

California State Water Resources Control Board

# Systems Thinking, Collaborative Leadership and Civic-Data Engagement

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#### **Overview of presentation**

- Introduction to "systems thinking" as it applies to leadership curriculum at Water Boards
- High level overview of "collaborative leadership" and interest based facilitation and negotiation processes
- Some examples of how this has helped me and our organization achieve better services and outcomes
- Contemporary version of stakeholder involvement → civic/data engagement



In event oriented thinking everything can be explained by causal chains of events. From this perspective the **root causes** are the events starting the chains of cause and effect, such as A and B. In systems thinking a system's behavior emerges from the structure of its feedback loops. **Root causes** are not individual nodes. They are the forces emerging from particular feedback loops.



#### Why systems thinking?

"Systems thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static 'snapshots'...

Today systems thinking is needed more than ever because we are becoming overwhelmed by complexity. Perhaps for the first time in history, humankind has the capacity to create far more information than anyone can absorb, to foster far greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace."

Peter Senge, The Fifth Discipline

#### Systems example for my work

Permit reissuance:

- Analytical thinking
  - statutes → regulations → policies → permit requirements

• Systems thinking

New driver

#### New data / information

What new management questions, stakeholder needs are present?

#### New permit

Addresses new needs, uses or builds new drivers (e.g., licensed personnel)

Existing permit

Check structure of codes / regs /policies to see if old/new drivers exist





#### Principles of systems thinking

- Systems thinking is a way of thinking about the world
- Systems behave as a whole
- Systems understanding is observer or perspective dependent
- A systems approach requires multiple perspectives
- Where we draw systems boundaries effects the system
- We need to be aware of what is going on inside the system but also outside
- Systems are 'nested' we should always think about the system we're looking at as being made up of smaller systems and being part of larger systems

- Being alive is being in relationship with everything!
- Truth' is subjectively defined, requires a diversity of opinion and perspectives
- Understanding is to enquire, examining connections, interdependence and polarities
- Use research and 'feedback loops' to collect and constantly renew relevant information so that learning and adaptation are possible
- Demands flexibility and capacity to invent Values creativity, spontaneity and innovation
- Embraces complexity and values diversity
- Traces cycles and looks for underlying structure and patterns over time
- Anticipates unintended consequences

#### Collaborative leadership

- Interest based facilitation and negotiation
- Design of a collaborative process is critical (way easier than "fixing" one that is already going)
- We have been teaching a collaborative leadership curriculum at the Water Boards since 2002
- Water issues are always changing, this approach to doing our work adapts



#### Evolution of Interest-Based Collaboration

- Top-down, expert-based decisions or purely political decisions: us vs. them
- Good PR sell citizens on the government's decision
- Gather input from the usual suspects we really are listening (and then we will do what we want anyway)
- Gather oodles of input from everyone- we are really listening; trust us!
- Public participation, try to resolve some differences compromise, find the middle



#### Interest-based Negotiation and Collaboration

- Inclusive, broad representation, all interests identified, represented and present
- Carefully structured assessment, education and negotiating process
- Shared decision-making
- Not just input or discussion, but collaborative problem-solving and relationship building
- Win-win-win solutions; interest-based not positional; creative packages of agreements
- Built on enlightened self-interest model



#### Interest-based best practices

- Reframing (of pointed, positional questions and statements)
- Design ("Designing an Effective Stakeholder Engagement Project" course)
- Mid process corrections (sometimes even good designs and plans get new input/drivers)
- Scenarios and role-playing in training and practice
- Practitioners groups
- More slides



### CA Water Boards

- 10 Boards (9 Regional WQ, 1 State WR)
- 68 (7\*9 + 5\*1 = 68) Governorappointed Board Members
- State Board has water quality, water rights, drinking water, funding and fiscal/administration duties





#### Water Boards by the Numbers

• Water Quality, Water Rights and Drinking Water number (of June 30, 2018)

- **10** Boards, **43** office locations
- **18** drinking water offices, **25** State and Regional Board office locations
- >45 programs, ~15 core regulatory programs
- **2178** positions, **338** in supervisory / management positions
- **\$736,000,000** annual operating budget
- Regulate ~**38,000** dischargers
- Allocate ~**34,000** water right holders
- Plan/Assess \$37,600,000 in monitoring
- Fund **\$902,000,000** in local assistance funding and cleanup
- Fund **\$10,600,000** in loans (as of June 30, 2018)
- Fund **\$20,000,000** in penalties assessed in 2017



### Background

- September 2016 AB 1755: The Open and Transparent Water Data Act
  - Develop an integrated platform for existing water and ecological data
  - Make water-related data, tools, and applications developed using state funds publicly accessible
  - Promote principles of openness and interoperability ("making information accessible, discoverable, and usable by the public can foster entrepreneurship, innovation, and scientific discovery")
- July 2018 State Water Resources Control Board Resolution 2018-0032: <u>Adopting Principles of Open Data as a Core Value and Directing Programs and</u> <u>Activities to Implement Strategic Actions to Improve Data Accessibility and</u> <u>Associated Innovation</u>
  - Make Data Accessible ("Open First"): make all critical public data available in machine readable datasets with metadata and data dictionaries
  - Understand Data Quality and Integrity: ensure data are of known and acceptable quality; deploy practices to protect its integrity with standards and protocols





### **Background (cont.)**

What is Open Data?

