Canals, and Patterson Reservoir.
- New drainage over-crossing structures to eliminate drainage into canals.
- 4 new siphons (Tesla Rd., Patterson Rd., Mines Rd. and Arroyo Seco Creek)

T.2S R.3E M.D.B.&M.
SECTION 17

Dyer Reservoir

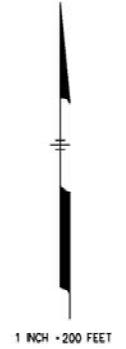
OAKLAND SCAVENGER COMPANY, INC.
A.P.N. 0998-0062-005
DOC. # 78-246757
RE 5723 M 287



COURSE TABLE PROPOSED P.G.&E. POLE LINE # 1 (CL 1)		
LINE#	BEARINGS	DISTANCES
1	S76°35'56"W	141'-/-
2	N86°17'30"W	180.01'
3	S79°58'25"W	499.82'
4	S89°55'41"W	249.99'
5	N82°05'44"W	1249.99'
6	S53°52'23"W	260.66'
7	S9°17'30"W	597.40'
8	S4°03'26"E	395.55'
9	S16°45'15"W	269.11'
10	S21°57'29"W	77'-/-

COURSE TABLE PROPOSED P.G.&E. POLE LINE # 2 (CL 2)		
LINE#	BEARINGS	DISTANCES
11	S75°52'59"W	61'-/-
12	S69°41'33"W	275.03'
13	S77°11'48"W	228.43'
14	S82°30'26"W	257.41'
15	S89°53'16"W	256.27'
16	N82°08'00"W	1003.02'
17	N85°13'30"W	227.39'
18	S54°29'24"W	222.06'
19	S9°09'40"W	566.56'
20	S7°58'10"E	359.80'
21	S35°43'33"W	291.77'
22	S21°43'33"W	133'-/-

SEC. 17 SEC. 16
SEC. 20 SEC. 21
SEC. CORNER
FD 1" IRON PIPE
W/ BRASS CAP



NOTE:
BEARINGS ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM ZONE 3, NAD83.
TO OBTAIN GEODETIC ROTATE 0°43'01" COUNTER CLOCKWISE.
DISTANCES SHOWN ARE GROUND. TO CONVERT TO GRID MULTIPLY BY 0.9998938143

MICROFILMED	CHG. DISTRIBUTION	CHG.	APPROVED BY	AUTHORIZATION
				30433258
REFERENCE DWGS.	CHANGES MADE ON THE LOCATION OF THE POINTS.CGV		BY: P. HARDER	
SCALES:	1 inch = 200 feet	DATE	DR. G. VENTURA	
	1 centimeter =	DESCRIPTION	CH. W. TOUTGES	
		REVISIONS	D.K. W. TOUTGES	
			DATE 3-09-05	

DWR - DYER RESERVOIR
VASCO - HERDLYN 60 kV RELOCATION

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA



JCN	22 05 051
REGION	ALAMEDA
COUNTY	ALAMEDA
PROFILE	
SHEET NO.	1 OF 1
DRAWING NUMBER	B-6310
CHANGE	1

CENTIMETERS

INCHES

Future Location of Dyer Reservoir



South Bay Aqueduct Canal



21 12:36PM

Bridge Structure to be replaced



Mines Road – future Siphon



Mines Road

Check Structures

Arroyo Mocho Creek

21 12:38PM

Mitigation for South Bay Project

288 acres total mitigation required
(upland and wetland habitat)

Burrowing Owl, Kit Fox, Tiger Salamander, Red Legged Frog

Two Locations – Egan Property at corner of Dyer Road
and Altamont Pass Road; and
– Bethany Reservoir

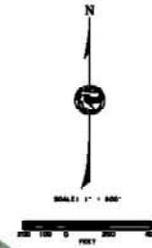
- Initial discussion began in March/April 2004
 - wetland habitat creation (23 acres at Bethany)
- First contact with State Parks in July of 2004
- Alternative choices were studied
- Bethany put back on the radar in 2006 at the request of regulatory agencies.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING – GEODETIC BRANCH

AUGUST, 2007

SOUTH BAY AQUEDUCT REHABILITATION MITIGATION
BETHANY RESERVOIR
TRANSFER TO DFG

EXHIBIT "C"



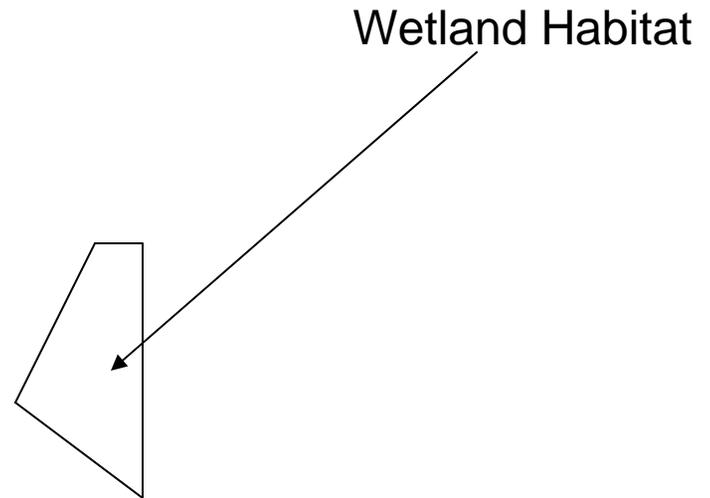
Bethany Mitigation Lands

168.39 acres (28.76)

DLV-2-C
(DLV-4-G)
(DLV-5-C)
(DLV-6-J)



Bethany Conservation Easement – Plat Map



Issues

Bethany Conservation Easement

1. Existing Leases
 - needed to be reviewed by regulatory agencies
 - modifications

2. Exceptions to Title
 - provided ESA with copies of all title exceptions and explanations. ESA prepared analysis of exceptions.

3. Land Under the Control of Parks and Recreation (DPR)
 - Negotiated Amendment to transfer Agreement with DPR.

Leases

- Added Special Provisions –
 1. Fences are to be kept in good repair and livestock must be contained within fenced areas. Failure to keep up the fences may be grounds for termination.
 2. This lease is subject to a conservation easement which may restrict, limit, and prohibit grazing practices and or certain areas of the property which are used for grazing.
 3. Squirrel Abatement is prohibited unless authorized in writing by State.
- *Received DGF and USFW service approval for continuation of leases using above Special Provisions.

