



United States Environmental
Protection Agency



Strategic Research Action Plans FY 2023-2026

State Engagement Focus

Product Portfolio



Foreword

Research in EPA's Office of Research and Development (ORD) provides solutions needed to meet today's complex environmental and human health challenges. Research is organized around six highly integrated and transdisciplinary national research programs that are closely aligned with the Agency's strategic goals and cross-Agency strategies. Each program is guided by a Strategic Research Action Plan (StRAP) developed by EPA with input from its many internal and external partners and stakeholders:

- [Air, Climate, and Energy StRAP](#)
- [Chemical Safety for Sustainability StRAP](#)
- [Health and Environmental Risk Assessment StRAP](#)
- [Homeland Security StRAP](#)
- [Safe and Sustainable Water Resources StRAP](#)
- [Sustainable and Healthy Communities StRAP](#)

In addition to outlining a research framework, the StRAPs also describe the overall structure and purpose of the program. The strategic directions and research areas identified in each StRAP serve as planning guides for ORD's research centers to design specific research products that address the needs of both internal and external Agency partners and stakeholders. Partner engagement is an essential part of the StRAP development process to identify research needs to be addressed.

This State Engagement Focus Product Portfolio (Fiscal Year 2023-2026) contains 124 research products that are most closely aligned with state interests. These products were identified based on state research needs from the [2022 ERIS States' Research Need Survey Summary](#), as well as feedback we heard directly from states and territories during various meetings and engagements we held over the recent years, including "ground truthing" meetings with state partnership groups held in spring 2022. Key research topic clusters include: PFAS, climate, wildland fires, cumulative impacts, chemicals of emerging concern, environmental justice, infrastructure and resilience, and drinking water.

We plan to engage with our state and territorial partners and partnership groups throughout research implementation and pursue co-generation of research with states and territories where mutually beneficial and appropriate. Results from this planned research will be shared with states as they become publicly available through various mechanisms to inform state environmental and environmental health management. We are excited to continue to bolster our relationships with states and territories as we jointly protect human health and the environment.

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List of Acronyms

AAPCA	Association of Air Pollution Control Agencies
ACWA	Association of Clean Water Administrators
AFWA	Association of Fish and Wildlife Agencies
ASDWA	Association of State Drinking Water Administrators
ASTHO	Association of State and Territorial Health Officials
ASTSWMO	Association of State and Territorial Solid Waste Management Officials
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
CDPHE	Colorado Department of Public Health and Environment
COMET	City-based Optimization Model for Energy Technologies
DEEP	Department of Energy and Environmental Protection
DEM	Department of Environmental Management
DEP	Department of Environmental Protection
DEQ	Department of Environmental Quality
DNR	Department of Natural Resources
DOH	Department of Health
ECOS	Environmental Council of the States
ERIS	Environmental Research Institute of the States
GenRA	Generalized Read-Across
GIS	Geographic Information System
GLIMPSE	Global Change Analysis Model Long-term Interactive Multi-Pollutant Scenario Evaluator
IRIS	Integrated Risk Information System
KDHE	Kansas Department of Health and Environment
MMDB	Multimedia Monitoring Database
MPCA	Minnesota Pollution Control Agency
NACAA	National Association of Clean Air Agencies
NYSDEC	New York State Department of Environmental Conservation
STEM	Science, technology, engineering, and mathematics
StEWIDB	Standardized Emission and Waste Inventories Database

Air, Climate, and Energy (ACE) Research Program

EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: Near-source hazardous air pollutant (HAP) impacts, volatile organic compounds (VOC) emission reduction, environmental justice (EJ), climate, ethylene oxide (EtO), climate change impacts, resiliency, wildfires, air quality, energy