#### According to **Project Open Data**:

- Public presumption in favor of openness
- Accessible available in convenient, modifiable, and open formats that can be retrieved, downloaded, indexed, and searched; format should be machine-readable (i.e., data are structured to allow automated processing)
- **Described** provide sufficient information to understand strengths, weaknesses, analytical limitations, security requirements, as well as how to process (metadata and data dictionaries)
- **Reusable** available under an open license with no restrictions on use
- Complete published with the finest possible level of granularity that is practicable; aggregate data should reference the primary data
- **Timely** made available as quickly as necessary to preserve the value of the data, accounting for key audiences and downstream needs
- Managed Post-Release point of contact to assist with data use

# **Improve Data Flows**

Enhance internal and external data sharing





#### WATER BOARDS' ENTERPRISE TECHNOLOGY APPLICATIONS AND SYSTEMS INFRASTRUCTURE Effluent Effluent Water Rights (Stormwater) (Wastewater) Surface Water **Drinking Water** Groundwater Documents ater Rights Informa Management Syst (eWRIMS) CAIntegrated Water Quality Sys (CIWQS) State Drinking Wate Information System (SDWIS) Electroni Content Manag (ECM) GeoTracker GAMA Exchange Netw (CEDEN) Master Data Repository SURFACE WATER GROUNDWATER REGULATORY **ADMINISTRATION** Grant Project Date So Cal Bight Irrigated Ag Notice of Intent (Region 3) USEPA Commitment CHISTARS Discharger Electronic Submittal Web-Based Ap Query, Display and Doventoad Annual Supplemental Project Report US Geological Survey Department Water Resources WORKFLOW & DOCUMENT STORAGE Web-Bases Map Query, Display and Download Deta of Public Health Integrated Clean Water Act 303 (d), 305 (b) Report/Map Legislatively Mandated & Other Public Reports itaff Regulator Data Entry Department of Pesticide Repulation State Data Checker **DRINKING WATER** CelEPA Water Quality Exchange (WQX) Node Permittee Licensee Electronic Submittal Performance& Enforcement Réports Portals Water System Data Entry My Water Quality Portais Performance Report Public Query FUNDING Water Board Systems Data Entry Bonds & Grants (Spreadsheet) Lab WQM Uploads Report





### **Open Data Portal**

#### **Open Data Portal**

• Tools to automate cleaning and loading data

	Stage 1 - Collecting Dat	ta	GOV CALIFORNIA OPEN DATA PORTAL
	CHMOS Data		Datasets Topics - Groups About - State Portals Civic Engagement Documentation - Log in
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### **APIs**

#### APIs

- Open Data Portal (dkan)
- Internal Databases

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# **Build Capacity**

Enhance organization-wide 'data literacy'





### Pilot assessment and training program:

- Reinforce basic concepts (how to engage with data)
- Apply best practices throughout the data life cycle (collecting, storing, managing, sharing, analyzing, reporting, ...)





#### Data Literacy Assessment



#### Data Literacy Assessment Continued



### Data Literacy Assessment (cont.)



# **Foster Engagement With Data**

Encourage data use and internal / external collaboration



### **Engagement With Data**

#### **Civic Engagement**

- Water Board Data Fair March every other year
- Watershed Health Indicator and Data Science Symposium June every year
- California Water Data Challenges Every year (most recent trash and drinking water)

#### **Data Science Group**

• Staff and partners





#### California Safe Drinking Water Data Challenge Submit your open data project by Oct. 1, 2018!











#### waterchallenge.data.ca.gov

#### #CAWaterDataChallenge





#### **20** new datasets in machinereadable format

- Human Right to Water Drinking Water Enforcement
- Monthly Water Production Reported by Water Suppliers in the Electronic Annual Reports (2011-2015)
- Drinking Water Watch Public Water Systems Information
- Disadvantaged Communities Mapping and Land Use by Parcel

...in addition to over 1,000 datasets to explore!





### **Sharing and Collaborating**

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### Data.ca.gov

#### California Open Data Portal: <u>data.ca.gov</u>

 Click on the Water icon to find State Water Board data





### **Stormwater Datasets**

#### California Open Data Portal

• Stormwater datasets





### **Open Data Services**

#### California Open Data Portal

- Datasets available as .csv files
- Data dictionaries
- Data description and metadata
- Currently available stormwater datasets include:
  - Industrial stormwater discharges (monitoring data and facility information)
  - Inspections, violations, and enforcement actions
  - Notice of Intent records



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Publisher California State Water Resources Control Board	
Modified 2018-07-28	
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Homepage https://smarts.waterboards.ca.gov/smarts/faces/Sw5martsLogin.ohtml	
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### **More Open Data Services**

Industrial Discharge Data

- Updated regularly via an automated process
- Persistent link to the data file
- API enabled





### **Other State Portals**

- <u>California Natural Resources Agency</u>
- <u>California Department of Health & Human Services</u>
- Others



# **Data Products**

Integrate open data services into tools for internal and external use



### Industrial Stormwater Assessment Tool



- Derived from a tool first developed by the California Coastkeeper Alliance / San Diego Coastkeeper and Water Board's Office of Enforcement
- Assesses water quality of industrial stormwater discharges relative to other indicators of water quality impairment and pollution (303d Listed Waterbodies, CalEnviroScreen 3.0)



### **Stormwater Assessment Tool**

#### Industrial Stormwater Assessment Tool:

- Accesses data from the <u>CA Open Data Portal</u>
- Built with open source tools (R Programming Language) code available on <u>GitHub</u>