Reasons for Lease Compatibility

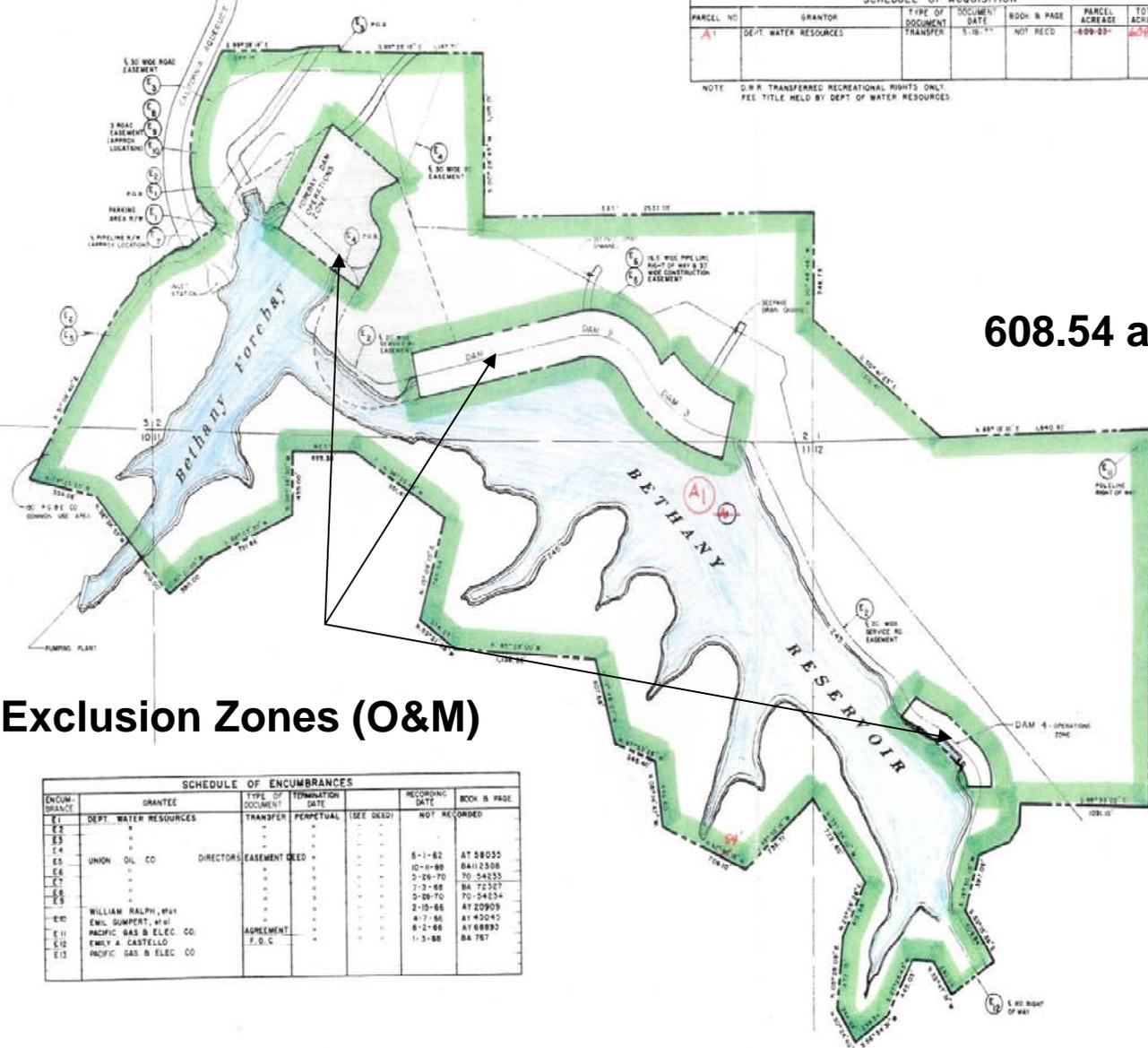
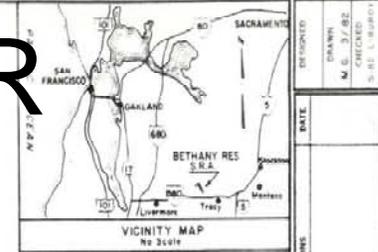
1. USFWS and DFG reviewed and approved standard grazing lease language.
2. Vegetation grazing is an effective tool to control vegetation and not inconsistent with the terms and goals of the conservation easement.
3. Burrowing owls can't nest in high vegetation.
4. Controlled vegetation is also beneficial to the Kit Fox.

Land Transferred to DPR

POR SECTIONS 1,2,3,10,11 & 12, T.2 S., R.3 E. M.D.M.

SCHEDULE OF ACQUISITION						
PARCEL NO.	GRANTOR	TYPE OF DOCUMENT	DATE	BOOK & PAGE	PARCEL ACREAGE	TOTAL ACREAGE
A1	DEPT. WATER RESOURCES	TRANSFER	5-18-82	NOT RECD	608.54	608.54

NOTE: D.W.R. TRANSFERRED RECREATIONAL RIGHTS ONLY. FEE TITLE HELD BY DEPT. OF WATER RESOURCES



608.54 acres

Exclusion Zones (O&M)

SCHEDULE OF ENCUMBRANCES						
ENCUMBRANCE	GRANTEE	TYPE OF DOCUMENT	TERMINATION DATE	RECORDING DATE	BOOK & PAGE	
E1	DEPT. WATER RESOURCES	TRANSFER	PERPETUAL (SEE DEED)	NOT RECORDED		
E2						
E3						
E4	UNION OIL CO.	DIRECTOR'S EASEMENT DEED		8-1-82	AT 88035	
E5				10-19-88	BA12308	
E6				0-24-70	70-54233	
E7				7-3-88	BA 72327	
E8				0-28-70	70-54234	
E9				2-15-88	AT 20809	
E10	WILLIAM RALPH, WIFE EMIL GUMPERT, HUSB.			4-7-86	AT 42040	
E11	PACIFIC GAS & ELECT. CO.	AGREEMENT		8-2-88	AT 68892	
E12	EMILY A. CASTELLO	F.D.C.		1-3-88	BA 787	

- LEGEND**
- STATE RECREATION AREA BOUNDARY
 - (1) ACQUISITION PARCEL
 - (2) ENCUMBRANCES
 - (P.O.B.) POINT OF BEGINNING
 - LIMITED USE AREA
 - (A1) APPURTENANCE



REVISIONS 	DATE 	DESIGNED DRAWN M.C. CHECKED S. RE. L. DRAWN	RESOURCES AGENCY OF CALIFORNIA DEPARTMENT OF PARKS AND RECREATION APPROVED: <i>[Signature]</i> DATE: 5-10-82 PROPERTY MANAGEMENT
BETHANY RESERVOIR S. R. A.			LAND OWNERSHIP RECORD
DRAWING NO. 1782			SHEET NO. 1 OF 1

Amendment of DWR and DPR Agreement

- No existing plan to develop additional park facilities, but maintains public access.
- Allows conservation easement to be placed on lands controlled by DPR.
- Allows for docent staff led tours of mitigation area not more than once per week – included provision to avoid disturbances to listed species.
- Provides for DWR funding of additional park improvements to existing facilities.

Improvements

- Up to \$65,000 based upon paid invoices.
- Electronically operated access gate. \$10K
- New pavement and pavement repairs.
- Other improvements not limited to concrete picnic tables, steel shade ramadas, and a vault toilet.

Park Improvements



Access Road to be paved



DWR/DPR staff identifying areas of pavement repair.





Shade Ramadas and picnic tables

16 3:19PM

Existing Vault Toilet





Management and Monitoring of Conservation Easement

- Conservation Easement Management Plan (CEMP) will define the following.
- Provides for annual biological survey of protected species by DWR environmental scientists.
- Provides for annual inspections of property by DWR environmental scientists to ensure protected species are not being harmed by lease conditions, fences, etc.
- All survey results and any management actions taken are to be submitted annually to regulatory agencies.
- Endowment amount required to pay for above activities.
- *CEMP is not complete and undergoing revisions.
- CEMP can be provided upon request when complete.

Decision to Lease DWR Land

1. If newly acquired property, send Request to Lease to O&M HQ, Field Division, SWPAO, and any other required Division or Water Contractor for approval.
2. If existing lease – Request to Lease without solicitation to current lessee due to renewal options in existing lease, or reservations to original grantor.

