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

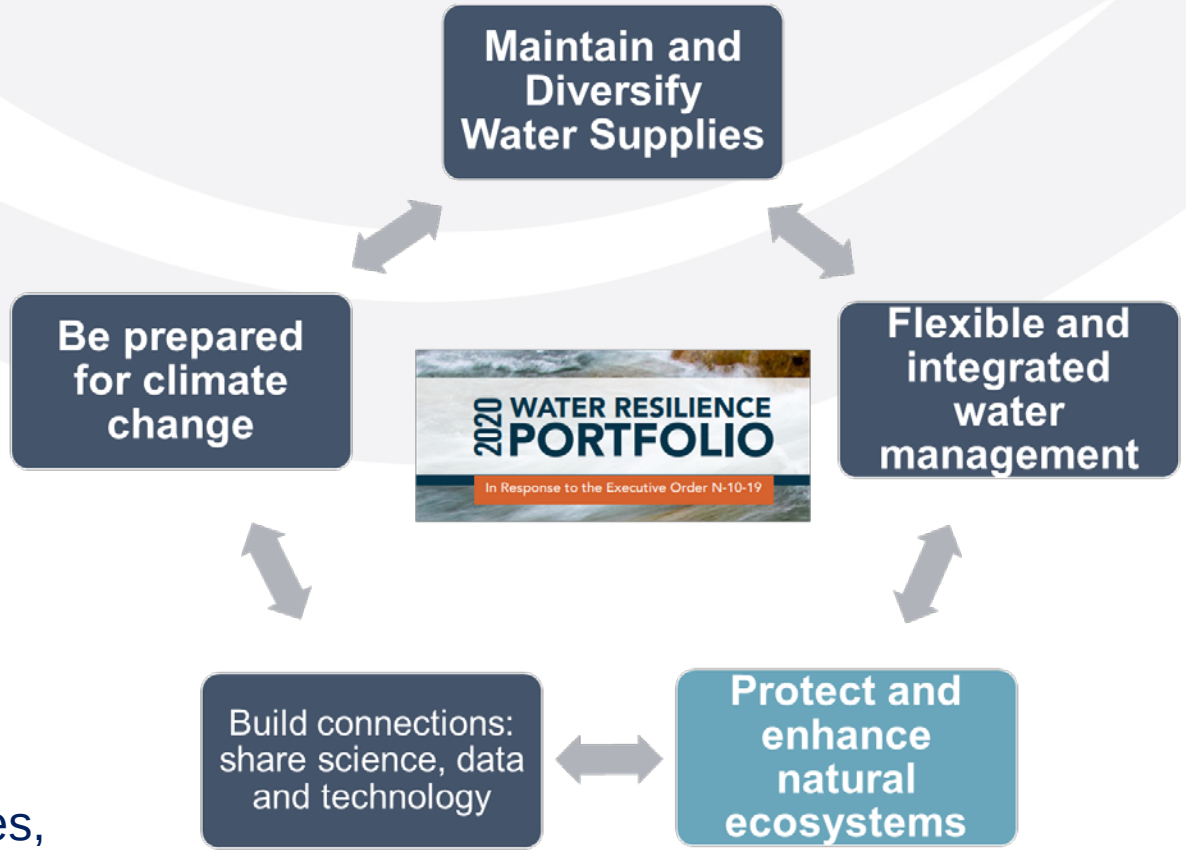
CALIFORNIA
Water Boards

Pretreatment and CECs Unit, Dec. 12, 2022