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Sources and Sinks of Air Pollution and Climate Forcers	Characterization of fugitive and area source air pollution and climate forcers	Next Generation Emissions Measurement (NGEM) for Fugitive and Area Sources and Fenceline Monitoring	Identify and characterize emissions, advance knowledge of near-source and regional impacts, and enable efficacious emission mitigation strategies.	Coordinate with NC DEQ on Greensboro project and share information with interested states/state media associations/state partners.
		Develop and Evaluate Methods to Measure Individual and Community Air Pollution Exposures	Improved exposure models for wildfire smoke; better understanding of microenvironment-based exposures and air toxic emissions sources.	Share results with AAPCA and NACAA; keep state and local agencies informed when working in communities.
Air Quality Concentrations and Exposure Characterization: Measurements	Methods to measure personal and community level exposures to air pollution	Advanced Measurement Approaches for Background and Near Source Ethylene Oxide (EtO)	Stakeholders can better characterize ambient EtO concentrations near potential emission sources to inform risk assessments and mitigation strategies.	Engaging with KDHE, MPCA and NC DEQ.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Human Health Impacts of Air Pollution and Climate Change	Impacts of air pollution on human health	The Fight for Progress in Communities with Environmental Justice (EJ) Concerns: How Do We Know if Air Pollution Mitigation Efforts are Improving Health?	These findings can be used to inform EPA's work in communities with EJ concerns and help guide the prioritization of strategies within community air protection plans developed pursuant to state EJ programs and other future initiatives to address health disparities in communities with EJ concerns.	Collaborate with California Air Resources Board, the West Oakland Environmental Indicators Project, and the Bay Area Air Quality Management District.
	Impacts of climate change-related extreme events on human health	Climate, Health, and Environmental Justice	Will provide key information for communities or policy makers who seek to understand and develop effective methods of remediation.	Methodological results will be shared with ERIS.
Ecosystem Impacts of Air Pollution and Climate Change	Air pollution impacts on ecosystems under a changing climate	Historical and projected estimates of atmospheric deposition to ecosystems and water bodies under changing climate and emission scenarios	New information for ecosystem managers regarding the impact that emission sectors are likely having on atmospheric deposition and ecosystem exposure and how these may change under future emission scenarios/decarbonization.	Collaborate with state/regional/local partners to assess ecological impact of the simulations (DC, DE, MD, PA, VA & WV); potential engagement with the Western States Air Resources Council (WESTAR).
	Effects on ecosystem carbon sequestration and storage	Assessing Carbon Sequestration Potential of Coastal Natural Infrastructure that Benefit Coastal Resiliency in the Chesapeake Bay Region	Inform community decision-making about blue carbon resource management; inform ongoing community and regional coastal adaptation and resiliency planning and project implementation.	Collaborate with MD DNR, Virginia Institute of Marine Science, and Delmarva Restoration & Conservation Network.
	Ecosystem recovery from pollution and climate-related disturbances	Mapping and modeling watershed resiliency to climate-related floods, droughts, and wildfire	Help state, Tribal and other managers prioritize climate-change adaptation management actions and activity on the landscape.	Engage with state agency partners (ecology, environment, fish & wildlife agencies in ID, OR & WA); connect with AFWA.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Scientific Support for Climate Change and Air Quality Policy Solutions	Locations with persistent air quality problems	Optimizing ozone and PM2.5 air quality control strategies in US megacities	Fill important gaps in our understanding of ambient air quality in complex megacity environments and its links to controllable source sectors.	Engaging with Northeast States for Coordinated Air Use Management (NESCAUM), CT DEEP, NJ DEP, NYSDEC & WI DNR.
	Quantifying benefits of reducing air pollution and emissions of climate forcers	Assessing the impacts of changing environmental conditions on air quality and human health	Better examine air quality impacts of future climate projections.	Partner with regional air quality managers.
		Urban Green Infrastructure (GI) Design and Assessment Resource to Promote Public Health, Climate, and Equity Benefits for Air Quality and Other Ecosystem Services	Provide stakeholders with the resources needed to identify and plan optimized GI designs, obtain recommendations for installation and maintenance, and quantify potential benefits for multiple ecosystem services.	Engage state and local agencies for optimal study locations, review of materials, and planting designs; seek input from state partners early-on to develop STEM and outreach materials for states and other stakeholders including school districts, transportation departments, and community leaders.
	Multipollutant/Multisector control strategy evaluations	Supporting regional organizations, states and municipalities in developing strategies for simultaneously achieving air, climate, and energy goals	Better informed planning, resulting in more cost-effective and equitable policies.	Collaboratively apply GLIMPSE and COMET in partnership with states and municipalities; build partner capacity to explore different scenarios.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Empowering Communities and Individuals to Improve Public and Ecosystem Health	Accessible and usable data and information	Smartphone Tool to Engage Communities in Classifying Odors	Better understand odors impacting the public and help address exposure concerns; help build capacity to support future odor and air quality screening efforts and inform mitigation strategies to reduce odor emissions and exposures.	Inform states about community collaborations; potential training and/or webinars on the app.
	Building environmental health literacy to inform health decision making	Strengthening Capacity at the Intersection of Environmental Justice and Climate Change	Support community, local, state, and regional partners in making positive improvements in local issues related to EJ and climate change through the application of collaborative governance strategies for affecting change.	Coordinate and communicate with state partners who provide services and support to local community research partners; share research results.
Responding to Fires, Floods, and Other Extreme Events	Interventions to reduce exposures and risks from wildland fire smoke	Wildfire Advancing Science Partnerships for Indoor Reductions of Smoke Exposures (ASPIRE) Study	Results shared through Wildfire ASPIRE and ASPIRE Health websites.	Continue partnerships with multiple local groups in MT (e.g. the Missoula City-County Health Department).
		Wildfire smoke air monitoring response technology (WSMART)	Improved smoke monitoring allows for better characterization of and response to wildland fire health risks.	Partner with state agencies interested in other air quality applications, collect feedback, share training materials, and provide webinars.
	Methods to inform resilience decisions	Regional climate projections and methods to simulate and understand extreme events	Supports resilience decisions for communities by providing data on climate change and extreme events at sufficiently fine spatial scales to provide adequate spatial and temporal coverage.	Share results utilizing a fact sheet.
Updating the Climate Change and Sea-level Rise Projections in the Global Change Explorer (GCX)		Accelerating resilience and adaptation planning to climate change impacts.	Group of state agency reps who work with GIS and sea level rise information will review the tool; webinar regarding updates to GCX.	

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Responding to Fires, Floods, and Other Extreme Events	Methods to inform resilience decisions	Developing New Synthetic Migration and Population Data for Resilience and Adaptation Planning	Accelerating resilience and adaptation planning to climate change impacts.	Webinar for states; opportunities for case studies as states reach out (i.e., TX).
Transitions to a Sustainable Future	Assessment of implications of achieving net-zero electricity generation	Integrated solutions for decision makers in achieving decarbonization goals	Enable regional, state, or municipal partners to conduct coordinated, long-term air-climate-energy planning.	Work with state and local governments to address concerns about impacts of decarbonization and related air quality challenges; apply COMET to identify strategies; build partner capacity to explore additional scenarios.
	Regional capacity building for sustainable transitions	Building regional capacity for resilient and sustainable natural resources: Organon for adaptation planning	Empower ORD-Region-State collaborative capacity-building for adaptation of management decisions and project designs to achieve resilient and sustainable natural resources.	Results will inform the needs of multiple states via case studies in four EPA regions.