		Distance / Industrial-Stormwate	r-Tool	O Unwatch ◄	1 🖈 Star 0 😵 Fork 0	
GOV OPEN DATA PORTAL	search Q	♦ Code ① Issues 1 ⑦ Pull rec	quests 0 🔲 Projects 1 💷 Wiki	🕕 Insights 🔅 Settings		
Datasets Topics • Groups About • State Portals Civic Engagement Documentation • Log in		Tool for examine water available of ind				
Home / Datasets / Stormwater - Regulatory (including Enforcement Actions) Information and Water Quality Results / Industrial Discharge - Monitoring Data	Log in	pollution.	ustrial stormwater discharges relative to	other indicators of water quali	ty impairment and Edit	
● View published         ▲ Back to dataset         ▲ Download         ▲ Data API		data-visualization gis stormwater (	decision-support water-quality water Mana	age topics		
Industrial Discharge - Monitoring Data		51 commits	ۇ¢ 2 branches	♡ 0 releases	L 1 contributor	
This file contains statewide results of industrial stormwater monitoring for various water quality parameters. For additional information about this dataset, please see the data dictionary.		Branch: master - New pull request		Create new file Upload files	Find file Clone or download -	
The dataset is extracted from the SMARTS user Interface, and is updated daily. The date appended to the end of the filename (YYYY-MM-DD.csv) indicates	ty parameters. The <i>I-DD.csv</i> ) indicates the	daltare fix error in creating list of analytes i	n WQI scores for each facility		Latest commit 379403f on Apr 13	
the date when the data was retrieved from the SMARTS interface. The source file for this dataset can be accessed from the SMARTS user interface by	er interface by	🖬 data	add back data files that were accidentally rer	moved	7 months ago	
following the link to Download NOI Data By Regional Board, selecting State Board from the dropdown menu, and selecting the Industrial Ad Hoc Reports	ustrial Application	geospatial_simplification_check	using R-generated polygons for simplifying	large Region 1 303d waterb	8 months ago	
		www	filled out the information for the navbarPage	e layout, and added the D	7 months ago	
Industrial_Ad_Hoc_ReportsParameter_Data_2018-09-26.csv		.gitignore	cleaning up the un-used data		7 months ago	
Data Preview: Note that by default the preview only displays up to 100 records. Use the pager to flip through more records or adjust the start and helds to display the number of records you wish to see	adjust the start and	README.md	fix typo in ReadMe file		7 months ago	
		Stormwater_Enforcement_Tool.Rproj using text files instead of database			10 months ago	
PER WDID APP REP REP MON MON MON MON SAM SAM SAM DISC D	Filters Fields	app.R	fix error in creating list of analytes in WQI sce	ores for each facility	6 months ago	
Indus 1 08I 178203 2016 918881 CL-1 Efflue NA 41.74124 22429 10/17 11:00 10/17 Indus 1 08I 178203 2016 918881 CL-1 Efflue NA 41.74124 22429 10/17 11:00 10/17 Indus 1 08I 178203 2016 918881 CL-1 Efflue NA 41.74124 22429 10/17 11:00 10/17 Indus 1 08I 178203 108I Active 04/03 NA 41.74124 22429 10/17 11:00 10/17	°ortola CA `resc CA	E README.md			ŕ	
California State Water Resources Control Board	Cresc CA	This (draft) tool is intended to a report to the California State Wa database). It also assesses the m impaired water bodies. CalFnvir	nalyze effluent water quality monitoring ater Resources Control Board (the tool dr nonitoring data relative to other indicator roScreen scores) in areas near each facilit	data from industrial stormwate raws from the data stored in th rs of impairment and pollution v.	er discharge facilities that e Waterboard's SMARTS burden (e.g., 303d	

#### Application Location

### Stormwater Assessment Tool (example)

#### Industrial Stormwater Assessment Tool:

 Calculates a Water Quality Index (WQI) score for each facility in a selected Water Board Region for a selected time period, and displays the computed scores on a map and in tabular format

Industrial Stormwater Assessment Tool Home WQI Scores Stand	ards Additional Data	More Information +							
Select Water Board Region:	Water Qual	ity Index (WQI) Se	cores:						
9	• +	Huntington Beach Lat	Ke Farma A Mart	h n 1	1	Palm Desert	2 200	1.10 E 1.10 W	selles V
Select Standard:	-		C Carrier		, * w	5	Say 1 have	The second	4500 h
California Toxics Rule (CTR)	•		No.	15	ton heard	C SAME A Proper Article	Charles Assertan Mountaine	Contraction of the second	""""
Select Monitoring Period:			X.	np Funding And	- X	7			A 15 5
2016 - 2017				VK	alm"	5		Saiton Seu	Ch 0
Select Facility WDIDs (Optional):			Qcea	ansio		2	4	Sonny Bono National Wikitila Refuge	Gunn - 50
All WDIDs				100	anaide - un	~	itim =	Man River	NA NA
Select Water Quality Index (WQI) Score Range:           0         10         20         14         0         1	100 100 100 100 100 100 100 100	Angelos Leaflet   Tiles allty Index Score oScreen 3.0 Pollution Bur	i⊜ Esri — Esri, DeLorme, N den Percentile	San AVTEQ, TomTem, Informaço, d	AC USGS. FAO. NPS. NRCAT	N GeoBase, Kadasler-HL	Pre La	US Naval Reservation 14 W 2012 303 METI, Esri China (Hong Kong).	d Listed Waterbodies
Filter for proximity to a 303d listed water body (rt):	WQI Scores -	Fabular Data:						Search	
Show 2024 pervisibly buffer:	Column Visibili	bownioad Data				and the second state of th			
Show avaluated points	WDID	Monitoring.Period	Standard. Type 🌖	Exceedances	sum.Excursion To	otal.samples F1	NSE F2	WQI STATUS_CC	DE_NAME REG
Show excluded points	9 301005260	2016 - 2017	CTR	0	0	2	0	0	C
snow parameters included in WQI score for each facility	9 301013802	2016 - 2017	CTR	3	1.31957364341085	11	27.2727272727273	0.119961240310078	10 7111957086001
	9 301013854	2016 - 2017	CTR	3	3.55	3	100	1.183333333333333	54 1984732824427
	9 331000856	2016 2017	CTP	9	1120	2	100	560	99 821746880570