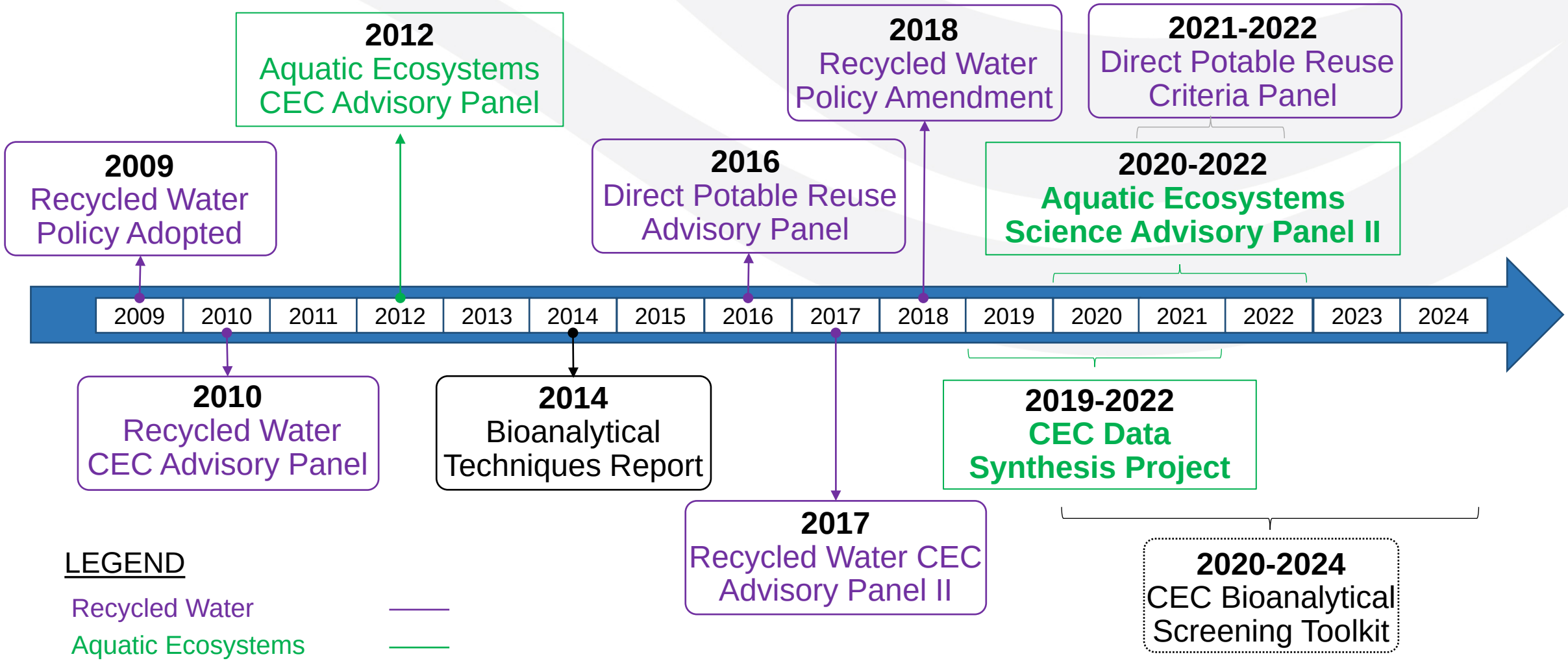
Water Quality, Water Resiliency, and Protecting California's Aquatic Ecosystems

