The SBA Watershed Project & the Lake del Valle Watershed

Prop. 13 Funding – CALFED Drinking Water Quality Program

Lake del Valle EBRPD Workshop

October 18, 2006

SBA Watershed Project Goals

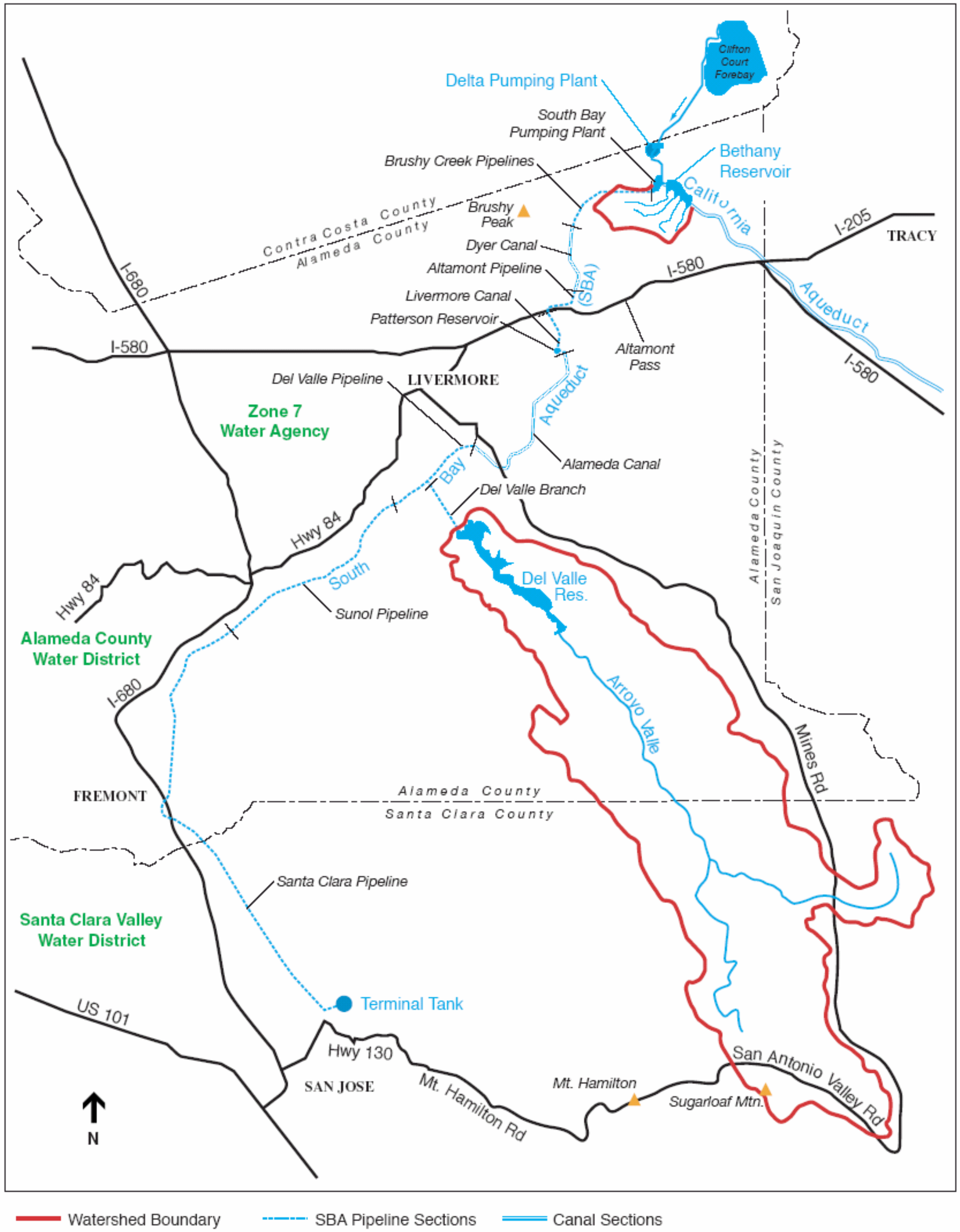
- Protect local drinking water from the identified contaminant sources
- Raise local awareness about watershed management and protection of water resources
- Recognize and respect the recreational, agricultural & environmental uses of SBA system water
- Provide educational benefits to the local community

SBA Watershed Project Activities

- Working with a Watershed Workgroup of various stakeholders to identify conservation practices relevant to the area
- Writing a Watershed Protection Program Plan guided by the Workgroup
- Developing educational materials and workshops
- Collecting stormwater quality data and reviewing other water quality information

The South Bay Aqueduct (SBA) System

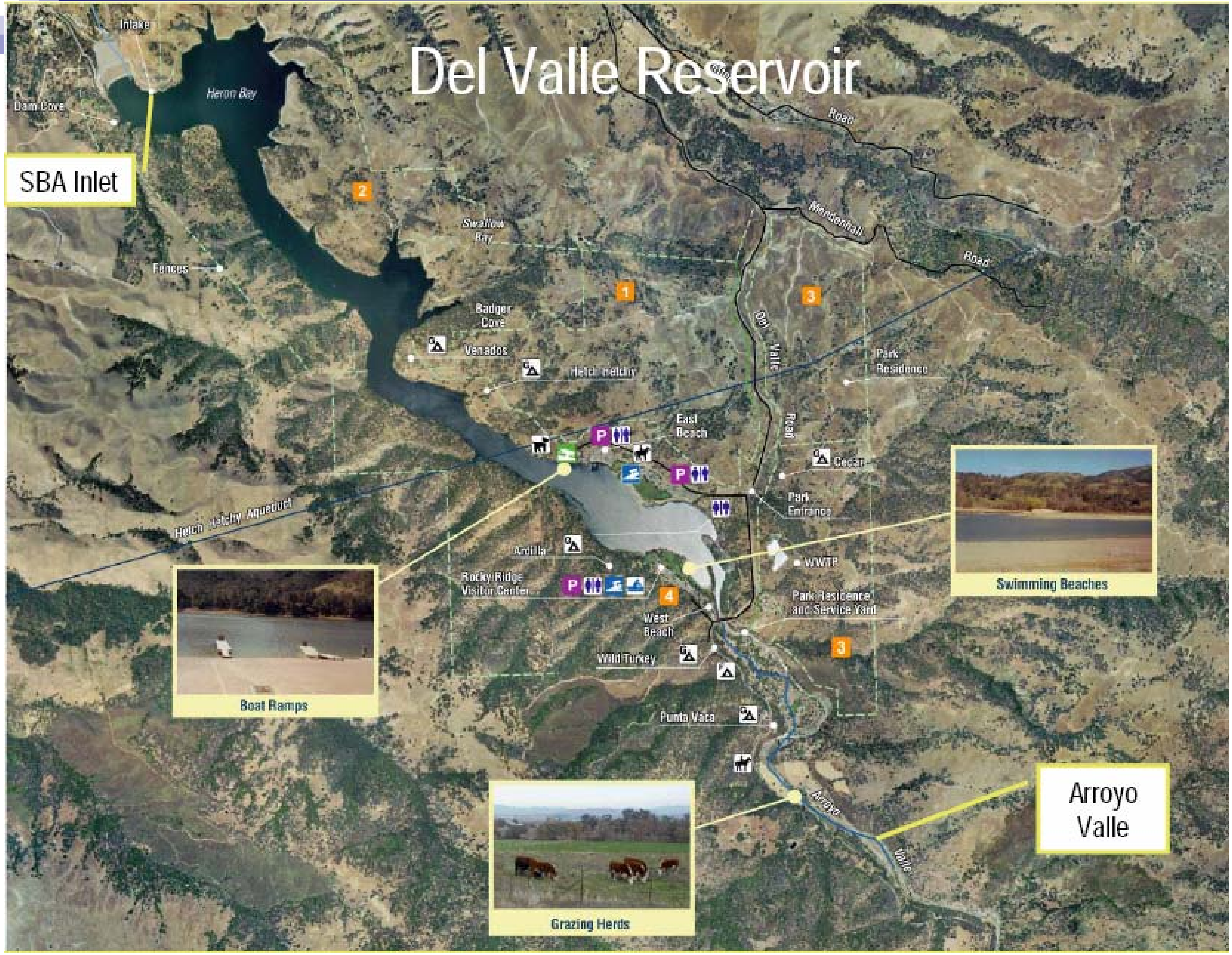
Cities served:
Zone 7
Dublin
Livermore
Pleasanton
ACWD
Fremont
Newark
Union City
SCVWD
Campbell
Cupertino
Los Altos
Los Altos Hills
Los Gatos
Milpitas
Monte Sereno
Mountain View
San Jose
Santa Clara
Saratoga
Sunnyvale



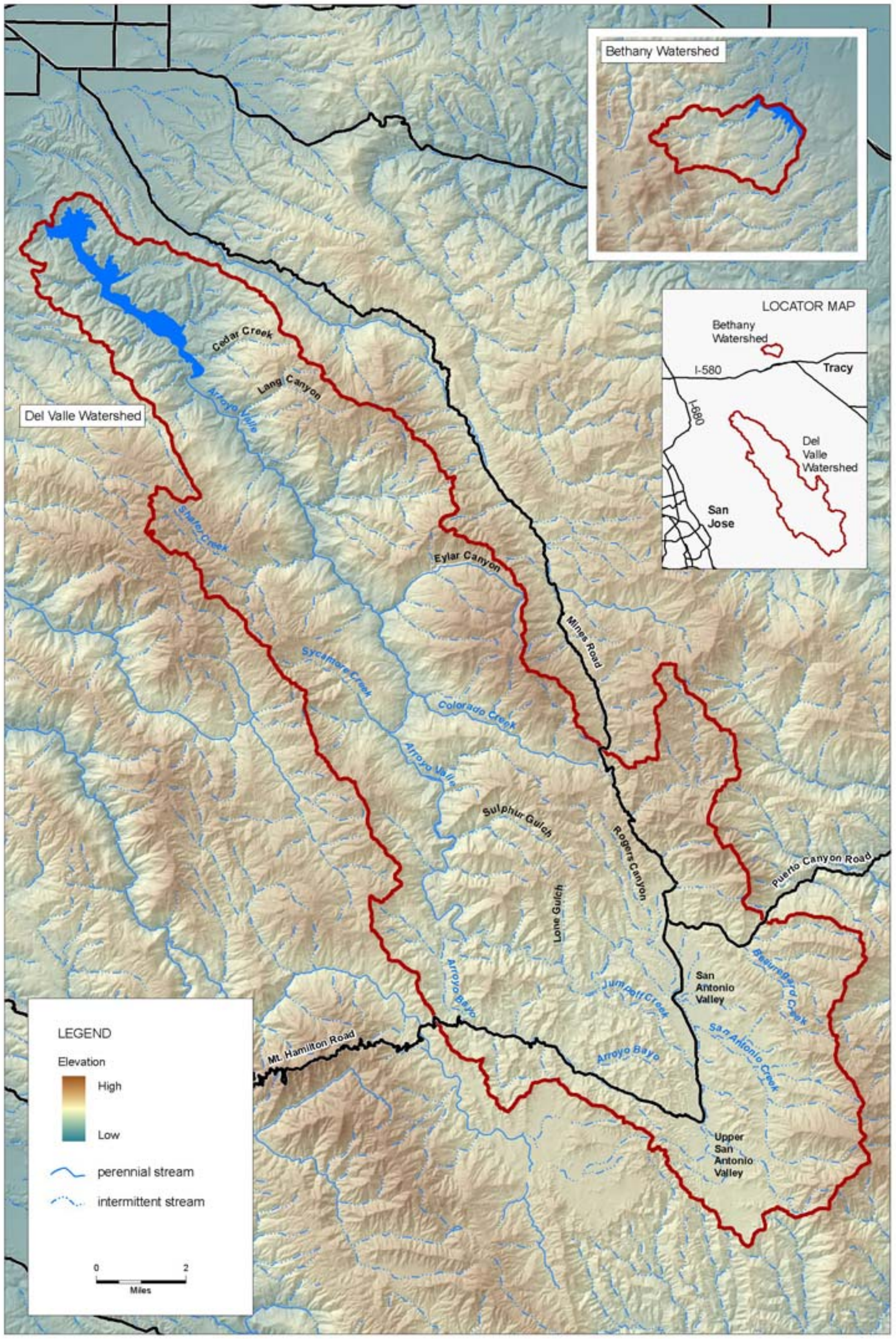
Lake del Valle – Multiple Uses

Courtesy of the Livermore Heritage Guild

Del Valle Reservoir




Lake
Del
Valle

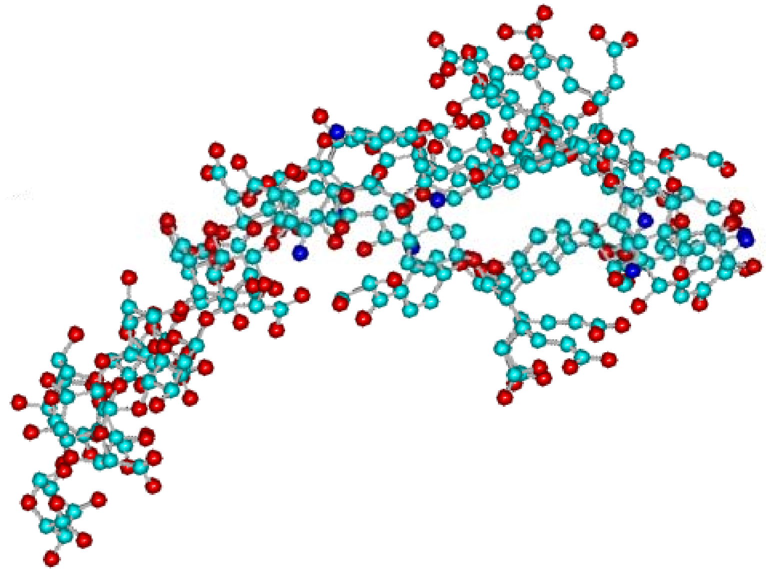


SBA Watershed Protection Program Plan . 205076

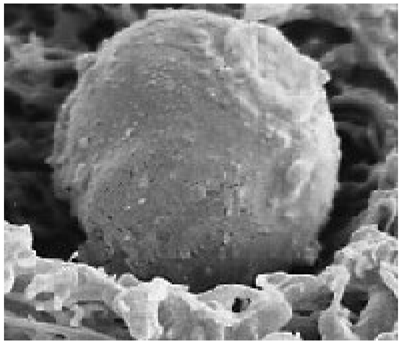
SOURCES: Topography: National Elevation Dataset, USGS, 2005
Hydrography: California Spatial Information Library, 2005