Steps to Lease DWR Land

1. Fair Market Value Appraisal, DWR staff.
2. Prepare Bid Document.
3. Prepare Lease Document for inclusion with bid package.
4. Advertise.
5. Mail to prospective bidders.
6. Bid Opening.
7. Mail Lease to bid winner.
8. Finalize Lease, MOS package, insurance, and/or DGS approval if over \$150,000.

Standard Lease Terms

- Five years with a five year option to renew.
- Allows for rental-rate adjustments.
- Highest bidder.
- Lessor must maintain fences, gates, etc.
- Only specific activities or purposes are allowed.
- Must maintain liability insurance.
- Bi-annual rent payments.
- Cancellation clauses.

Benefits of Leasing DWR Land

1. Keeps excess land economically productive.
2. Allows for temporary uses until property is required for project needs.
3. Provides a source of revenue.
4. Provides vegetation management.
5. Reduced O&M costs.
6. Helps prevent trespassing and vandalism.
7. Public Relations.



Rangeland Watershed Management Practices

Sheila Barry

Theresa Becchetti

University of California Cooperative Extension

Ranch Water Quality Planning Short Course



- Developed by University of California Cooperative Extension & Natural Resource Conservation Service in 1995
- Addressed water quality issues on rangelands
- Self-determined compliance
- Livestock & dairy owners and operators

**Results of a Statewide Survey of California's
Ranch Water Quality
Planning Short Course**

*Stephanie Larson, Kelly Smith,
David Lewis, John Harper and Mel George Ph.D.,*

**UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
DAVIS, CALIFORNIA**

Ranch Water Quality Planning Short Course

Involved -

- Four to six sessions
- Field site visits
- Letter of intent
- Written plan

Written Ranch Water Quality Plan



Contains 8 Sections:

- Introduction
- Goals- *Quality of Life; Production; Natural Resources*
- Property location & description – *property facilities & resources*
- Enterprise descriptions
- Current ranch management practices
- Water quality assessment
- Planned management practices
- Monitoring program

Self Assessment Field Site Visits



Successful Voluntary Program Indicators

- Rangeland owner and manager participation in water quality training
- Completion of ranch non-point source self assessment
- Completion of ranch water quality plans
- Implementation of best management practices (BMPs) proposed in ranch water quality plans

Table 1

Reasons for taking the short course cited by respondents who implemented BMPs *or* did not implement BMPs

Reasons for attending the short course	Implemented BMPs	
	Yes (n=252) %	No (n=120) %
Learn about non-point source pollution	72	66
Learn about non-point source pollution regulations	65	57
To support livestock industry water quality	68	60
To avoid regulation	73	68
Other reasons	13	4

Table 2

Reasons for implementing Best Management Practices

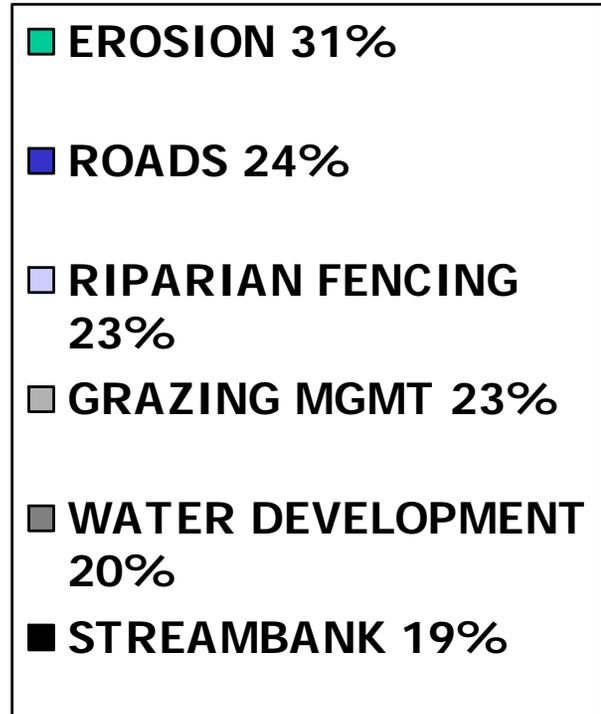
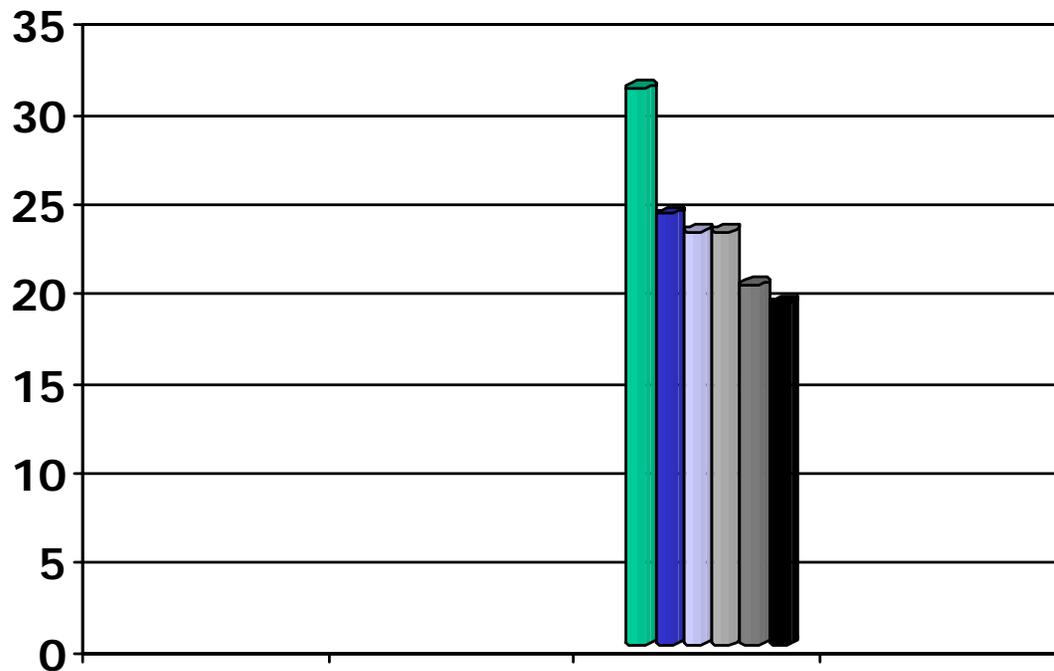
Reasons for implementing BMPs	Implemented BMPs % Respondents
To control non-point source pollution	68
To comply with non-point source regulations	35
To support industry water quality initiative	63
To avoid regulation	50
Other reasons	36

Table 3

Non-point sources of pollution identified by respondent
with rate of Best Management Practice implementation

