

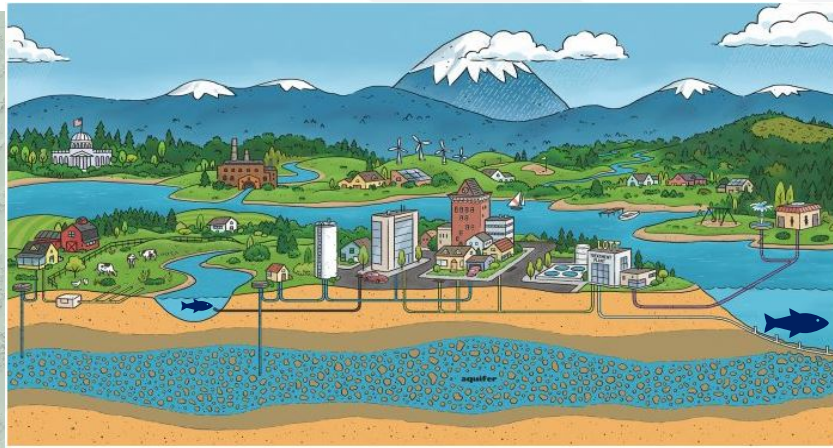
Monitoring Strategies for Chemicals of Emerging Concern (CECs) in California's Aquatic Ecosystems – Recommendations of a Science Advisory Panel

CEC Program Response and Next Steps



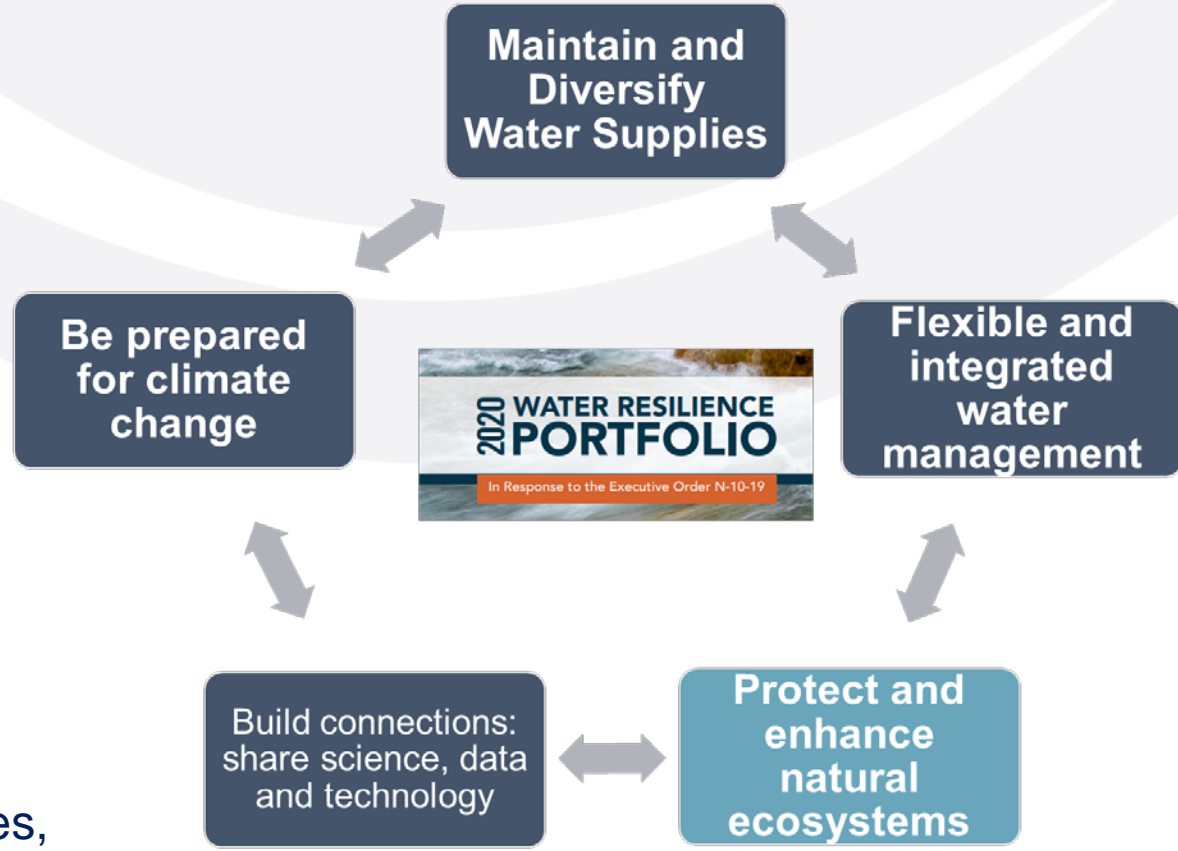
Pretreatment and CECs Unit, Dec. 12, 2022