Chemical Safety for Sustainability (CSS) Research Program

EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: Contaminants of emerging concern (CECs), PCB, chemicals, non-targeted analysis (NTA), biosolids, wildfires, mixtures, 6PPD, PFAS, tools translation

Research Area	Output	Product Title	Expected Impact	Partner Engagement
High-Throughput Toxicology (HTT)	Advance a tiered, high-throughput toxicity testing strategy	Transcriptomic points of departure for contaminants of immediate or emerging ecological concern	Provide data for initial screening-level assessments of these compounds.	Conduct outreach to states (e.g., ECOS Cross-Media Committee) and share results.
Rapid Exposure and Dosimetry (RED)	Collect and curate exposure-relevant data	Chemicals and Products Database (CPDat) V4 with Natural Language Curation, OECD Harmonization, Occupational and Industrial Use Categories, and Measured Product Data	More accurate predictions of chemical functions, concentrations, and occurrences in consumer products.	Engage with CalEPA and MN DOH.
		CPDat V5 with New Measured or Predicted Concentrations and Expanded Functional Use Predictions	More accurate predictions of chemical functions, concentrations, and occurrences in consumer products.	Engage with CalEPA and MN DOH.
		Updated ChemExpoDB Monitoring (MMDB) and Release (StEWIDB) Databases to Support Exposure Assessment and Modeling	Inform the development of much-needed predicted models of chemical releases into environmental compartments.	Webinar for states demonstrating capabilities and use at product delivery.
	Develop and evaluate next generation monitoring methods for exposure assessment	Performance evaluation strategies and benchmarks to instigate non-targeted analysis (NTA) laboratory accreditation procedures	Provide the research underpinnings for NTA technology transfer to those that wish to implement defensible NTA methods in support of health-based decisions on chemical contaminants.	Working with NE; some early implementation of criteria with CA, MD & MN.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Rapid Exposure and Dosimetry (RED)	Build confidence in the use of non-targeted analysis for exposure assessment through applications	Characterization of Biosolid-associated Organic Compounds (BOCs) using NTA	Flexible framework for improved characterization and prioritization of BOCs.	Working with CA, MD, MN & NE; webinar for states through the ECOS Cross-Media Committee/TSCA Workgroup.
		Application of non-targeted analysis to characterize emissions from household materials during a fire	Make NTA useful to rapid responders to better assess the hazard for downwind populations posed from smoke emissions during an actual fire event.	Webinar for states through various groups.
Adverse Outcome Pathways (AOP)	Demonstrate the utility of AOPs along with data derived from various sources to inform risks and associated management actions	Assessment of chemical mixtures within the Great Lakes as part of the Great Lakes Restoration Initiative (GLRI)	Facilitate stronger weight of evidence-based conclusions that will inform subsequent management and monitoring needs in the Great Lakes.	Webinars for Great Lakes states and regional staff.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Ecotoxicological Assessment and Modeling (ETAM)	Develop and demonstrate ecological models to characterize risk of environmental contaminants for risk assessment at national, regional, and local scales	Ecological Effects of Tire Wear Particles (TWP) and 6PPD Quinone on Marine Benthic Communities	Support environmental managers and regulators in managing effects caused by TWP and 6PPD-quinone.	Engage with the Pacific Northwest Consortium and its state members; update the Interstate Technology and Regulatory Council (ITRC) Tire Anti-Degradants (6PPD) Team on evolving research.
	Identify, assemble, and curate toxicity data for ecologically relevant species for risk assessment (ECOTOX)	ECOTOX Knowledgebase quarterly updates, including data on new chemicals and updated Standard Operating Procedures (SOPs) – FY23	Provide important toxicity information on existing and emerging chemicals.	Training webinars on updates and on ECOTOX broadly.
		ECOTOX Knowledgebase quarterly updates, including data on new chemicals and updated SOPs – FY24	Provide important toxicity information on existing and emerging chemicals.	Training webinars on updates and on ECOTOX broadly.
		ECOTOX Knowledgebase quarterly updates, including data on new chemicals and updated SOPs – FY25	Provide important toxicity information on existing and emerging chemicals.	Training webinars on updates and on ECOTOX broadly.
		ECOTOX Knowledgebase quarterly updates, including data on new chemicals and updated SOPs – FY26	Provide important toxicity information on existing and emerging chemicals.	Training webinars on updates and on ECOTOX broadly.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Ecotoxicological Assessment and Modeling (ETAM)	Improve ecological methods and models for predicting exposure, accumulation and effects of Per- and Polyfluoroalkyl Substances (PFAS)	Evaluating bioaccumulation of PFAS in freshwater systems	Inform management approaches related to PFAS in fish.	Briefings for interested states, state environmental staff, and state partnership groups (e.g., PFAS Science Call).
		Bioaccumulation of PFAS in marine aquatic food webs	Improved understanding of factors controlling PFAS bioaccumulation in coastal ecosystems.	Present on PFAS Science Call with ECOS and ASTHO.
		ECOTOX PFAS FY23 - Identification and curation of ecologically relevant PFAS toxicity studies for criteria development, ecological risk assessments, and identification of data gaps	Expanded curated toxicity data for PFAS to support risk assessments, development of criteria and screening levels, and identification of data gaps.	Trainings and webinars for state associations/interested states.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Chemical Characterization and Informatics (CCI)	Develop new and improve existing structure activity relationship models to support risk assessment	Addition of revised toxicity models, new toxicity endpoints, and third-party models to WebTEST2.0 , a proof-of-concept web tool for real-time predictions	Users will have access to reproducible real-time predictions from a large array of property and toxicity models in a single user-friendly web-based tool.	Trainings and webinars demonstrating capabilities and use, especially with MN DOH.
	Advancing chemical categorization approaches for aiding the interpretation and prediction of bioassay and toxicity outcomes	Enhancing GenRA with additional contexts of similarity	Automated approach to make reproducible read-across predictions of toxicity outcomes.	Trainings and webinars demonstrating capabilities and use.
	Advancing use of structural, mechanistic, and toxicokinetic data to support categorization and classification of Per- and Polyfluoroalkyl Substances (PFAS)	Structure-Based classification approaches for PFAS chemicals	Support a PFAS informatics toolkit—automatic profiling and classification of chemicals of interest with several available filters.	Share results on PFAS Science Calls with ECOS and ASTHO.
		Development of new approaches to characterize PFAS into structural categories informed by New Approach Methods (NAMs) data	Improved classification of PFAS will allow for better regulation.	Share results on PFAS Science Calls with ECOS and ASTHO.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Integration, Translation and Knowledge Delivery (ITK)	Knowledge delivery and interoperability in support of chemical safety decisions	ECOTOX user interface updates, new functionality, and communication: FY23-FY26	Improve the ability of ECOTOX users to rapidly identify and review relevant studies for research and risk assessment.	Training on ECOTOX updates.
		Public release of version 4.0 of the Chemical Transformation Simulator (CTS) web application	Users will be able to better predict and identify the most likely transformation products in environmental and biological systems.	Training for states on use of the CTS tool and webinar on CTS updates.
		CompTox Chemicals Dashboard : FY23, FY24, FY25 & FY26	Provide data to inform decision making, including chemical screening and prioritization.	Engaging with state of Washington; webinars and training for interested state staff.
	Cross-disciplinary integration and applied case studies to support chemical safety decision making	Rapid evaluation of potential hazards and exposures to children and women of child-bearing age using TEST (Toxicity Estimation Software Tool) .	Improved ability to address potential chemical hazard and exposures to children and childbearing aged women.	Collaborate with the MN DOH.
		RapidTox workflow development, refinement, and maintenance	Rapidly assess chemicals in emergency situations; better assess mixtures of chemicals.	Webinars and trainings for state associations/interested states.
		High throughput hazard screening for 6PPD-quinone (6PPD-q), a high priority contaminant.	Inform risk assessment and management decision making concerning 6PPD-q.	Engage with Interstate Technology and Regulatory Council (ITRC) Tire Anti-Degradants (6PPD) Team and the Pacific Northwest Consortium and its state members.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Integration, Translation and Knowledge Delivery (ITK)	Translation of research for chemical safety decision making through demonstration, training, outreach, and partner engagement	Demonstration of case studies to engage stakeholders and apply CSS cross-disciplinary research to support chemical safety decision making	Increased partner usage of EPA's Chemical Safety for Sustainability (CSS) research to help inform public health and environmental decisions.	Outreach activities will include states and state environmental agencies.
		Outreach activities, stakeholder engagement and informational resources to translate and encourage use of CSS research	Increased utility of EPA's Chemical Safety for Sustainability research results for informing public health and environmental decisions.	Engage existing workgroups and committees such as the ECOS Cross-Media Committee.
		CompTox Chemicals Dashboard : Communication, training, and outreach	Increased knowledge of chemicals for better management.	States will be invited to trainings and webinars.

