Towards Integrated Water Management: Data Strategies

CWQMC webinar for September 15, 2011

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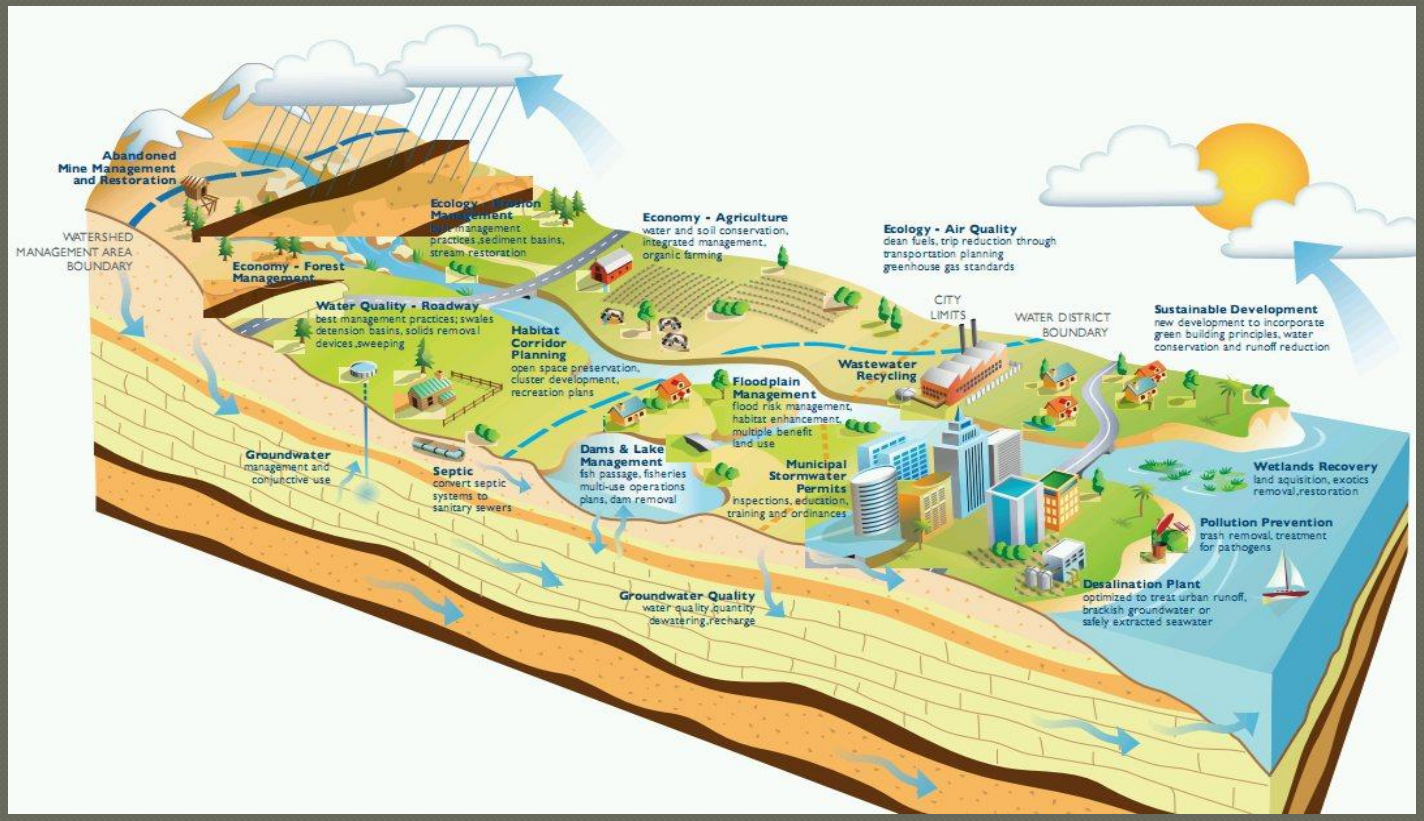
Outline

- Integrated water management (IWM)
  - Integrated Water Management, what is it?
    - Compare to conventional approach
    - Elements / segments of the water environment
    - Components of IWM
- Case study
  - Integrated Water Quality Management

Water environment an Integrated System; one scale is the watershed



However, impact, use and management of water environment is highly fragmented

What is "Integrated Management"?

- Simply put, Integrated Mgmt views the water environment as an integrated, inter-dependent system

- How do we understand and manage this system?
  a. Data integration: Bring together multiple data sets
  b. Information sharing
  c. Collaboration between stakeholders

- Integration ≠ "Data Management" or GIS

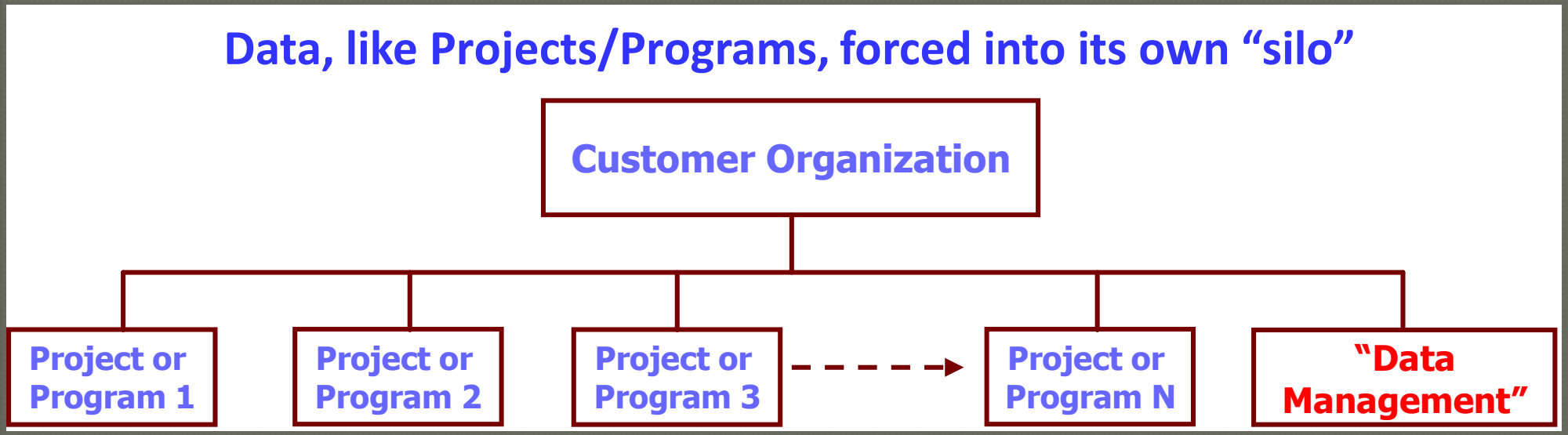
Integrated Water Management: Key Drivers

- Policy and planning
  - Integrated Regional Water Mgmt (IRWM)
  - Urban Water Mgmt (UWMP)
  - Green infrastructure
- Regulatory
  - MS4 / stormwater permits
  - TMDLs
- Operations and reporting
  - MS4 / stormwater

Integrated Water Management: Benefits

- Integrated strategies result in more efficient and sustainable outcomes, e.g.,
  - Better local/regional water augmentation and pollution prevention strategies
  - Lower costs for resource management, permitting, and compliance
  - Lower capital expenditures
  - Improve ability to identify stressors (root causes)

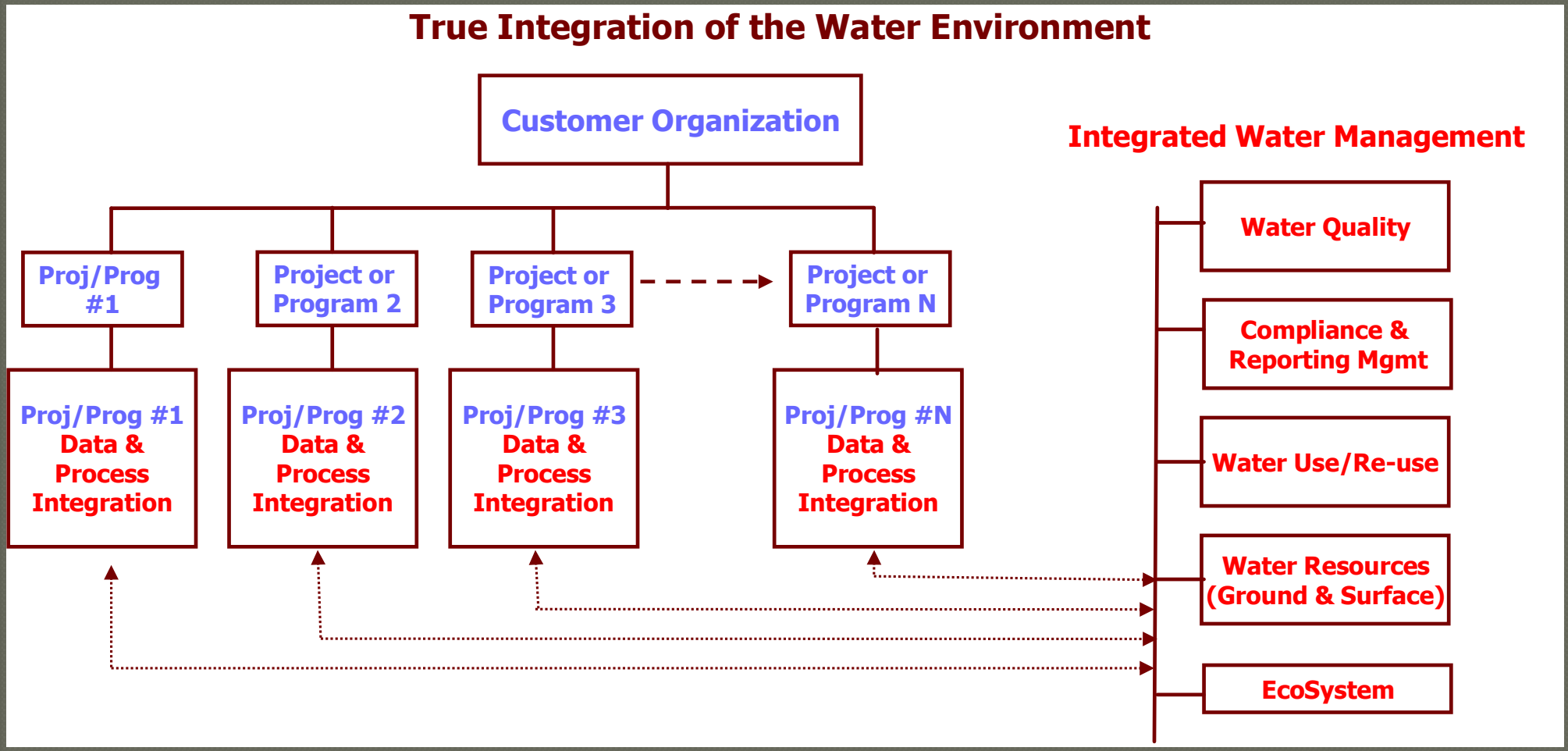
Conventional Approach



A Closer Look at the Water Environment

NPDES Permits MS4 Phase 1 & 2 Industrial Stormwater Construction Stormwater Non-point Source Discharges Groundwater Discharges TMDL Development TMDL Implementation	Basin Planning Water Quality Objectives Beneficial Uses Chemical Integrity Biological Integrity Physical Integrity	Water Supply CEQA (Water Quality) Low Impact Development Wetlands Impact 401/404 Permits Mitigation	Spills & Clean-ups Remediation Treatment Facilities (BMPs) Facilities Inspections Incidents Tracking Monitoring Sewer System Overflows	Aquifers Lakes River Basins Reservoirs	Mitigation Conservation Invasive Species Endangered Species Trails
Discharges - Water Quality	Water Quality Standards	Land Use	Site Activties	Water Resources	Aquatic Ecosystem

