EPA, in addition to implementing the Clean Water Act programs for: bacterial pathogen standards, monitoring, permits, assessment, TMDLs and enforcement; is engaged in these topics:

1. Clean Water Act Recommended Water Quality Criteria for Recreational Waters (Swimming) [John Wathen]

- EPA published final recreational water quality criteria in November 2012.
- EPA's implementing guidance discussing alternative enumeration methods, alternative health relationships, and non-human sources of fecal contamination is available at: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm
- As required by BEACH Act amendments to the Clean Water Act (CWA) Section 304(a)(9)(B), EPA has begun a 5-year review of its recreational water quality criteria (RWQC). In conducting this review, EPA will consider a number of factors including: the availability and evaluation of new science; the underlying science used to develop the 2012 RWQC; additional implementation support needs; and perceived barriers to state adoption. EPA will prepare a report summarizing the findings of the 2017 review of the 2012 RWQC at the end of CY2017. The report will inform subsequent consideration of whether or not any revisions to the 2012 RWQC are necessary and appropriate, based on the review's findings.

2. Development of Recreational Water Quality Criteria for Coliphage [Sharon Nappier]

- EPA is developing RWQC for Coliphage, a viral indicator, to ensure public health protection from water sources that have been influenced by fecal contamination or wastewater discharge.
- In April 2015, EPA published a literature review on the state of the science describing the usefulness of coliphage as an indicator.
- In March 2016, EPA held the Coliphage Experts Workshop on science questions related to the development of Coliphage-based RWQC. The literature review and fact sheet are available on our EPA microbial pathogen website: https://www.epa.gov/wqc/microbial-pathogenrecreational-water-quality-criteria#coliphage .
- EPA anticipates the peer-reviewed Meeting Proceedings Report will be available mid-2017.
- EPA continues to publicly engage with stakeholders at key milestones in the problem formulation stage of the criteria development process, including:
    - September 2016: WEFTEC Workshop: *Bacteriophage analyses in wastewater, ambient water, and for biosolids quality compliance measurements*: Attended workshop and presented highlights from the Coliphage Experts Workshop.
    - May 2017: EPA will be discussing the Coliphage Criteria and research supporting its development at the 2017 University of NC Water Microbiology Conference.
    - Ongoing meetings with key stakeholders to provide updates: WEF, NAWCA, NRDC, and other environmental groups.
- EPA anticipates draft criteria will be ready for peer review in 2018.
- Throughout the process, EPA will be evaluating the impact of future criteria on Clean Water Act (CWA) programs including: research, water quality standards, permits, and enforcement to protect designated uses including shellfish harvesting.

3. *EPA Development of Recreational Ambient Water Quality Criteria (AWQC) and Swimming Advisories for Cyanotoxins [John Ravenscroft]*

- EPA published draft recommendations for microcystins and cylindrospermopsin in December 2016. https://www.epa.gov/wqc/draft-human-health-recreational-ambient-water-quality-criteria-andor-swimming-advisories

- The recommendations were developed based on the increased recreational exposures experienced by children.
- EPA incorporated the same peer-reviewed science that supported the 2015 Drinking Water Health Advisories for microcystins and cylindrospermopsin, utilized exposure parameters published in EPA's *Exposure Factors Handbook*, and applied the Agency's peer-review and published *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (2000) to develop recommended values protective of human health while recreating in ambient waters.
- The recommended values for the cyanotoxins can be applied as swimming advisories or as water quality criteria.
- The 90-day public comment period ended in March 2017 and EPA is currently addressing comments and revising the draft.
- EPA's goal is to publish the final document in the summer of 2017.
- *EPA is developing two sets of implementation support materials for the draft cyanotoxin advisories or criteria.*
- *The first set of materials provides information to recreational water managers to help them protect public health from harmful algal blooms (HABs) outbreaks and harmful levels of cyanotoxins.*
- *These materials collate examples from established state programs and work previously done by EPA.*
- *Included is information on how to develop and manage a HABs monitoring program, communicate potential risks to the public, and address problems when they occur.*
- *The second set of materials will discuss the implementation of the cyanotoxin criteria in the impaired waters listing, TMDL and NPDES programs, including flexibilities for criteria implementation.*
- *This second set of materials will be published contemporaneously with the finalized criteria or swimming advisory document.*

