EPA Introductory Comments to the ISSC Executive Board Meeting 5-17-2018 (rev from 10/06/17)

EPA, in addition to implementing the Clean Water Act programs for: bacterial pathogen standards, monitoring, permits, assessment, Total Maximum Daily Loads (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
- This month EPA released its Five-year Review of the 2012 Recreational Water Quality Criteria (RWQC), as required by the BEACH Act amendments to the Clean Water Act. The review describes the state of the science related to human health protection in water bodies designated for primary contact recreation, such as swimming, since the EPA published the 2012 RWQC. The review report also contains technical assessments which form the basis for the EPA's decision not to revise the 2012 Recreational Water Criteria during this review cycle. The Agency believes, however, that further research and analysis as identified in this Report will contribute to future EPA review of the 2012 RWQC. The EPA will work with the environmental public health community as it moves forward with its research efforts. The use of qPCR and ongoing research in methods and indicators continue to strengthen and augment the tools available to support the current criteria.
  View the report: www.epa.gov/wqc/five-year-review-2012-recreational-water-quality-criteria

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.
  - Available on our EPA microbial pathogen website: https://www.epa.gov/wqc/microbial-pathogenrecreational-water-quality-criteria#coliphage
- In March 2016, EPA held the Coliphage Experts Workshop on science questions related to the development of Coliphage-based RWQC. The fact sheet and peer-reviewed Meeting Proceedings Report are also available on our EPA microbial pathogen website.
- 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.
  - September 2017: WEFTEC Workshop: Bacteriophage analyses for Biosolids and Water quality standards assessment Attended workshop and presented coliphage related updates.
- EPA has validated two coliphage enumeration methods for use in ambient waters and wastewater effluent. We anticipate these will be available online in May 2018.
- 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 are 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 in the peer-reviewed and published scientific literature, 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 by September 2018.
- EPA is developing two sets of implementation support materials for the draft cyanotoxin advisories or criteria.
- In July 2017, EPA released a suite of materials which states and communities can use to protect public health during cyanobacterial blooms. Public health officials and outdoor recreational waterbody managers can use the resources provided to develop a cyanotoxin monitoring program, communicate potential health risks to the public, and address HAB outbreaks. The easiest way to find the materials online is to Google "EPA" and "Monitoring and Responding to Cyanobacteria" (webpage).
- EPA is continuing to work with the states to develop additional materials to support implementation of the criteria, when finalized.

4. Ocean and Coastal Acidification (OCA) [Amanda Santoni]
https://www.epa.gov/ocean-acidification/what-epa-doing-address-ocean-and-coastal-acidification

- *Monitoring*
  - EPA increased 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.
  - Similar OA monitoring is being conducted in the Tillamook Estuary through a collaboration between EPA, USGS, Oregon State University and Tillamook Estuary (a National Estuary Program) (Cheryl Brown, ORD).
  - Providing carbonate analyses of samples from NEPs for ground-truthing OW-supported instrumentation (Jason Grear, ORD)
  - EPA is studying the response of pH and associated carbonate chemistry in Narragansett Bay to ongoing reductions in nutrient loading (Jason Grear).

- EPA is releasing guidelines (expected May 2018) for measuring changes in seawater pH and associated carbonate chemistry in coastal environments of the Eastern United States (Adam Pimenta and Jason Grear).
- EPA surveyed nearly 200 stations in the Delaware River Estuary and performed transects off the coast of Delaware and Chesapeake Bays for a baseline assessment of coastal and ocean acidification (Sherilyn Lau, R3).
- EPA is collaborating with the Mid-Atlantic Coastal Acidification Network, Northeast Coastal Acidification Network, (NECAN) and Southeast Ocean and Coastal Acidification Network on the development of monitoring strategies.
- EPA is co-leading a monitoring workgroup with the Mid Atlantic Regional Council for the Ocean (MARCO) to develop the framework for a regional monitoring infrastructure to guide future acidification research (Sherilyn Lau, R3).
- EPA is considering a proposal to add coastal acidification monitoring into the National Coastal Condition Assessment.