Figure 3-6
Streams and Waterways

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

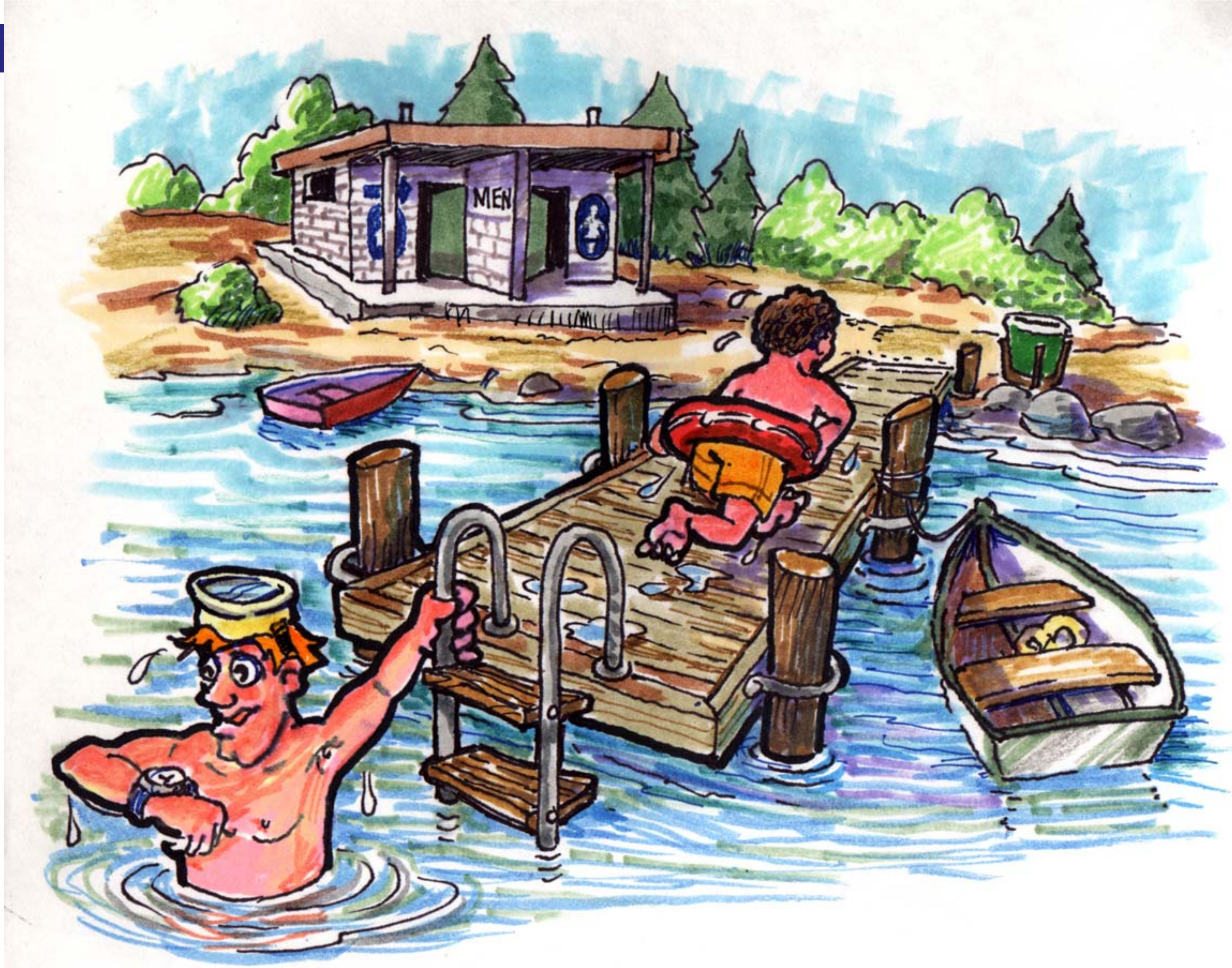

Lake
Del
Valle

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 / Spring 2007
  - "Stewardship for Small Acres" series
  - Recreation Management Strategies for Water Quality Protection

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

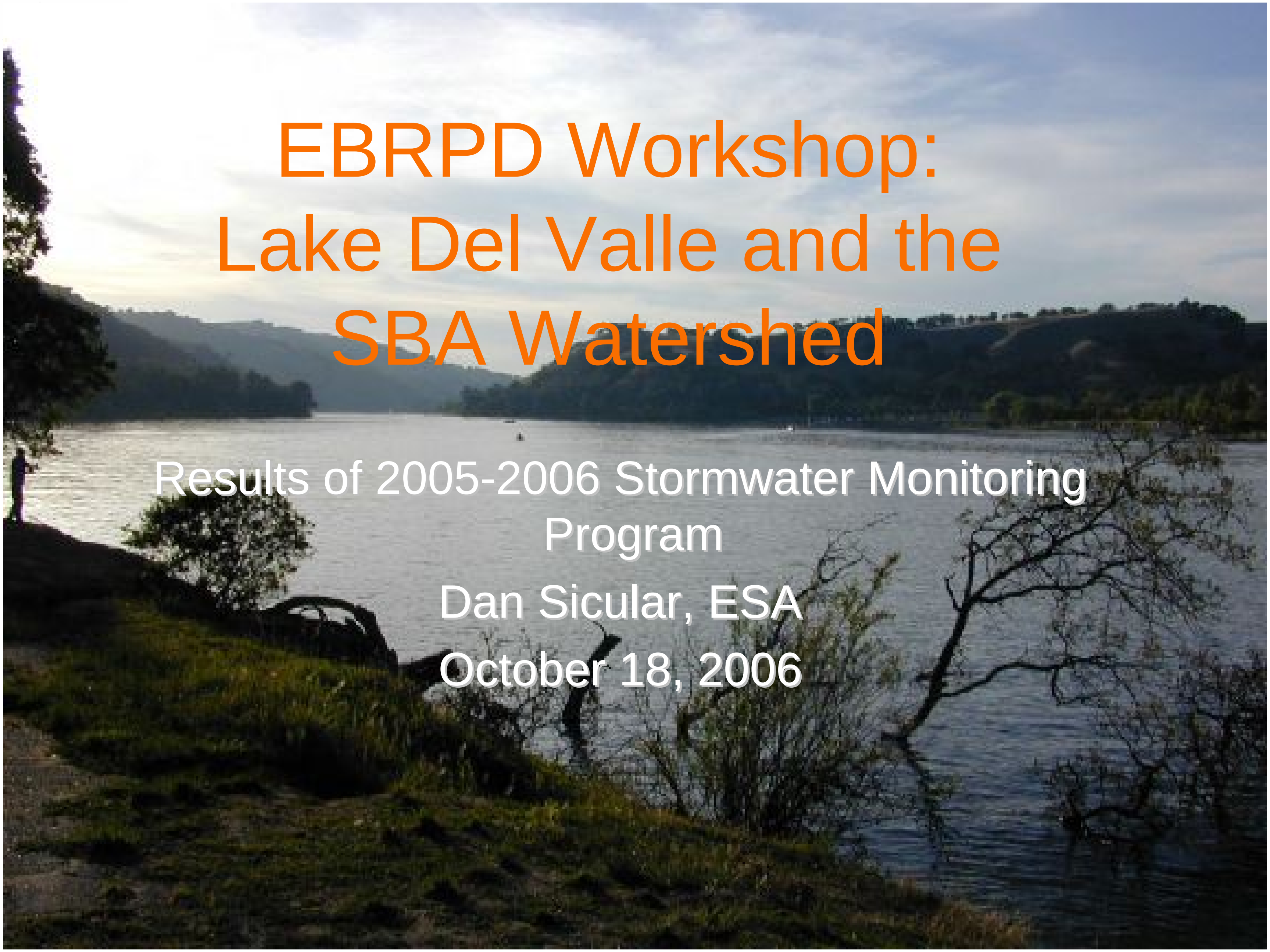
Dispose of trash properly. Litter can introduce a variety of pollutants to the water.



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

Recreation Stewardship Messages

- **Prevent erosion by staying on trails.** Erosion contributes sediment to reservoirs, which makes the water cloudy, more difficult to treat, and raises treatment costs.
- **Help prevent 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.



EBRPD Workshop: Lake Del Valle and the SBA Watershed

Results of 2005-2006 Stormwater Monitoring Program

Dan Sicular, ESA

October 18, 2006

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

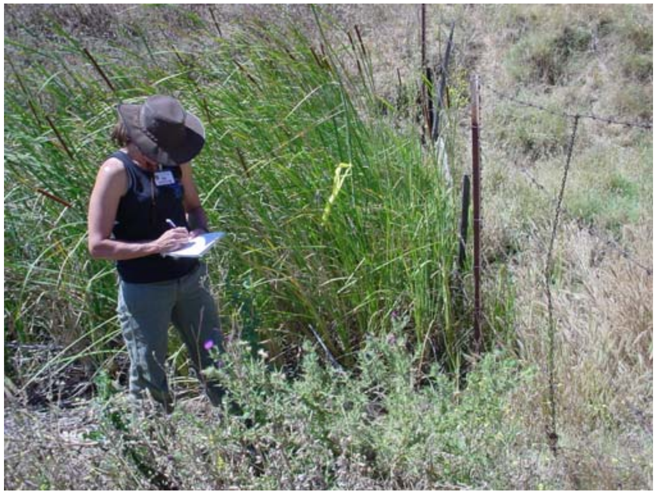
- Basic chemistry and physical properties
- Pathogens
- Nutrients

Key Water Quality Indicators

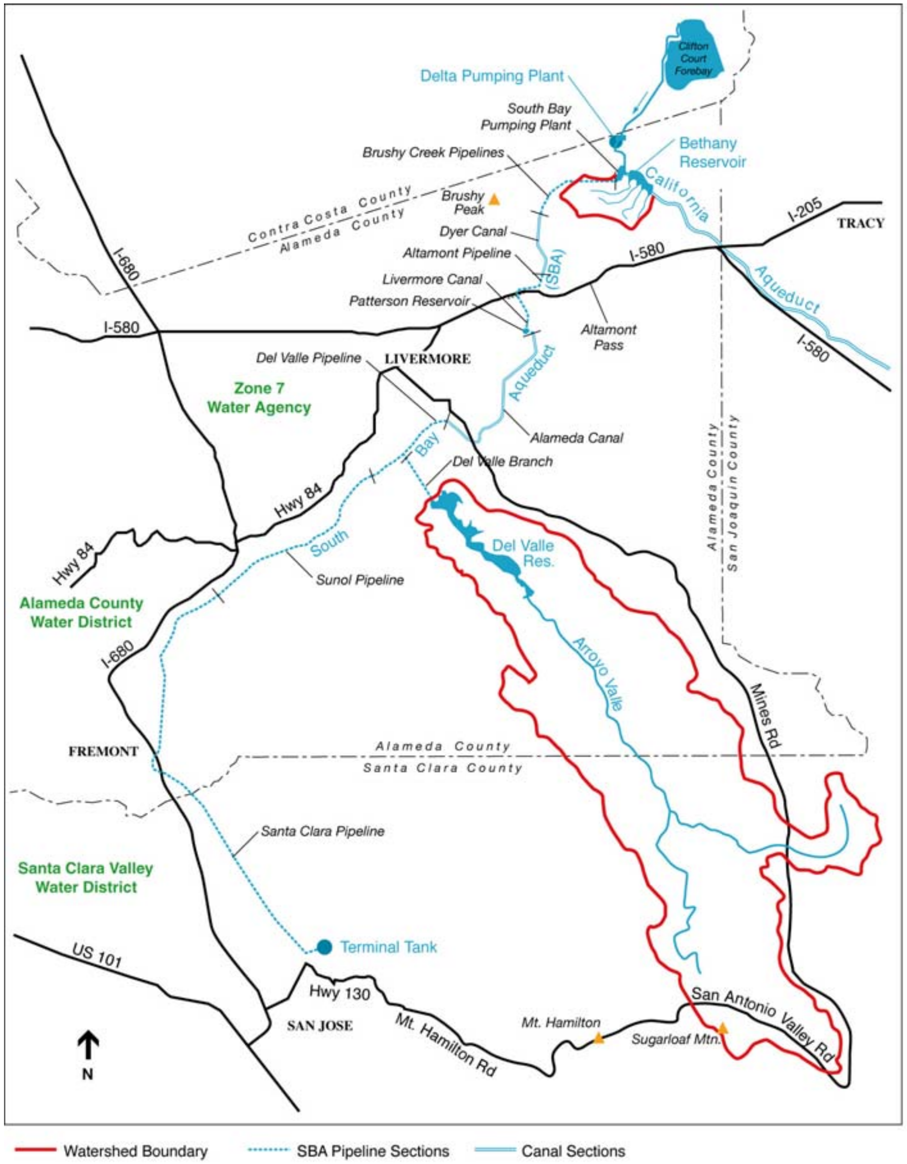
- Microbial Indicators
- Pathogens
- Bromide
- Total Organic Carbon
- Nutrients
- Turbidity
- Total Solids