### Stormwater Assessment Tool (ex. 2)

#### Industrial Stormwater Assessment Tool:

• Water Quality Index (WQI) score considers the frequency and magnitude of exceedance of water quality thresholds/standards (details available under *More Information* tab)

	Water Quality Index (WQI) Scores:
Industrial Stormwater Assessment Tool Home WQI Scores Standards  Select Water Board Region: 9 Select Standard: California Toxics Rule (CTR) Select Monitoring Period: 2016 - 2017 Select Facility WDIDs (Optional): All WDIDs Select Water Quality Index (WQI) Score Range:	Water Quality Index (WQI) Scores:
Select Facility WDIDs (Optional): All WDIDs Select Water Quality Index (WQI) Score Range: Select CalEnviroScreen (CES) Parameter: Pollution Burden	Parameters In WQI Score: Zinc Total   Lead Total   Copper Total Exceedence Frequency: 80 Exceedence Magnitude: 74 WQI: 23.1
	WQI = Water Cuality Index Score **CES = CalEnviroScreen 3.0 Pollution Burden Percentile

### Stormwater Assessment Tool (ex. 3)

#### Industrial Stormwater Assessment Tool:

• Standards used in calculating Water Quality Index (WQI) scores can be customized (prepopulated standards available based on existing rules and regulations)

Industrial Stormwater Assessment Tool Home WQI Scores Standards Additional Data More Information -Enter / Edit Standards: This table defines the parameters and associated thresholds used to calculate the WQI scores (the standard to apply is selected in the WQI Scores tab). You can edit the values in the table, add new parameters by right clicking anywhere in the table to add a new row, or enter a completely new standard using the Custom column. You can also use the buttons below the table to reset to the default values, or download the table as a csv file Parameter CTR MSGP - Benchmark NAL Custom 1 Aluminum Total 0.75 0.75 2 Ammonia Total (as N) 2.14 2.14 3 Antimony Total 0.64 4 Arsenic Total 0.34 0.15 0.15 5 Beryllium Total 0.13 6 Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C) 30.00 30.00 7 Cadmium Total 0.00 0.00 0.01 8 Chemical Oxygen Demand (COD) 120.00 120.00 0.03 9 Copper Total 0.01 0.01 10 Cvanide Total (as CN) 0.02 0.02 0.02 11 Iron Total 1.00 1.00 12 Iron, Total 1.00 13 Lead Total 0.06 0.08 0.26 14 Magnesium Total 0.06 0.06 0.00 0.00 15 Mercury Total 16 Nickel Total 0.47 0.04 1.02 0.68 0.68 17 Nitrite Plus Nitrate (as N) 18 Oil and Grease 15.00 15.00 19 Phosphorus Total (as P) 2.00 2.00 20 Selenium Total 0.01 0.01 0.01 21 Silver Total 0.00 0.00 22 Total Suspended Solids (TSS) 100.00 100.00 23 Zinc Total 0.12 0.12 0.26 Reset Standards & Standards Used in WQI Calculations



### Stormwater Assessment Tool (ex. 4)

#### Industrial Stormwater Assessment Tool:

• Filter results based on: WQI Score

Industrial Stormwater Assessment Tool Home WQI Scores Standards	Additional Data More Information -
Select Water Board Region:	Water Quality Index (WQI) Scores:
9	
Select Standard:	San Diego Bildoway Est Radio and Contraction of the State St
California Toxics Rule (CTR)	a set and the set of t
Select Monitoring Period:	
2016 - 2017 🔹	Paster Park D CH. Z LSI Z S C Canadian Canadia
Select Facility WDIDs (Optional):	Clay Ave
All WDIDs	
Select Water Quality Index (WQI) Score Range:	Miranse Digen Chuis Vist Chuis Are Class Chuis Are Class C
Filter by Score of Selected CES Parameter:	Leaflet   Ties @ Esn — Esn, DeLorme, NAVTEQ, TomTom, Intermap, IPC, USGS, FAO; NPS, NRCAN, GeoBase, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community.
0 10 20 10 40 56 90 70 80 60 100	**CES = CalEnviroScreen 3.0 Pollution Burden Percentile
Filter for proximity to a 303d listed water body (ft):	WQI Scores - Tabular Data:
Enter a distance in feet	Column visibility Download Data Search:
Show 303d proximity buffer	WDID Monitoring.Period Standard.Type Exceedances Sum.Excursion Total.Samples F1 NSE F2
Show excluded points	9 30/013854 2016 - 2017 CTR 3 3.55 3 100 1.18333333333 54.1984732824427
	9 331000856 2016 - 2017 CTR 2 1120 2 100 560 99.8217468805704