Health and Environmental Risk Assessment (HERA) Research Program
EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: PFAS, Lead

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Science Assessment Development	Portfolio of final assessment products to support decision-making	Final PFHxA IRIS Assessment	Expand understanding of effects of PFAS on human health to inform risk management decisions and risk communication.	Present on PFAS Science Call with ECOS and ASTHO.
		Final PFHxS IRIS Assessment	Expand understanding of effects of PFAS on human health to inform risk management decisions and risk communication.	Present on PFAS Science Call with ECOS and ASTHO.
		Final PFDA IRIS Assessment	Expand understanding of effects of PFAS on human health to inform risk management decisions and risk communication.	Present on PFAS Science Call with ECOS and ASTHO.
		Final PFNA IRIS Assessment	Expand understanding of effects of PFAS on human health to inform risk management decisions and risk communication.	Present on PFAS Science Call with ECOS and ASTHO.
		Final Integrated Science Assessment for Lead	Assessment will serve as the scientific foundation for EPA’s review of the NAAQS for Lead (Lead (Pb) Air Quality Standards US EPA).	Science-focused webinar for state staff.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Emerging and Innovative Assessment Methodologies	Improved methods for dose extrapolation and the related uncertainty characterization in human health risk assessment via integration of pharmacokinetic (PK) models	Assessment of inhalation pharmacokinetic data for perfluoroalkyl substances (PFAS) and development of an inhalation dosimetry model	Improved understanding of the dosimetry resulting from inhalation exposure to help inform future risk assessment and risk management decisions.	Present on PFAS Science Call with ECOS and ASTHO.
Essential Assessment and Infrastructure Tools	Advance exposure and biokinetic models for lead, including children	Lead (Pb) model development	Provides the ability to predict Pb concentration in body tissues and organs across all lifestages.	Share information with states via EPA's Human Health Regional Risk Assessors Forum and provide training on model usage to interested parties.