Water Quality, Water Resiliency, and Protecting California's Aquatic Ecosystems

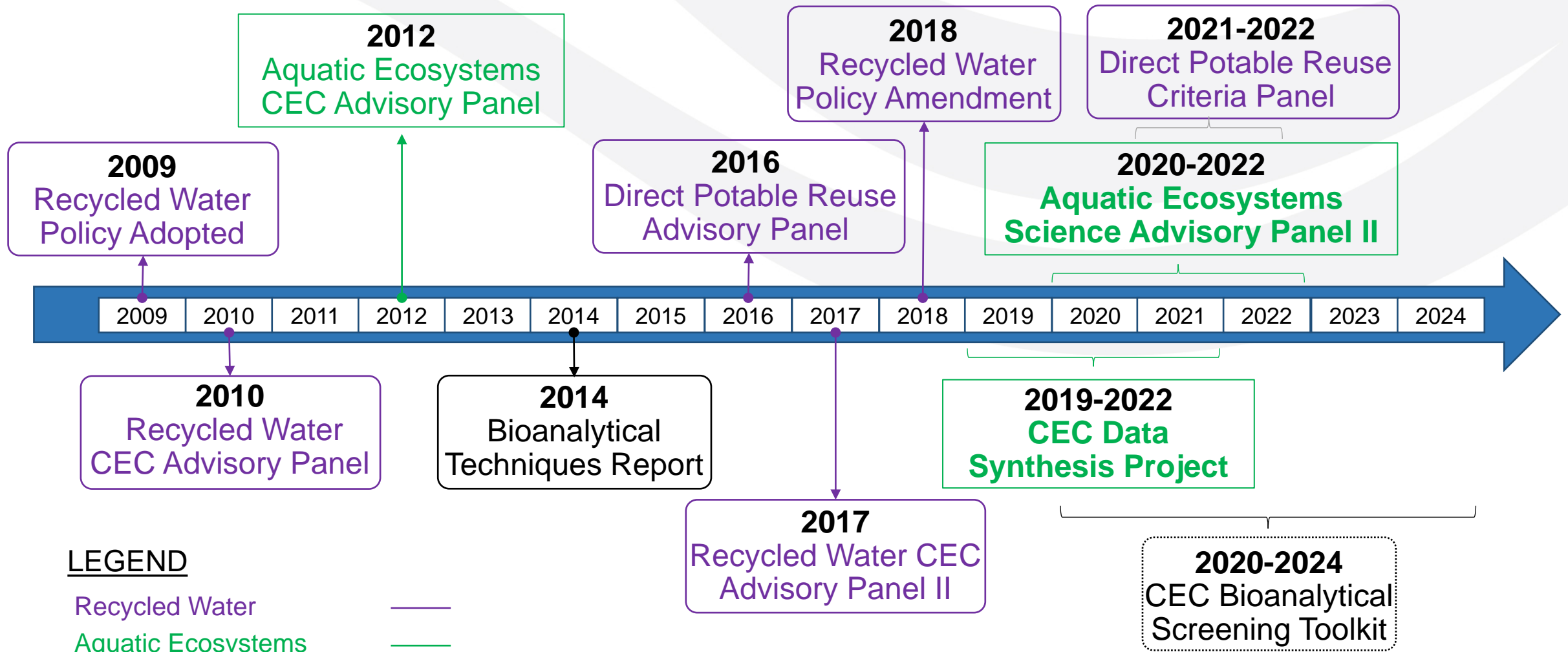


The urban cycles moves water through a system of pipes. Photo courtesy: WET Science Center