What True Integration of the Water Environment Should be



Integrated Water Management: Impacts All Key Stakeholder Groups

Stakeholders	Water in the "Non-Built" Environment					
	Water Resources	Water Use	Water Quality	Ecosystem	Permitting & Enforcement	Compliance & Reporting
Regulatory Agencies			+	+	+	
Water Agencies/Districts	+	+	+	+		
Dischargers (Permittees) [1]			+			+
Wastewater Agencies		+	+			+
Municipalities	+	+	+	+	+	+
Infrastructure Developers[2]	+	+	+			+
Stewardship Organizations[3]	+	+	+	+		
Environmental Consultants	+	+	+	+	+	+

1. Stormwater Phase 1 & Phase 2, and general NPDES permits.
2. Real-estate developers, utilities, mining, oil and gas, transportation, and others
3. River/lake conservancies, land trusts, watershed councils, municipalities, corporate environmental assets, and others

Integrated Water Management – Key Functionality

- Data aggregation and single-point online access
- Search, visualize and export for a wide range of content, e.g., data, spatial, documents, schematics, images, URLs and others.
- Integrated statistics, modeling, custom analytics, and reporting.
- Shared permission-based access to information and decision support tools by affiliated third parties
- Online tools to reduce or automate manual activities.
- Engage public and other constituencies-of-concern around specific customer objectives

Case Study – Integrated Water Quality Management

- Integrated WQ metrics: chemical, physical, and biological
- Integrated monitoring
- Integrated data administration, analysis and visualization
- Integrated permit compliance and reporting
- Integrated mitigation, BMP and pollution prevention strategies
- Support the virtous planning cycle

Case study – key components for water quality IWM (tool box)

- Comprehensive Watershed-wide Monitoring Program for Surface Water
- WQ data content aggregation
  - Centralized (CEDEN)
  - local (SD Regional Data portal)
- Access to monitoring directories and laboratories
- Addition of non-water data, i.e., trash, CRAM, bio-assessment, PHAB, photo uploads, special studies, USGS data, political boundaries, reports, SSOs
- Ability to efficiently apply limited resources for intensive projects, i.e., TMDLs
- On-line reporting, report cards and ability to easily update reports

Integrated Water Management
The Feedback Loop

Stakeholder-level: Optimize stakeholder objectives

Stakeholder-level: Information aggregation, access, visualization and analysis

INTEGRATING WATER QUALITY, WATER RESOURCES, LAND USE, AND HABITAT					
Discharges (Pollution)	Water Quality Standards	Land Use & Re-development	Site Activities	Water Resources	Habitat
NPDES Permits	Basin Planning	Water Supply	Spills/Clean-ups	Aquifers	Mitigation
MS4 Phase 1 & 2	WQ Objectives	Landscapes	Remediation	Lakes	Conservation
Industrial	Beneficial Uses	LID	BMPs	River Basins	Invasive Species
Construction	Chemical Integrity	Wetlands Impact	Facility Inspections	Reservoirs	Endangered Species
Non-point Discharges	Biological Integrity	401/404 Permits	Monitoring		Trails
Groundwater	Physical Integrity	Mitigation	Sewer Overflows		

Integrate Public Participation

- Public outreach
- Public input
- On-line tools
- Community building

Integrated Water Management Applications

- Enable integrated data access for general use: Watersheds, river basins, other water resources, species conservation
- Integrated Regional Water Management Plans (use, conservation, quality)
- Integrated stormwater management/compliance - jurisdictional & watershed levels
- TMDL development and management
- 303(d) de-listing process
- 401/404 permitting and mitigation, wetlands monitoring, recovery, etc.
- Beach water monitoring and upstream surveillance
- BMP effectiveness at the water body or watershed level
- Invasive species – tracking and treatment effectiveness
- Ecosystem services – landscape and watershed scales
- Conservation and re-development programs
- Public involvement
- Long-term research programs or studies

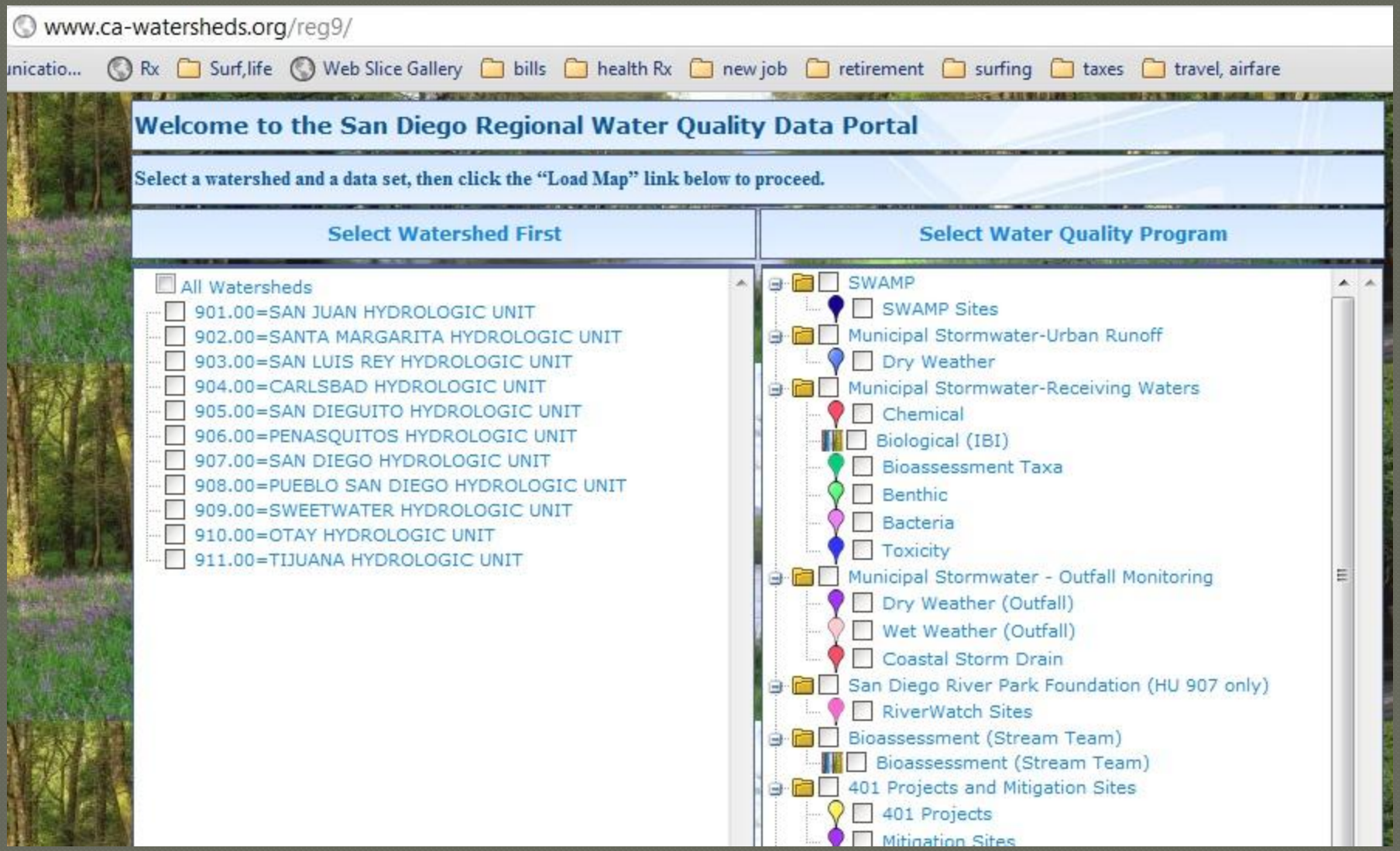
Integrated Water Quality Management Challenges

- Dependency on the status quo:
  - Systems and processes that are difficult to change
  - Resistance from beneficiaries of the current inefficiencies
  - Inter-departmental or inter-stakeholder tensions
- Data availability and access
- Lack of the right cost-effective tools

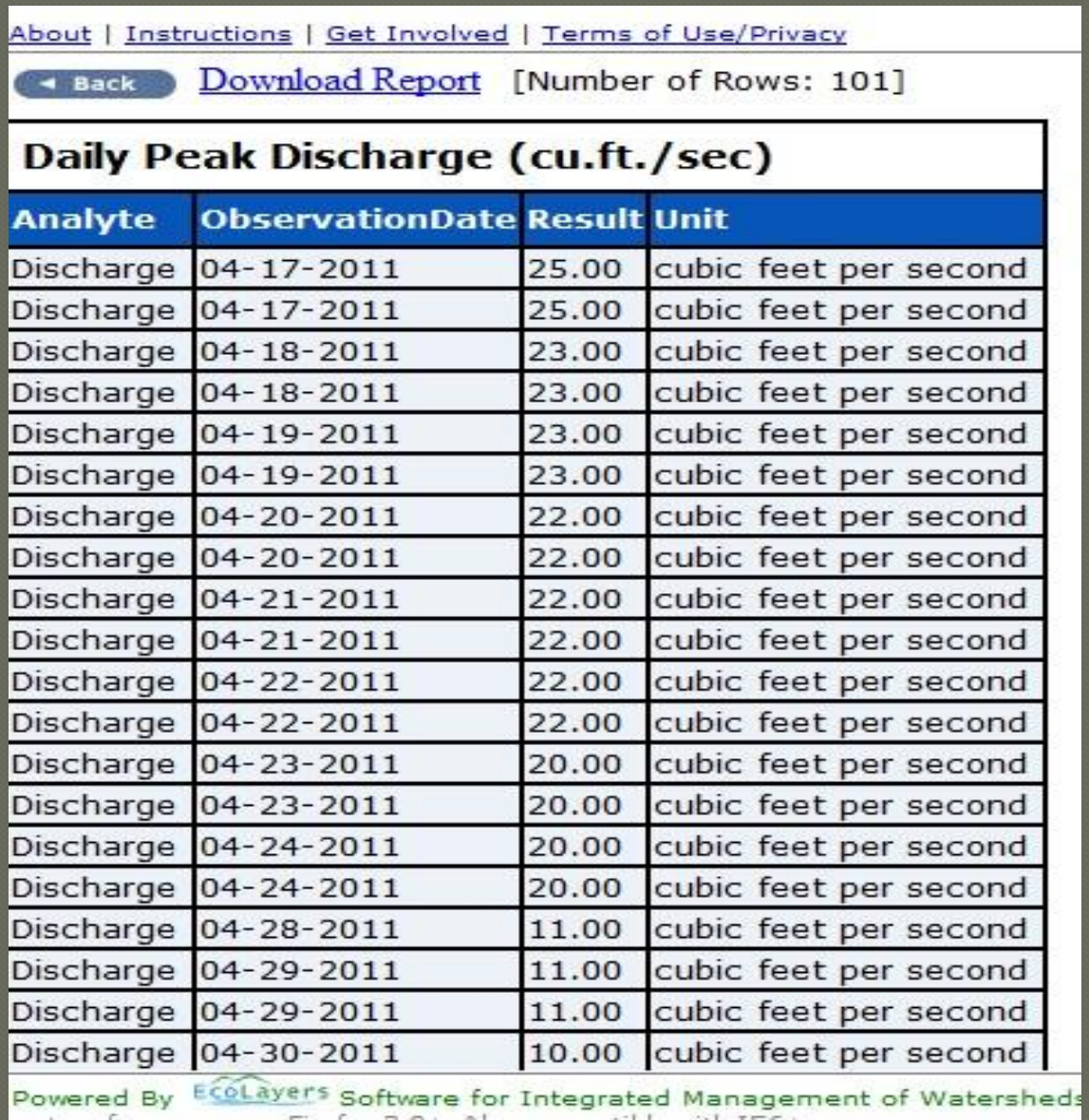
Integrated Water Management Is Not….