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

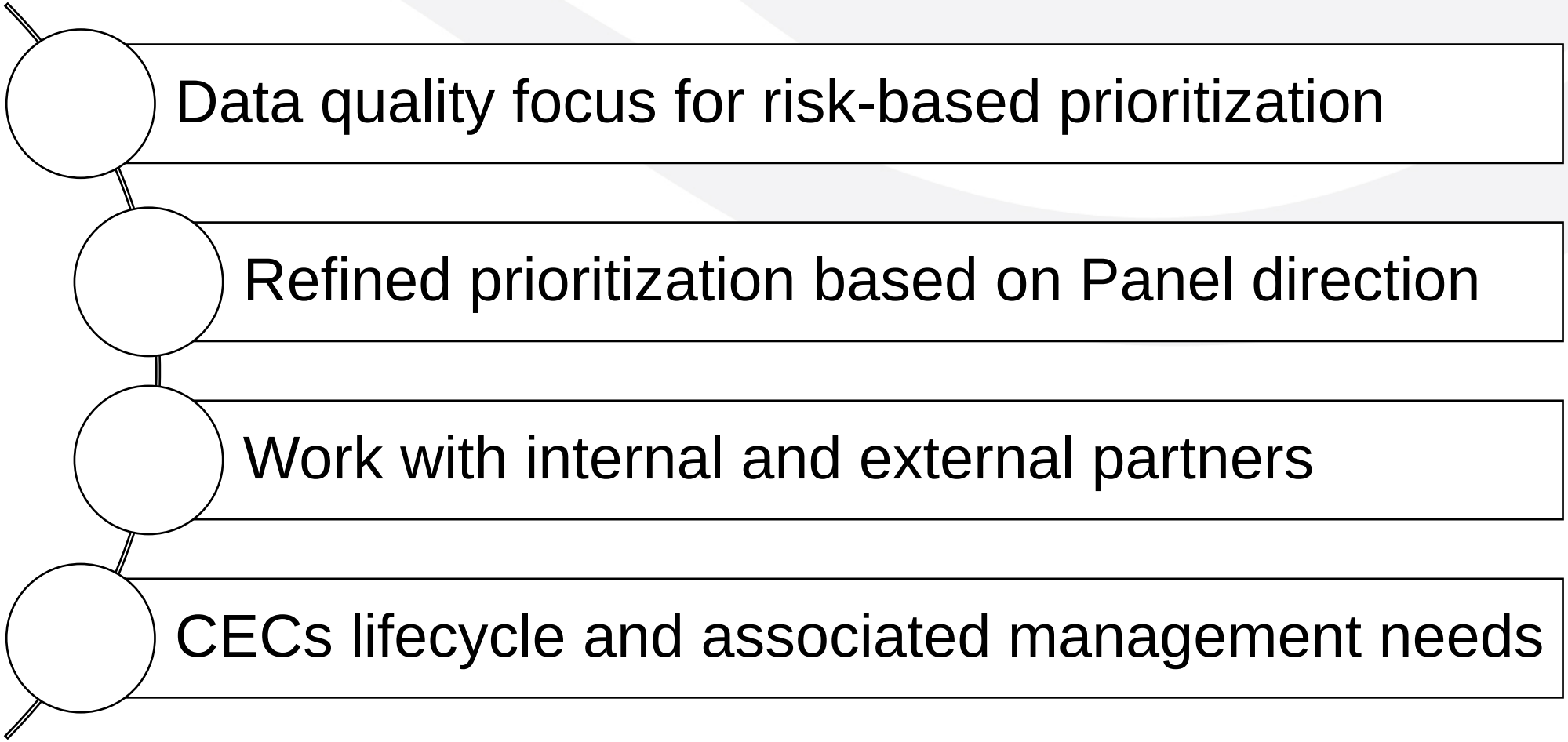
- 1,609 miles of shoreline
- 200,000 miles of rivers
- 1.6 M acres of lakes and reservoirs
- 645,000 acres of estuaries, harbors, and bays
- 275,000 acres of wetlands



State Water Board CEC Science Advisory Panels and Projects



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

Pesticides

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

Pesticides (cont.)

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

Pesticides (cont.)

Sulfentrazone
Hexazinon

Pharmaceuticals

Gemfibrozil
Sitosterol, beta-
Ethinylestradiol, 17alpha-
Estrone
Caffeine
Diclofenac
Estradiol, 17beta-
Testosterone
Tamoxifen
Fluoxetine
Estriol
Acetaminophen
Ibuprofen
Carbamazepine
Hydrocortisone
Promethazine
Bezafibrate
Diltiazem
Triamterene
Sulfamethoxazole
Verapamil

Pharmaceuticals (cont.)