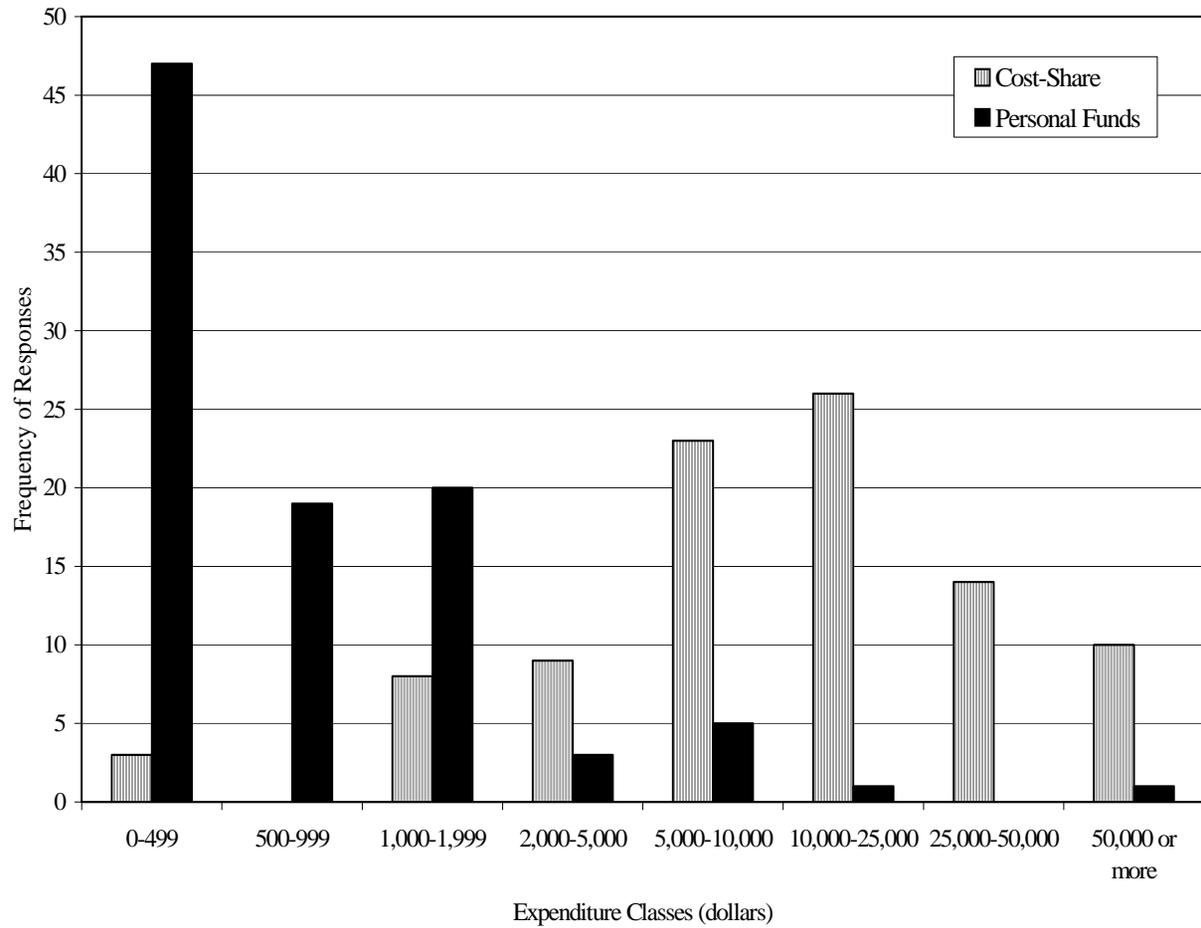
Non-point sources of pollution	Implemented BMP	
	Yes (n=252)	No (n=120)
	<u>(%)</u>	<u>(%)</u>
Sediment	70	35
Nutrient	22	10
Pathogen	12	3
Heat	13	5
Riparian damage	36	14

Management Practices Implemented



Funding Spent on BMPs Implementation

Figure 2



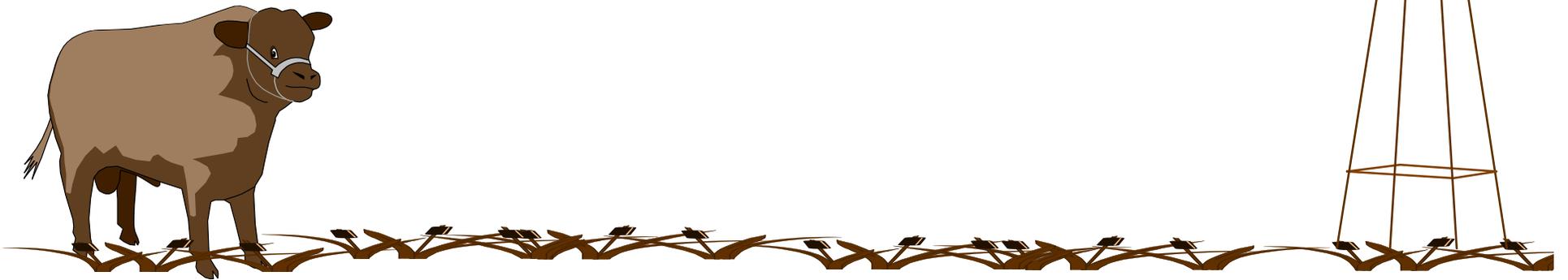
SUMMARY

- Short course participants met success indicators
- Completed non-point source self assessment
- Completed Ranch plans
- Implemented BMPs with private and cost share funds
- Changed behavior from regulation avoidance to one of proactive implementation of BMPs



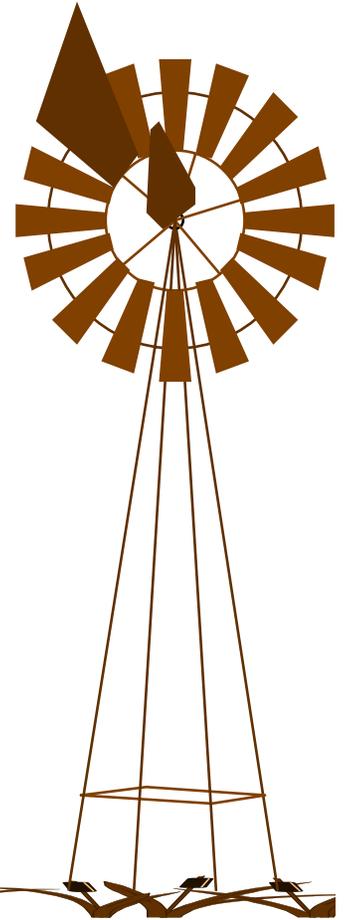
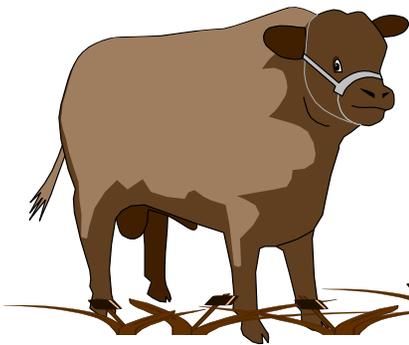
Potential Contaminants from Grazing Operations

- Pathogens
 - E. Coli
 - Cryptosporidium parvum
- Nutrients
- Sediment

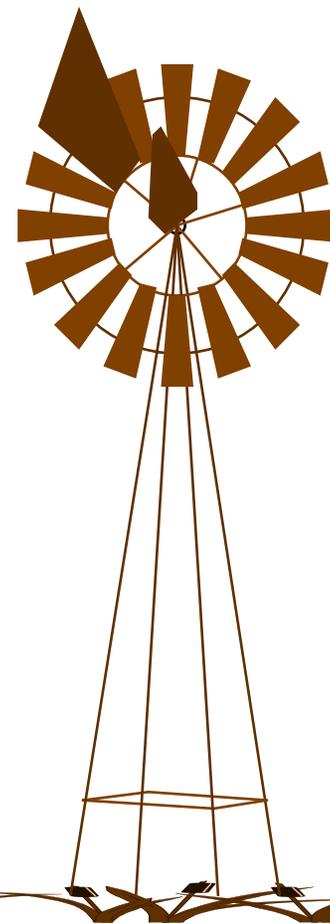
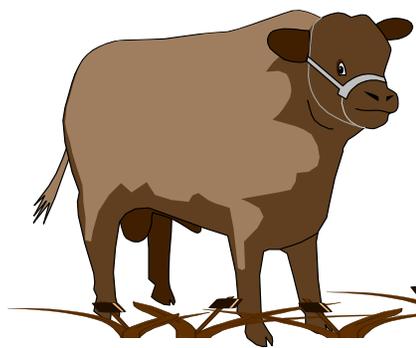