### Stormwater Assessment Tool (ex. 5)



Industrial Stormwater Assessment Tool:

• Filter results based on: proximity to 303d listed waterbodies

Industrial Stormwater Assessment Tool Home	WQI Scores Stand	ards Additional Data	More Information +						
		Water	Quality Index	(WQI) Score	s:				
9		-	Ash St Tect	nobgy	Russ Blvd	ASD SI		1. X	6.
Select Standard: California Toxics Rule (CTR)		-	San Diego	55 Broadw	ay F St	BSt G €	Martin-Luther-King-Jr	Fwy	illtop <sup>moklyn</sup> Ave
Select Monitoring Period:			G St O	st 15th		303d Listed Waterbo Water Body Name: 0 Type: River & Stream	ody (2012) Chollas Creek	41st St	45th St
Select Facility WDIDs (Optional):			o Sthate	16th St 16th St 20th St 15t St	Isla TO E K St E St E St St St St St St St St St St	Region: 9 (San Diego ID: CAR90822000199 Listed Pollutants: Ci	) 990208140725 poper   Diazinon   Indicator	ange Line	0 50 100
All WDIDs Select Water Quality Index (WQI) Score Range:		100	Petco Park		Con	Bacteria   Lead   Phos Trash   Zinc Listing Comments: 1 Potential Sources: N	sphorus   Total Nitrogen as N   NA IA	Greenwood Cemetery	CES**
n no 20 30 40 60 50 Select CalEnviroScreen (CES) Parameter:	70 83 40			Newon Ave	Julian Ave	Logan tõ K-8	CCCanterior		-40 -60 -80 -80
Pollution Burden Filter by Score of Selected CES Parameter:			Miramar 1592 ff	•		5	Logan Ave	e to to to Vewton	Ave
p         10         20         50         40         50         60           Filter for proximity to a 303d listed water body (ft):	70 90 90	n Die	Jo Contraction of	S D	Harbor Dr	Depo and Impe	a company	oth St 43rd St	_
Enter a distance in feet Show 303d proximity buffer			-Chula Vist;		2		- Norm		
Show excluded points		If K	2002	Leaflet   Tiles © Esri	— Esri, DeLorme, N	IAVTEQ, TomTom, Intern	nap, iPC, USGS, FAO, NPS, NR	CAN, GeoBase, Kadaster	NL, C
		9 301013	302 2016 - 2017	CTR	3	1.31957364341085	11 27.2727272727273	0.119961240310078 10	7111957086001

## Stormwater Assessment Tool (ex. 6)



Industrial Stormwater Assessment Tool:

• Filter results based on: CalEnviroScreen 3.0 parameter values (by census tract)

ndustrial Stormwater Assessment Tool Home WQI Scores Standards	Additional Data	More Information $\star$							
Select Water Board Region:	Water Qualit	ty Index (WQI) Sco	res:						
9	+	Pesheobay	Ross til d A.Se	6 St		y Party Crown	S Wal	/	15 E
Select Standard:	- San Di	ego a a Bros	away g	C SI	Mattund ütter-Kitte	Demesry Huttob Dr	Mileonusi Ter li Maldie	1	11-
California Toxics Rule (CTR)			Community of the		Allen Park	41st St yre St Sili St		1	Etoo kiyn Ave
Select Monitoring Period:		1 St	iskind Avn	as puzz		E Charge / top	= Marse	131	
2016 - 2017 -		Petro Park 0	E Lai E E Imperali	Ne E	Lift Hope Committeey	Gunanood	5	Sum St	WQI*
Select Facility WDIDs (Optional):		2 C	Commercia	City Ave			o Uacolii	Churchward-St	- 50
All WDIDs			and the second		Gcean View Bly		Mak	Soundan strot.	NA
Select Water Quality Index (WQI) Score Range:	Milan	102.m EL			Logan Ave	Hanne an Are	Knos u Made u wynth Street Chane	Olvers Ars	-20 -40 -60
Select CalEnviroScreen (CES) Parameter:	n Diego 🏦	Delle 1	Prop.	and the	Come -		V A	an st in the	-80
Pollution Burden 👻		Shula Visto	2 Date		A REAL		f form	2012 303	d Listed Waterbodies
Filter by Score of Selected CES Parameter:		Leaflet   Tiles © F	Esri — Esri, DeLorme, NAVTE	Q, TomTom, Intermap, IPr	C. USGS, FAO, NPS, NRCAN	GeoBase, Kadaster NL, Ordna	nce Survey, Esri Japan, Mi	ETI, Esri China (Hong Kong),	and the GIS User Communit
	*WQI = Water Qua **CES = CalEnviro	aity index Score Screen 3.0 Pollution Burden	Percentile						
Filter for proximity to a 303d listed water body (ft):	WQI Scores - Ta	abular Data:							
Enter a distance in feet	Column visibilit	y Download Data						Search:	
Show 303d proximity buffer	WDID	Monitoring.Period	Standard.Type 🕴	Exceedances (	Sum.Excursion	Total. Samples (	F1 0	NSE (	F2 (
Show excluded points	9 371000449	2016 - 2017	CTR	9	30.3166666666667	15	60	2.02111111111111	66.8995954394998
	9 371000615	2016 - 2017	CTR	1	2.75	2	50	1.375	57.8947368421053