Homeland Security (HS) Research Program

EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: Emergency management, drinking water management, waste management

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Contaminant Characterization and Risk Assessment	Developing reliable strategies, data management capabilities, and methodologies for sampling, processing, and analysis to address contamination incidents and inform mitigation and remediation decisions	Tools to inform, support, and enhance the Environmental Sampling and Analysis (ESAM) Program for the environmental characterization process for chemical, biological, radiological and nuclear (CBRN) contaminants.	CBRN contaminant characterization and remediation efforts will be enhanced with tools for sampling, analysis, and data management.	Communicate ESAM program to state and local public health officials (e.g., via ASTSWMO, ASTHO); state and local laboratory participation in workgroup updates to ESAM companion documents.
Water Systems Incident Response Support	Tools and methodologies to inform infrastructure decontamination and management of drinking water, wastewater, and stormwater	Water Infrastructure Decontamination: Generating new data and increasing data usability	Water utilities, decision makers and other responders will be able to easily use and access the data during a contamination event.	Engage interested states by providing a tutorial on how to access infrastructure decon data in publicly available databases.
		Decontamination and exposure risk characterization of chemical and microbial contaminants within premise plumbing systems	Access to EPA's Homeland Security Research Program (HSRP) research results will aid in remediating contaminated premise plumbing systems.	Work with states to prioritize premise plumbing contaminants of concern; share reports and results as available.
		Testing mobile water treatment technologies in the field	Responders will be able to better provide safe water during or after events where drinking water systems are compromised.	Working with states of KY and OH on Emergency Use Pre-Approval; short-term state deployments; training and demonstration of mobile water treatment system.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Waste Management	Advancing Approaches and Tools for Waste and Materials Management	Advancements in Waste Management Tools – Improving Usability and Accessibility	Improved and reduced maintenance costs related to waste management, improved usability and accessibility of waste management tools.	Training for interested state staff (ASTSWMO, FL Fish & Wildlife Commission).
Communities, Resilience, and Remediation	Social Considerations for Building Community Resilience	Design for community resilience and equity	Enable communities to build their resilience before an emergency occurs and respond and recover from an incident.	Conduct human-centered design activities and trainings with state and local partners.

Sustainable and Healthy Communities (SHC) Research Program

EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: Waste management, drinking water, climate, PFAS, food waste, ecosystem restoration benefits, tools translation, underground storage tanks (USTs), environmental justice (EJ), cumulative impacts