4. Ocean Acidification (OA) [Brian Rappoli]
https://www.epa.gov/ocean-acidification/what-epa-doing-address-ocean-and-coastal-acidification

- *Monitoring*
  - EPA is increasing the capacity to monitor coastal acidification by providing eight National Estuary Programs (Barnegat Bay Partnership, Casco Bay Estuary Partnership, Coastal Bend Bays and Estuaries Program, Long Island Sound Study, Massachusetts Bays National Estuary Program. San Francisco Estuary Partnership, Santa Monica Bay Restoration Commission, and Tampa Bay Estuary Program) with funding for the procurement of instrumentation for high-frequency and high-precision measurement of pH and pCO_2.
  - EPA is collaborating with the Mid-Atlantic Coastal Acidification Network, Northeast Coastal Acidification Network, and Southeast Ocean and Coastal Acidification Network on the development of monitoring strategies.

- *Research on Ecological Impacts*
  - Characterizing the dynamics and drivers of carbonate chemistry experienced by nearshore organisms in seagrass beds (Cheryl Brown, ORD)
  - Quantifying the relative contributions of natural and anthropogenic nitrogen sources in fueling local metabolism and associated carbonate chemistry dynamics (Cheryl Brown, ORD)
  - Constructing baseline demographic models to scale organism response to population response (Jason Grear, ORD)

- *Ecosystem Valuation*
  - EPA is developing a bioeconomic model for valuing marine ecosystem services and assessing economic impacts from climate change and acidification. Initial efforts are focusing on impacts in the Gulf of Maine and the Salish Sea.
  - A draft report entitled "Economic Impacts of Ocean Acidification and Climate Change on Shellfish" has been the subject of an external peer review.

- *Water Quality Modelling*
  - The Salish Sea Model is nearing completion.
  - The purpose of this project is to (1) expand the existing Salish Sea Model to evaluate pH, aragonite saturation state, and related carbonate system parameters, and (2) quantify the influences of regional nutrient sources.
  - A draft final report entitled "Ocean Acidification Module and the Response to Regional Anthropogenic Nutrient Sources" is currently undergoing peer review.
  - Preliminary findings indicate that anthropogenic nutrient loadings can increase pH and aragonite saturation levels in some areas, particularly in several South Sound shallow inlets and bays. Portions of the main basin, South Sound, Port Susan, Skagit Bay and Whidbey Basin, present higher sensitivity to reductions in aragonite saturation levels due to anthropogenic nutrient loadings.

- *Interagency and Intra-Agency Coordination*
  - EPA is a member of the Interagency Working Group on Ocean Acidification (IWG-OA). The IWG-OA has developed a national strategy for researching and monitoring OA, and is developing an implementation plan for the national strategy.
  - EPA has an Agency-wide Ocean and Coastal Acidification Coordination Workgroup. The workgroup was formed to foster coordination across the Agency to ensure efforts are leveraged, whenever possible.

- *OA-related Water Quality Parameters*
  EPA continues to coordinate with the West Coast Scientific Panel on Ocean Acidification and Hypoxia and NECAN as they develop their state-of-the-science synthesis for acidification on the West and East Coast, respectively.

5. Harmful Algal Blooms (HABS) [Lesley D'Anglada]

Interagency and Intra-Agency Coordination

EPA co-chairs with NOAA the Interagency Working Group on HABHRCA (IWG-HABHRCA). The IWG coordinates and convene Federal agencies to discuss HAB and hypoxia events in the United States, and develops action plans, reports, and assessments of these situations.
ftp://ftp.oar.noaa.gov/OA/IWGOA%20documents/IWGOA%20Strategic%20Plan.pdf

- On June 2015, EPA published Health Advisories and Health Effects Support Documents for microcystins, cylindrospermopsin and anatoxin-a. Health Advisories are informal technical guidance to assist federal, state and local officials, and managers of public or community water systems in protecting public health during cyanotoxins events in drinking water systems.
- Along with the health advisories, EPA published methods and guidance documents to support drinking water systems:
  1. Analytical methods (LC/MS/MS) for microcystins and nodularin-R, and for anatoxin-a and cylindrospermopsin, and ELISA (Adda) methods for microcystins and nodularins.
  2. Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water Guidance Document