Sampling Program

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

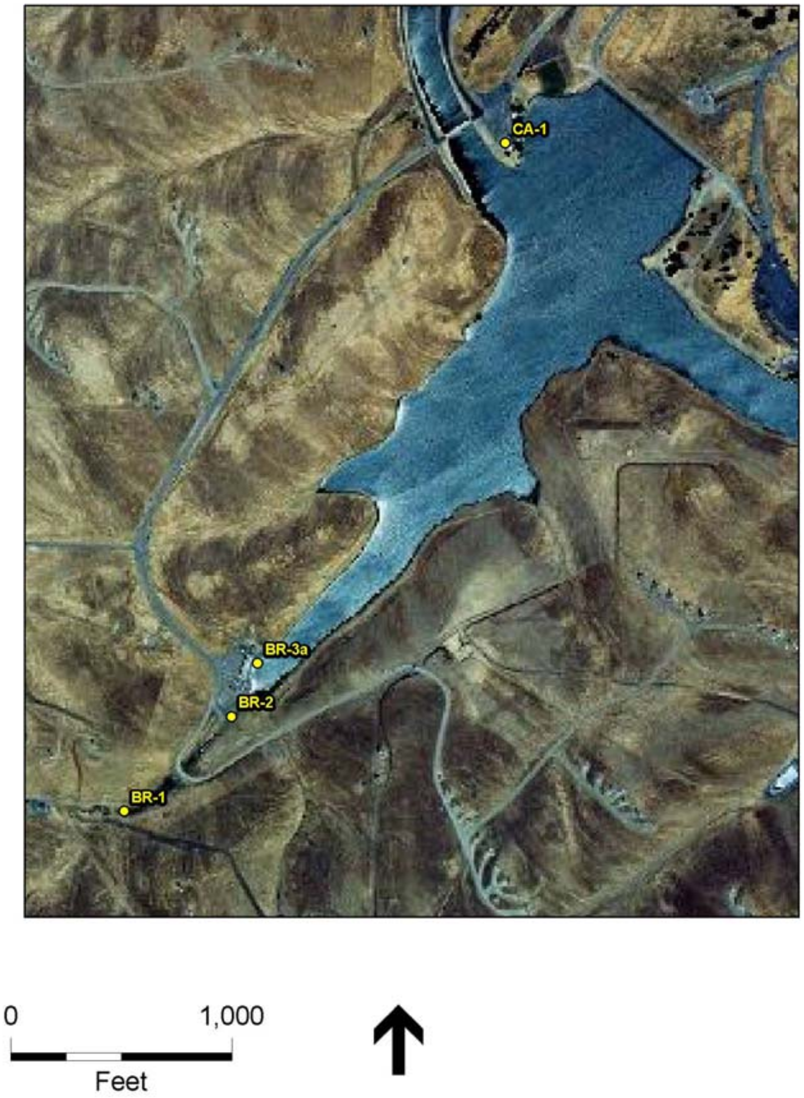


SBA System

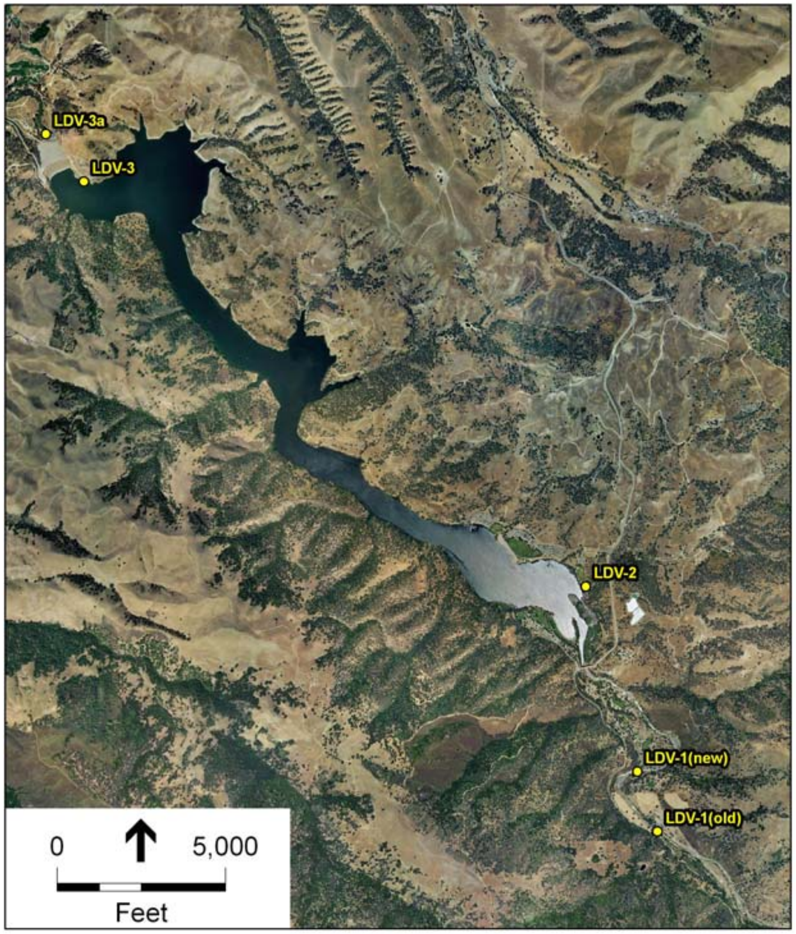


Clifton Court Forebay
Delta Pumping Plant
South Bay Pumping Plant
Bethany Reservoir
Brushy Creek Pipelines
Brushy Peak
Contra Costa County
Alameda County
Dyer Canal
Altamont Pipeline
Livermore Canal
Patterson Reservoir
California Aqueduct
I-205
TRACY
I-580
I-680
Altamont Pass
LIVERMORE
Del Valle Pipeline
Zone 7 Water Agency
South Bay Aqueduct (SBA)
Alameda Canal
Del Valle Branch
Hwy 84
Del Valle Res.
Sunol Pipeline
Alameda County Water District
Alameda County
San Joaquin County
Arroyo Valle
Mines Rd
FREMONT
Santa Clara County
Santa Clara Pipeline
Santa Clara Valley Water District
Terminal Tank
US 101
Hwy 130
SAN JOSE
Mt. Hamilton Rd
Mt. Hamilton
Sugarloaf Mtn.
San Antonio Valley Rd
N
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