Glipizide
Citalopram
Glyburide
Valsartan
Atorvastatin
Androstenedione
Tanitidine
Norverapamil
Clonidine

Personal Care Products

Triclosan
Triclocarban
Tonalide
Galaxolide
Celestolide
Musk ketone
Butylparaben
Phantolide

Natural toxins

Lyngbyatoxin-A
Microcystin YR
Microcystin LA
Microcystin LR

PFAS

PFOA
PFOS
PFNA

Organophosphate esters

Triphenyl phosphate
Tris(2-butoxyethyl) phosphate
Tris(2-chloroethyl) phosphate

Alkylphenols

4-n-Octylphenol
4-tert-Octylphenol
4-Nonylphenol

Phthalates

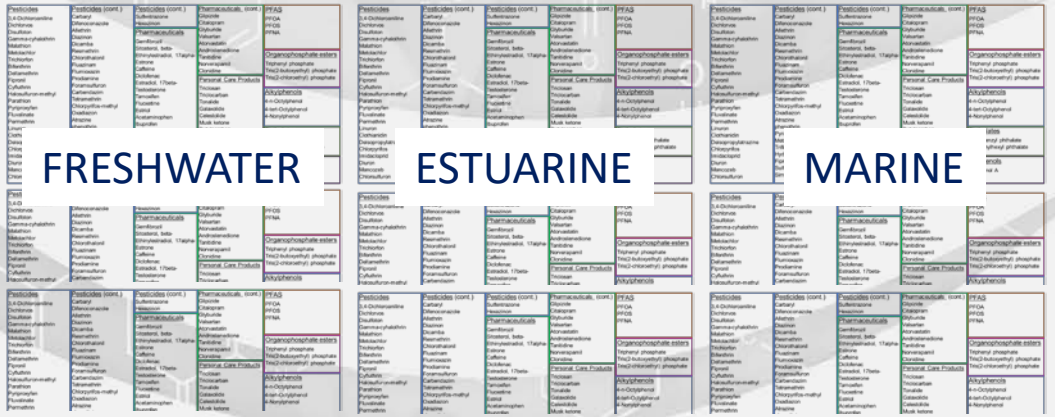
Butyl benzyl phthalate
Di-2-ethylhexyl phthalate