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Site Characterization and Remediation	Methods, Tools, and Guidance on Remediation Options	Methods, metrics, and tools to assess effectiveness of remediation and restoration at contaminated sites	Improved understanding of the underlying mechanisms and their responses at project-scale along with long-term changes in the environment will result in more effective use of the Remediation to Restoration to Revitalization (R2R2R) framework.	Work with states (MI & MN) as coordinated by the Great Lakes National Program Office (GLNPO).
Leaking Underground Storage Tanks	Models, Metrics, and Spatial Tools	Groundwater vulnerability model	Enhance prevention, including approaches to assessing and triaging site cleanups, and evaluating appropriate cleanup technologies.	Collaborating with the state of California in evaluation; provide training on tools.
		Underground Storage Tank (UST) Finder	Support decision making on site cleanups and program management based on risk to co-located public and private drinking water sources.	Collaboration with ASTSWMO.
	Extreme Weather Events and Environmental Justice	Management of Underground Storage Tanks Sites while Protecting Water Resources and EJ Communities and in Extreme Weather Events	Approaches for mitigation and clean-up in the event there are fuel releases due to extreme weather events.	Working with ASTSWMO to develop approaches and identify new sites.
		Aboveground Storage Tanks (ASTs) Clean Water Act (CWA) Hazardous Substances: Climate Change and the Impacts on Environmental Justice	Better management and protection of AST's nationwide in preparation to withstand extreme weather events and provide support for post event mitigations and remediation of accidental releases.	Work with states to identify sites and develop data on aboveground storage tanks.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Chemicals of Emerging and Immediate Concern	Remediation and Treatment to Manage PFAS in the Environment	Research on Treatment, Disposal and Destruction of PFAS to include key uncertainties identified in EPA's 2020 Interim Guidance on the Destruction and Disposal of PFAS and Materials Containing PFAS	Improved knowledge of effective treatment and destroying technologies will allow more PFAS to be removed from the environment and reduce human exposure.	Collaborate with states (AK, FL, IA, MI, PA & VA) at field testing locations; share results on PFAS Science Call with ECOS and ASTHO.
Material Flow and Life Cycle Impact Analysis	USEEIO Economy-Wide Life Cycle Models	Consumption and Systems-Based greenhouse gas (GHG) Inventories and Emission Factors	Partner states may use this information to prioritize or guide GHG emission reductions; this could prompt other states to take a consumption-based prioritization approach to GHG reductions.	Working with states through the Northeast Waste Management Officials Association (NEWMOA).
	Data and Methods to Advance EPA's Waste Measurements Program	Characterizing Plastic Recycling Processes	Key information for improving markets for recycling (i.e., identifying and overcoming barriers to recycling), developing recycling infrastructure, and developing national recycling system definitions, measures and performance indicators.	Engaging with CalRecycle about studying municipal solid waste (MSW) and plastic recycling.
	Opportunities for Food Waste Reduction	Preventing Food Waste to Achieve National Food Waste Reduction Goal	Support the National Food Loss and Waste Goal and the forthcoming National Food Waste Strategy.	Involve states and localities when determining priorities and building tools; present results to interested states.
		Barriers to Recycling of Food Waste	Reduced environmental impact of food waste by increasing use of lower-impact recycling and disposal options.	States provided input used to select these projects; present results to interested states.
	Tools and Methods to Empower Community-Based Decisions	Community-based Decision Making for Municipal Solid Waste (MSW) and Disaster Debris Management Identifying Best Practices	Optimized materials management and improved environmental and economic performance of solid waste management plans.	Provide interested states (e.g., through ASTWMO) with a training on the MSW decision support tool.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Waste Recovery and Beneficial Use of Materials	Enhance the Recovery and Increase Reutilization of Construction and Demolition Materials	Enhancing the Reduction Recycling and Recovery of Construction and Demolition Debris	Increased recycling of construction and demolition (C&D) materials, especially during disaster recovery.	Provide results to interested states (e.g., via ASTSWMO and ASTHO Preparedness) through state focused webinars, fact sheets and other information.
		Quantifying Reuse and Recycling of Construction and Demolition Materials.	Help C&D project site managers and planners identify the reuse opportunities for materials.	Share results through Region 9.
	Potential Leaching from Beneficial Use, Land Disposal, and Remediation	Validation of Leaching Environmental Assessment Framework (LEAF) methods for Organic (PFAS/PFOA and SVOC) and inorganic contaminants of potential concern from waste beneficial use, land application, and treatment	Validation of LEAF for semi-volatile organic compounds (SVOCs) and inorganics will reduce cost and time required to publish methods.	Provide results in state focused webinars and PFAS Science Calls with ECOS and ASTHO.
	Optimization tools and methods to Beneficially Reuse Waste Products and Materials	Benefits and Hazard Assessment in Determining the Benefits of Recycling Used Lithium-Ion Batteries (LIBs)	Better support for reuse and recycling of spent rechargeable LIBs through the ability to make comparisons of potential battery reuse, recycling, and disposal options.	Share results in a usable form with Region 5 and other interested states.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Benefits from Remediation, Restoration, and Revitalization	Methods and Measures for Characterizing Restoration Effectiveness	Novel measures and analytical approaches to quantify restoration effectiveness and benefits of ecosystem restoration to local communities	Communities will be more willing to adopt effective restoration approaches.	Collaborate with Ohio DNR and states in other regions.
		Translational Approaches to Advance Community Decision Support	Better facilitated assessment of restoration effectiveness, including the application of ecosystem services and their benefits, for a suite of decision contexts.	Closely work with state and local collaborators identified by the EPA regions to apply ecosystems tools to empower community decision making.
	Contribution of Site Remediation and Restoration to Revitalizing Communities and Improving Well-being	Social benefits and well-being from ecosystem services of remediated and restored ecosystems	Improved understanding of how ecosystem services can be used to integrate local and expert knowledges to make remediation and restoration more responsive to community needs.	Work and/or engage with all Great Lakes states through annual Area of Concern meeting; Area of Concern communities in MI, MN, OH & WI; Massachusetts Bays National Estuary; and WI Sea Grant.
	Increasing Environmental Benefits and Community Involvement	Community capacity, ecosystem services, and decisions in coupled social-environmental systems	Better understand the interfaces between research, solutions, community, and practitioners to build collective capacity that can be applied in the Great Lakes region and nationally.	Work with the state of Wisconsin on the health impact assessment and the Great Lakes National Program Office.
		Underground Storage Tanks (USTs): Community-based model to assess cumulative impacts and effectiveness of multi-media interventions in improving public health and mitigating the effects of climate change	Better control of air emissions and protection of water quality in meeting programmatic goals and performance measures.	Pilot studies to assess cumulative impacts of potential exposures from USTs.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Cumulative Impacts and Community Resilience	Develop, Map and Analyze Baseline and Changes in Assets and Vulnerabilities to support Cumulative Impact Assessments for Vulnerable and Disadvantaged Communities	Community Health Capacity Score (HCS)	State and local agencies can use the HCS to understand the magnitude of differences and long-term trends in health burden across communities based on demographic profiles, as well as evaluate differential impacts of proposed interventions.	States can help identify and prioritize environmental stressors of concern and participate in human-centered design phase to ensure delivery of information in the most usable way.
	Through Cumulative Impact and Cumulative Risk Assessments, Characterize and Quantify Select Interrelationships Between Environmental Stressors and Their Impacts on Disproportionately Impacted and Overburdened Communities to Support Various Decision Contexts	Wood pellet manufacturing in the southeastern US: An assessment of environmental justice concerns and cumulative impacts on adjacent communities	Improved understanding of health and environmental effects of wood pellet production facilities can help decision-makers best reduce exposure to communities located near them.	Reach out to relevant states before engaging with people and communities.
		Opportunities for increasing the use of qualitative information in environmental decision making	Risk analysis and assessments will more accurately assess affects to human health by including qualitative information.	Work with regions, state, Tribal, and local partners; invite states to participate on advisory committee; share final results.
	Analyze and Enhance Methods for Building Community Capacity to Support Community-Driven Solutions to Cumulative Impacts for Communities with Environmental Justice Concerns, and Disadvantaged Communities	Different by Design: Strengthening system capacity for creating change in environmental justice concerns through EPA's EJ Academy (EJA)	Strengthen the capacity of community leaders and members and community-based organizations to lead EJ change initiatives.	Support NJ DEP and WI DNR who have requested an EJA in the near-term.
		Characterizing community capacity through comparative case studies of ORD research	Build capacity for social science research in ORD through methodological & analytic assistance; Inform efforts to strengthen community capacity as well as tool development & translational research.	Collaborate with state of Wisconsin in Milwaukee and communities or community groups.

