Summary of the NARS National Meeting:
Evaluating NARS to Identify Improvements for the Future
Dec 5 – 7, 2017 Silver Spring, MD

The National Aquatic Resource Surveys program is a partnership between EPA, states, and tribes. It is designed to assess the condition and trends of the nation's waters, identify the extent of key stressors impacting our waters, link those stressors to condition, and help build/refine state and tribal monitoring and assessment programs. As we are now into the third cycle of NARS, this is an opportune time to conduct a wider review/evaluation of the program. During December 2017, EPA, state, and tribal partners convened to identify ideas for how the NARS program could improve to be more effective at meeting the program objectives and to increase the utility of the program to partners. Below is a summary of the key findings compiled from questions asked during the meeting, breakout session and group discussions, and follow-up meeting evaluations. **Section A** lists thirteen key topics that were identified during the meeting that would help to improve the NARS program. The top areas of improvement included aspects of data availability, indicators/methods, communication/messaging and engagement with partners.

In order to address the NARS objective of trend detection, EPA's Office of Research and Development analyzed what implementation strategies might improve our ability to detect trends while maintaining our confidence in status estimates. ORD's analysis shows that moving from our current practice of implementing the design for one waterbody type in one year every five years to one in which we implement the design annually over five years would result in an improved ability to detect trends in the short and medium term. This proposed change to the implementation of NARS was discussed during the meeting. Participants discussed the potential benefits and challenges of the proposed change and identified key impacts that the change would have on their programs (**Section B**). Participants also identified specific information that we need to know before making a decision to change the implementation of NARS and key things to consider in the decision-making process.

Summary of NARS National Meeting

A. What areas should we focus on to improve NARS?

1. Data Availability

- Reduce data turnaround time
  - Distinguish data category types (i.e. raw, finished, and modeled, and pilots)
  - Better communication of data availability and status of data categories
  - Get raw/provisional data in CSV format as soon as it's QC'd
- Provide easier access to data
  - Develop better query tools and output tools for delivery (e.g., filter capabilities)
  - Format that facilitates state review and approval for release to portal
  - Better explanation of data organization/formulas/excel file headings
  - Standardize data delivery to states
  - STORET/WQX/WQ portal
  - Alternatives to SharePoint and csv files
- Partner with States on QA/QC
  - QA checks earlier in the process
  - Allow states to QA/QC their own data
  - Specific questions to states/tribes on what to look for with data QA
- Release the final results faster
  - Interactive tool/dashboard to retrieve data on different levels
- Follow-up with landowners
  - Faster delivery of data back to landowners
  - Landowner reporting template/interactive tool

2. Indicators/Methods

- Evaluate/ streamline indicators and sampling protocols across surveys
  - Streamline protocols where possible (e.g., biological/habitat RBPs)
  - Use common language throughout all surveys (apps/manuals)
  - Stabilize indicators and assess shared indicators across surveys
  - Continued/better use of integrating indicators
  - Don't use similar indicators between surveys just to standardize (i.e. only if it makes sense)
- Evaluate comparability of NARS methods with State methods
  - Use biological methods compatible with state programs
  - Provide methods comparison grants and publish results
  - Compare biological methods where there are state methods/indices tailored to state ecoregions
  - Develop a national scale BCG combined with a more refined natural classification of waterbodies
- Evaluate relevancy of indicators
  - Refine/streamline indicators that are applicable to the states
  - Provide a greater understanding of the basis for indicators

    - Find uses for parameters measured but not used in analysis or reporting
    - Eliminate collection of data not used or of limited use (i.e., evaluate time spent vs data returned)
    - Drop water chemistry sampling (states can't use it in 305b assessments)
    - Make it relatable to States/Tribes and designated uses; tie indicators to attainment
    - Develop models for converting good, fair, poor to full support, stress/altered, and impaired
    - Evaluate if current indicators are telling us something (e.g., sampling an indicator every 5 years that doesn't change quickly is informative)
    - Allow greater flexibility in methods to get data representative of sites in different regions
    - Review metrics that are not serving as good indicators of stress
    - Ensure that condition results are accurate (poor = impaired)
- Explore new indicators
    - Used to inform states of concerns that they may want to evaluate at the state scale
    - Allows for new methods/techniques to be adopted into state programs
    - Additional indicators could be added on a state by state basis that match the states assessment/listing needs
    - Don't want to lose the option to add emerging new indicators
    - Better explain premise for new research indicators
    - Ideas for new Indicators
        - Diatoms
        - Emerging contaminants
        - Neonictonides
        - eDNA
        - PPCP hydrocarbons
        - Microplastics (<5 mm)
        - Indicators of hydro-alterations
- Other indicator considerations
    - Improve/refine index periods regionally
    - Use regional labs for taxonomy
    - Resolve how to handle high-current areas with no sediment
    - Integrate drone applications to sampling events (phab)
    - Look at other ways to collect data (e.g., continuous data, GIS, or Remote Sensing)