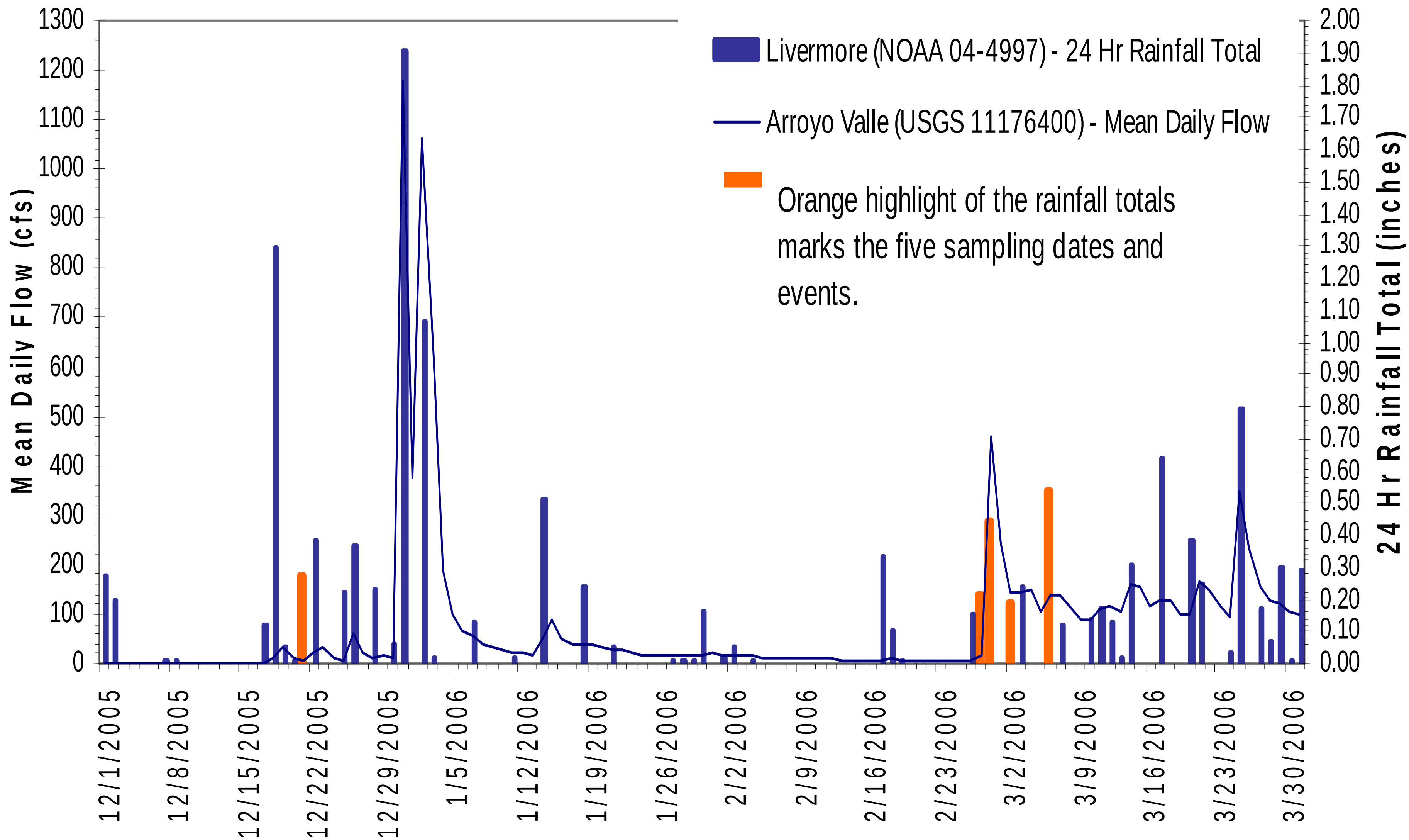
BR-1: Bethany Headlands – upstream

BR-2: Bethany Headlands – Downstream

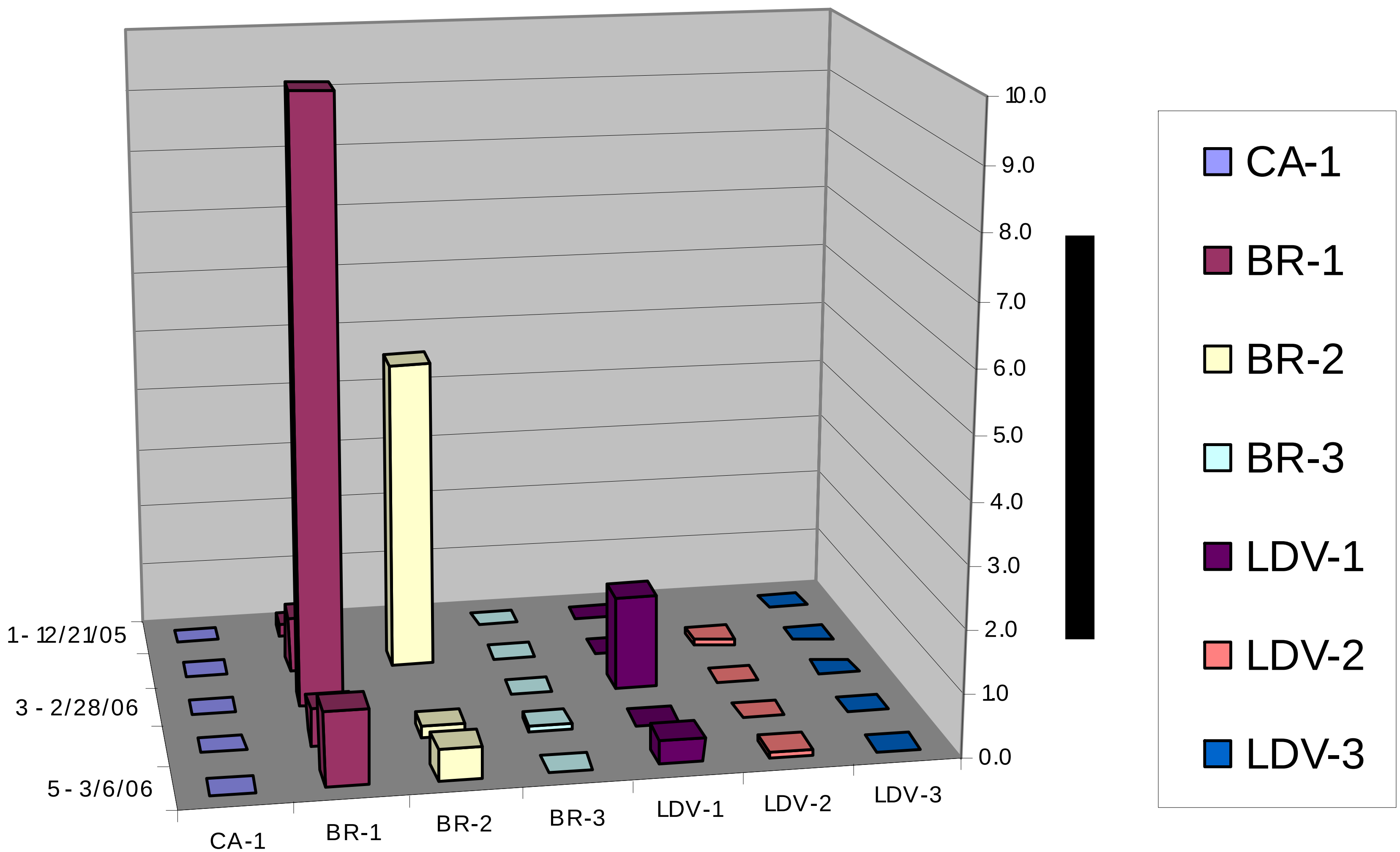
BR-3: Dyer Canal

CA-1: California Aqueduct

2005-2006 Rainfall and Streamflow

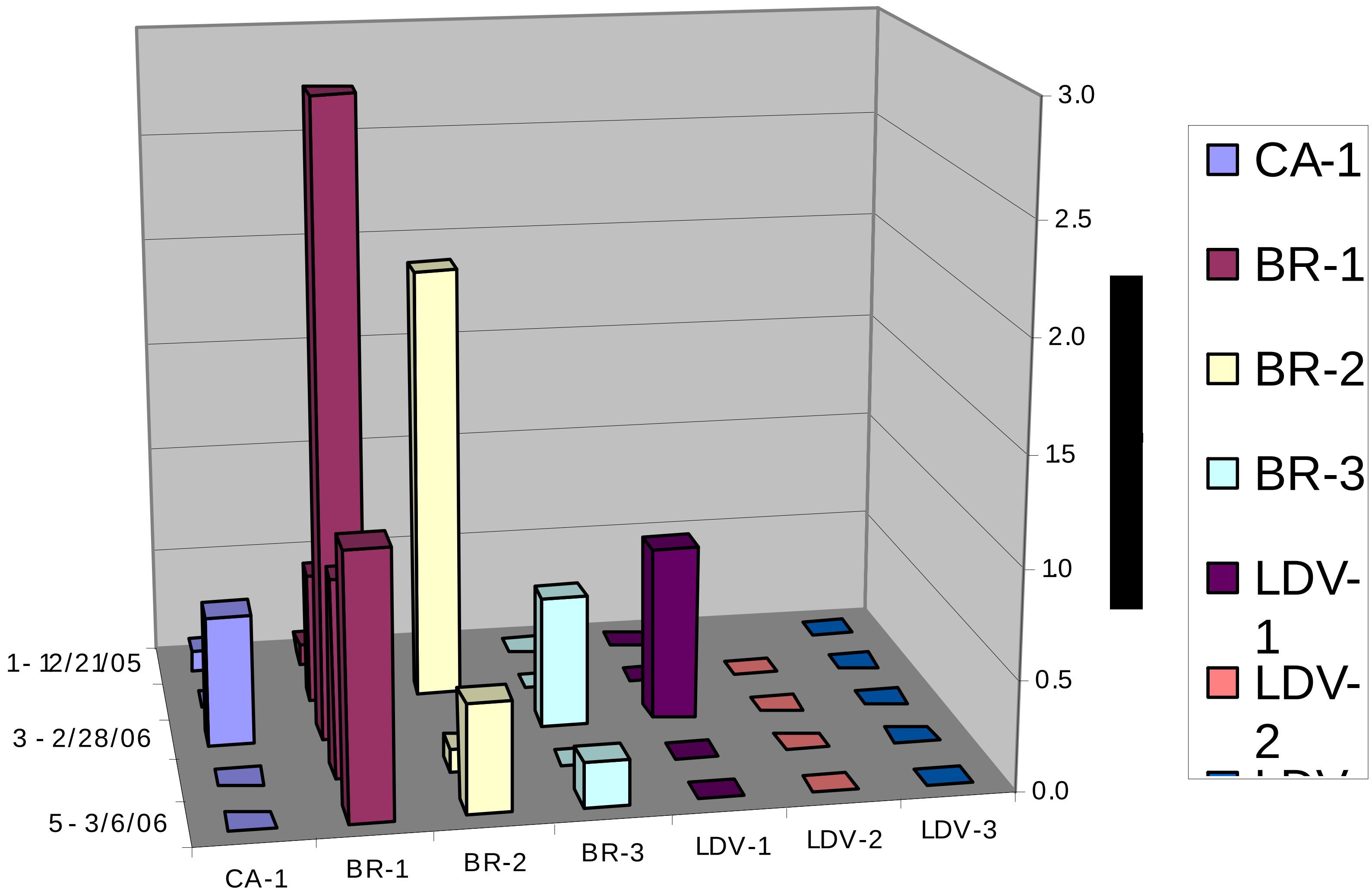


Cryptosporidium



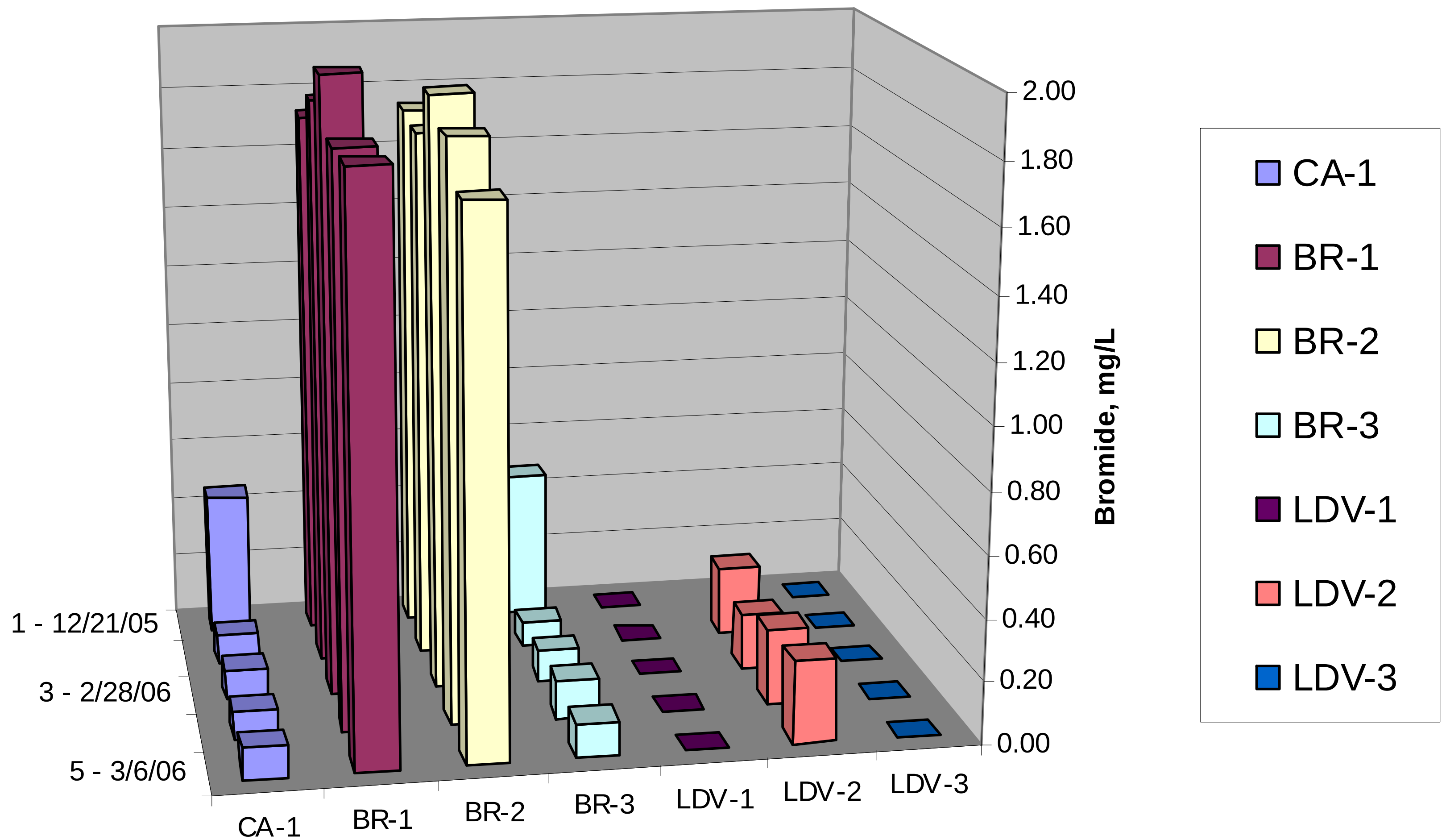
ESA

Giardia



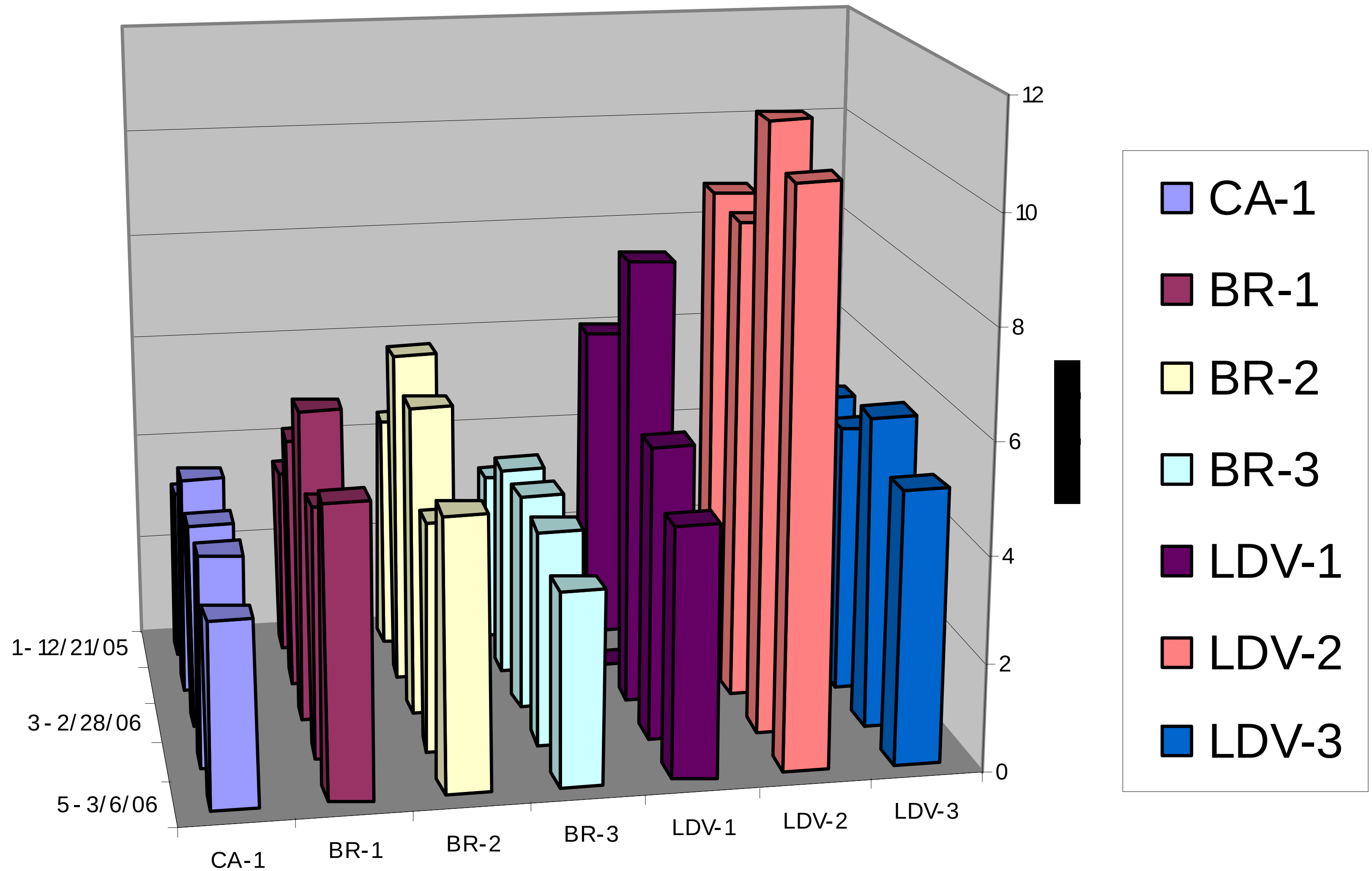
3.0
2.5
2.0
15
10
0.5
0.0
[redacted]
1- 12/21/05
3 - 2/28/06
5 - 3/6/06
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2

Bromide

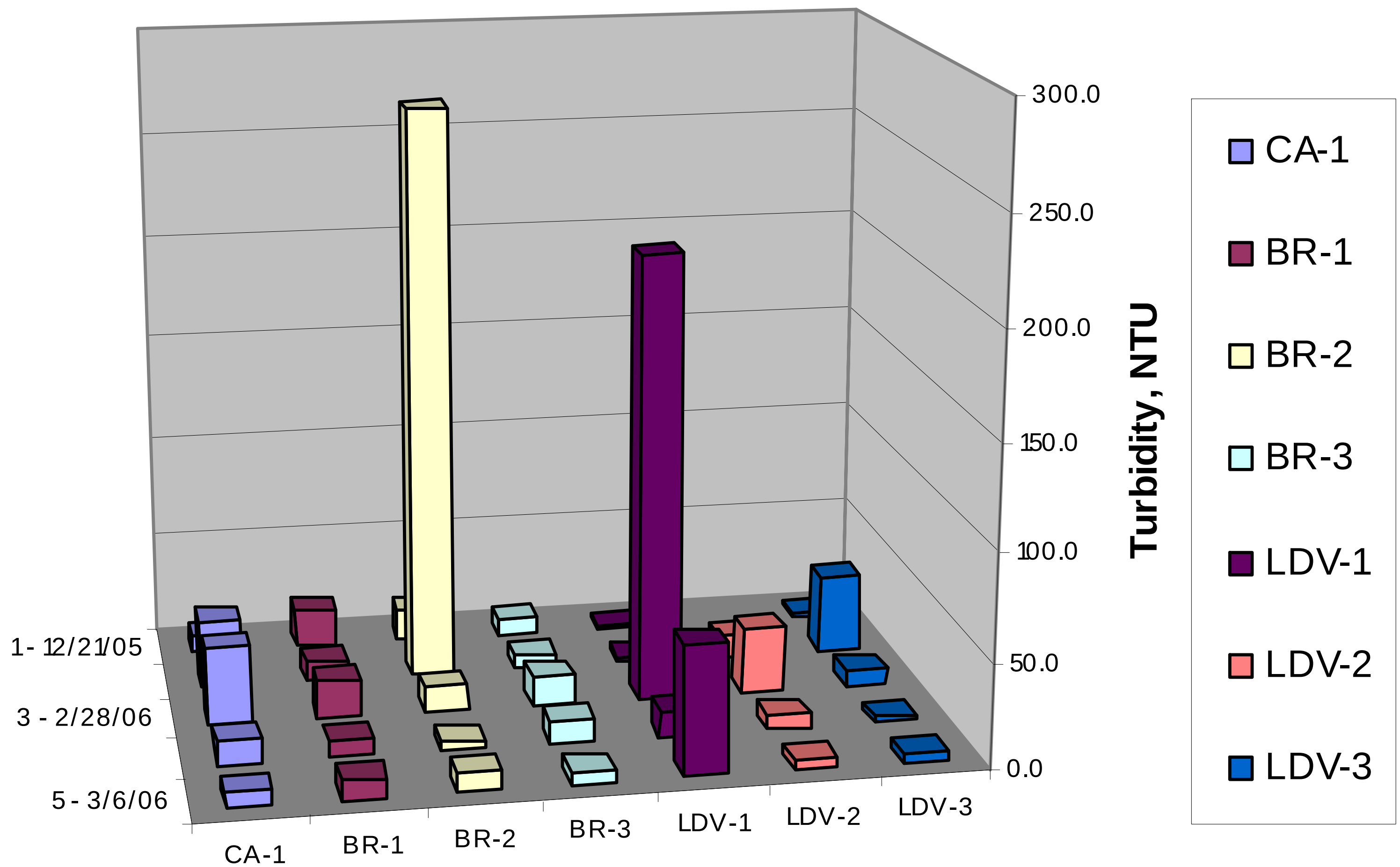


2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Bromide, mg/L
1 - 12/21/05
3 - 2/28/06
5 - 3/6/06
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3