CURRENT MANAGEMENT PRACTICES

- Livestock Distribution
- Livestock/ Grazing Management
- Structural Range Improvements



Livestock Distribution



Manage livestock near streams

Water livestock off-stream



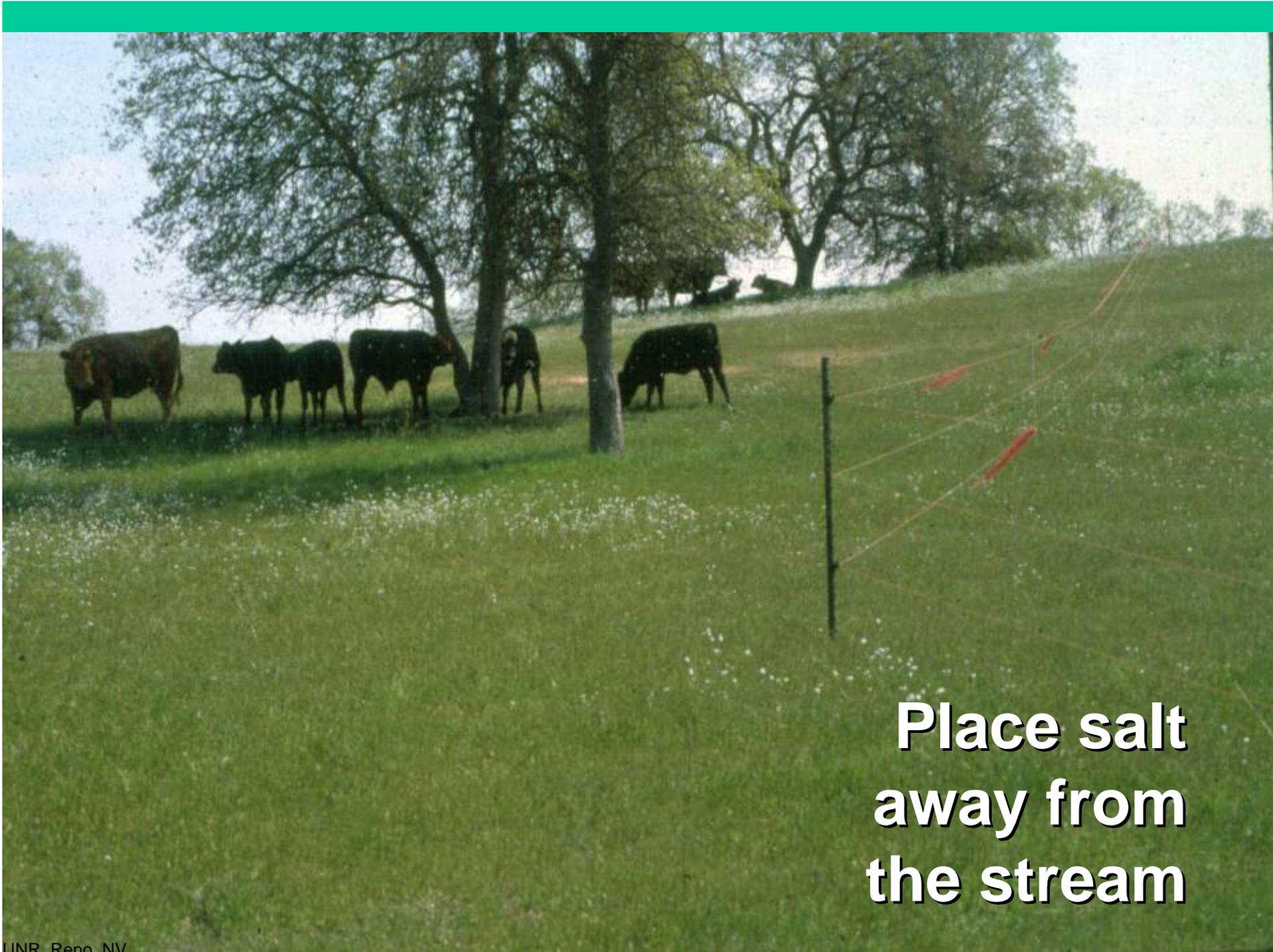






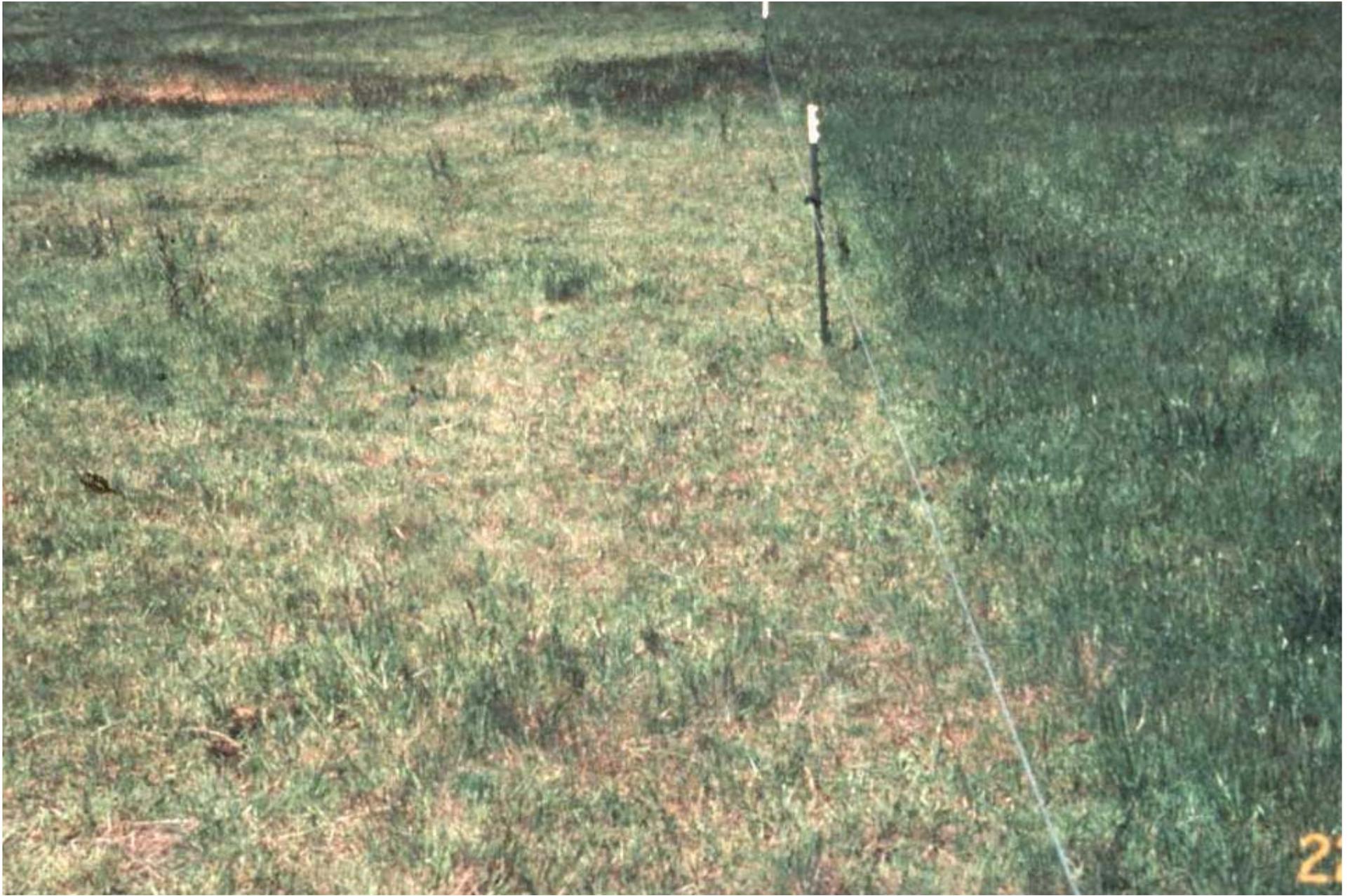






**Place salt
away from
the stream**











Cow Tracking Study



Dr. Mel George

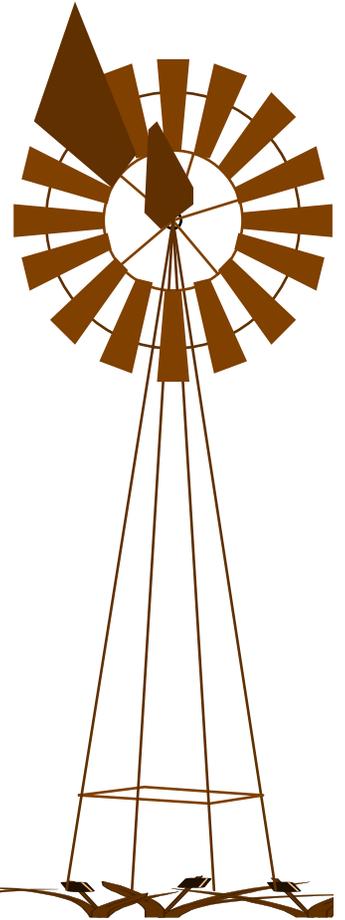
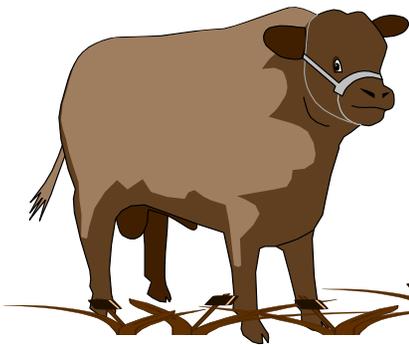


**OREGON STATE
UNIVERSITY**



Improving Distribution by Improving Forage Palatability

- Burning
- Brush Clearing
- Seeding
- Fertilization



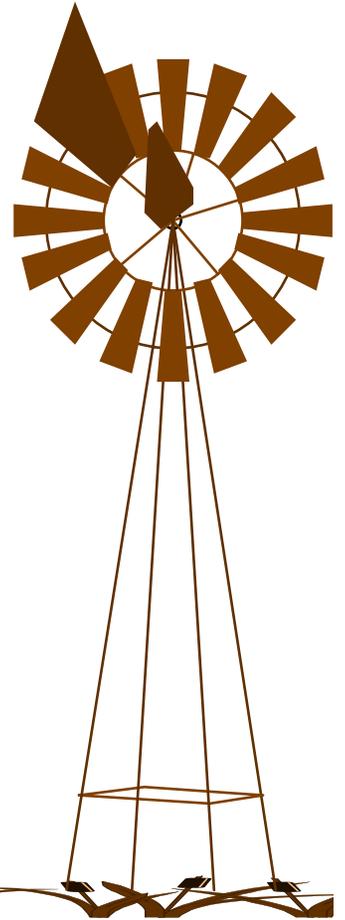
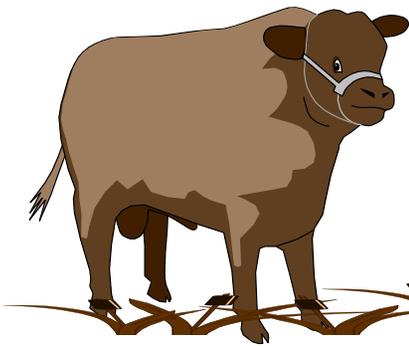






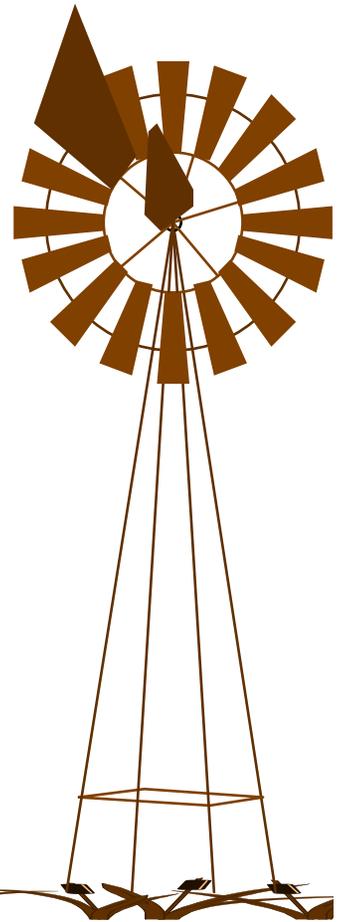
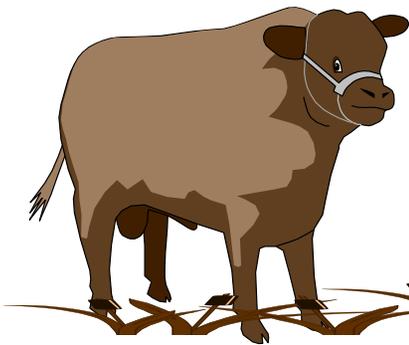


Livestock/ Grazing Management



Livestock Management

- Health Program
- Nutrition Program
- Cull Riparian Huggers
- Change Kind/Class of Animal