- *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)
  - Developing methods for extrapolating from laboratory studies to wild populations of crustaceans and resource shellfish (Jason Grear, ORD)
  - Investigating the recovery of juvenile hard clams (*M. mercenaria*) placed in Narragansett Bay after short term exposure to low pH (Jason Grear, ORD).
  - Investigating how nutrient-related water quality processes in coastal waters interact with the carbonate system in the adjacent coastal marine environment influencing water quality and aquatic life (Jim Hagy, NHEERL).
  - Predicting responses of estuarine production and carbonate chemistry to nutrient loading using stable carbon isotopes (Autumn Oczkowski and Jason Grear, ORD)

- *Ecosystem Valuation*
  - EPA is finalizing a bioeconomic model for valuing marine ecosystem services and assessing economic impacts from climate change and acidification. Initial efforts focus on impacts to the clam, crab, lobster, mussel, oyster, and scallop industries in the Gulf of Maine and Puget sound.
  - 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 Modeling*
  - The Salish Sea Model to examine how regional freshwater/land-derived sources of nutrients impact acidification in the Salish Sea is complete. This expanded the Salish Sea Model developed by the Pacific Northwest National Laboratories (PNNL), to evaluate pH, aragonite saturation state, and related carbonate system parameters, and quantify the influences of regional nutrient sources.
  - The report entitled “Ocean Acidification Module and the Response to Regional Anthropogenic Nutrient Sources” was subject to a peer review, and was published in June 2017. Findings indicate that anthropogenic nutrient loadings can decrease 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 released an implementation plan in December of 2016. The IWG-OA is also spearheading an ocean acidification information exchange in collaboration with the Northeastern Regional Association for Coastal Ocean Observing Systems (NERACOOS) to share resources, access up-to-date information, and interact across disciplines and regions. [https://www.oainfoexchange.org]
  - EPA is a member of the Coral Reef Task Force which has dedicated a working group to climate change and ocean acidification.
  - 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. The IWG released the *Harmful Algal Blooms and Hypoxia in the Great Lakes Research Plan and Action Strategy: An Interagency Report*, a report focusing on the relationships between federal partners and their stakeholders, and the challenges, concerns, and needs related to HABs and hypoxia, and their impact on Great Lakes regional interests and communities. Recently, The IWG released a Progress Report on Implementation of Recommendations and Actions Taken from the National and Great Lakes Research Plans and Action Strategies.

- 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.

- In July 2017, EPA published communication materials for states, tribes, and communities to use to protect public health during cyanobacterial HABs in recreational waters: Recommendations for Cyanobacteria and Cyanotoxin Monitoring in Recreational Waters, and Recreational Water Communication Toolbox for Cyanobacterial Blooms.
- 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), Regions 1, 2, 3, 7 and 9 (2017) and Region 4 (2018).
- 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

- New HABs Collaboratory Products

    - How Does Nitrogen Affect Harmful Algal Blooms?
    - Phosphorus (P) and HABs: Sources of P from the Maumee River

  For more information visit the HABs Collaboratory website

6. Microplastics in Shellfish - Trash Free Waters Program [John Goodin]
   https://www.epa.gov/trash-free-waters

- The EPA Trash Free Waters program (TFW) is facilitating Agency efforts 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. TFW hosted a Microplastics Expert Workshop on June 28-29, 2017. Top researchers from academia and several Federal agencies identified data gaps and research priorities. A workshop report is available on the TFW web site https://www.epa.gov/trash-free-waters/microplastics-expert-workshop-report . EPA has identified microplastics research as a high priority for its research programs.

- The TFW program hosted a series of 8 webinars on plastics and microplastics in the environment from January-August 2017. The monthly webinars featured top researchers in the field. All of the webinars are archived on the TFW website: https://www.epa.gov/trash-free-waters/trash-free-waters-webinar-series

Microplastics pose 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
- Recent studies highlight the severity of the microplastics problem. Among these reports are studies on microfiber contamination; microplastic contamination in drinking water; microplastic contamination in the Arctic; plankton ingestion of microplastics; and impacts of plastic nanoparticles on brain function and behaviors in fish. For current information on the state of science regarding micro- and nanoplastics, contact Dylan Laird at laird.edward@epa.gov.

7. Fish and Shellfish Program Newsletter [Sharon Frey]

The monthly newsletter focuses on current information about shellfish, finfish and crustaceans. 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. Guidance for Conducting Fish Consumption Surveys [Samantha Fontenelle]

In December 2016, EPA released an updated version of Guidance for Conducting Fish Consumption Surveys to assist states, tribes, local governments, and others with the design, conduct, and analysis of surveys focused on characterizing the ingestion of finfish and shellfish. This document updates EPA's 1998 Guidance for Conducting Fish and Wildlife Consumption Surveys with recent developments in survey research and includes new sections on non-survey approaches for assessing heritage rates of fish consumption (the amount of fish consumed prior to non-indigenous or modern contamination with the natural lifecycle of fish) and estimating suppression of fish consumption (the reduction in fish consumption due to environmental or other factors). More information is available at https://www.epa.gov/fish-tech/epa-guidance-developing-fish-advisories.

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. (See also handout for Foreign Relations Committee) https://www.epa.gov/international-cooperation