- 1,609 miles of shoreline
- 200,000 miles of rivers
- 1.6 M acres of lakes and reservoirs
- 645,000 acres of estuaries, harbors, and bays
- 275,000 acres of wetlands



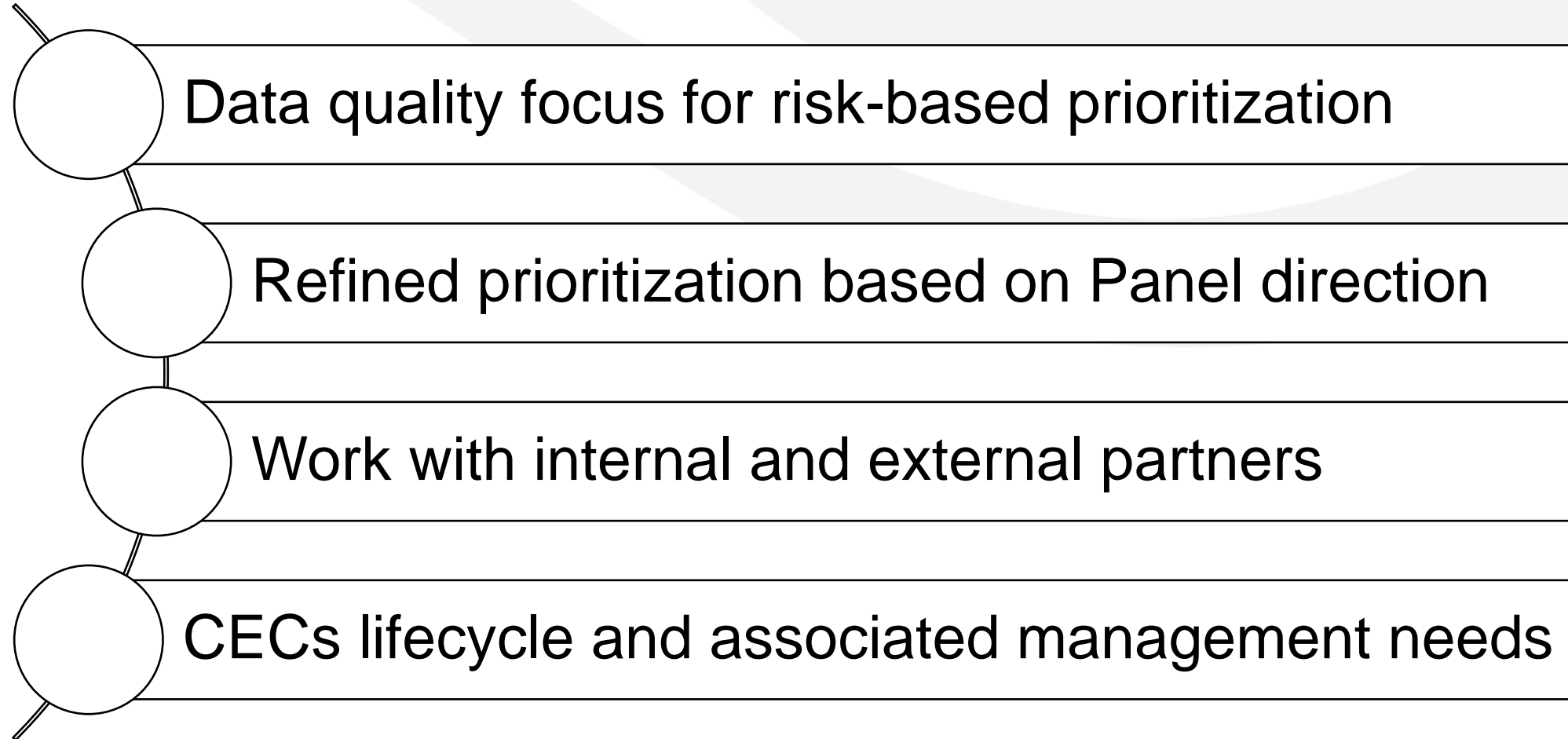
State Water Board CEC Science Advisory Panels and Projects