- Data management
- GIS
- “Synergistic” collaborative projects

Examples of IWM data types



Stream flow data



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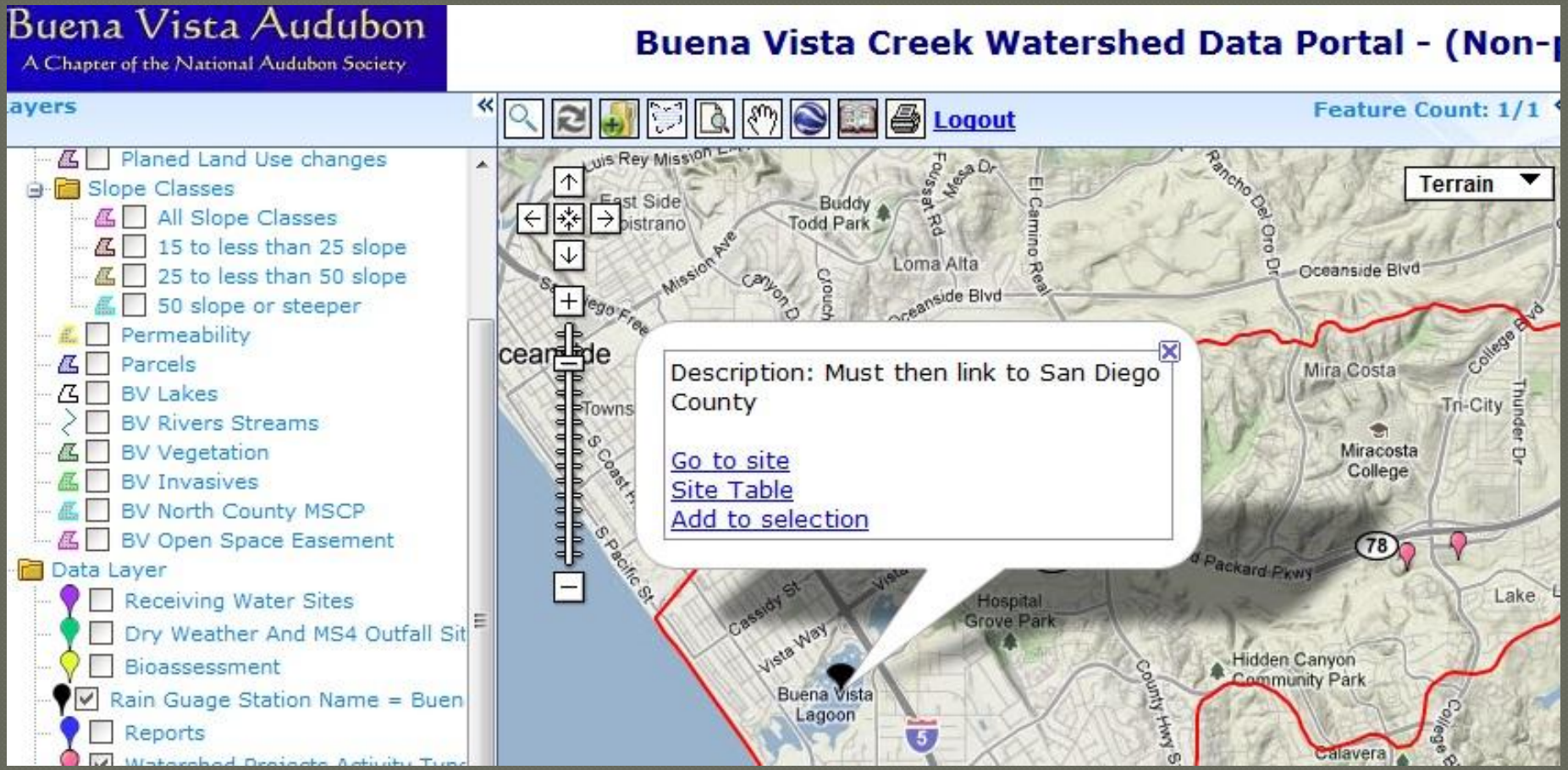
Daily Peak Discharge (cu.ft./sec)

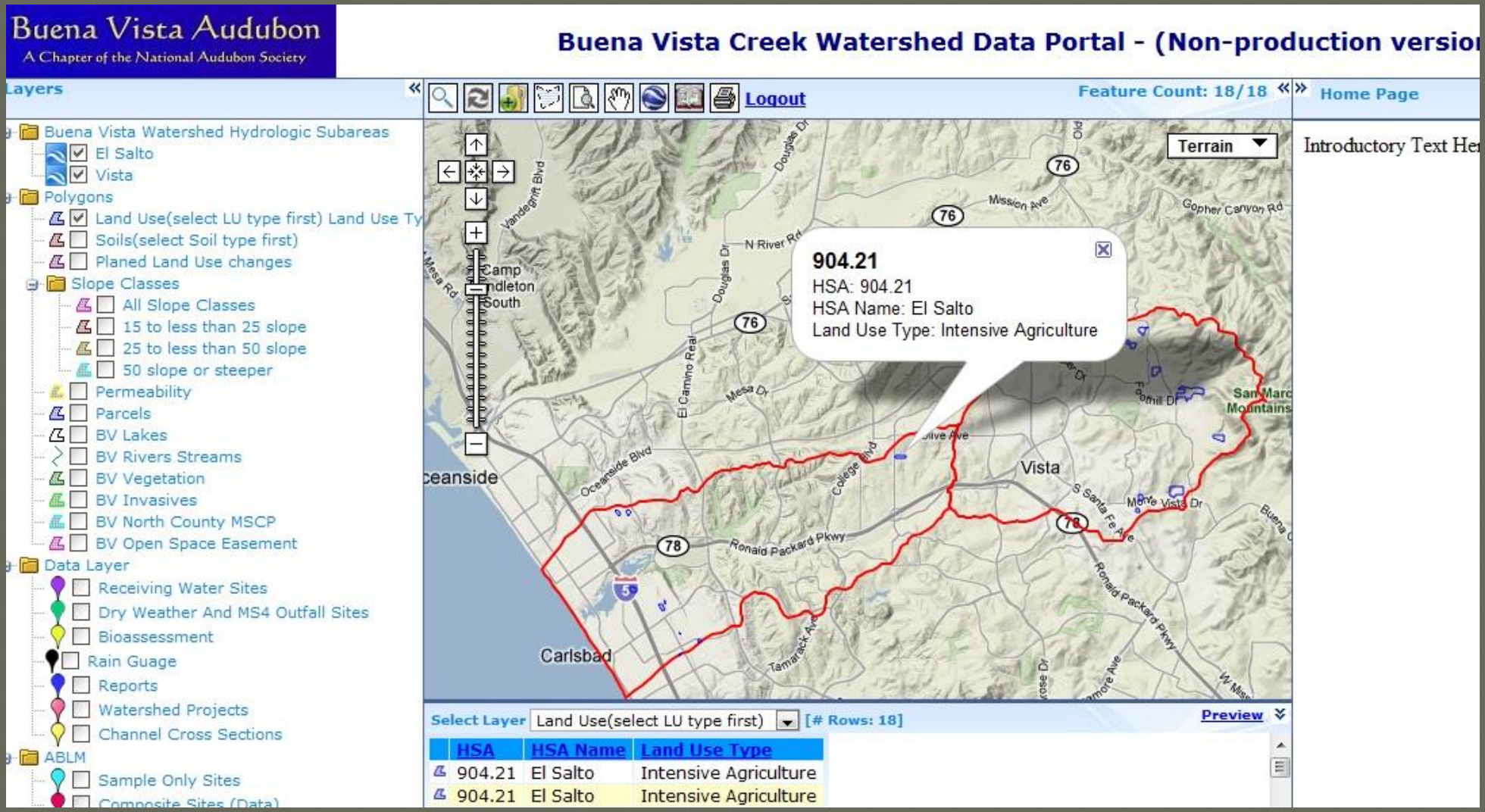
Analyte	ObservationDate	Result	Unit
Discharge	04-17-2011	25.00	cubic feet per second
Discharge	04-17-2011	25.00	cubic feet per second
Discharge	04-18-2011	23.00	cubic feet per second
Discharge	04-18-2011	23.00	cubic feet per second
Discharge	04-19-2011	23.00	cubic feet per second
Discharge	04-19-2011	23.00	cubic feet per second
Discharge	04-20-2011	22.00	cubic feet per second
Discharge	04-20-2011	22.00	cubic feet per second
Discharge	04-21-2011	22.00	cubic feet per second
Discharge	04-21-2011	22.00	cubic feet per second
Discharge	04-22-2011	22.00	cubic feet per second
Discharge	04-22-2011	22.00	cubic feet per second
Discharge	04-23-2011	20.00	cubic feet per second
Discharge	04-23-2011	20.00	cubic feet per second
Discharge	04-24-2011	20.00	cubic feet per second
Discharge	04-24-2011	20.00	cubic feet per second
Discharge	04-28-2011	11.00	cubic feet per second
Discharge	04-29-2011	11.00	cubic feet per second
Discharge	04-29-2011	11.00	cubic feet per second
Discharge	04-30-2011	10.00	cubic feet per second