3. Cyanotoxin Management Plan Template and Example Plans
4. Water Treatment Optimization for Cyanotoxins Document
5. Drinking Water Cyanotoxin Risk Communication Toolbox

- In August 2016, the Drinking Water Protection Act (H.R. 212) was signed to control harmful algal blooms in drinking water and to evaluate the risk to human health, recommend feasible treatment options, identify research gaps, identify possible cyanotoxins that could be present in drinking water, and determine and issue, if needed, health advisories for those algal toxins.
- In November 2016, EPA published the *Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water* in response to the Drinking Water Protection Act. OST is working with the Office of Ground Water and Drinking Water (OGWDW) and ORD in addressing those research gaps identified in the Strategic Plan.
- The OW is conducting Regional Workshops on HABs to provide technical support and bring together States and tribal agencies working on HABs-related issues in fresh and coastal waters. The workshops provide opportunities for collaborations with national and regional partners, and to share experiences and strategies. So far, the OW have supported Regional workshops in Region 8 (2015), Regions 5 and 10 (2016) and Regions 1, 7 and 9 (2017).
- The OST publishes a monthly Freshwater HABs Newsletter with news, recently published research, upcoming events, beach closures and Health Advisories, and other relevant information. OST also conducts webinars to discuss current issues related to HABs. For Freshwater HABs Newsletters go to: https://www.epa.gov/nutrient-policy-data/research-and-news To sign up for the HABs Newsletter (and to ask HABs-related questions) please send an e-mail to epacyanohabs@epa.gov
- EPA, along with NASA, NOAA and USGS are developing an Early Warning System to Detect Harmful Algal Blooms in freshwater systems building on previous NASA ocean satellite sensor technologies. EPA is pioneering the integration of satellite data into the decision-making process. NOAA and NASA have pioneered the use of oceanic satellite data for monitoring and forecasting harmful algal blooms. Ocean color satellite data are currently accessible to scientists but are not routinely processed and produced in formats that can meet the needs of state and local environmental and water quality managers.
- On December 8, 2016, EPA announced the release of the National Lakes Assessment (NLA) 2012 Report. This report is the culmination of a significant partnership between EPA, states, tribes, and other partners. In addition to the report, assessment of conditions at regional scales, differences between natural lakes and reservoirs, and an opportunity to explore population-level results in an interactive dashboard are also available. A few key findings from the report include the following:
    - The NLA indicates that nutrient pollution is common in U.S. lakes; 40% of lakes have excessive levels of total phosphorus and 35% have excessive levels of total nitrogen. Nutrient pollution is the most widespread stressor among those measured in the NLA and can contribute to algae blooms and affect public health and recreational opportunities in lakes.
    - In comparison with the 2007 report, a measure of the density of cells that could produce cyanotoxins, shows a statistically significant increase (+8.3%) in the percentage of lakes in the most disturbed category. The NLA identified a significant increase in the detection of microcystin among lakes in 2012 (+9.5%). However, concentrations of this algal toxin remained low and rarely exceeded WHO recreational levels of concern (<1% of the population) in both assessments.
- For general information regarding cyanobacteria and their toxins please go to: https://www.epa.gov/nutrient-policy-data/cyanohabs

6. Microplastics in Shellfish - Trash Free Waters Program [Margaret Murphy]

https://www.epa.gov/trash-free-waters

- The EPA Trash Free Water program is holding an invitation-only workshop in late June to develop a prioritized framework for short- and long-term research needs to better understand microplastics sources, distribution and impacts on ecological and human health.
- The Trash Free Waters program is also in the process of hosting a webinar series on plastics and microplastics in the environment that features top researchers in the field. Past webinars are archived on the Trash Free Waters website: https://www.epa.gov/trash-free-waters/trash-free-waters-webinar-series

Microplastics (a type of "physical adulterant") with potential risks to aquatic life and human health (physical injury in tissues, vector for adsorbed toxins and pathogens in biofilm on pieces.