Safe and Sustainable Water Resources (SSWR) Research Program

EPA ORD Strategic Research Action Plans FY 2023-2026 State Engagement Focus Products

Relevant state needs: Climate, climate change, water resources, water quality, microplastics, nutrients, harmful algal blooms (HABs), nutrient stressor-response, water reuse, drinking water, drinking water treatment, small drinking water systems, PFAS, wastewater monitoring

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Watershed Assessment	Stressor-Response and Multiple Stressor Impacts	Development and Assessment of Stressor-Response Relationships for Climate and Related Stressors	Improve bioassessment informed by expected climate impacts.	Scoping meetings held with states and territories; preliminary interactions with National Estuary Programs and MA.
Ecosystem and Community Resilience	Water Mapping and Functional Analyses	Climate change effects on surface waters	Provides accessible information on effects of climate futures and the vulnerability of communities and infrastructures to support planning and preparedness.	Outreach to states and communities; webinars for states through ACWA and ASDWA.
		Development of open access data and tools to support surface water analyses	Enhance the usefulness of water quality data, analyses and assessments for states, Tribes, municipalities, agriculturists, educators, and commercial enterprises.	Provide webinars and training on use of tools, models and datasets for interested states.
Advanced Ambient Water Quality Research	Recreational Water Quality and Human Health	Development and characterization of analytical methods to support recreational water quality criteria recommendations in fresh and marine waters	Science support for future revisions of recreational water quality criteria, and for region, state, and Tribe priorities.	Collaborate with state, regional, and local agencies (e.g., DC, KY and Puerto Rico).
		Development and implementation of human health risk and water quality predictive modeling tools to support recreational water quality criteria	Findings will inform regulatory and policy decisions for the use of model-based implementation tools for adoption of recreational water quality criteria.	Webinar and training for interested state staff.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Advanced Ambient Water Quality Research	Environmental Health Effects of Microplastics	Ecological Health Effects of Micro and Nanoplastics Including Toxicity Tests for Representative, Sensitive Ecological Species	Research will inform the derivation of possible regulations, state criteria, and guidelines; has Environmental Justice relevance to several underserved groups (i.e., Pacific Islanders in Hawaii, Guam, and America Samoa).	Involved with the state of California on collection guidelines and analysis of sediment methods used for determining microplastics and nanoplastics exposure.
Assessment and Management of HABs	Health Effects and Toxicity	Benthic cyanobacteria research to standardize methods, assess drivers, and understand toxins and spatial distribution to support indicator development for preventing adverse health outcomes	Better understand the drivers of benthic harmful algal blooms beyond nutrients and the impacts of algal toxins on human health and wildlife.	Work with states to prioritize sampling locations and share results.
	Managing HABs in the Built and Natural Environment	Vulnerability Assessment for Risk of Harmful Algal Blooms (HABs) on US Public Drinking Water Supplies	Support for developing mitigation strategies.	Work with states to compile information on Public Water System (PWS) operation capabilities; share results through partner-focused webinar.
		Surface Water Interventions for HABs Management	More confidence in applying short-term intervention/mitigation techniques in pond, reservoir or aquaculture settings.	Presentations to be given at EPA webinars or other external webinars and conferences.
		Drinking Water Interventions for HABs Management	Improved short-term operational decision making for HABs in drinking water.	Technical support; webinars and training for states (e.g., ACWA, ASDWA).

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Nutrients	Terrestrial, Freshwater, and Estuarine	Legacy nutrients and source/sink multi-scale modeling analyses	Support for total maximum daily load (TMDL) development, prioritization of restoration activities, and climate change risk characterization.	Collaborate with states in the Upper Mississippi River Basin; engage with states in the Long Island Sound Basin (CT, MA, NH, NY & VT), the Puget Sound Basin (WA), and possibly the Illinois River Basin (IL).
		Novel methods to identify sources, sinks, and fate of nutrients	Provide mechanistic understanding on quantifying nutrient sources, transformation and fate as nutrients move through the environment, and uptake by sinks which can inform management decisions.	Use samples states provide; continue working with MPCA and WI DNR.
	Nutrient Impacts and Tools to Support Nutrient Criteria Development	Assessing Nutrient Impacts on Aquatic Life in Freshwater Systems to Support the Development of Indicators and Nutrient Criteria	Scientifically defensible approaches for regions, states, and Tribal governments to reduce nutrient pollution and protect freshwater resources.	Collaborate with CDPHE (diatoms); IN DEM and Ohio EPA (DNA metabarcoding); and Region 5 states; provide technical assistance to states.
		Modeling to Assess Nutrient-Related Stressors and Ecosystem Recovery in Freshwater and Coastal Ecosystems	Inform management decisions across a range of ecosystems and watershed scales, and within the context of future climate conditions.	Engage with states in EPA Regions 1, 4, 5, 6 & 10 and through the EPA Great Lakes National Program Office and the Gulf Hypoxia Task Force.
	Nutrient Reduction Approaches	Review and synthesis of the effectiveness of nutrient management practices (agricultural conservation practices, best management practices, green infrastructure, etc.)	Improved effectiveness for reducing nutrient loading to freshwater, groundwater and coastal systems.	Seek input from states through EPA regions.
		Nutrient Reduction Program Design and Implementation	Help partners improve their assessment of nutrient mitigation programs and adapt more effective nutrient mitigation strategies.	Engage state partners on potential research translation materials; engage with partners in Ohio (environment, agricultural and natural resources agencies).