Powered By EcoLayers Software for Integrated Management of Watersheds

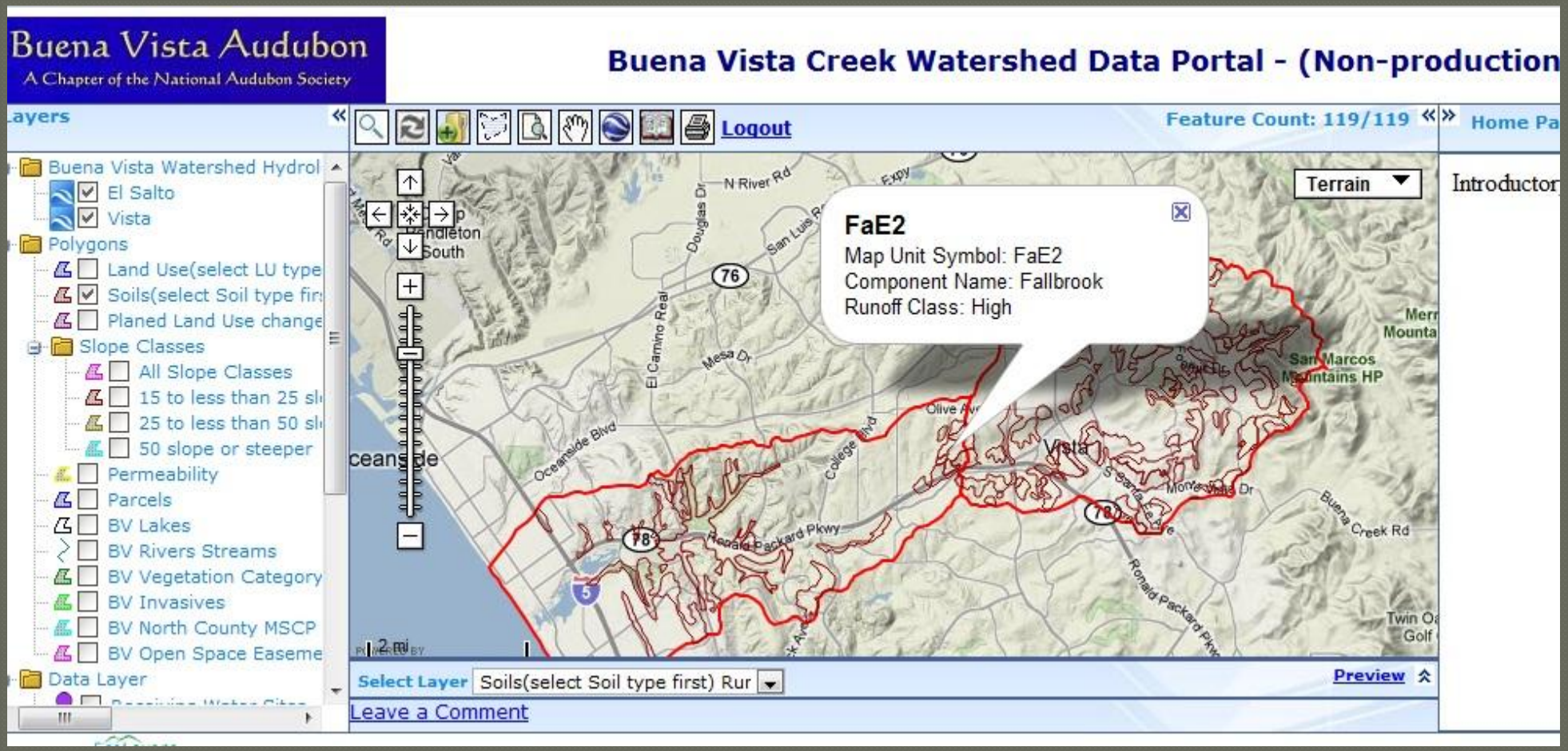
Rain gauges



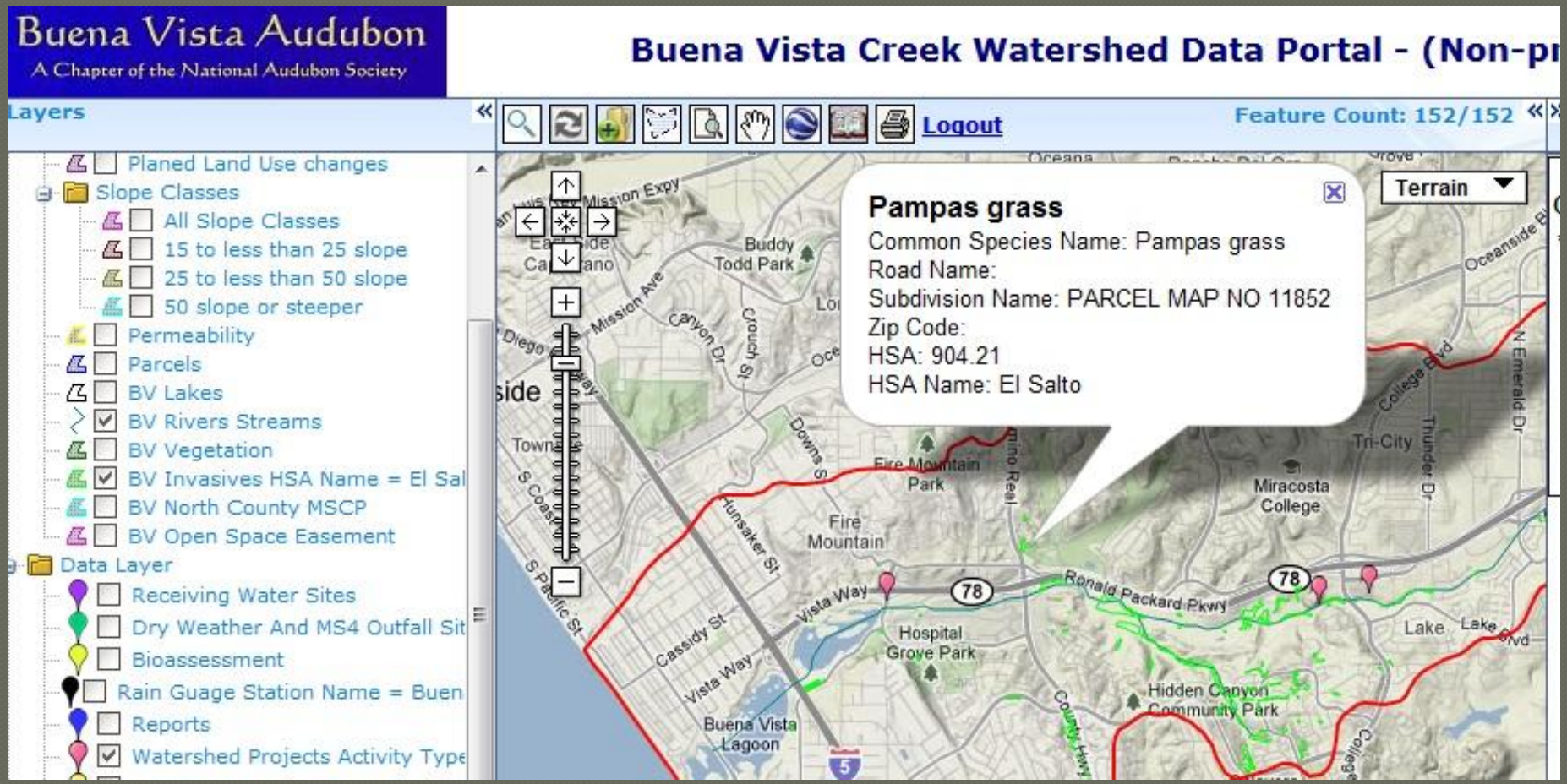
Land use data



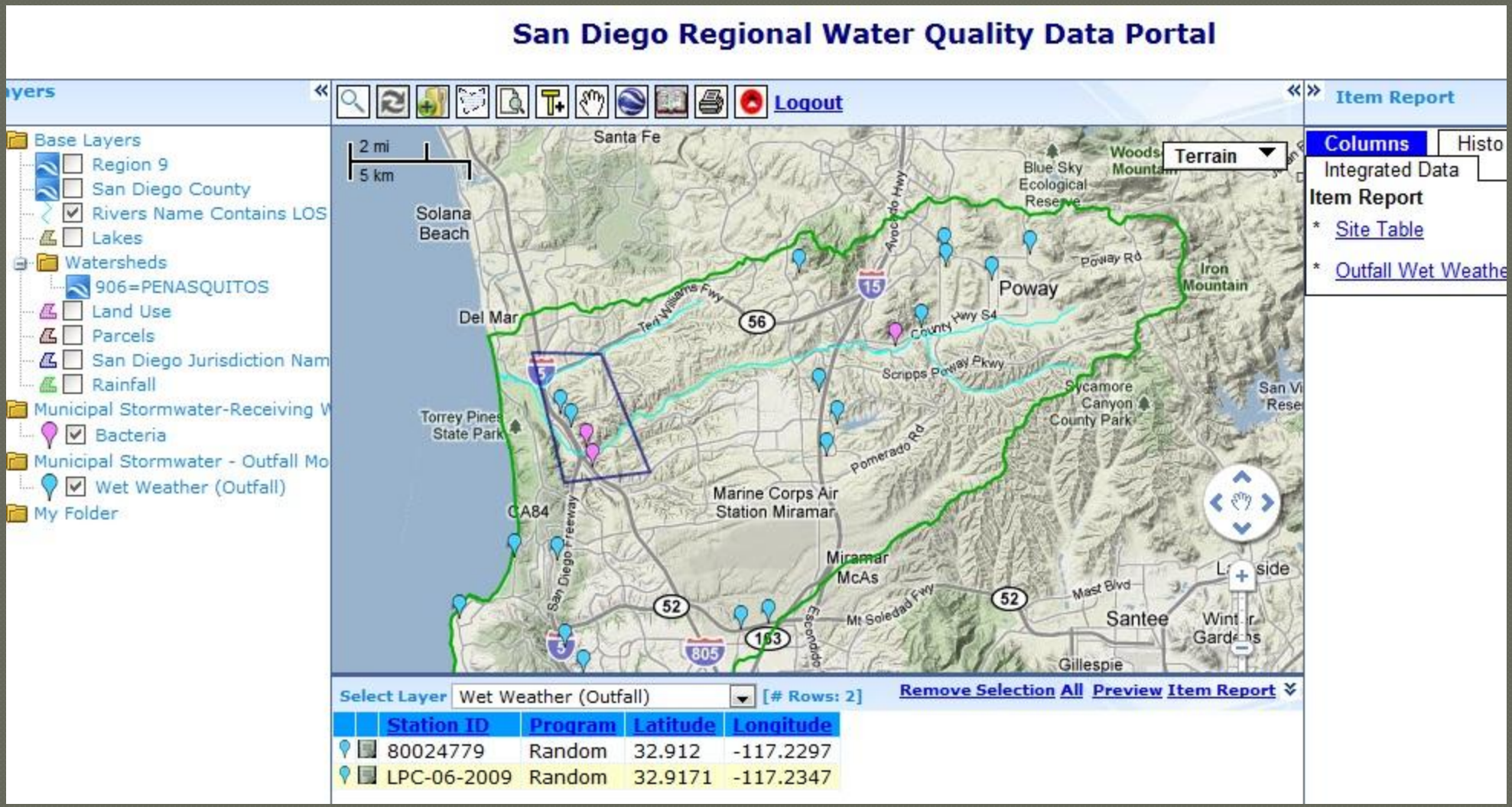
Soils



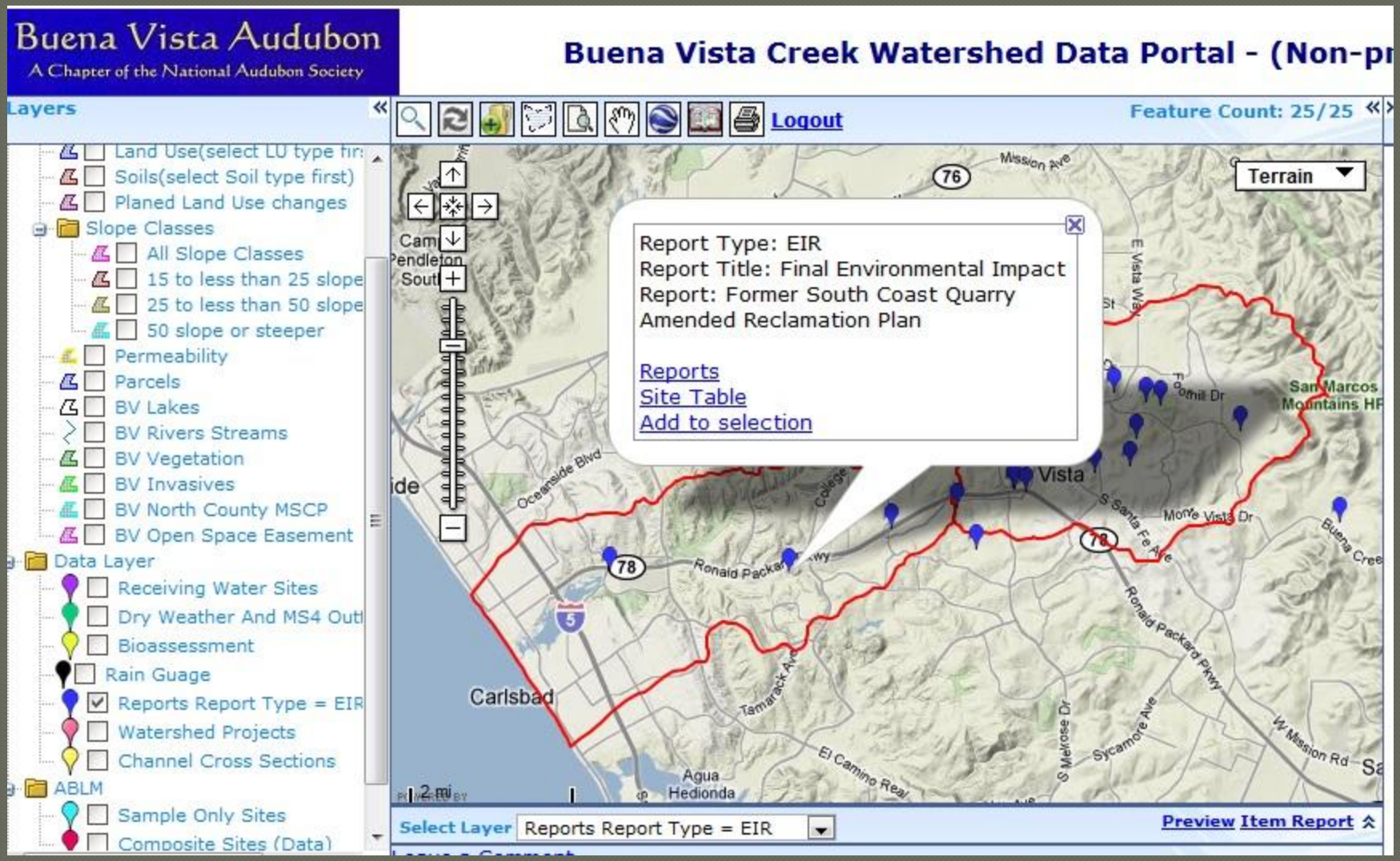
Vegetation