Cryptosporidium parvum
in the Municipal Water Source

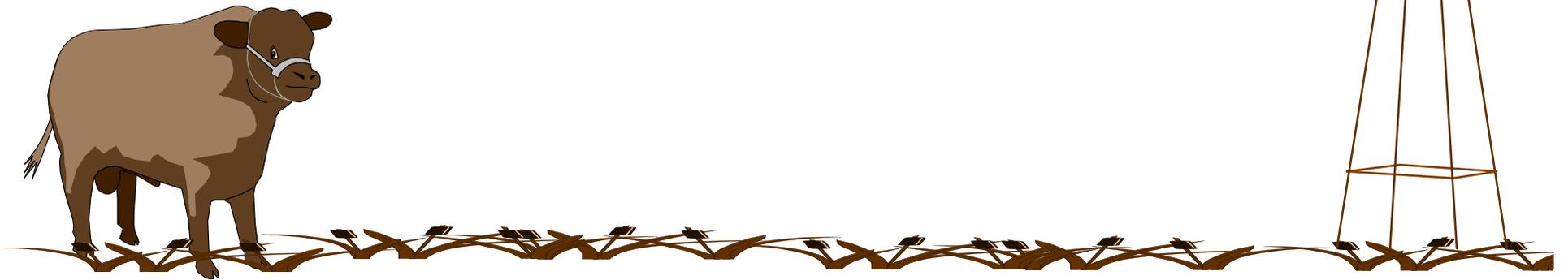






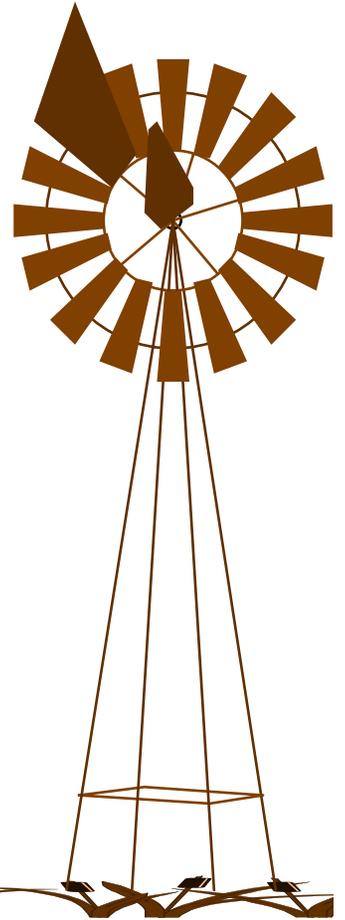
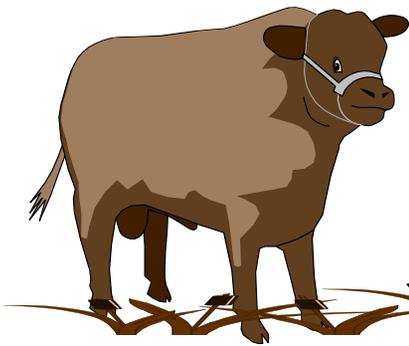


Grazing Management



Grazing Management (Prescribed Grazing)

- Proper Stocking Rate
- Rotational Grazing
- Riparian Pastures
- Rest or Temporary Exclusion
- Deferred Grazing
- Permanent Exclusion