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Alternative Water Sources for Climate Adaptation	Facilitating Implementation of Alternative Water Use Through Improved Treatment Characterization and Monitoring	Investigation of microbial surrogates and indicators for different types of treatment processes	Enhanced ability to evaluate the efficacy of newer treatment technologies, reducing human health risks posed by waterborne pathogens.	EPA presentations or external webinars and conferences; regular updates to ORD Research Area Coordination Team partners.
		Characterizing the effectiveness of natural or engineered pre-treatments for indirect potable water reuse	Improved drinking water reuse while minimizing any negative effects of pre-treatment methods.	Coordinate with states on proposed field studies associated with EPA sole source community drinking water aquifers in CA and OK.
		Characterization of chemical water quality and applicability of chemical surrogates for assessing treatment performance in water reuse	Supplemental treatment methods to remove difficult-to-treat-pollutants to support potable reuse.	Engage states where case studies may be performed; provide webinars and presentations for states.
Drinking Water/Distribution Systems	Lead and Copper Drinking Water Research to Support Communities	Assess and develop tools to identify lead sources in drinking water and evaluate corrosion control assessment tools	Support the Lead and Copper Rule and consider the challenges of small and disadvantaged communities.	Engage states where case studies are performed; present results at Annual Drinking Water Workshop and EPA Small Drinking Water Systems webinar series .
	Advancing Treatment Technologies and Providing Small and Socially Vulnerable Communities Access to Treatment Information	Develop and evaluate effective and low-cost treatment technologies for small, disadvantaged, and vulnerable systems, particularly for contaminants undergoing regulatory development	Small water systems will be able to more easily, sustainably, affordably adopt treatment technologies.	Inform relevant states & territories about pilot communities (e.g., Puerto Rico); present results to states through Annual Drinking Water Workshop and EPA Small Drinking Water Systems webinar series .

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Per- and Polyfluoroalkyl Substances (PFAS)	Analytical Methods for PFAS in Drinking Water, Wastewater, and Environmental Samples	Analytical Methods for PFAS in Drinking Water, Wastewater, and Environmental Samples	Improved ability to detect PFAS contamination in environmental samples and ultimately reduce human exposure to PFAS.	Solicit state feedback via agency groups; technical support at state request; share final results.
		Data Analysis for Non-Targeted Characterization of PFAS	Enable more robust decision-making from non-targeted analysis (NTA) screening results; build capacity for state and regional laboratories to independently apply NTA for management of PFAS and emerging contaminants.	Partner with state and regional labs; provide ongoing technical support (CA, KY, MI, MN, NC, NY, OH, PA, UT, & WV); seek input from state partners on research translation materials.
	PFAS Sources and Occurrence in Water	Site and source characterization of PFAS in water	Manage PFAS risk to human health and the environment.	Updates to state partners on evolving science through PFAS Science Calls with ECOS and ASTHO.
	Treatment Technologies and Processes for Removing PFAS from Community Drinking Waters	Drinking water treatment technologies research at various scales to determine the fundamental parameters that govern process design, operation, performance modeling validation, scale-up & system costs	Inform cost data determinations for when the Agency makes a regulatory determination for PFAS in drinking water; ultimately reduce PFAS exposure.	Collaborate with states, territories and communities to identify and apply appropriate treatment optimization tools in pilot-scale and full-scale settings.
		Drinking water treatment performance model(s) development, updates, and use for predicting PFAS treatment and optimization	Helps achieve drinking water treatment goals.	Share results through PFAS Science Calls with ECOS and ASTHO.

Research Area	Output	Product Title	Expected Impact	Partner Engagement
Per- and Polyfluoroalkyl Substances (PFAS)	Disposal and Destruction of PFAS in Difficult to Treat Matrices	Bench-, pilot-, and field scale demonstrations of thermal treatment of PFAS in wastewater residuals	Help reach decisions on managing PFAS from the thermal treatment of wastewater residuals.	Webinars and updates to state partners on evolving science.
		Treatment of PFAS through conventional wastewater treatment processes, including pretreatment of high strength wastes	Helps utilities reach decisions on managing PFAS from wastewater treatment and disposal practices.	Share results through PFAS Science Calls with ECOS and ASTHO.
		Managing PFAS in stormwater, runoff, and other non-point source discharges	Support regulatory decisions regarding the efficacy and costs of treating PFAS in in stormwater.	Webinars and updates to state partners on evolving science.
Wastewater	Development and Implementation of Effects Based Bioassays for Monitoring Chemical Risks in Wastewater	Developing Cell-based Assays for Assessing Known and Unknown Chemical Contaminants in Wastewater	Water quality managers will have increased confidence in their application of effects-based monitoring tools.	Support State Water Boards (e.g., California); provide final results to interested states.
Tech Support for Communities	Training and Outreach	Training on Solutions for Small Drinking Water System Challenges: Annual Drinking Water Workshop and EPA Small Drinking Water Systems webinar series	These outreach efforts will provide current information, resources, and training needed to assist small drinking water systems in building capacity, systems sustainably, and providing equitable access to drinking water.	Collaborate with ASDWA to produce training.

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