# Stormwater Assessment Tool (ex. 7)



#### Industrial Stormwater Assessment Tool:

 Filter results based on: WQI Score, proximity to 303d listed waterbodies, and CalEnviroScreen 3.0 parameter values

Industrial Stormwater Assessment Tool Home WQI Scores Standards	Additional Data More Information +
	Water Quality Index (WQI) Scores:
Select Water Board Region:	
9 -	
Select Standard:	San Diego Bradway Balton Caller Saller Sa
California Toxics Rule (CTR)	A LAN 2 S S S S S S S S S S S S S S S S S S
Select Monitoring Period:	
2016 - 2017 💌	
Select Facility WDIDs (Optional):	Commercial St.
All WDIDs	
Select Water Quality Index (WQI) Score Range:	Minnes 1927 EL 1927 EL 1928 EL 1938
Pollution Burden	-chula vist
Filter by Score of Selected CES Parameter:	Leader 1 Ties © Esil — Esil DeLomie. NAVTEQ. TomTom. Intermap. IPC. USGS. FAO. NPS. NRCAN. GeeBase. Kadaster NL. Ordnance Survey, Esil Japan. METI, Esil China (Hong Kong), and the GIS User Communit     "WQI = Water Quality Index. Score     "CES = CalEnviroScreen 3.0 Pollution Burden Percentile
Filter for proximity to a 303d listed water body (ft):	
2000	Column visibility Download Data Search:
Show 303d proximity buffer	WDID Monitoring.Period Standard.Type Exceedances Sum.Excursion Total.Samples F1 NSE F2
Show excluded points	9 37/006106 2016 - 2017 CTR 46 215.0583333333 72 63.888888888888888 2.9869212962963 74.9179899555839
	9 37/006108 2016 - 2017 CTR 41 918.9233333333 87 47.1264367816092 10.562337164751 91.3512295502971

### Stormwater Assessment Tool (ex. 8)



Similar tool developed to investigate individual water quality parameters:

• Can be used to assess water quality and to perform QA/QC (e.g. identify outliers)

ndustrial Stormwater Effluent Water Quality Assessment Tool Home	ampling Summary	Additional Data More Inf	ormation *						
Parameter:          Lead, Total <ul> <li>Water Board Region:</li> <li>9</li> <li>Filter Sample Data Considered:</li> <li>Sample Date Range:</li> <li>2001-11-17</li> <li>to</li> <li>2018-06-25</li> </ul>	+ - 0	interest and inter	Laguna Nigue San Cler Ma	Internet to the second	v Information: • 9 37/026734 • y Name: CENTER POINT AUT	C dhull an Reserve n	ANTA FOSA MA	Turn Annis Tar Annis Tar McAurinott Anni McAurinott Annis Anni Anni	
Range of Sampling Data Considered (mg/L): Minimum Value:				SIC: 5 Addre City: 5 Receiv	015-Motor Vehicle Parts, Used ss: 935 B HERITAGE RD San Diego ving Water: Otay River Is:		Love Land	Really Really	-0.1 -0.2 -0.3 A -0.4 -0.4
Maximum Value:	Los	An geles		Media Maxim Numb	n: 0.908 mg/L num: 1.8 mg/L er of Samples: 2	Tecate	UNITED S	TATES	-0.6 -0.7 -0.8 -0.9 e
Filter Statistical Results Reported: Statistic to Plot:	Water Quality k	Leafet   Tiles © Esr - I	Esri, DeLorme, NAVTEQ, TomTom, I	Intermap, iPC, U	Tijijan a SGS, FAO. NPS, NRCAN, GeoBa	ise, Kadaster NL	Ordnance Survey	20 , Esri Japan, METI, Esri China (Hong Kon	g), and the GIS User Community
Median	Column visibilit	y Download Data	Data.					Search:	
Scale marker size by selected statistic	WDID 0	SAMPLING_MAXIMUM	SAMPLING_MEDIAN	UNITS	SAMPLES_COUNT	APP_ID	STATUS	NOI_PROCESSED_DATE	NOT_EFFECTIVE_DA
Range of Results for the Selected Statistic (mg/L): Minimum Value:	9 30/013802	0.004	0.002	mg/L	5	214873	Active	03/13/1998	2
	9 301014449	0.019	0.019	mg/L	2	214878	Active	08/03/1998	
Maximum Value:	9 371000277	0.057	0.003825	mg/L	70	218151	Active	03/06/1992	