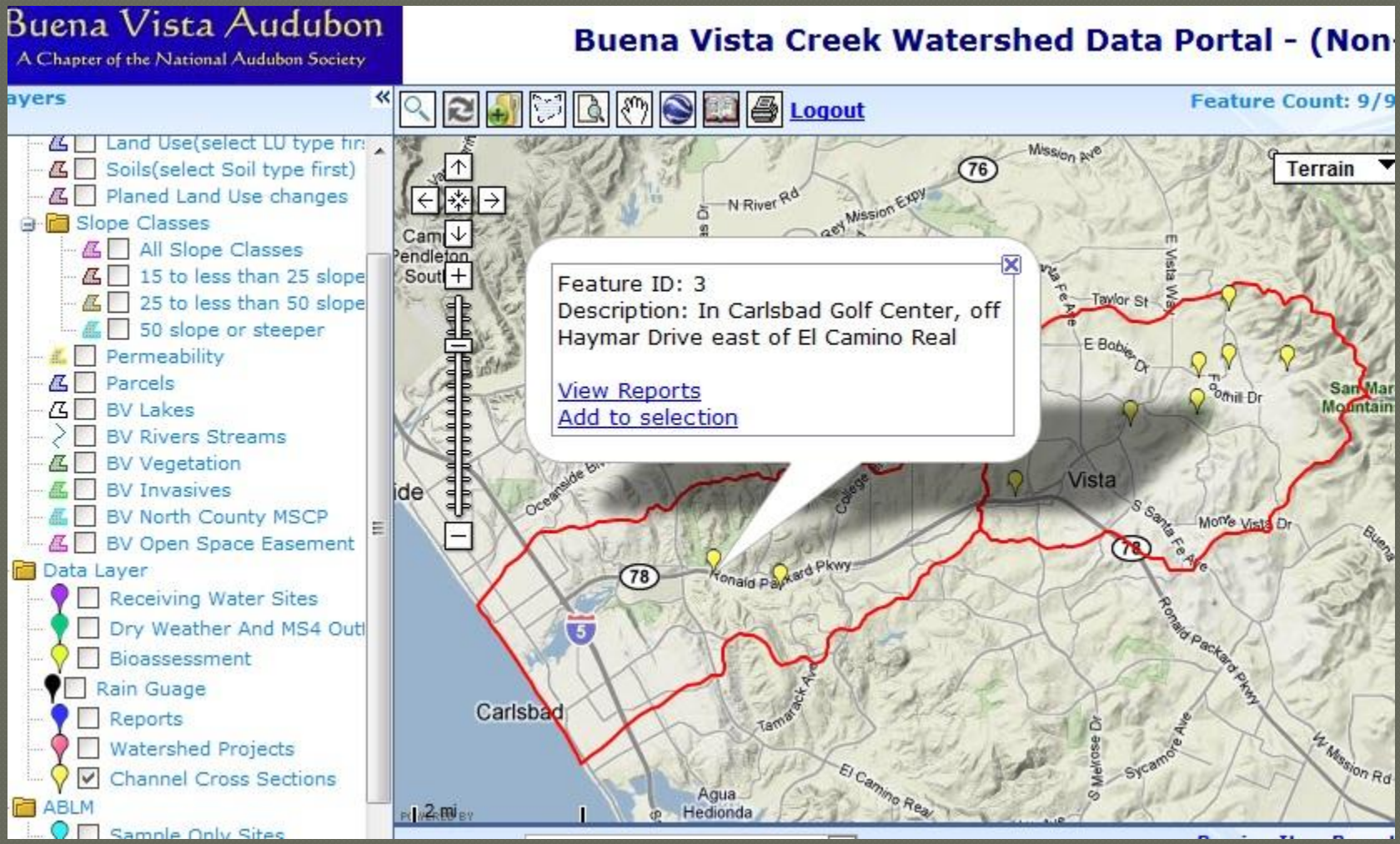
W.Q. data (by monitoring program)



EIR, CEQA documents

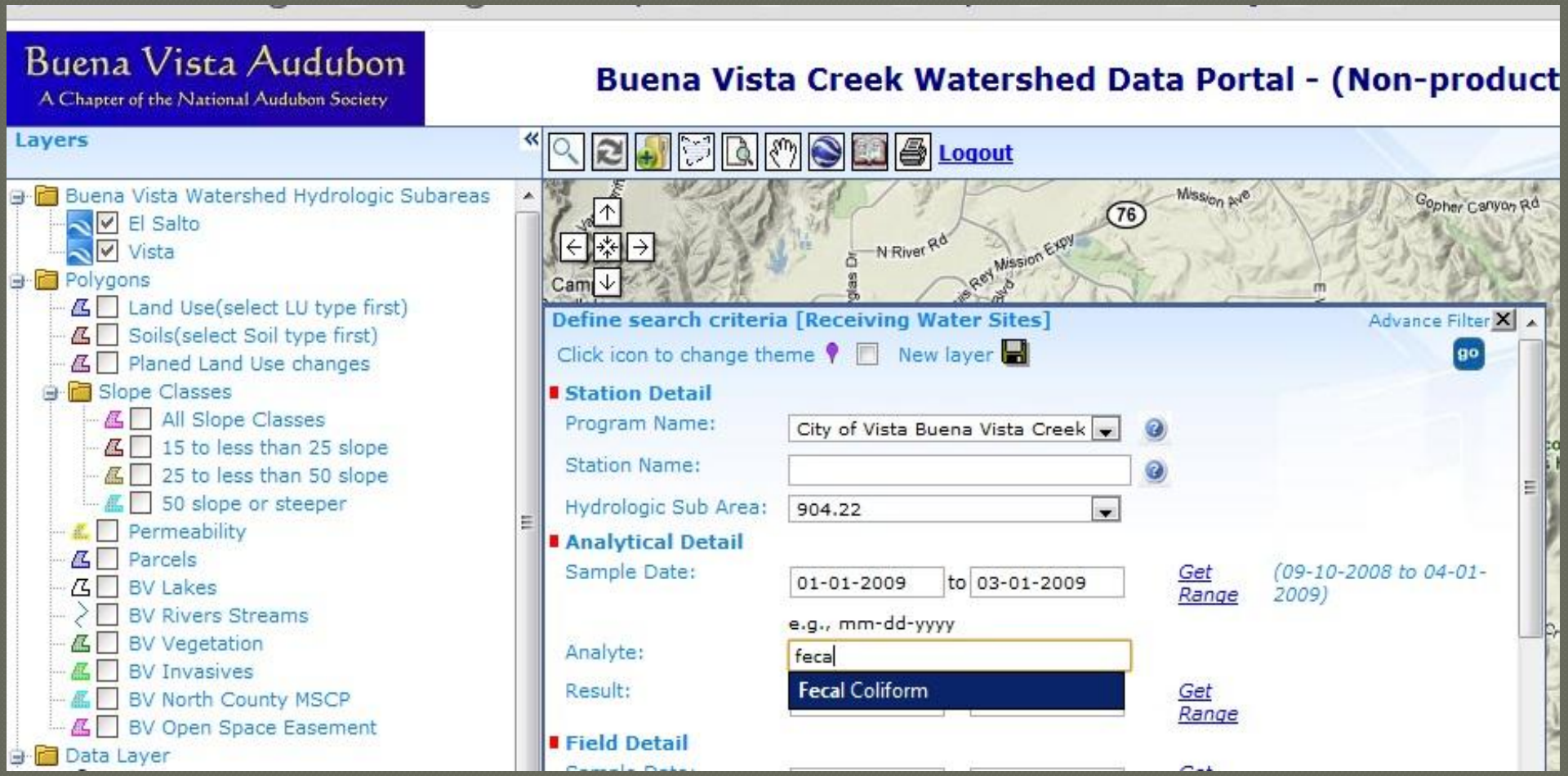


Channel cross sections

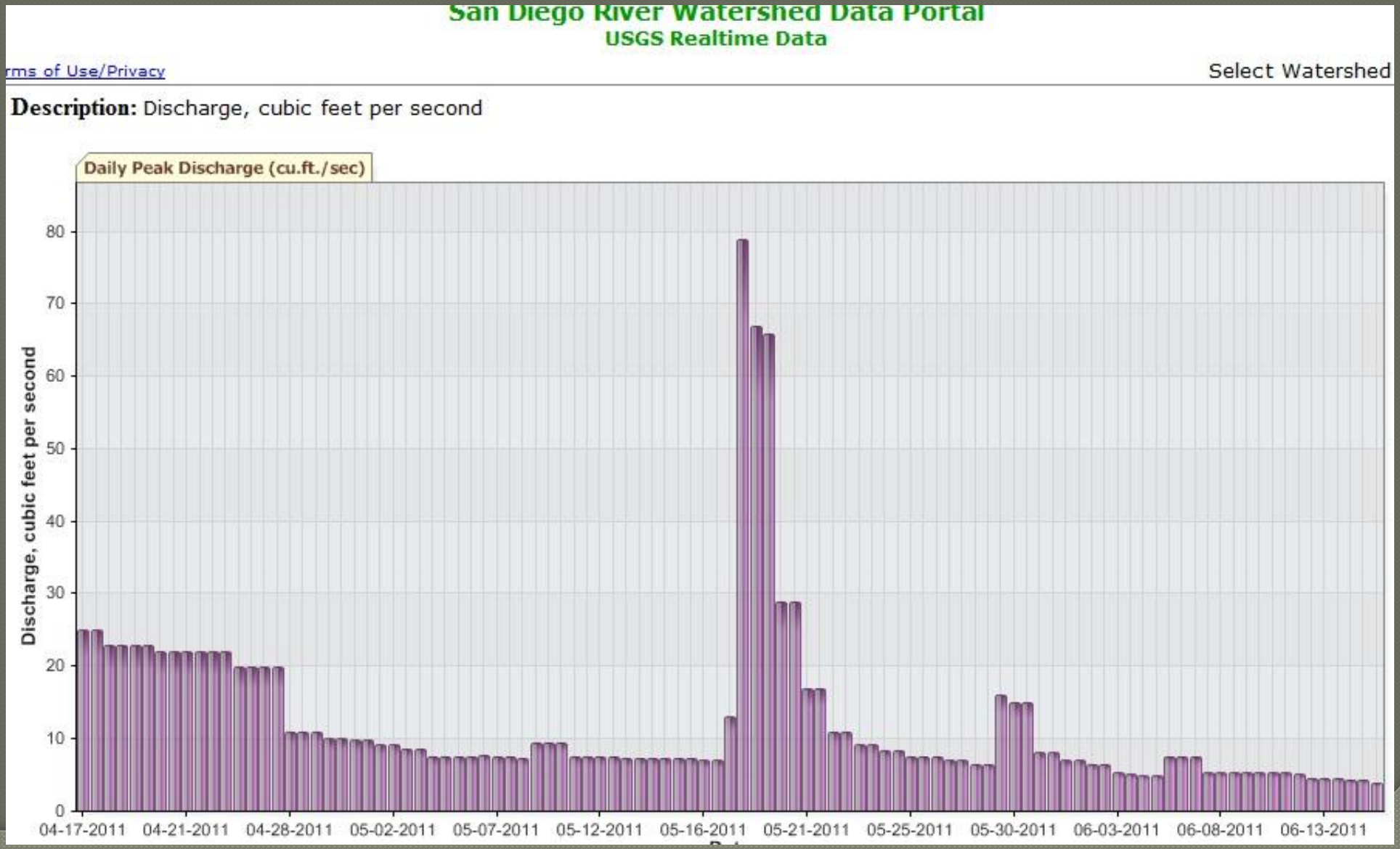


Examples of IWM data sorting and presentation

Query by program and indicator



Time series graph (stream flow)