Total Organic Carbon

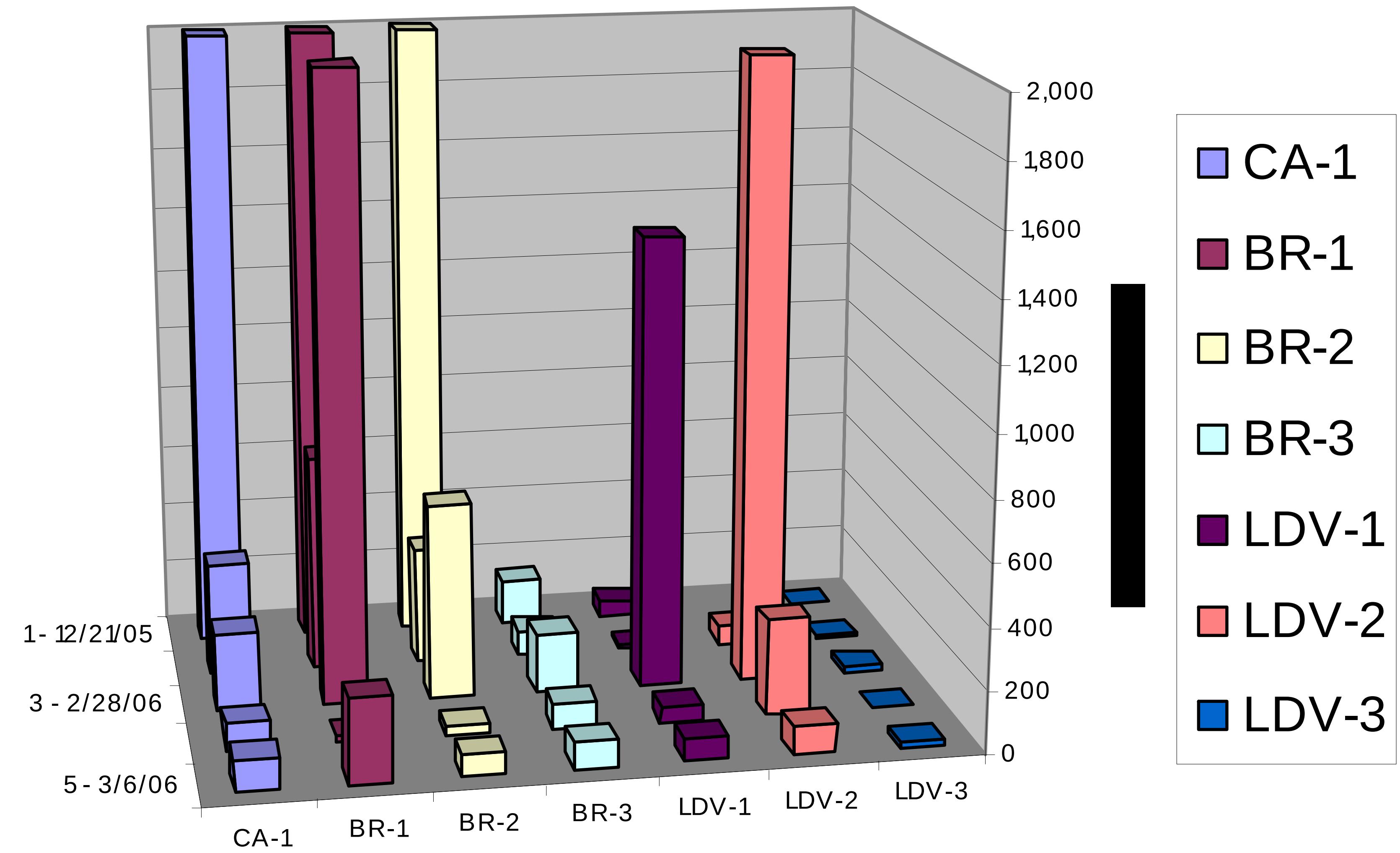


Turbidity



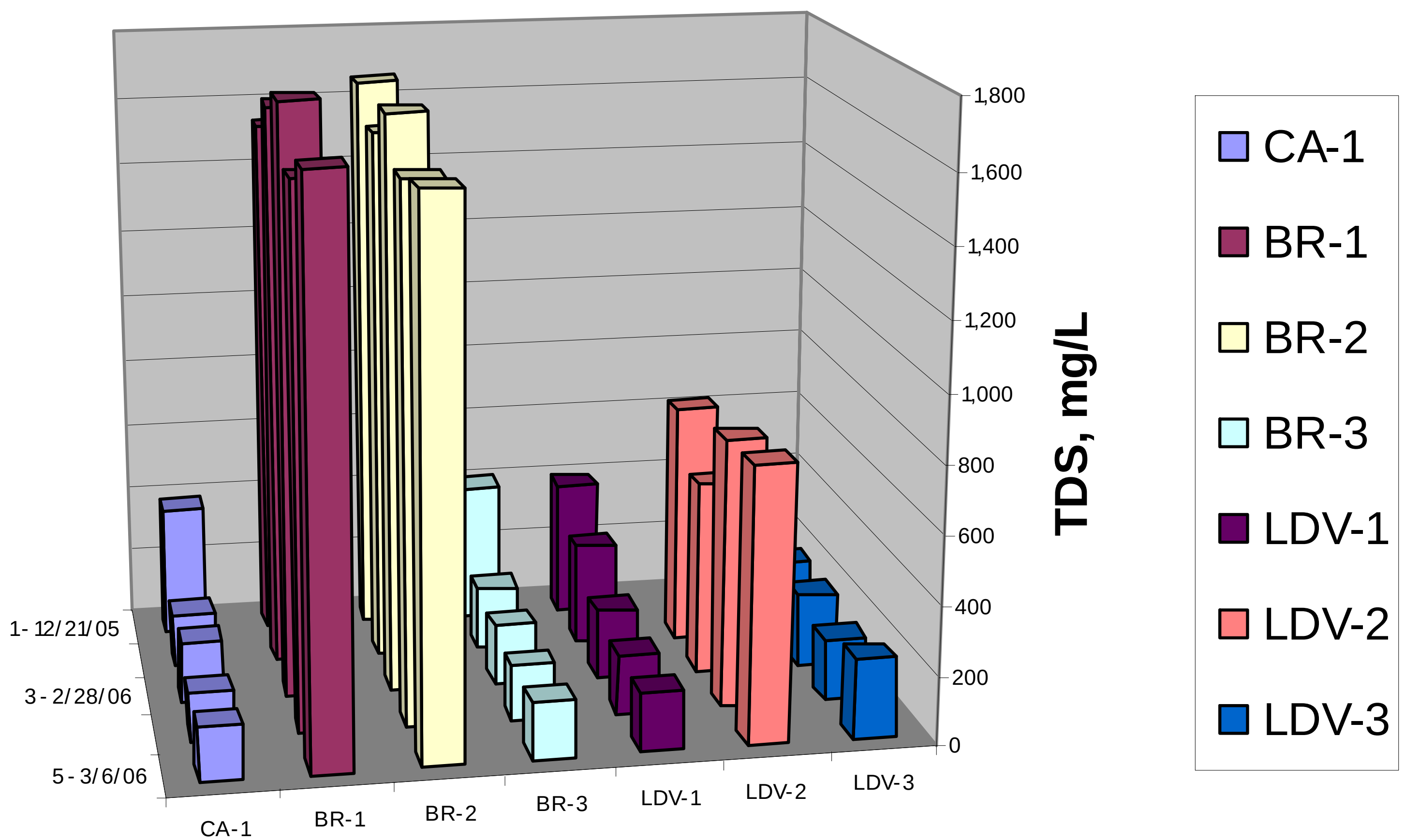
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Turbidity, NTU
1- 12/21/05
3 - 2/28/06
5 - 3/6/06
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3

E. coli

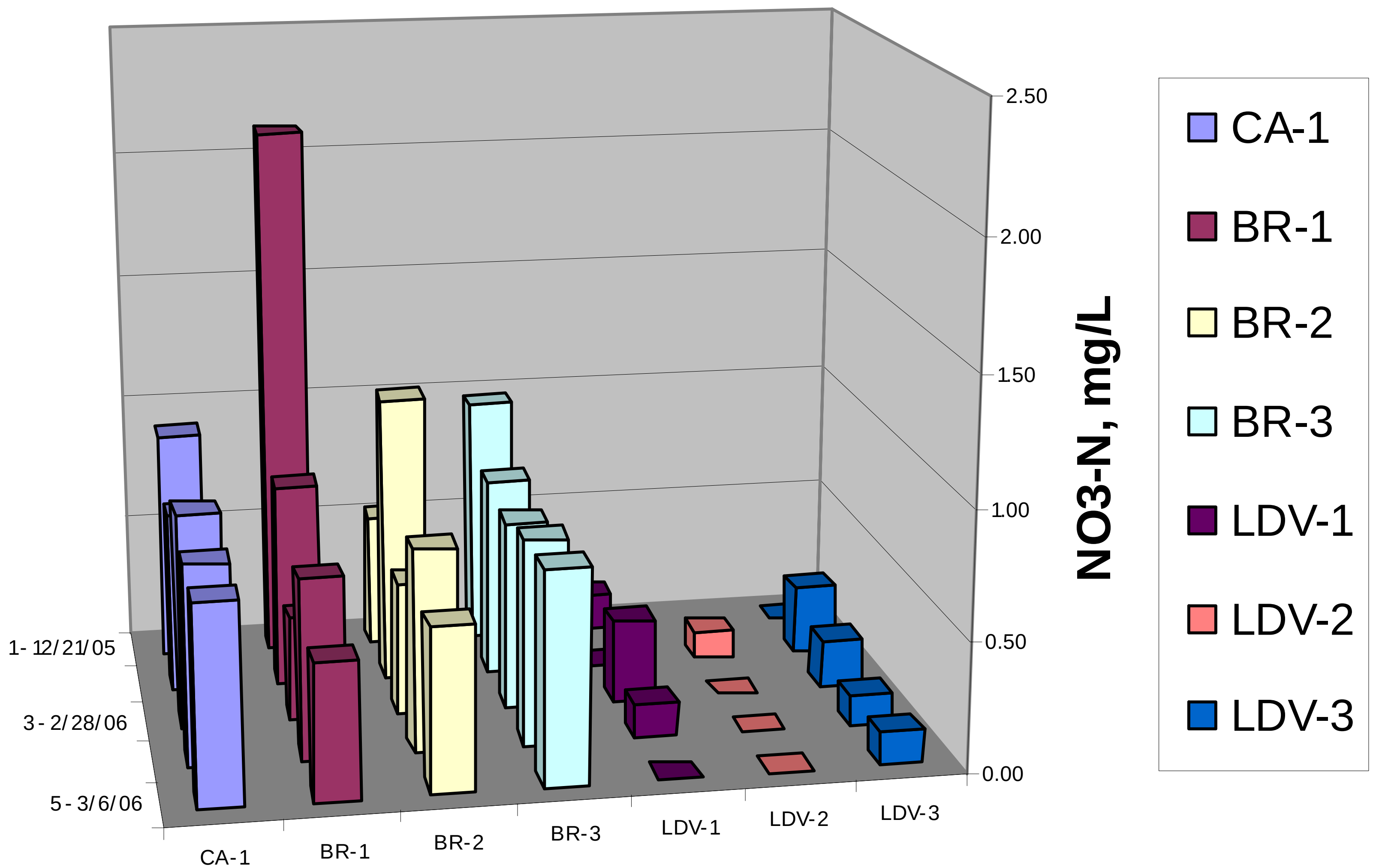


2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1 - 12/21/05
3 - 2/28/06
5 - 3/6/06
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3
[redacted]
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3