LEGEND

- Recycled Water —————
- Aquatic Ecosystems —————
- Bioanalytical Tools —————

Key Take Home Messages



Next Steps – Integrate Panel Recommendations into Program Development Process

Develop CECs Strategic Plan

Articulate CECs Program goals and objectives

Develop Data Quality Management Plan

Document CECs management questions

Identify and coordinate with partners

Data Quality Management

Existing data need further refinement and quality assurance

Data collected in the future needs to be of consistently high quality

Review MTLs and method detection limits; incorporate MTLs into future study designs

Establish and implement procedures to transfer data and review data quality from sources

Preliminary Prioritization Results by Class to be Further Refined

	Freshwater					Estuarine					Marine				
	H	M	L	N	Constituents Detected	H	M	L	N	Constituents Detected	H	M	L	N	Constituents Detected
Pesticides	✓	✓	✓	✓	99	✓	✓	✓	✓	43	✓		✓	✓	31
Pharmaceuticals	✓	✓	✓	✓	59	✓	✓	✓	✓	68	✓			✓	2
AP/APEs	✓		✓	✓	7	✓	✓	✓	✓	1	✓			✓	1
Phthalates	✓		✓	✓	6	✓		✓	✓	1	✓		✓		4
PBDEs		✓		✓	46	✓	✓	✓	✓	43					40
PFASs	✓			✓	17	✓		✓	✓	14					10
PCPs	✓	✓	✓	✓	10	✓		✓		7	✓		✓	✓	5
Bisphenols	✓				1	✓		✓	✓	4	✓				1
OPEs	✓	✓	✓	✓	6	✓	✓	✓	✓	12	✓			✓	1
Natural toxins	✓	✓	✓	✓	6		✓	✓	✓	5	+		✓	✓	2

NOTES:

AP/APEs: alkyl phenols/ alkyl phenol ethoxylates
 PBDEs = polybrominated diphenyl ethers
 PFASs = per- and polyfluoroalkyl substances

PCPs = personal care products
 OPEs = organophosphate ethers

✓ = one or more constituent in this class identified as a priority using risk-based framework
 + = constituent in this class identified as a priority through collaborative process