Column or tabular data

Buena Vista Audubon
A Chapter of the National Audubon Society

Buena Vista Creek Watershed Data Portal - (Non-production version)

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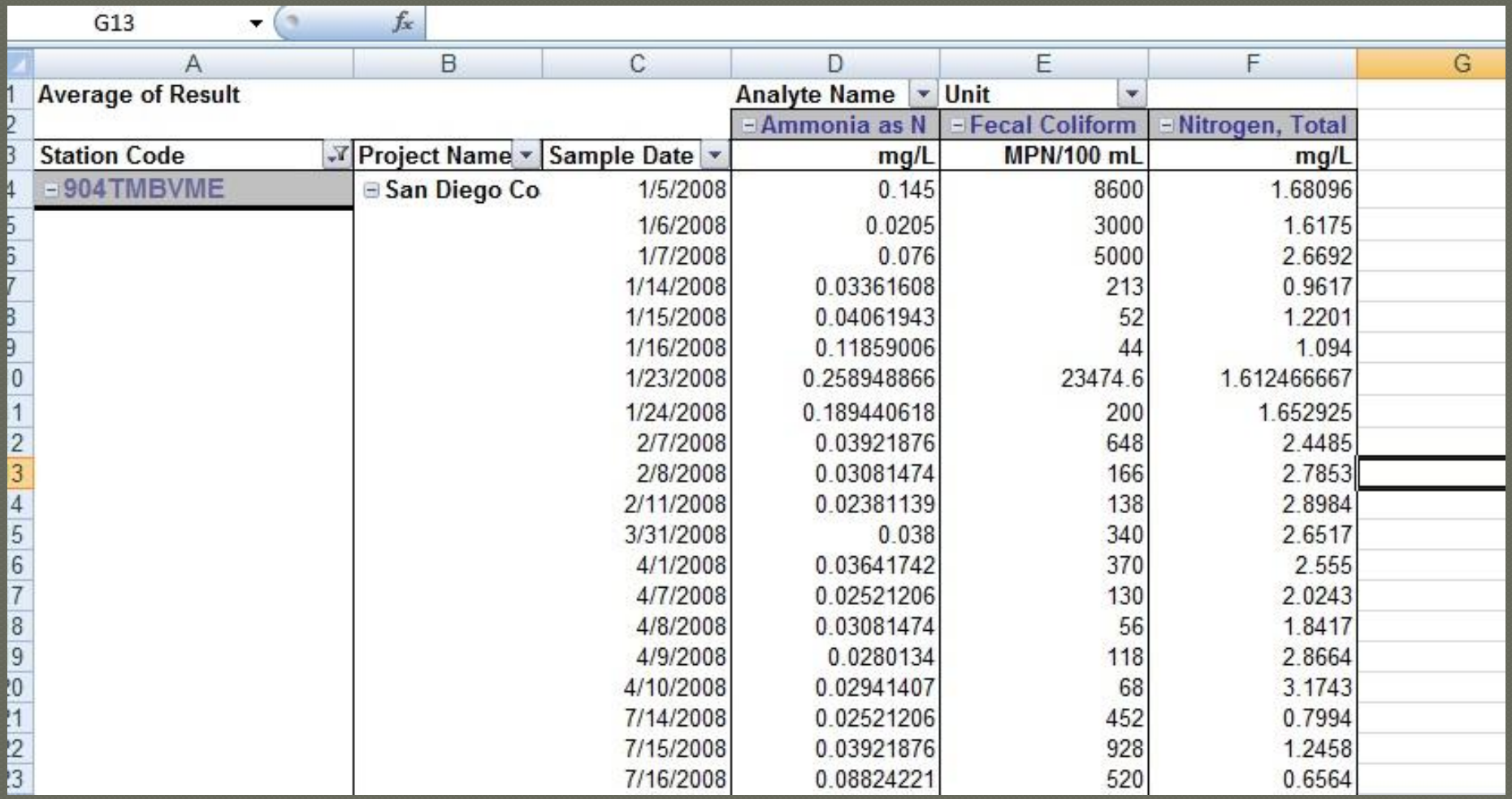
Station Code	Project Name	Sample Date	Collection Method Code	Matrix Name	Method Name	Fraction Name	Analyte Name
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/11/2008	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/10/2008	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	03/31/2009	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/11/2008	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/10/2008	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	03/31/2009	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/12/2008	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/12/2008	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	03/30/2009	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	04/01/2009	Water_Grab	samplewater	SM4500 NO3 E	None	Nitrate + Nitrite as N
BVCSW1	City of Vista Buena Vista Creek Monitoring	03/30/2009	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	04/01/2009	Water_Grab	samplewater	Calculation	None	Nitrogen, Total
BVCSW1	City of Vista Buena Vista Creek Monitoring	09/10/2008	Water_Grab	samplewater	SM 9230 A, B	None	Enterococcus
BVCSW1	City of Vista Buena Vista Creek Monitoring	03/30/2009	Water_Grab	samplewater	SM 9221 B, E	Fecal	Fecal Coliform