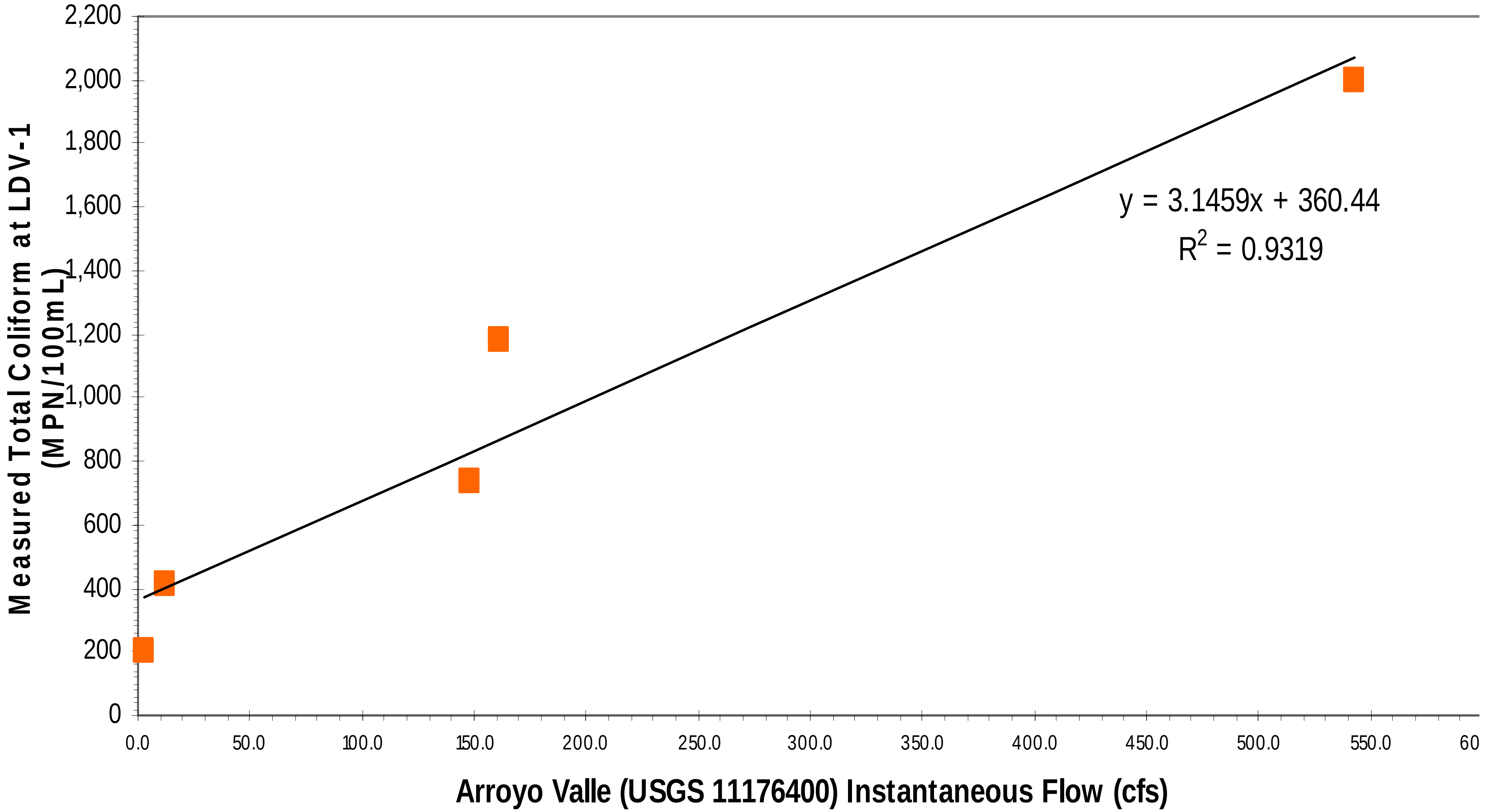
Total Dissolved Solids



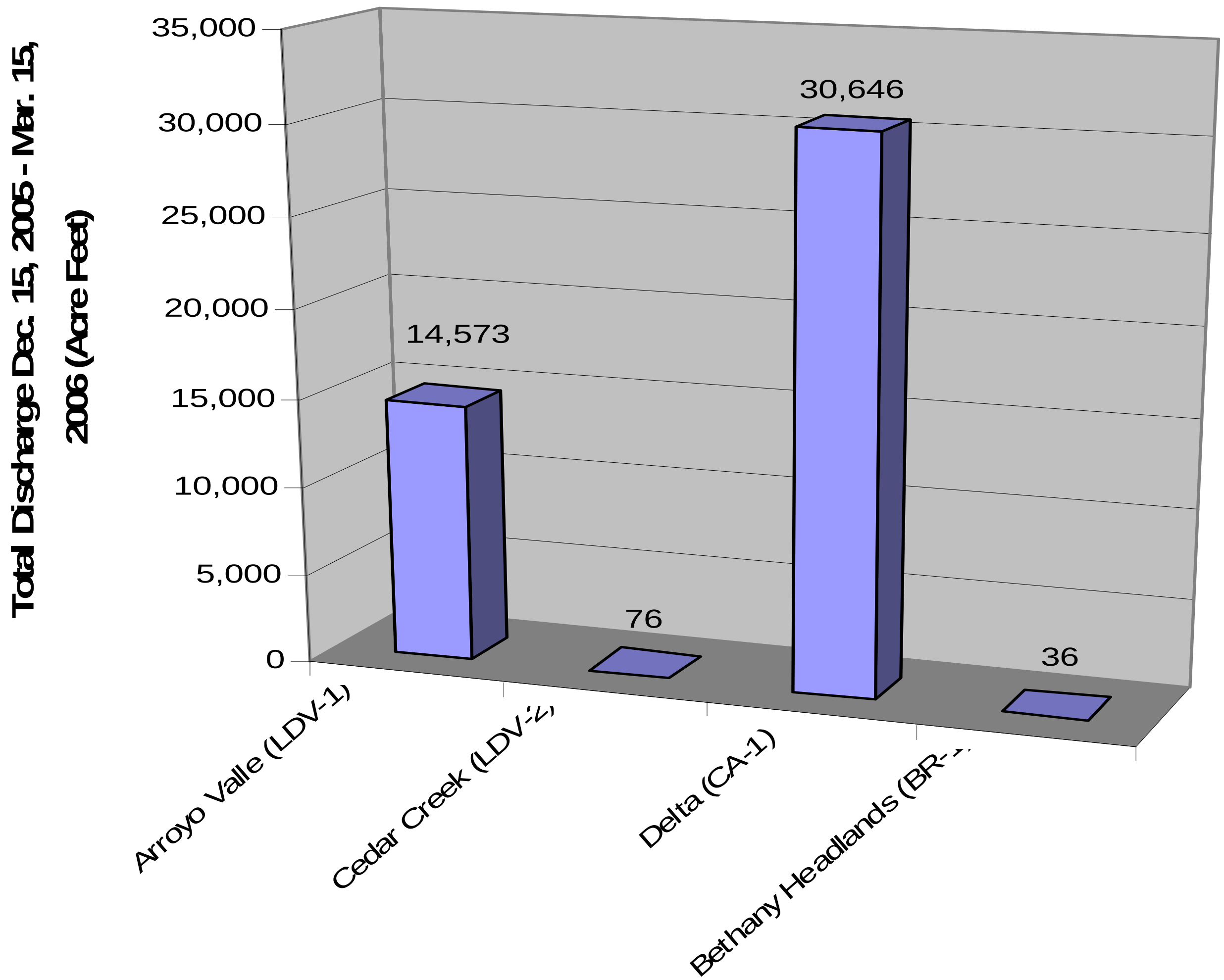
Nitrate


NO3-N, mg/L
0.00
0.50
1.00
1.50
2.00
2.50
1- 12/21/05
3 - 2/28/06
5 - 3/6/06
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3
CA-1
BR-1
BR-2
BR-3
LDV-1
LDV-2
LDV-3

Correlation: Total Coliform vs. Flow



Relative Contribution of Monitored Sources to the SBA



Conclusions

- Lake Del Valle water quality much better than Delta:
  - No parasites
  - Low bacteria
  - Low chemical and nutrient
  - Low turbidity and solids
- 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 Cedar Creek reflect watershed uses;
- Points to need for careful, comprehensive land management on a watershed scale

EBRPD WORKSHOP

CWA 303(d) Listing of Lake Del Valle

Laura Young

Source Water Protection Program

Santa Clara Valley Water District

October 18, 2006

Del Valle Reservoir

Santa Clara Valley Water District

Potential 303(d) Listing of Lake Del Valle

- Lake Del Valle is recommended by SWRCB to be added to the impaired water bodies list under Section 303(d) of the CWA because of Hg and PCB levels in fish tissue; if finalized, TMDL development may be required in a few years.

- The TMDL development process involves the technical analysis of the sources, fate, and transport of the contaminant; development of proposed water quality objectives (e.g., levels of methylmercury in fish tissue); and a description of the amount of reduction necessary to attain the proposed objective.

- Both chemicals tend to be found in sediments and bioaccumulate in aquatic organisms.

What are TMDLS ?

- TMDL is a water quality plan that identifies the sources of pollutants and includes targets, load allocations for each pollutant source and an implementation plan.
- Required for all 303(d) listed water bodes
- TMDLS for mercury in fish tissue-impaired watersheds of central valley, Guadalupe R., SF Bay are under development

TMDL Development

- If TMDL identifies reservoir and watershed as a source, implementation may require operational changes and monitoring.

- Regional Board considering development of TMDL for all fish tissue impaired reservoirs in region with same sources

Example: Diazinon TMDL for urban creeks requires

1) phase out of diazinon sale and use

2) education and outreach

3) substitute less toxic pesticides

Mercury (Hg)

- ***Hg:***
  - The proposed listing is based on a sampling event on 4/25/2001 at the upper end of the reservoir (south of the boat ramp) when 12 composite samples of 3 bluegill, 3 channel catfish, 3 largemouth bass, and 3 redear sunfish were collected. One catfish and all three largemouth bass samples exceeded the Hg OEHHA guideline of 0.3 ug/g Hg.
  - Mercury comes in different forms. Methylmercury is the form that is problematic for fish consumption.
  - Potential sources of <u>total mercury</u>: Delta water (sources: tributary inflows from upstream watersheds, atmospheric deposition, urban runoff, and municipal and industrial wastewater), sediment flux, local atmospheric deposition, local runoff, and unknown sources.
  - Potential sources of <u>methylmercury</u>: Delta water (sources: tributary inputs from upstream watersheds and in-Delta sources such as sediment flux, municipal and industrial wastewater, agricultural drainage, and urban runoff), sediment flux, atmospheric deposition, local runoff, and unknown sources.

AQUATIC MERCURY CYCLE

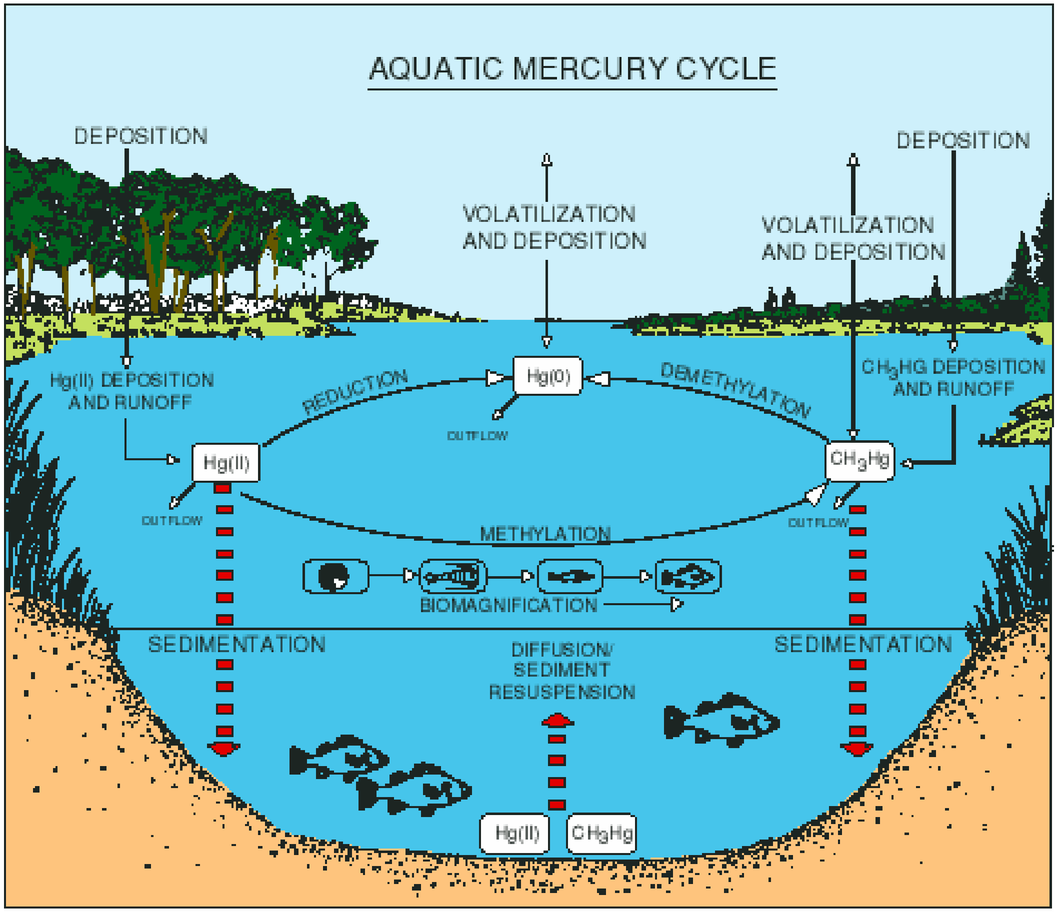


Figure 6. *Mercury cycling pathways in aquatic environments are very complex. The various forms of mercury can be converted from one to the next; most important is the conversion to methylmercury (CH_3Hg^+), the most toxic form. Ultimately, mercury ends up in the sediments, fish and wildlife, or evades back to the atmosphere by volatilization. Reprinted with permission from Mercury Pollution: Integration and Synthesis. Copyright Lewis Publishers, an imprint of CRC Press.*

Polychlorinated Biphenyls (PCBs)

- ***PCBs:***
  - The proposed listing based on 4/25/2001 sampling event at upper end of the reservoir (south of the boat ramp) - 3 composite samples of 3 channel catfish collected. All three catfish exceeded the PCB OEHHA guideline of 20.0 ng/g.
  - PCBs are a mixture of individual chemicals which have been banned since 1977 in the U.S., but are still found in the environment. PCBs were used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they do not burn easily and are good insulators.

Mercury (Hg)

- **Summary of Mercury (Hg) data for Lake Del Valle and DVWTP and PPWTP intakes:**

- *MCL: Total Mercury 0.002 mg/L*
- All DWR sample results from 1996-2005 for dissolved mercury in lake samples were non-detect (generally <0.0002 mg/L) within the lake and at the outfall.
- Samples were generally taken at a depth of 1 m. One sampling event sampled at 1.6, 18, 38, 58, and 100 m depths.
- Sample collected on 10/20/05 from the Arroyo Valle turnout, representing lake outflow, found ND (<0.001 mg/L) level of Total Mercury.
- Samples from the DVWTP and PPWTP influent from 1992-2005 have had ND (<0.0002 mg/L) levels of Total Mercury. PPWTP receives 100% Delta water. DVWTP receives 100% Delta water, 100% Lake Del Valle water, or a blend of the two.

Polychlorinated Biphenyls (PCBs)

- **Summary of Polychlorinated Biphenyls (PCBs) data for Lake Del Valle and DVWTP and PPWTP Treated Water:**
- *MCL: Total PCBs 0.0005 mg/L*
- All DWR sample results from 2000-2001 (4 sampling events) for PCB compounds[1] in the lake at 0.5 and 4 m depths have been ND (<0.0001 mg/L).
- Sample collected on 10/20/05 from the Arroyo Valle turnout, representing lake outflow, found ND (<0.0005 mg/L) level of Total PCBs.
- PCBs have not been detected in the treated water produced by the PPWTP and DVWTP.