- Microplastics are plastic particles < 5 mm in size, which may occur in the form of beads, pellets, fibers, fragments, etc. They originate either directly from products used in the manufacture of plastics (e.g., plastic pellets; this group is called primary microplastics), or as weathering/breakdown products of larger plastic litter or debris in aquatic environments (secondary microplastics).
- Microbeads, spherical microplastics ranging in size from 0.004 to 1.24 mm, were banned in rinse-off cosmetics in the US by the Microbead-Free Waters Act (2015), which takes effect on July 1, 2017 (product manufacture) and July 1, 2018 (product sale). Microbeads are only one type of microplastic, and microbeads are also used for other applications apart from cosmetics.
- Studies around the world have shown that microplastics are ubiquitous in marine, estuarine and freshwater environments, where they are commonly found in water and sediment samples. Microplastics are also regularly found in the digestive tracts of seabirds and fishes, generally in small quantities, though some species can accumulate larger numbers of particles.
- Microplastics contain plastics-associated chemicals (e.g. plasticizers, flame retardants), but may also act as vectors for the environmental transport of other organic contaminants such as PCBs that may sorb to their surfaces. There is an ongoing discussion among microplastics researchers about the degree to which microplastics contribute to contaminant exposure in organisms. Some models show that microplastics are likely to be a small contributor to overall exposure, with the diet contributing the major part of the contaminant load, but these findings need to be confirmed with further lab experiments and in the field.
- Microplastics may also be vectors for invasive species and pathogens; a recent study has shown that microplastics can transport potentially pathogenic *Vibrio* spp. Dangerous Hitchhikers? Evidence for potentially pathogenic Vibrio spp. on Microplastic particles. *Marine Environmental Research*, 2016; 120: 1 DOI: 10.1016/j.marenvres.2016.07.004
- A major limitation to understanding the impacts of microplastics is the lack of standardized and validated method for their quantification and characterization.
- Studies have reported the presence of microplastics in shellfish in Indonesia, China and Canada, raising concern about human consumption, especially given that shellfish may undergo minimal cleaning and preparation before consumption (e.g. raw oysters).
- EPA White Paper (Dec 2016): A Summary of the Literature on the Chemical Toxicity of Plastics Pollution on Aquatic Life and Aquatic-Dependent Wildlife https://www.epa.gov/wqc/white-paper-summary-literature-chemical-toxicity-plastics-pollution-aquatic-life-and-aquatic

7. Fish and Shellfish Program Newsletter [Sharon Frey]

The monthly newsletter focuses on current information about shellfish, finfish and crustations. The newsletter provides a snapshot of recent advisories, federal agency activities, publications, awarded research, and future meetings and conferences. The focus area of the Nov. 2016 newsletter was on shellfish. The newsletter can be found at this link: https://www.epa.gov/fish-tech/fish-and-shellfish-program-newsletter
If you wish to be on the email list to receive the newsletter, please contact Sharon Frey at frey.sharon@epa.gov.

8. 2017 EPA-FDA Advice about Eating Fish and Shellfish
https://www.epa.gov/fish-tech/2017-epa-fda-advice-about-eating-fish-and-shellfish

EPA and FDA provide advice on eating fish and shellfish. Fish and shellfish provide protein, are low in saturated fat, are rich in many micronutrients, and provide certain omega-3 fatty acids that the body can not make and are important for normal growth and development. However, as a result of natural processes and human activity, fish also contain mercury in the form of methylmercury. Methylmercury can negatively affect the central nervous system, particularly the developing brain of a fetus. In January 2017, they released updated advice that is geared toward helping women who are pregnant or may become pregnant – as well as breastfeeding mothers and parents of young children – make informed choices when it comes to fish that are healthy and safe to eat as it pertains to methylmercury. The FDA and EPA's new advice for the first time features a chart with 36 types of fish and shellfish that are "best choices" to eat 2 to 3 times a week; 19 fish that are "good choices" to eat one serving a week and 7 fish to avoid if pregnant, breastfeeding, or feeding to young children. "Best Choices" include: Clam, Oyster and Scallop. No bivalves are listed under "Good Choices" or "Choices to Avoid".

9. Beach Marine Sanitary Survey Tool Demonstration [Samantha Fontenelle]

In September 2016, EPA released a free mobile app: the Marine Beach Sanitary Survey form. The app allows states to gather electronically the same data previously collected with the paper form. It was developed for use on Android and Apple tablets and can be downloaded from: https://www.epa.gov/beach-tech/beach-sanitary-surveys

10. EPA International Cooperation Website [Bill Kramer]

Collaborating with global and bilateral partners, EPA is working to promote sustainable development, protect vulnerable populations, facilitate commerce, and engage diplomatically around the world.

https://www.epa.gov/international-cooperation