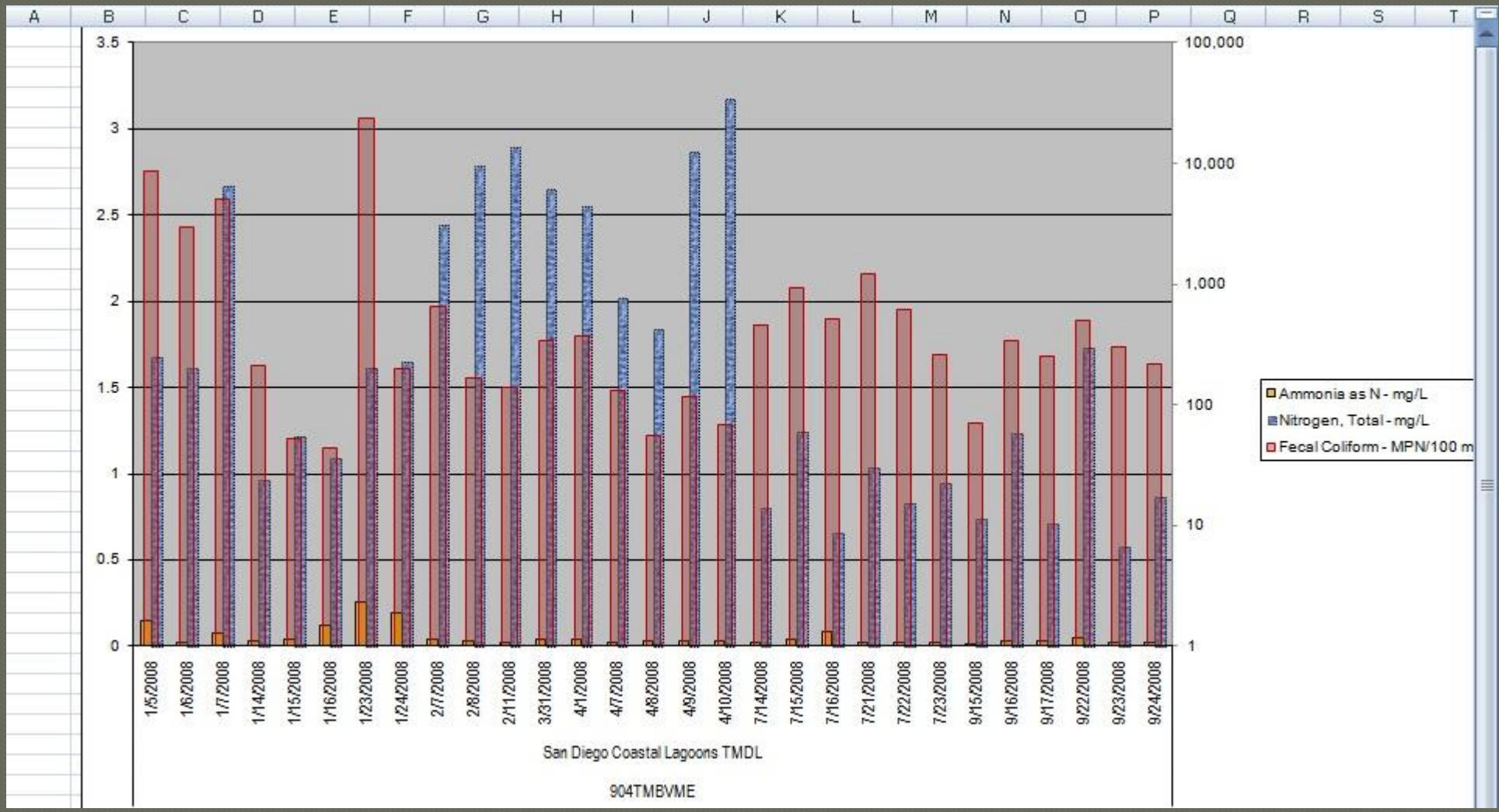
Grouped reports in pivot tables



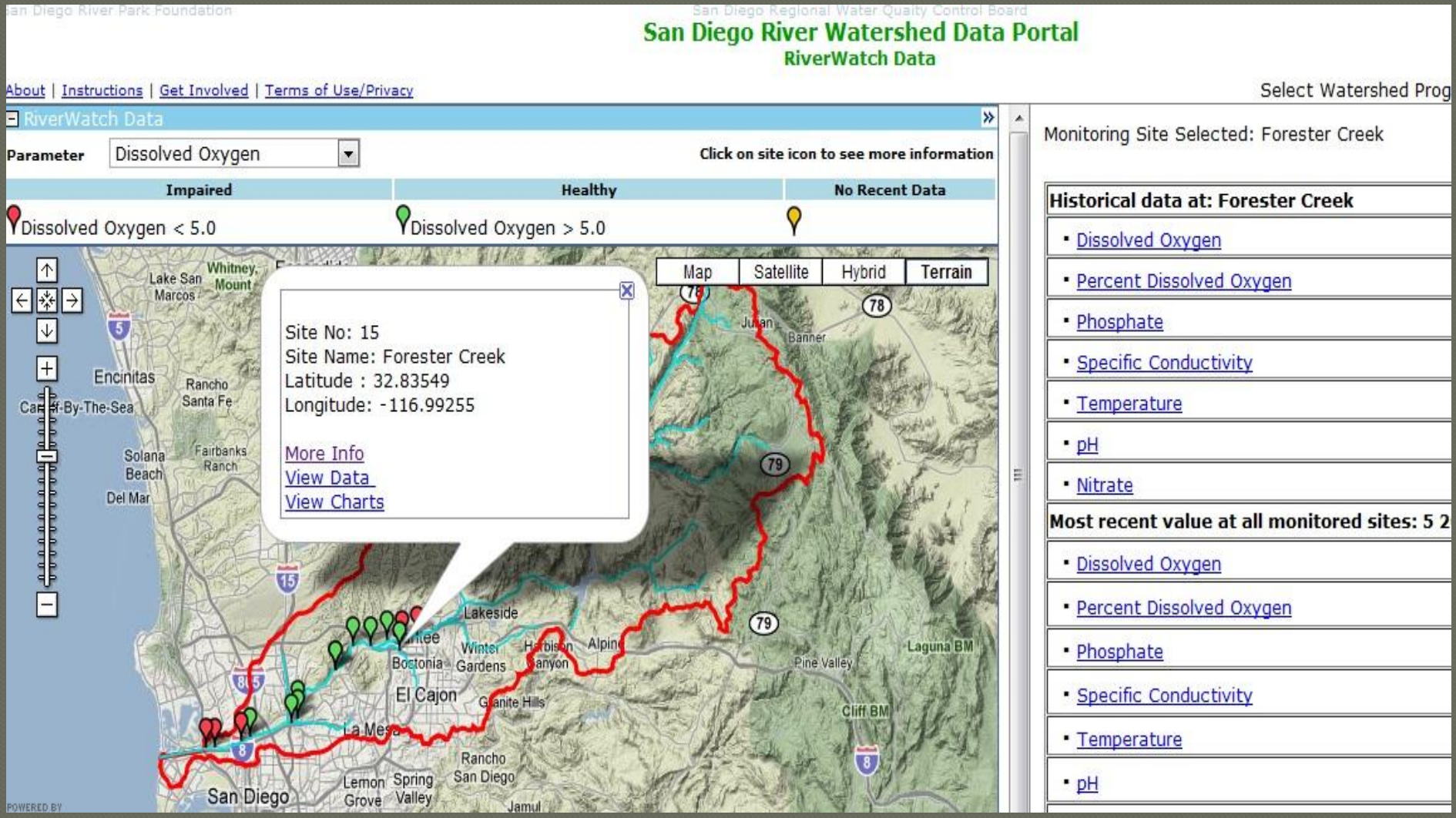
G13

	A	B	C	D	E	F	G
1	Average of Result			Analyte Name	Unit		
2				Ammonia as N	Fecal Coliform	Nitrogen, Total	
3	Station Code	Project Name	Sample Date	mg/L	MPN/100 mL	mg/L	
4	904TMBVME	San Diego Co	1/5/2008	0.145	8600	1.68096	
5			1/6/2008	0.0205	3000	1.6175	
6			1/7/2008	0.076	5000	2.6692	
7			1/14/2008	0.03361608	213	0.9617	
8			1/15/2008	0.04061943	52	1.2201	
9			1/16/2008	0.11859006	44	1.094	
10			1/23/2008	0.258948866	23474.6	1.612466667	
11			1/24/2008	0.189440618	200	1.652925	
12			2/7/2008	0.03921876	648	2.4485	
13			2/8/2008	0.03081474	166	2.7853	
14			2/11/2008	0.02381139	138	2.8984	
15			3/31/2008	0.038	340	2.6517	
16			4/1/2008	0.03641742	370	2.555	
17			4/7/2008	0.02521206	130	2.0243	
18			4/8/2008	0.03081474	56	1.8417	
19			4/9/2008	0.0280134	118	2.8664	
20			4/10/2008	0.02941407	68	3.1743	
21			7/14/2008	0.02521206	452	0.7994	
22			7/15/2008	0.03921876	928	1.2458	
23			7/16/2008	0.08824221	520	0.6564	

Grouped reports in charts



W.Q. data results themed by color

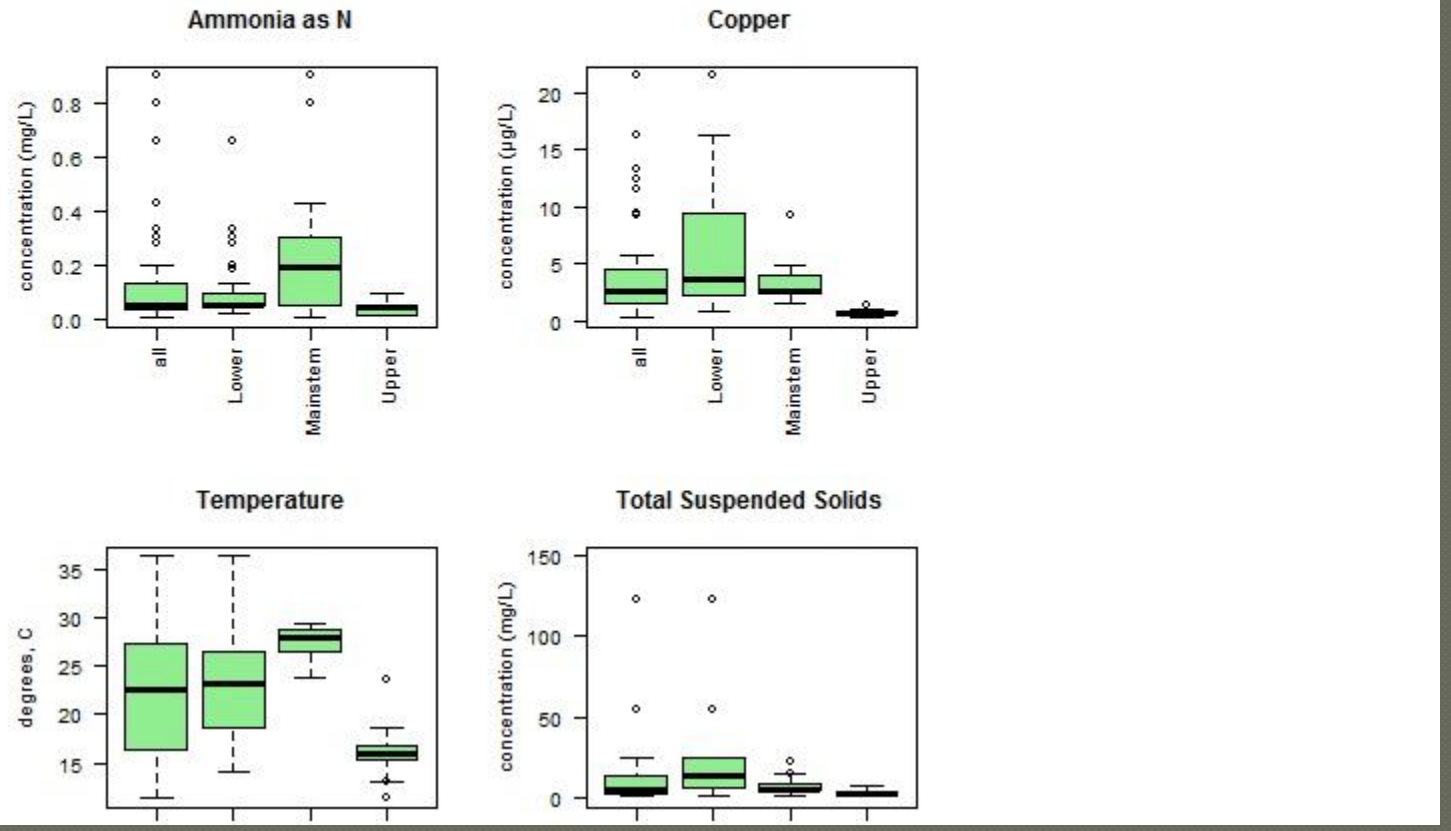


Box charts for W.Q. indicators

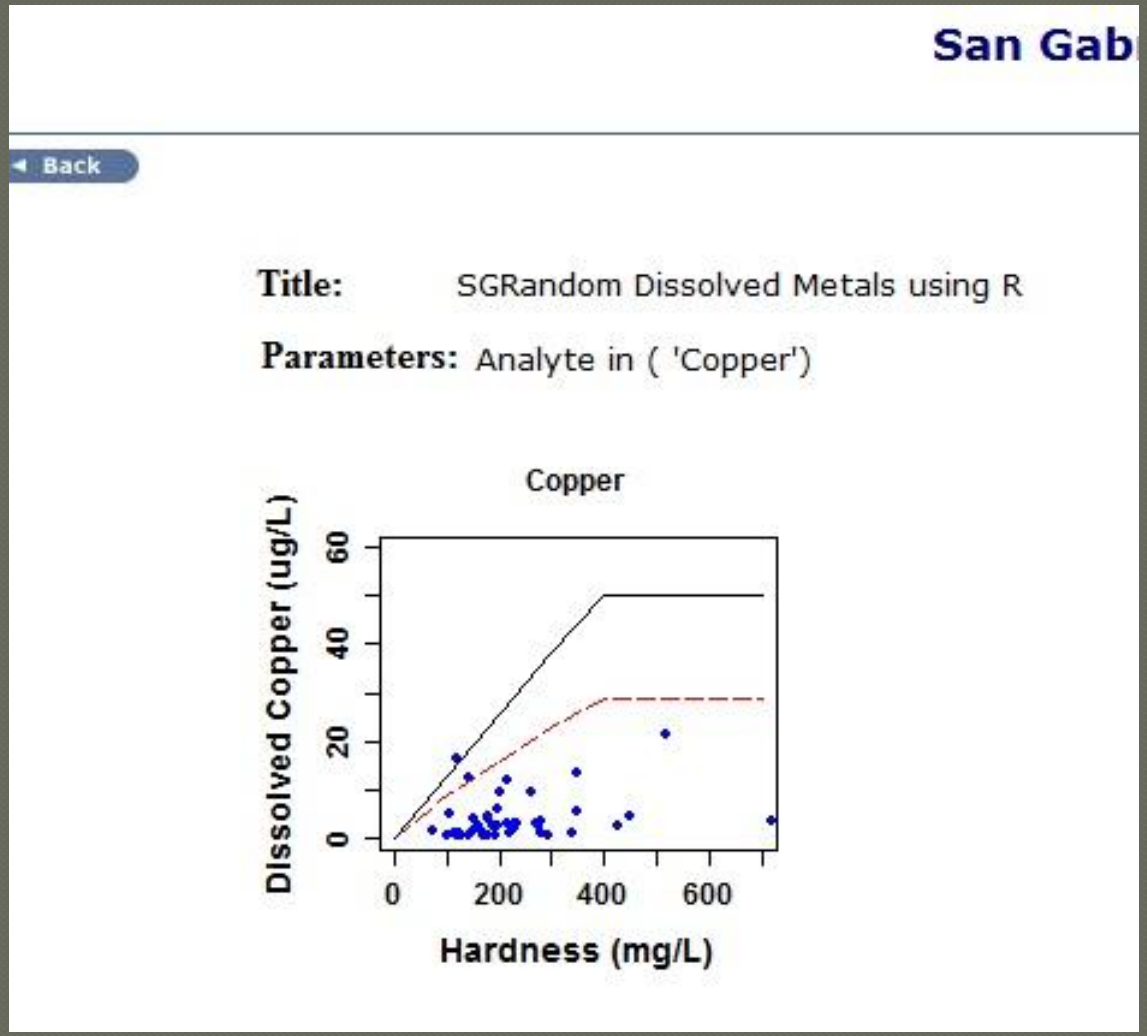
San Gabriel Watershed Data Portal

Title: Chemistry Box Chart Using R

Parameters: AnalyteName in ('Ammonia as N', 'Copper', 'Temperature', 'Total Suspended Solids')