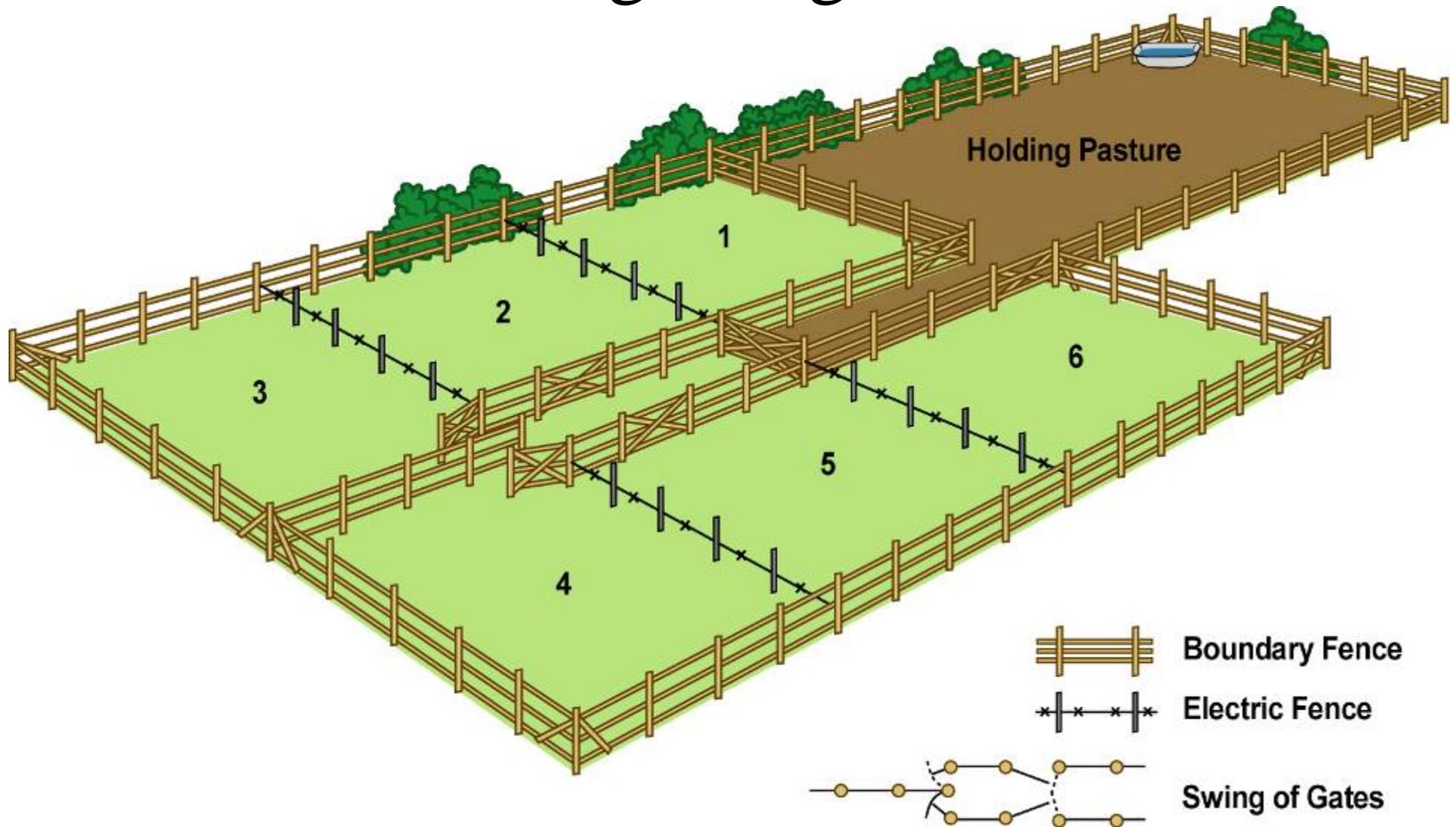
Seasonal long grazing

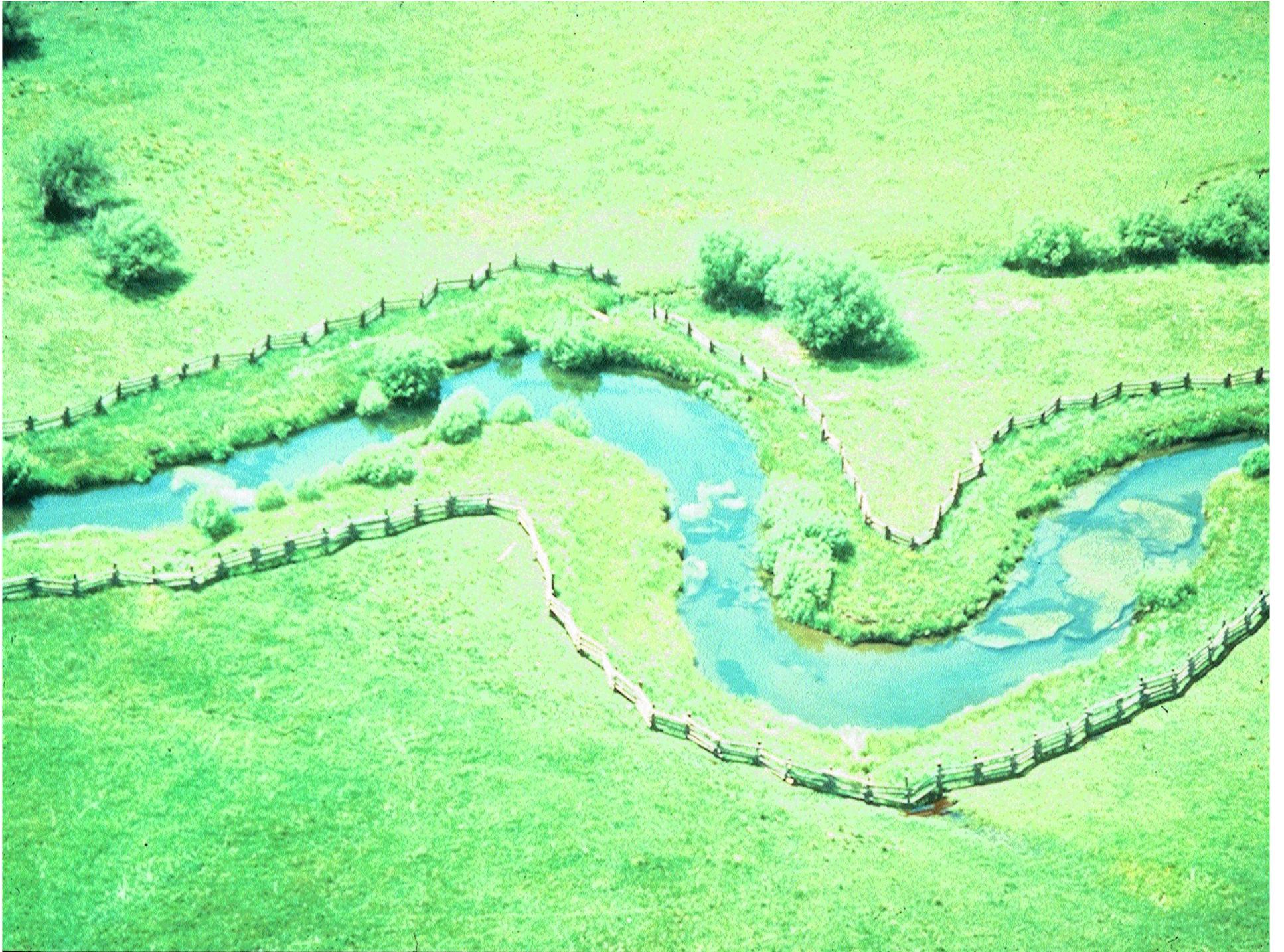


Rotational grazing



Rapid rotation or short duration grazing

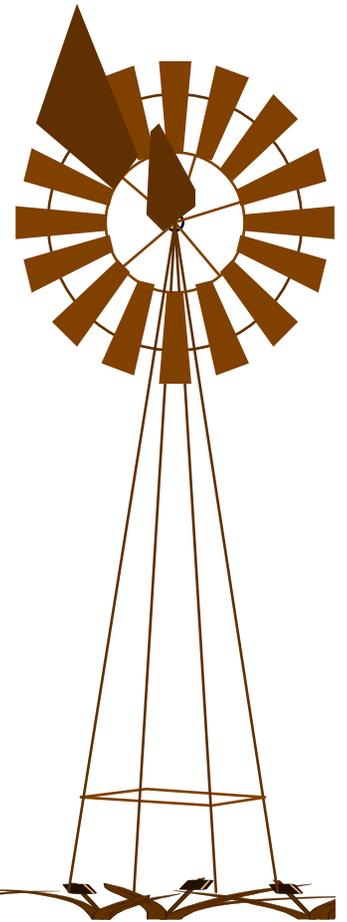
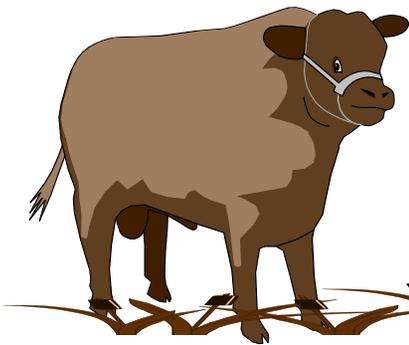






Structural Range Improvements To Stabilize Streambanks or Reduce Movement of Sediment or other Pollutants

- Landslide Treatments
- Sediment Basins
- Grade Stabilization
- Stream Crossings
- Streambank Protection or Armoring











Building/fixing roads and bridges



UNR, Reno, NV

Design roads carefully

Maintain watershed functions

Manage runoff





UNCE, Reno, NV

Rangeland Stewardship



Pardee Reservoir - EBMUD

- EPA drinking water testing
- Wanted to remove grazing
- Used recent science and BMPs to find compromise