Preliminary List of High Priority Compounds in Freshwater to be Further Refined

<u>Pesticides</u> 3,4-Dichloroaniline Dichlorvos Disulfoton Gamma-cyhalothrin Malathion Metolachlor Trichlorfon Bifenthrin Deltamethrin Fipronil Cyfluthrin Halosulfuron-methyl Parathion Pyriproxyfen Fluvalinate Permethrin Linuron Clothianidin Deisopropylatrazine Chlorpyrifos Imidacloprid Diuron Mancozeb Chlorsulfuron	<u>Pesticides (cont.)</u> Carbaryl Difenoconazole Allethrin Diazinon Dicamba Resmethrin Chlorothalonil Fluazinam Flumioxazin Prodiamine Foramsulfuron Carbendazim Tetramethrin Chlorpyrifos-methyl Oxadiazon Atrazine phenothrin Pyraclostrobin Metconazole Trifloxystrobin Hydroxysimazine Fipronil-sulfide Sulfometuron-methyl Simazine	<u>Pesticides (cont.)</u> Sulfentrazone Hexazinon <u>Pharmaceuticals</u> Gemfibrozil Sitosterol, beta- Ethinylestradiol, 17alpha- Estrone Caffeine Diclofenac Estradiol, 17beta- Testosterone Tamoxifen Fluoxetine Estriol Acetaminophen Ibuprofen Carbamazepine Hydrocortisone Promethazine Bezafibrate Diltiazem Triamterene Sulfamethoxazole Verapamil	<u>Pharmaceuticals (cont.)</u> Glipizide Citalopram Glyburide Valsartan Atorvastatin Androstenedione Tanitidine Norverapamil Clonidine <u>Personal Care Products</u> Triclosan Triclocarban Tonalide Galaxolide Celestolide Musk ketone Butylparaben Phantolide <u>Natural toxins</u> Lyngbyatoxin-A Microcystin YR Microcystin LA Microcystin LR	<u>PFAS</u> PFOA PFOS PFNA <u>Organophosphate esters</u> Triphenyl phosphate Tris(2-butoxyethyl) phosphate Tris(2-chloroethyl) phosphate <u>Alkylphenols</u> 4-n-Octylphenol 4-tert-Octylphenol 4-Nonylphenol <u>Phthalates</u> Butyl benzyl phthalate Di-2-ethylhexyl phthalate <u>Bisphenols</u> Bisphenol A
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DRAFT
Do Not Use

Step 1: Analyze Initial Lists

Pesticides	Pesticides (cont.)	Pesticides (cont.)	Pharmaceuticals (cont.)	PFAS
3,4-Dichloroaniline	Carbaryl	Sulfentrazone	Glipizide	PFOA
Dichlorvos	Difenoconazole	Hexazinon	Citazogram	PFOS
Disulfoton	Altehrin		Glyburide	PFNA
Gamma-cyhalothrin	Diazinon	Pharmaceuticals	Valsartan	
Malathion	Dicamba	Gemfibrozil	Atorvastatin	
Metolachlor	Resmethrin	Sitosterol, beta-	Aspirin/acetone	
Trichlorfon	Chlorothalonil	Ethinylestradiol, 17alpha-	Tanitinide	Organophosphate esters
Bifenthrin	Fluazainam	Estro	Triphenyl phosphate	Tri(2-butoxyethyl) phosphate
Deltamethrin	Flumioxazin	Diclofenac	Clonidine	Tri(2-chloroethyl) phosphate
Fipronil	Prodiamine	Testosterone		
Cyfluthrin	Foramsulfuron	Tricloso	Personal Care Products	
Halosulfuron-methyl	Carbendazim	Niclosolan	Alkylphenols	
Parathion	Tetramethrin	Fluoxetine	4-n-Octylphenol	
Pyriproxyfen	Oxadiazon	Acetaminophen	4-tert-Octylphenol	
Fluralinate	Atrazine	Ibuprofen	4-Nonylphenol	
Permethrin	phenothrin	Carbamazepine		
Linuron	Pyraclonipin	Hydrocortisone	Phthalates	
Clothianidin	Metconazole	Promethazine	Butyl benzyl phthalate	
Deisopropylatrazine	Chlorpyrifos	Bezaflibrate	Di-2-ethylhexyl phthalate	
Chlorpyrifos	Hydroxymazine	Lynbysatin-a		
Imidacloprid	Fipronil-sulfide	Microcystin YR	Natural toxins	
Diuron	Sulfometuron-methyl	Microcystin LR		
Mancozeb	Simazine		Bisphenols	
Chlorosulfuron			Bisphenol A	



Step 2:
Address quality assurance concerns, incorporate new information

- ✓ Additional quality assurance and quality control protocols
- ✓ Review toxicity literature and databases to update and refine Monitoring Trigger Levels (MTLs) (e.g., sediment, biota, etc.)
- ✓ Add data fields to streamline downstream analyses (e.g., stormwater)
- ✓ Review literature to inform potential new emerging CECs
- ✓ Consider persistent, mobility, and bioaccumulative properties
- ✓ Update with most current CEC occurrence data
- ✓ Incorporate voluntary data submittals
- ✓ Include additional CEC classes and analytes