Indicator plotted with another parameter



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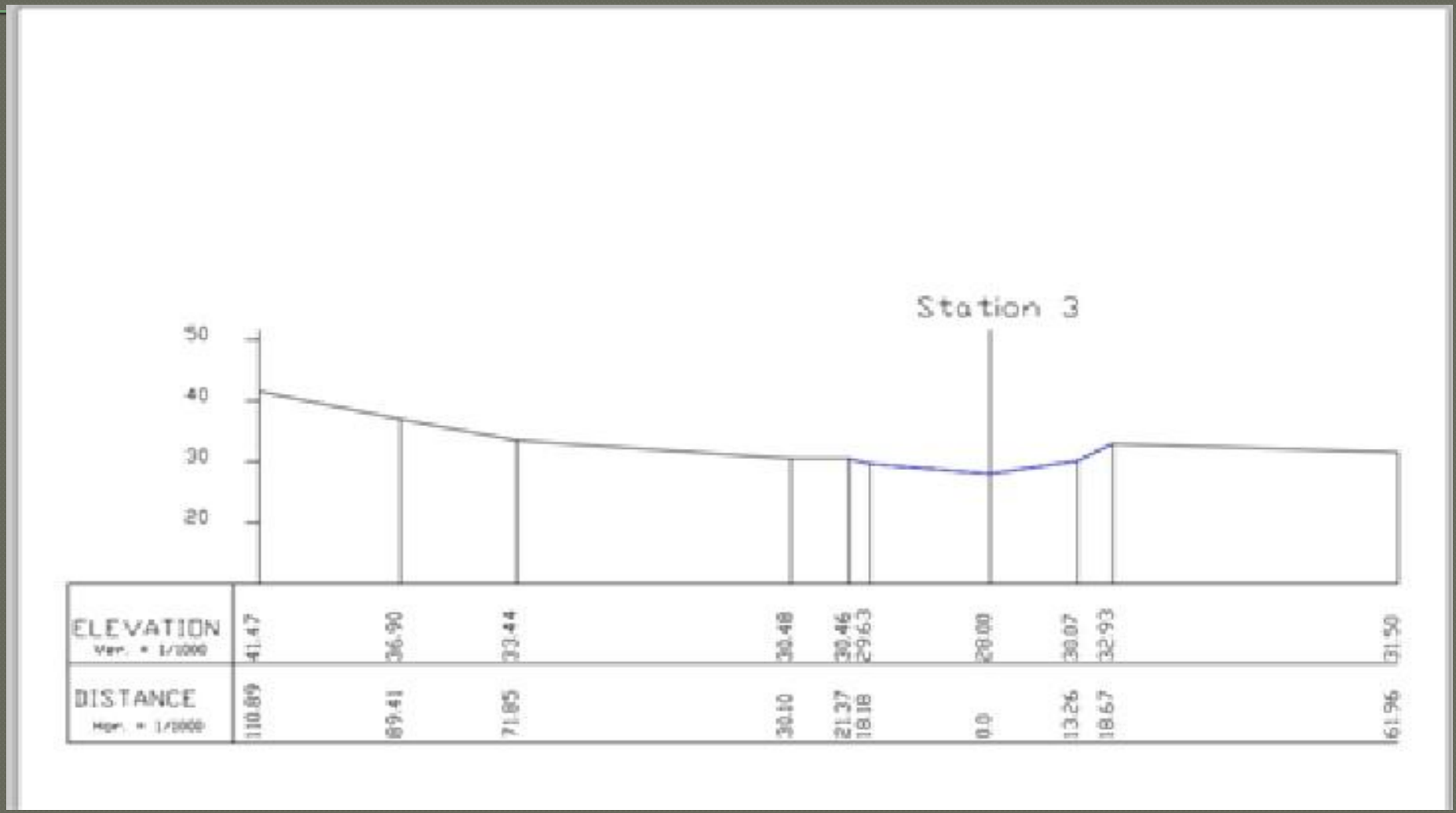

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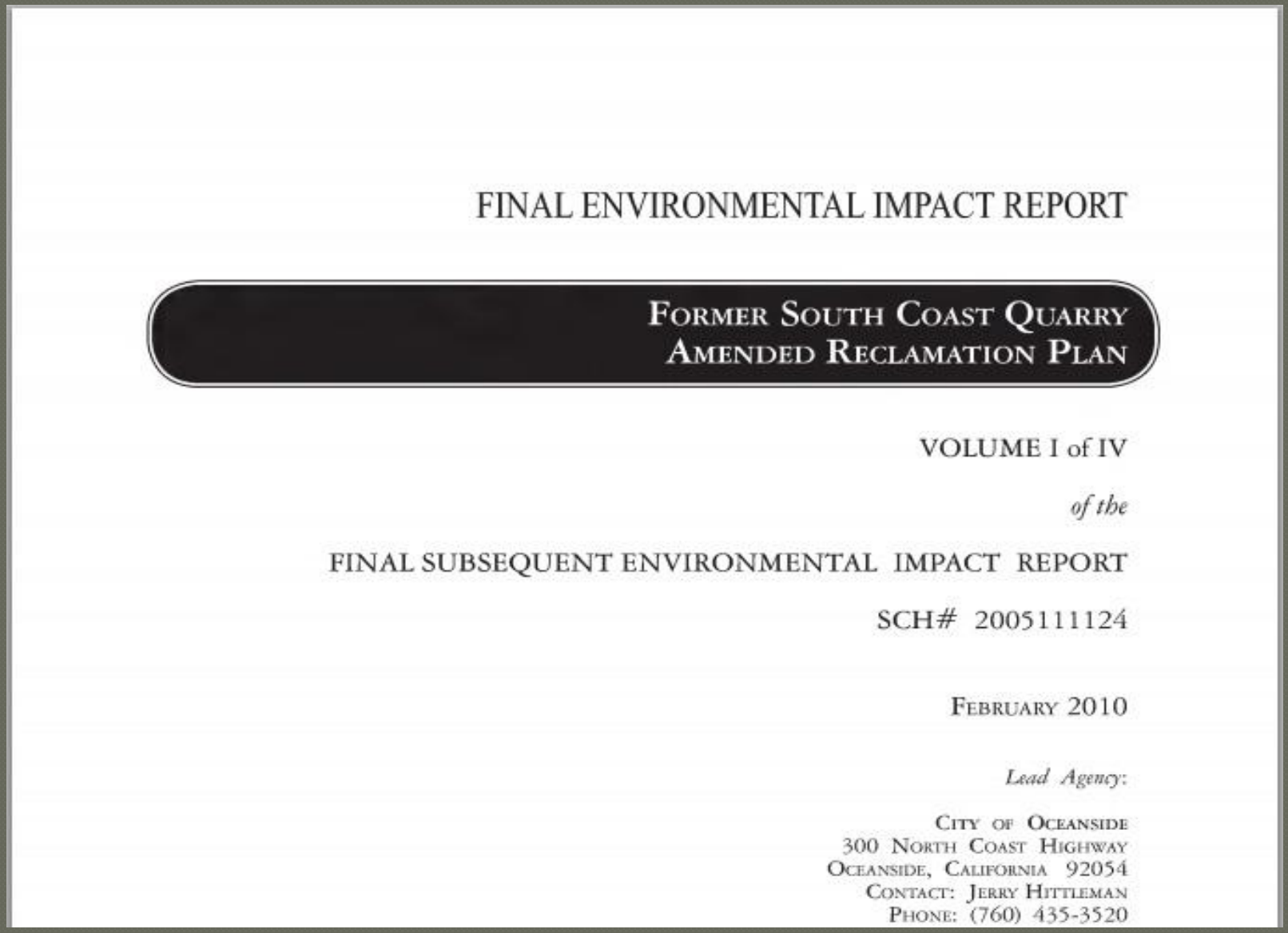

FINAL ENVIRONMENTAL IMPACT REPORT

FORMER SOUTH COAST QUARRY
AMENDED RECLAMATION PLAN

VOLUME I of IV

of the

FINAL SUBSEQUENT ENVIRONMENTAL IMPACT REPORT

SCH# 2005111124

FEBRUARY 2010

Lead Agency:

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300 NORTH COAST HIGHWAY
OCEANSIDE, CALIFORNIA 92054
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PHONE: (760) 435-3520

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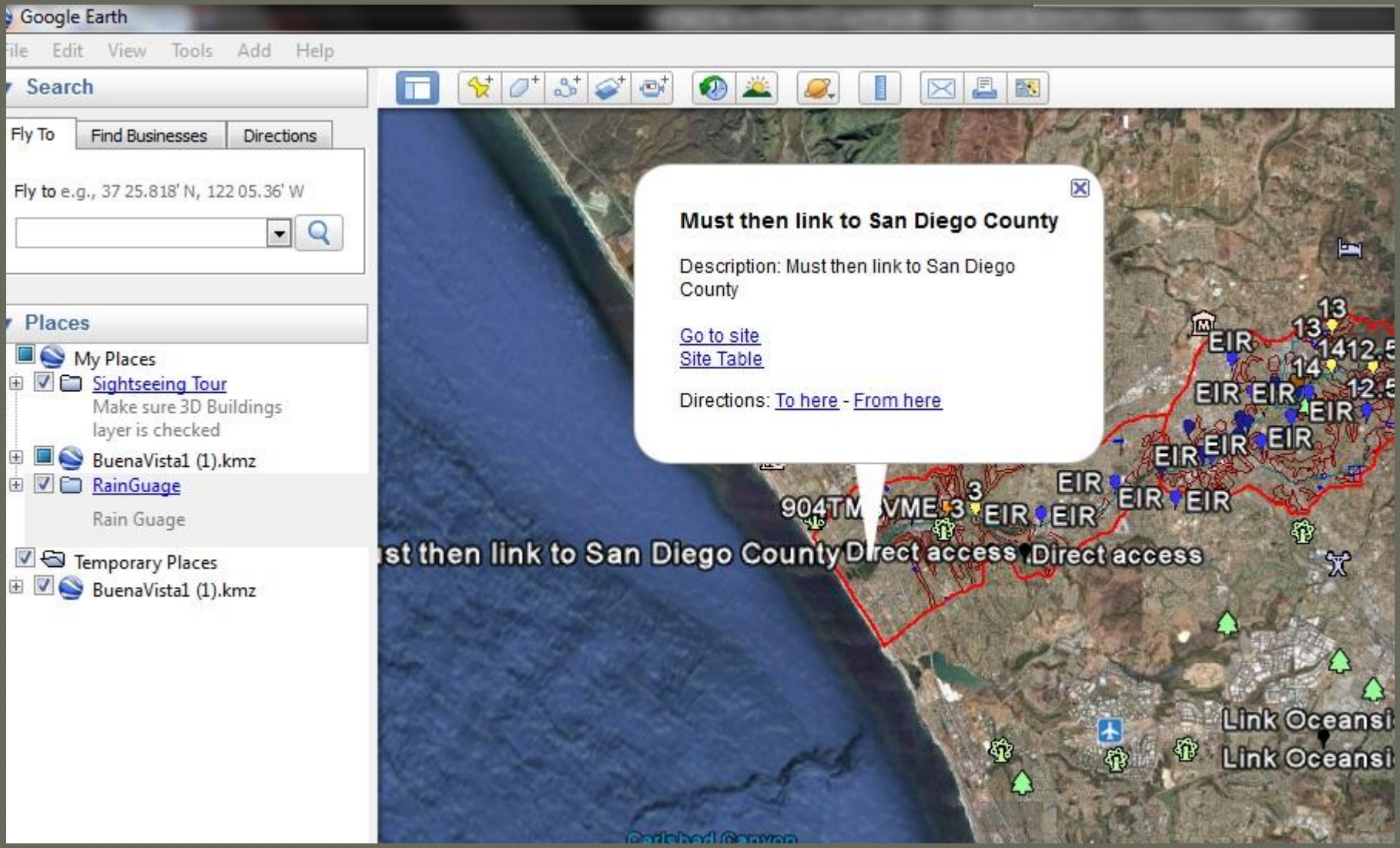

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