[1] PCB-1016, 1221, 1232, 1242, 1248, 1254, 1260

Rangeland Watershed Management Practices

Sheila Barry

University of California Cooperative Extension

Why is Crowley Lake So Green?

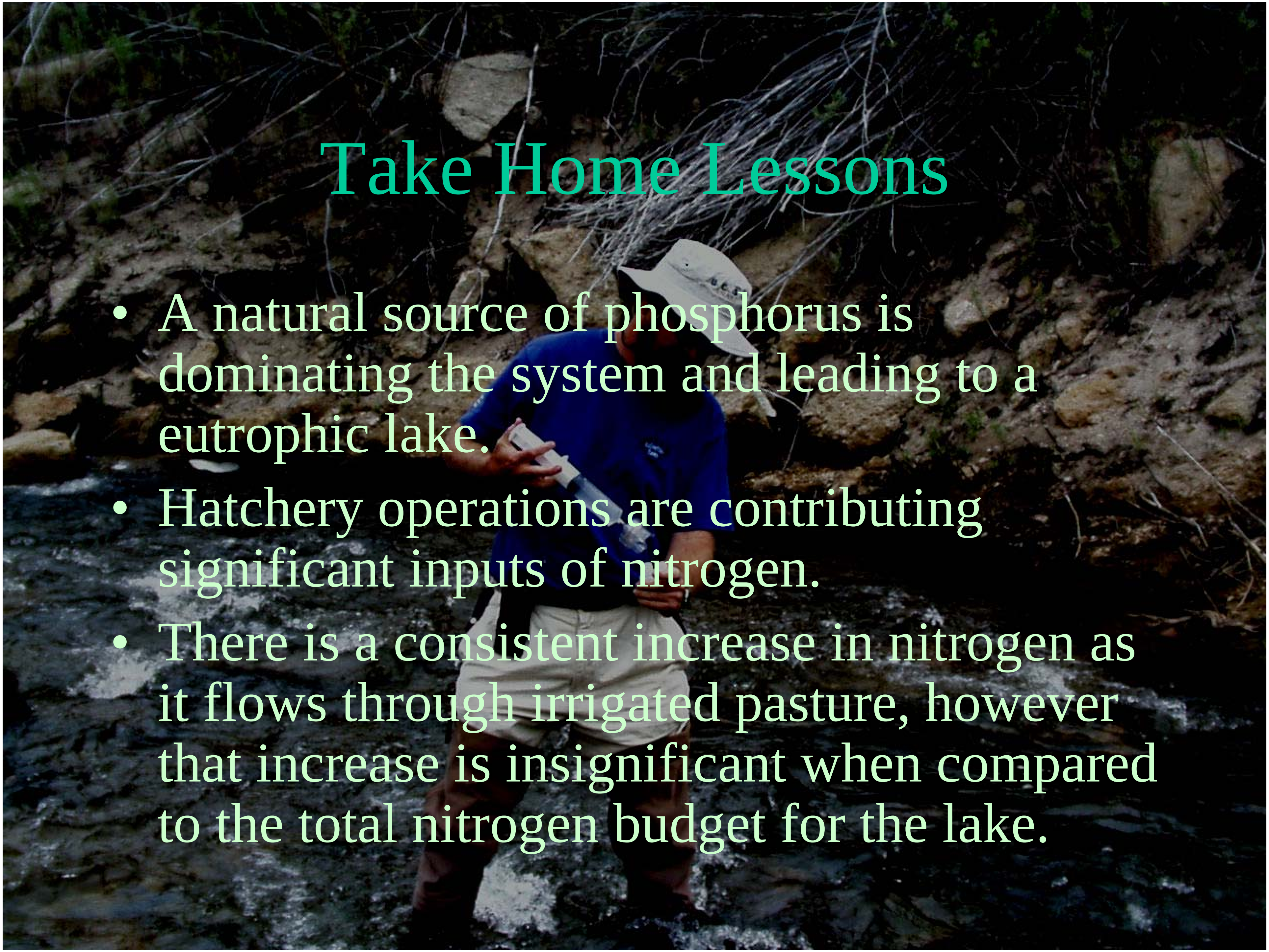
Daniel R. Dawson, Dr. Robert Jellison, Kimberly Rose
Sierra Nevada Aquatic Research Laboratory (SNARL)
University of CA, Santa Barbara

Crowley Lake Facts

- Created in 1941 by impoundment of the Owens River.
- It is the largest reservoir in the LA aqueduct system and provides 60% of their storage capacity.
- Elevation: 6781’ Area: 5300 acres
- Land uses: cattle grazing, recreation, urban development, fish hatcheries, geothermal development

Project Goals

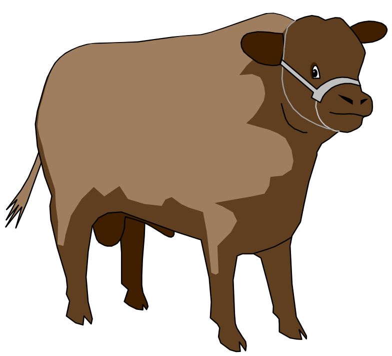
1. Implement and determine the effectiveness of certain grazing Best Management Practices
2. Determine the annual nutrient (N & P) budget for Crowley Lake (inputs and outflow).
3. Determine the sources of the nutrients and the associated land use.



Take Home Lessons

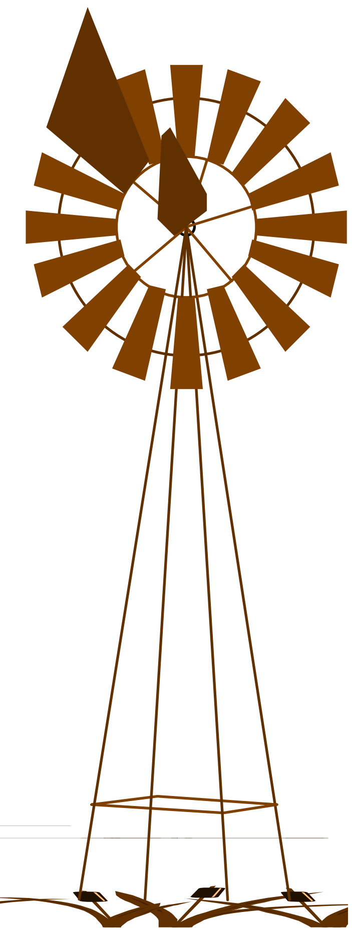
- A natural source of phosphorus is dominating the system and leading to a eutrophic lake.
- Hatchery operations are contributing significant inputs of nitrogen.
- There is a consistent increase in nitrogen as it flows through irrigated pasture, however that increase is insignificant when compared to the total nitrogen budget for the lake.

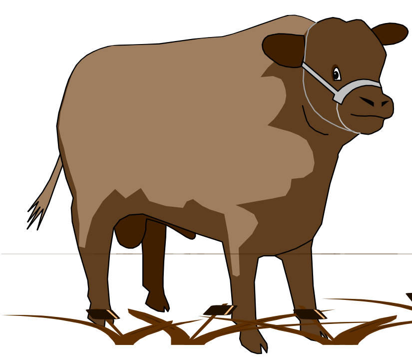
Potential Contaminants from Grazing Operations



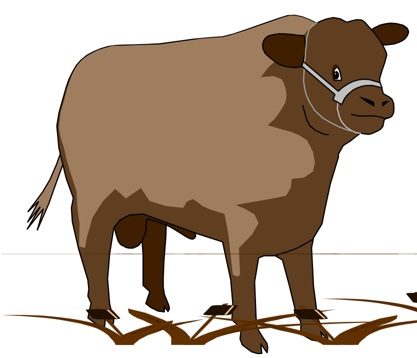
CURRENT MANAGEMENT PRACTICES

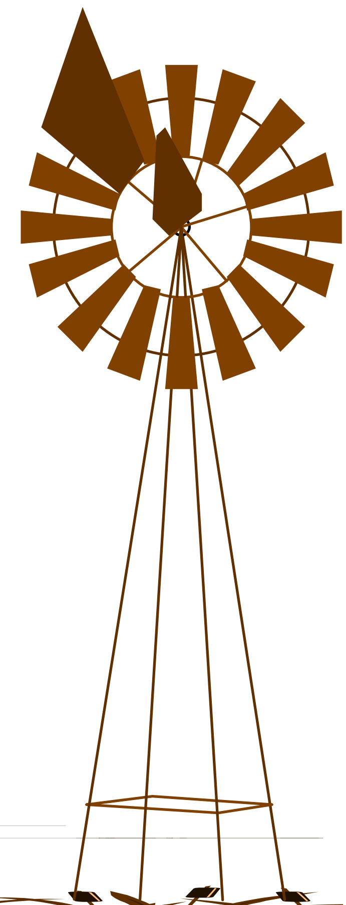
- Livestock Distribution
- Livestock/ Grazing Management
- Structural Range Improvements