Pardee Reservoir

- All permittees had buffers installed
- All improved distribution
- All maintained RDM standards



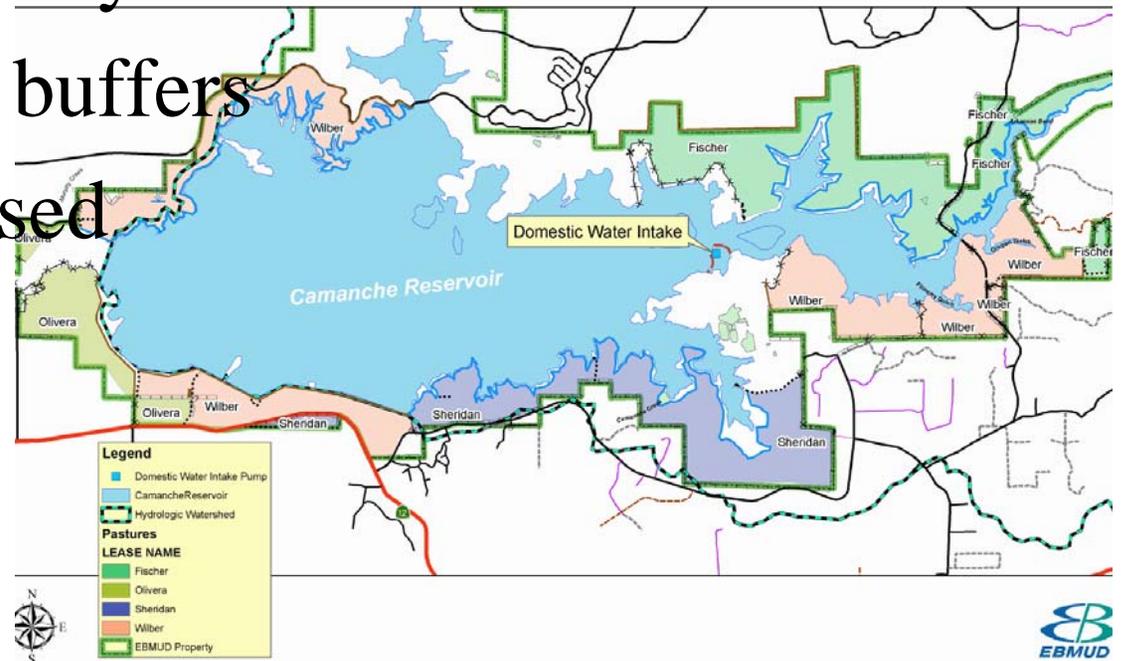
Pardee Reservoir

- One permittee also changed age of calves



Camanche Reservoir

- Drinking water is secondary use
- Still concerned about using best science to protect water quality
- Distribution and buffers primary BMPs used



Modesto Irrigation District

- Smaller reservoir
- One permittee
- BMPs used:
 - Distribution
 - Age of cattle
 - RDM

\$\$\$ Cost Share Programs \$\$\$

- NRCS – EQIP
 - Can cost share for practices to improve water quality
- NRCS – CSP
 - When the watershed is selected, will pay for practices already done.
 - Records are important
- California Rangeland Conservation Coalition