Bisphenols

Bisphenol A

Step 1: Analyze Initial Lists

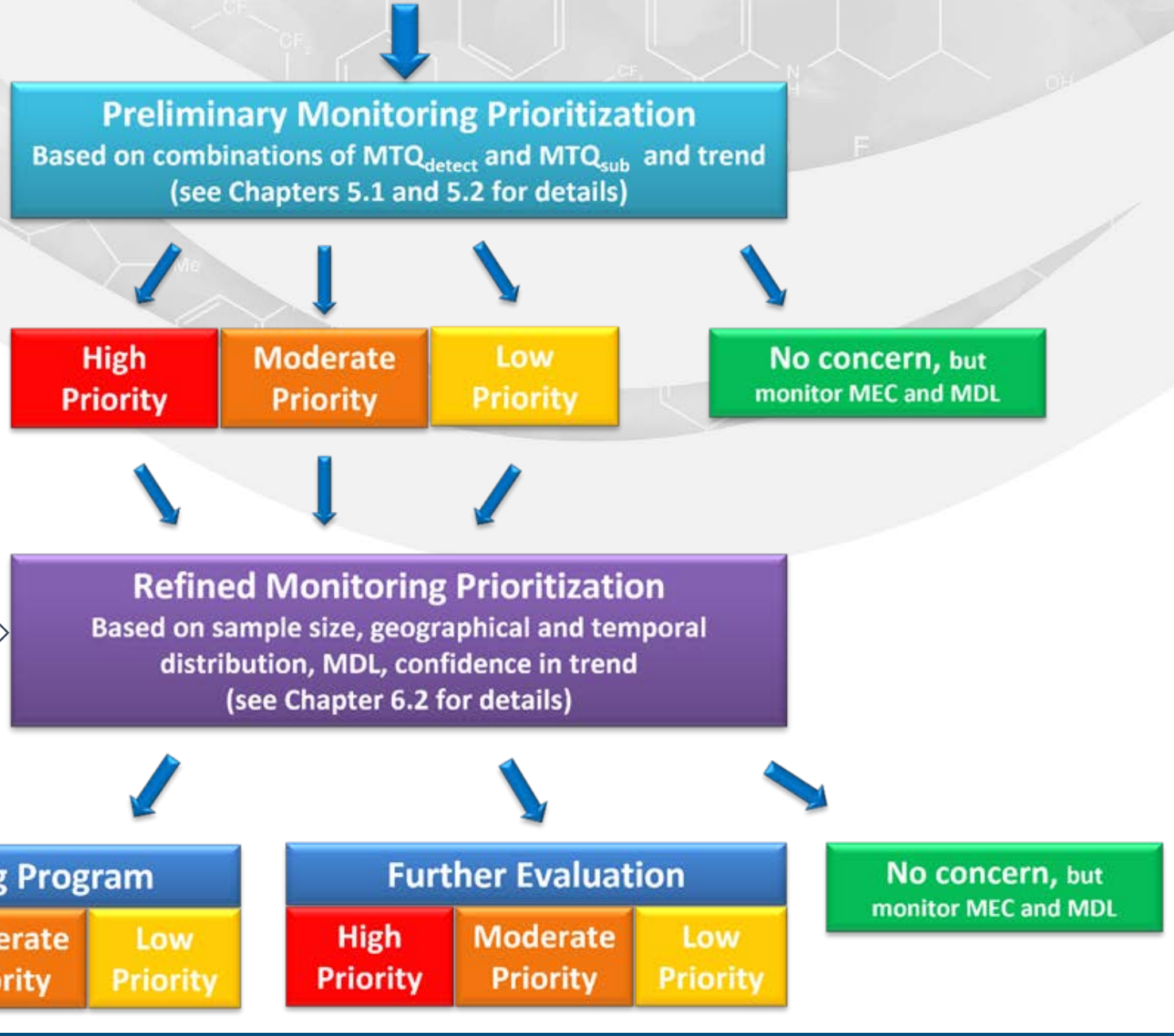
Step 3: Rerun the Priority Lists



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

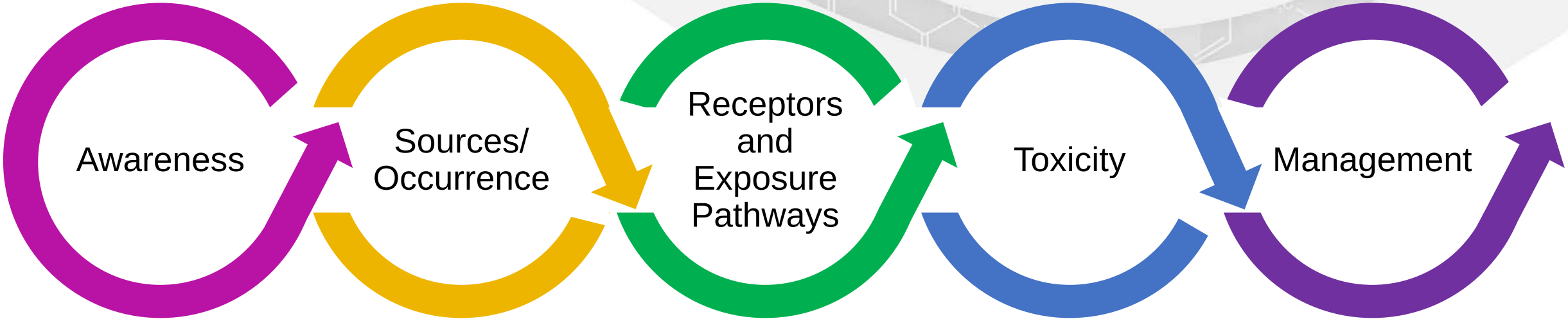
Complete Risk-Based Screening Approach



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	 And more!
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