Livestock Distribution





Manage livestock near streams

Water livestock off-stream

Place salt away from the stream

UNR, Reno, NV

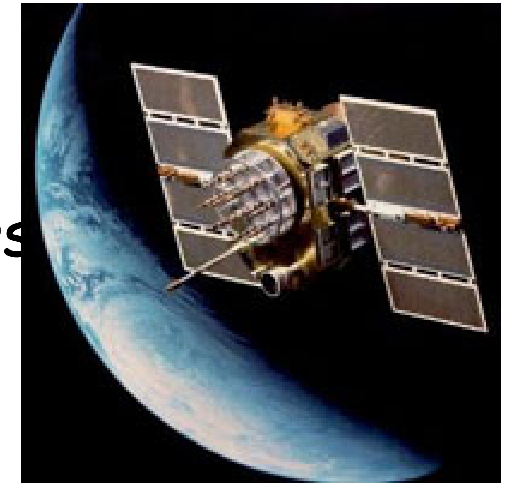
Cow Tracking Study

UC DAVIS
University of California, Davis

Dr. Mel George

OREGON STATE UNIVERSITY

GPS Collars



Global Positioning System (GPS) Tracking System

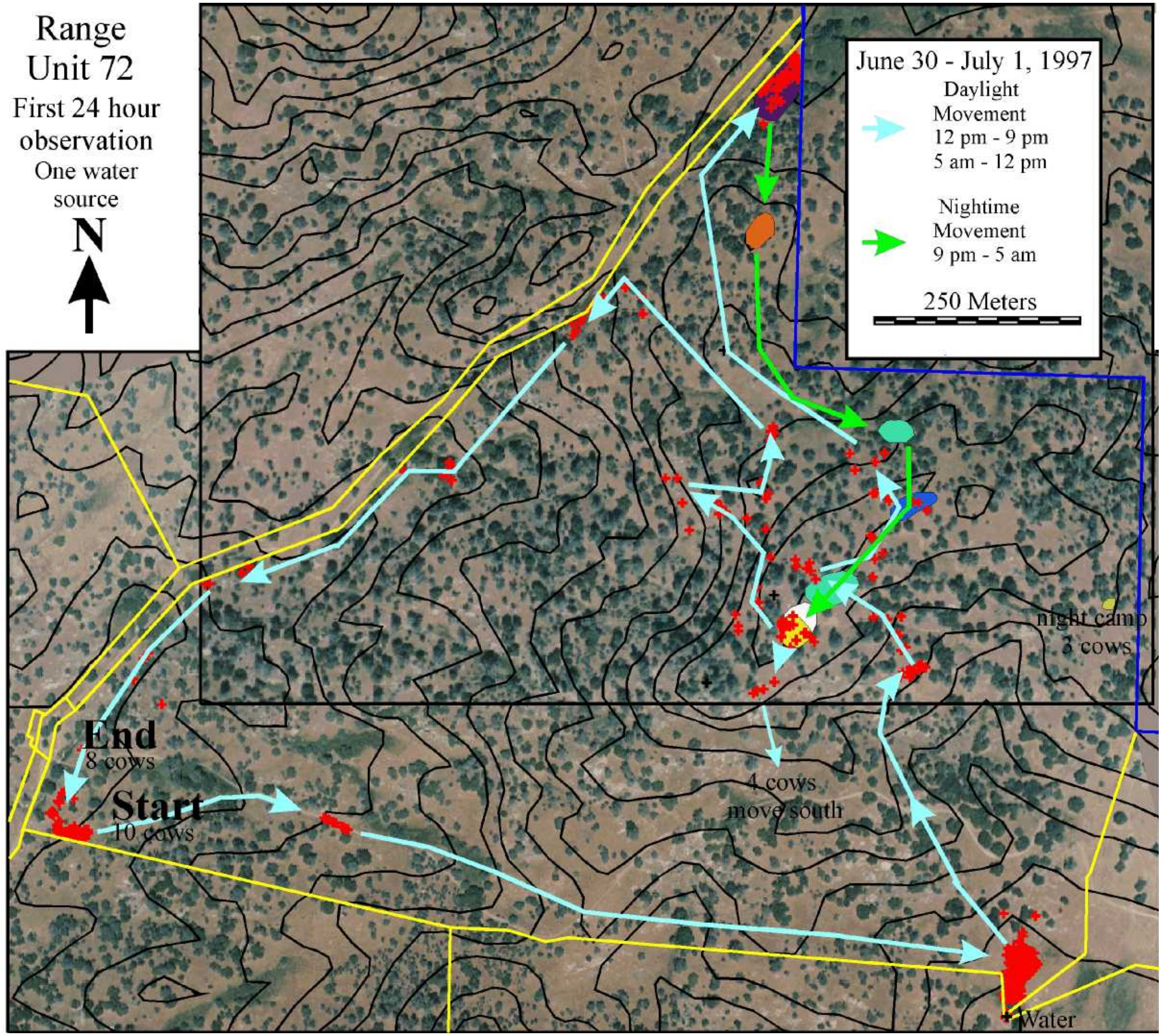
Lotek GPS 2000

Tracks Animal Movements with an Accuracy of + or - 10 yards

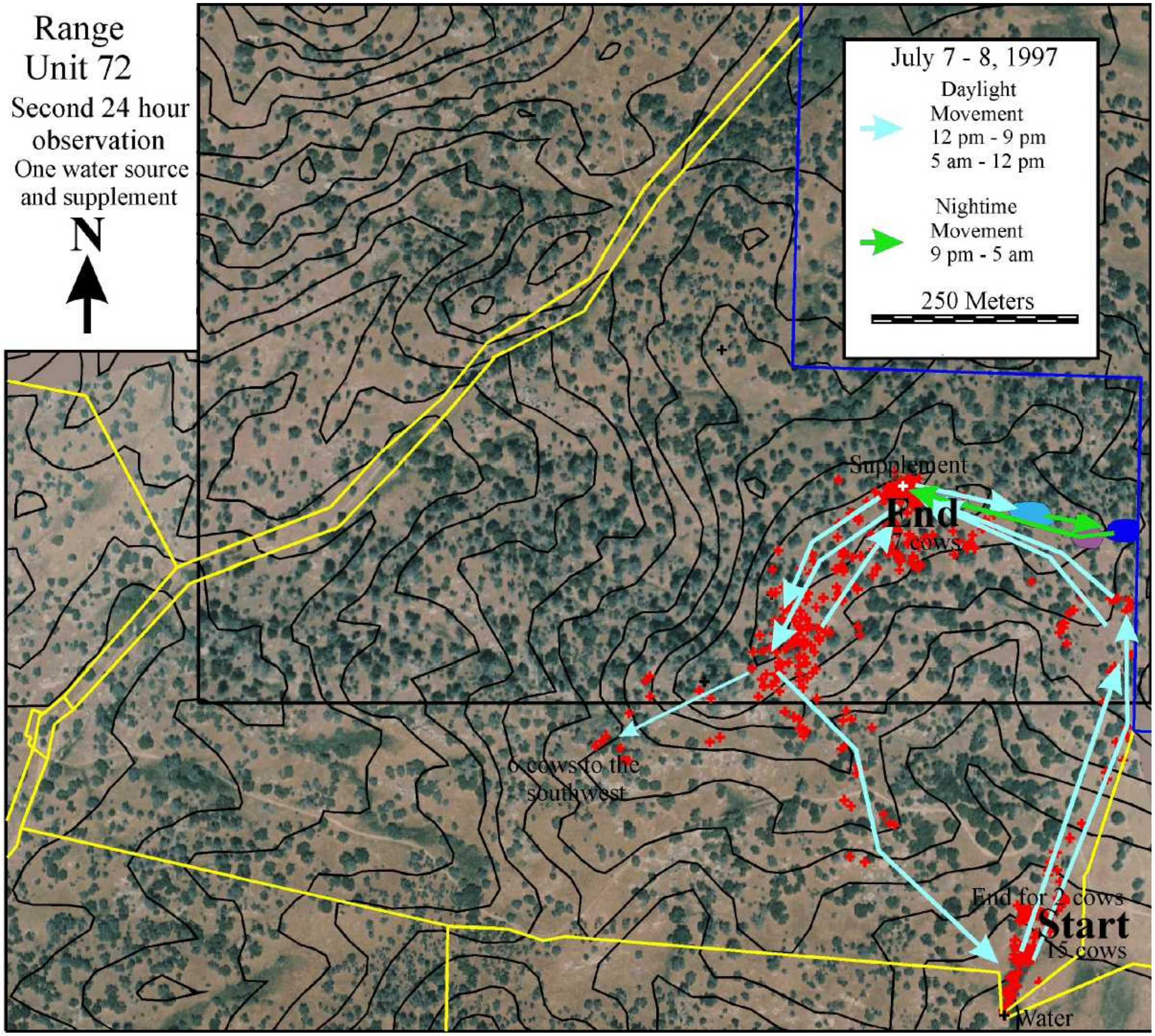
Obtains Positions at Intervals from 5 min to 6 hr

Project Question: Can cows be attracted away from riparian vegetation?

Cows visit each riparian patch daily

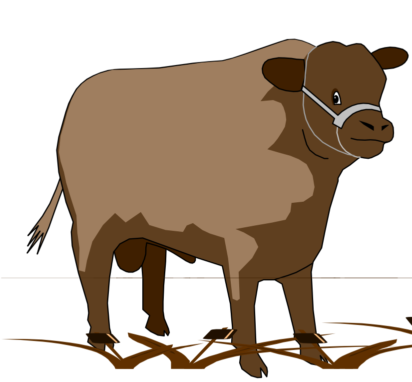


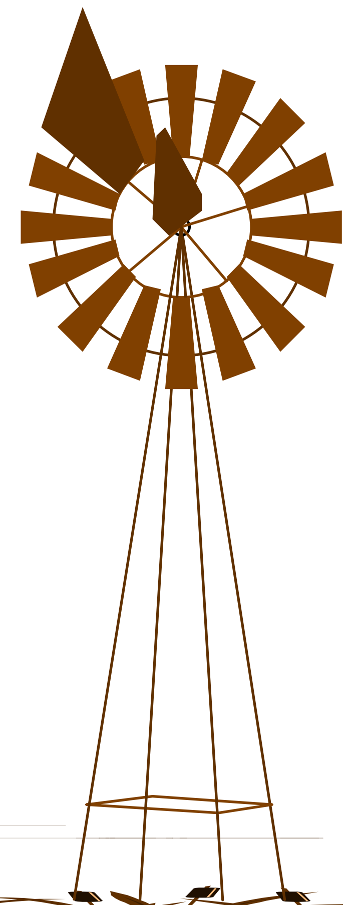
Strategic placement of supplement attracted cows away from riparian patches



Improving Distribution by Improving Forage Palatability

- Burning
- Brush Clearing
- Seeding
- Fertilization






29 4 85

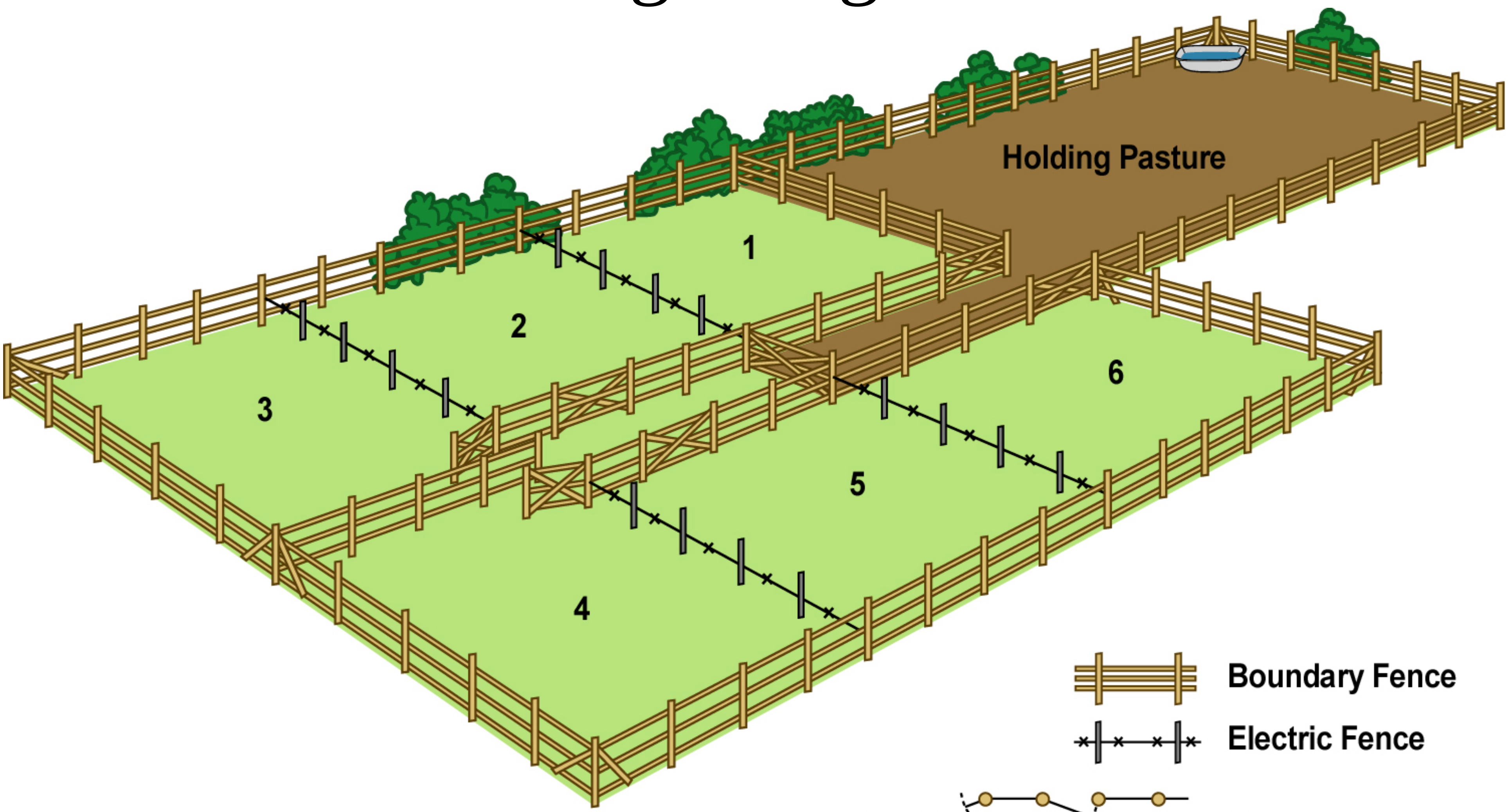
Seasonal long grazing

NRCS, Bozeman, MT

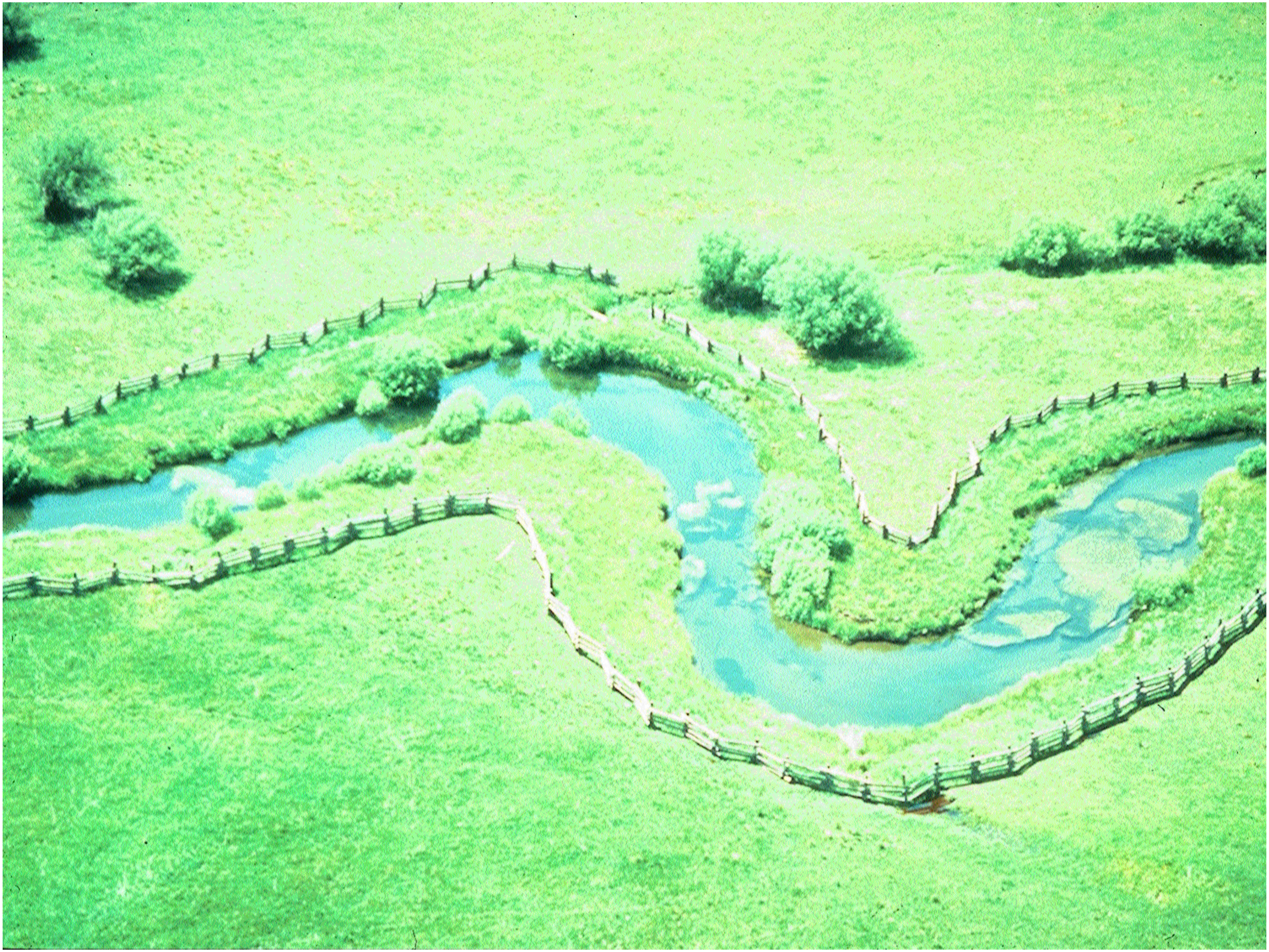
Rotational grazing

www.agry.purdue.edu/ext

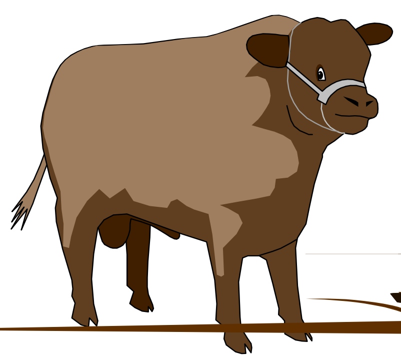
Rapid rotation or short duration grazing



NRCS, Bozeman, MT



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



Design roads carefully


Maintain watershed functions
Manage runoff
UNR, Reno, NV


UNCE, Reno, NV

Rangeland Stewardship