### **Enable data-driven decision making**

ndustrial Stormwater Assessment Tool Home WQI Scores Standar	GOV OPEN DATA PORTAL	search	Q Pull requests Issues Marketplace Explore				
Select Water Board Region:	Datasets Topics - Groups About - State Portals Civic Engagement Documentation -	Log	in a start of the second s				
9 Select Standard:	A / Home / Datasets / Stormwater - Regulatory and Enforcement Actions - SMARTS / Industrial Discharge - Monitoring Data	Projects 1 I Wiki di Insights Settings					
California Toxics Rule (CTR)	View published ABack to dataset		vater discharges relative to other indicators of water quality impairment and				
Select Monitoring Period: 2016 - 2017	Industrial Discharge - Monitoring Data		water-quality water Manage topics				
Select Facility WDIDs (Optional):	This file contains statewide results of industrial stormwater monitoring for various water quality parameters. The dataset is extr	racted from the SMAR	TS ranches 🛇 0 releases 🎎 1 contributor				
All WDIDs	user interface, and is updated daily. The date appended to the end of the filename (YYYY-MM-DD.csv) indicates the date when the data was retrieved						
Select Water Quality Index (WQI) Score Range:	from the SMARTS interface. The source file for this dataset can be accessed from the SMARTS user interface by following the link By Regional Board, selecting State Board from the dropdown menu, and selecting the Industrial Ad Hoc Reports - Parameter Data	Ita Latest commit 535fbee 6 hours ago					
0 10 20 10 40 00 70 40 00 Select CalEnviroScreen (CES) Parameter:	Industrial_Ad_Hoc_ReportsParameter_Data_2018-03-15.csv		a files that were accidentally removed       a day ago         rated polygons for simplifying large Region 1 303d waterb       2 months ago         nformation for the navbarPage layout, and added the D       2 days ago				
Pollution Burden Filter by Score of Selected CES Parameter:	<b>6</b> Data Preview: Note that by default the preview only displays up to 100 records. Use the pager to flip through more records end fields to display the number of records you wish to see.	s or adjust the start ar	nd he un-used data a day ago				
0 0 10 20 20 40 50 .80 70 80 00	Grid Graph Map 380152 records (1 - 100 ) Search data	Go » Filters Fie	s instead of database     3 months ago       tion title (remove <div>)     a day ago</div>				
Filter for proximity to a 303d listed water body (ft):	PER WDID APP REP REP MON MON MON MON MON SAM SAM	SAM DISC	. D				
Enter a distance in feet	Indus 1 08I 178203 2016 918881 CL-1 Efflue NA 41.74124 22429 10/17	11:00 10/17					
Show 303d proximity buffer Show excluded points Show parameters included in WQI score for each facility	Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22429       10/17         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22429       10/17         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22429       10/17         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22429       10/17         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22429       10/17         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22430       12/29         Indus       1 08I       178203       2016       918881       CL-1       Efflue       NA       41.74       -124       22430       12/29	11:00 10/17 11:00 10/17 11:00 10/17 12:00 12/29	the twater quality monitoring data from industrial stormwater discharge facilities     urces Control Board (the tool draws from the data stored in the Waterboard's     toring data relative to other indicators of impairment and pollution burden (e.g.,				
	9 301013854 2016 - 2017 CTR 3 3.55 3 100	1.1833333333333 54.19	964732824427				

The application is available at: https://daltare.shinvapps.io/Stormwater Enforcement Tool

### **More Data Products**

#### Communicate vital information to the public





### **More Examples**

More examples – Data-Driven Management (Performance Report), Innovative Tools (Trash Tracker), etc.





# Open Data at the CA Water Boards

The Open and Transparent Water Data Act (AB1755), our efforts to better manage our data, and the related principles adopted by the State Water Board in July 2018



# The Open and Transparent Water Data Act (AB 1755)



#### AB1755 requirements operative to WBs

- DWR is leading effort to build platform, develop protocols, etc.
- Water Board and WQ Monitoring Council is supporting DWR effort(s)
- Water Board must publish open data by September 2019. In addition, by August 2020 we must:
  - 12415. The statewide integrated water data platform created pursuant to Section 12410 shall, at a minimum, do all of the following:
  - (a) Integrate existing water and ecological data information from multiple autonomous databases managed by federal, state, and local agencies and academia using consistent and standardized formats.
  - (b) Integrate the following datasets, as available:
  - (1) The department's information on State Water Project reservoir operations, groundwater use, groundwater levels, urban water use, and land use.
  - (2) The state board's data on water rights, water diversions, and water quality through California Environmental Data Exchange Network (CEDEN)



### 5 Guiding Principles for WB Data Management

- Make Data Accessible ("Open First"): our organization values transparency and strives to make all critical data available in machine readable datasets with metadata and data dictionaries
- 2. <u>Understand Data Quality and Integrity</u>: our data are thoughtfully planned, of known and useful quality, and we deploy practices to protect its integrity with standards and protocols
- **3.** <u>Improve Data Literacy</u>: our whole organization understands its data needs and responsibilities, can speak the language of data science the staff and managers have robust data science capacity



### 5 Guiding Principles for WB Data Management (cont.)

- **4.** <u>Use Data to Govern:</u> our organization uses data to govern, or makes decisions that are in the best interest of our mission(s)
- 5. <u>Govern our Data</u>: our organization takes proactive steps to develop effective data and information technology management practices to ensure our data flows to where it is needed in a timely manner while complying with our data sharing policies



### Data Driven Management Examples

Water Quality Status Reports (2017 and 2018)

FY2016/17 Water Boards Performance Report Story



This pilot dashboard shows inspection trends for 9 Regional Boards for all programs could replace almost 50 report cards currently posted as individual HTML pages.

#### **REGULATE**: ALL PROGRAMS **MEASURE**: INSPECTION TRENDS



# Additionally, the tool encourages more interaction and allows users to see more granular data. All due to open data techniques.