Step 3: Rerun the Priority Lists

FRESHWATER	ESTUARINE	MARINE



Complete Risk-Based Screening Approach

Preliminary Monitoring Prioritization
Based on combinations of MTQ_{detect} and MTQ_{sub} and trend
(see Chapters 5.1 and 5.2 for details)



Implement Refined Prioritization Framework

Refined Monitoring Prioritization
Based on sample size, geographical and temporal distribution, MDL, confidence in trend
(see Chapter 6.2 for details)

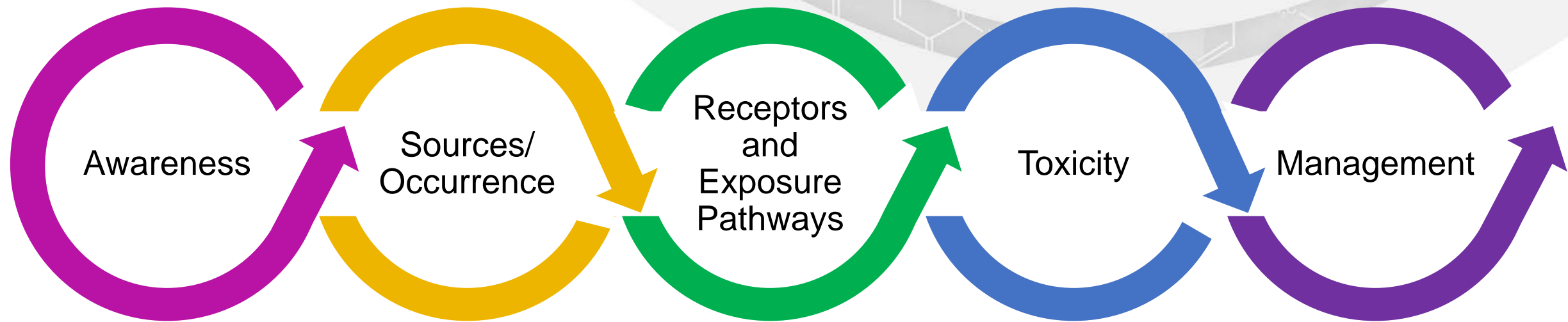


Final Monitoring Lists are then Reviewed

Achieve Program Goals and Objectives by Working with Many Partners

Existing Water Boards Programs	SWAMP, SpOT, RMPs, HABS, STORMS, Impaired Waters/Integrated Report, Recycled Water, Drinking Water, GAMA, Oceans and Beaches, Inland Waters, Irrigated Lands, NPDES/WDR Permitting, Non-Point Source, Pretreatment, Biosolids, Land Disposal, Site Cleanup, Oil & Gas, Irrigated Lands, etc.
Government Agency Coordination	
Stakeholders	Academic partners, research partners, association partners, public entities/utilities
Community Outreach	Community partners, public participation, education and outreach

Develop CECs Lifecycle Management Strategies



Finalize Risk-Based Prioritization

Conduct refined prioritization process

Explore alternative monitoring approaches

Refine visualization dashboard; automate future data compilation and processing

Develop CECs monitoring plans to accomplish management strategies

Long-Term Next Steps – Statewide and State-Run Monitoring Program(s)

- Identify opportunities for state funded CEC Monitoring Program
- Incorporate effects-based monitoring
- Integrate and coordinate with existing monitoring infrastructure
- Issue investigative orders as needed

Final Take Home Messages

- Prioritize actions based on urgency, effort, and beneficial outcomes
- CECs Program development will continue to include a public process stakeholder outreach and increased effort for community engagement

Thank You!



Follow up with us at
EmergingContaminants@waterboards.ca.gov



Check out the new Program
website at
www.waterboards.ca.gov/water_issues/cec/index.html