● GENERAL ● Major ● Minor

#### Water Quality Report Card

#### Water Quality Report Card - Algae in the Ventura River

Regional Water Board:	Los Angeles, Region 4	-	Conditions Improving Data Inconclusive Mimprovement Needed Targets Achieved/Water Body Delisted			
Beneficial Uses Affected:	REC-1, REC-2, WARM, COLD, EST, WILD, RARE, MIGR, SPWN, WET, MUN	STATUS				
Implemented Through:	NDPES Permits, MS4 Permits,	Pollutant I Point Source Nonpoint Source Legacy Type:				
	Conditional Waivers	Pollutant Source:	Urban Storm Water Runoff	Irrigated Crop Production		
Effective Date:	June 28, 2013		Onsite Wastewater Treatment Systems	Wastewater Discharges		
Attainment Date: 2023			Horses and Livestock	Non-Point Source Runoff		

#### Water Quality Improvement Strategy

The Ventura River watershed is in Ventura and Santa Barbara Counties in Southern California. The Ventura River, including its estuary and tributaries, is impaired due to algae, eutrophic conditions, low dissolved oxygen, and elevated nitrogen. The primary sources of these impairments are nutrients discharged from the municipal separate storm sewer system (MS4), agriculture operations, livestock facilities, onsite wastewater treatment systems (OWTS), and the Oiai Valley Waste Water Treatment Plant (WWTP). In 2013, USEPA approved the TMDL for Algae, Eutrophic Conditions, and Nutrients in the Ventura River and Its Tributaries to restore water quality. The TMDL includes numeric targets for algal biomass, dissolved oxygen, and pH, and load allocations (LAs) and waste load allocations (WLAs) for total nitrogen and total phosphorus. The TMDL assigns more stringent nitrogen and phosphorus allocations for dry weather than wet weather because dry weather (May 1 to September 30) is the growing season. The TMDL allows the Ojai WWTP 12 years, MS4 permittees six years, agriculture operations six years, livestock facilities 10 years, and OWTS 10 years to attain allocations. The Oial WWTP intends to attain WLAs by upgrading its nutrient removal processes. Agriculture operations will implement iterative management practices to control nutrients in their discharges. The MS4 permittees' compliance approach is to eliminate dry-weather discharges by implementing best management practices (BMPs). Horse facilities will implement manure management plans. Individual responsible parties are monitoring their discharges to demonstrate compliance with allocations and multiple responsible parties are jointly monitoring algal biomass, nutrients, and other constituents in receiving waters to assess watershed-wide conditions. The Board intends to adopt a Conditional Waiver for horse facilities in FY 18-19. Agriculture operations will implement nutrient management as required by the Conditional Waiver.





Blank Total Nitrogen values, as seen for Happy Valley outfall after 2012, are due to zero flow and represent WLA attainment.

#### Water Quality Outcomes

 Monitoring data show that algal biomass continues to exceed the numeric target. Total nitrogen in MS4 outfalls exceeds the WLA when there is sufficient flow to sample. However, no flow and no sample in the outfalls amounts to WLA attainment.

 WLAs have not been incorporated into the MS4 permits, but permittees are implementing BMPs, including a bioswale at the Happy Valley outfall in Reach 4, which has reduced dry-weather flow.

 The Ojai WWTP is on schedule to implement the nitrogen removal upgrades required by its permit to attain the WLAs. Venture County is studying which OWTS will be upgraded to advanced treatment. The agriculture LAs are incorporated into a Conditional Waiver.

 The TMDL is still in the early stages of implementation. The multiple sources, complex interaction between groundwater and surface water, and variable flow make this a complicated TMDL.

 Responsible parties will continue implementation actions.





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#### Water Quality Report Card (cont.)

#### A story map

#### Water Quality Report Card- Pesticides in the Palo Verde Outfall Drain and Lagoon

#### Regional Water Board -Colorado River Basin, Region 7

<u>Beneficial Uses Affected</u> - Contact Water Recreation (REC-1); Non-Contact Water Recreation (REC- 2); Warm Freshwater Habitat (WARM); Wildlife Habitat (WILD); Rare, Threatened, Endangered Species (RARE)

Implemented Through - Conditional Waiver of Waste Discharge Requirements (WDR)

Pollutant Type: Non-Point Source, Legacy Pollutant Source:

Irrigated Crop Production

Status: Data Inconclusive

Effective date: September 20, 2012 Attainment Date: 2036

The Palo Verde Outfall Drain (PVOD) and Lagoon is located in Palo Verde Valley and Mesa (approximately 131,000 acres of agricultural land) in Imperial and Riverside counties. Palo Verde Outfall Drain and Lagoon are impaired by the legacy pesticides, Dichloro-Diphenyl-Trichloroethane (DDT) and Toxaphene and listed on the



#### Water Quality Report Card- North Coastal Basin Rivers

Water Quality Report Card - North Coastal Basin Rivers Cyanobacteria

#### Regional Water Board -North Coast Region, Region 1

Beneficial Uses Affected - Cold Freshwater Habitat (COLD); Rare, Threatened, and Endangered Species (RARE); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and/or Early Development (SPWN); Commercial and Sport Fishing (COMM); Tribal Tradition and Culture (CUL) Contact Water Recreation (REC-1); Non-Contact Water Recreation (REC- 2) Implemented Through - Restoration, Coordination efforts Pollutant Type: Non-Point Source, Legacy Pollutant Source: Irrigated Crop Production, Hydromodification, Non-Point Source Run-off, Naturally Occurring, Logging, Grazing Status: - Improvement Needed Effective date - December 28, 2012

Attainment Date - 2050 or longer



#### Extra URLs

TMDLs to be done

Safe to Swim

Rafa's Tableau wonderland

WQ Story map

Github repo

Trash-tobacco project



### **Questions?**

Greg Gearheart, Deputy Director Office of Information Management and Analysis