3. Communication/Messaging

- Develop a communication strategy
    - Spend more energy to report the information (e.g., several webinars and press release)
    - Form working groups to develop communication products
    - Utilize a social scientist/comms specialist /journalist/public affairs specialist/NARS lobbyist
    - Invest in branding and marketing of NARS (i.e. better presence)
    - Find ways to get people to website and use it

    - Focused strategy/messages for different audiences (e.g., congress, public, landowners, managers, state legislation)
    - Create communication templates (i.e., standardized messages, graphics, messages to communicate to managers, stock presentations, summary of talking points, overview of NARS, fact sheets)
    - State/tribes/other partners can better incorporate their own successes and challenges and be better advocates for the program
- Craft meaningful messages
    - Sell the objective of NARS (i.e., be clear about what the purpose of NARS is)
    - Highlight more examples of how states are using data
    - Translate NARS indicators and stressors into something the public can use and understand (i.e., What do our surveys actually mean?)
    - Communicate why should NARS matter to me (i.e., Emphasize benefits to community, states, regions; how can someone make a difference)
    - Connect NARS data to other data sources
    - Craft messages that are linked to impairments
    - Bring in case studies/local stories (e.g. Nitrogen levels: recreation/financial/living standards – Can I swim there? Can I drink the water?)
    - Integrate NWCA, NCCA, NRSA, NLA analyses
    - Expand usefulness of final reports (e.g., support policy changes, restoration initiatives)
- Identify audiences
    - Public
    - State WQ Managers
    - Policy makers/Congress/Elected officials/Decision Makers
    - Media
    - Upper Management
    - Landowners
    - Academic (i.e., more published literature)
- Explore communication tools
    - Single site reports
    - Use Visualization tools (Story maps, GIS linked data, R shiny)
    - Develop stories and exploratory tools

4. Engagement with Partners

- Improve communication
    - A priori engagement with states
    - Improved communication with Tribes
    - Talk to States about revisits and what is practical
    - Improved communication of pilot efforts
    - More frequent discussion on specific issues
    - More opportunities for face time interactions with partners

- Address hurdles to State participation
  - Large effort for site verification, getting permits, permissions
  - Streamline permit process and landowner access requests
  - Encourage states that don't participate to look for partnerships within states to allow participation
  - Staff turnover and institutionalized knowledge among a few
- Help States find ways to leverage NARS participation
  - Create better incentives for State/Tribes to participate in NARS
  - Need States' participation/buy-in in all stages (e.g., field work, reporting, etc.)
  - Tie data to state use; align NARS to state program objectives
  - Systematically identify how make NARS data more useful to variety of state programs
  - Better explanation of VA/OK monitoring strategies and how NARS fits for them (e.g., What monitoring efforts do they do outside of NARS/did NARS design replace other efforts/how do they pay for the enhancement it takes to assess 305b/303d – WQS)
  - Ability to use data for state purposes without doing the full site overdraw (e.g., does not have to be fully merged with their existing monitoring scheme)
  - Incentivize States/Tribes to participate at overdraw level (can then compare results to nation/ecoregions)
  - Incorporating state and REMAP data into national dataset when data is compatible with NARS data

5. Supporting States to use NARS data

- Data Management Support
  - Exchange of data management tools
- Data Analysis Support
  - Being able to roll NARs data together with state data
  - Analytical tools for states for state-scale surveys (R code, dashboards)
  - Provide statistical support for state-scale projects
  - Support states in developing tools to analyze/report
- Reporting Tools
  - Adaptable tools to present data
  - State specific tools for data discovery/reporting templates
  - Data visualization to compare locally/regionally
  - Create clearinghouse for state reporting tools (templates for state intensifications)
- Reporting
  - Communication strategies of NARS results to IRs
  - Better linking state usage of survey results
  - Use information on triennial review

6. Training

- Issues with current structure
  - Costly to send everyone
  - State travel restrictions
  - Trainers are not prepared
  - Need to spend more time on new methods
  - A week is too long for a regional training
  - Need less in class training (i.e. more webinars and in the field training)
  - Training location may not capture variability of regional sites
- Potential improvements
  - Have multiple levels of training
    - Cater training for new vs. experienced crews (e.g., use a national training for new personnel, dry-run trainings and audits for more experienced crews)
    - Examine who needs full training each year and who can do a brief refresher
    - Create a certification program for the crew leader
  - Use training videos (e.g., NARS Youtube channel)
  - More efficient/streamlined training
  - Have continuing education (e.g., NARS university)
  - Use of NARS apps annually
  - Webinars to enhance/standardize cross-training
  - Distribute previous survey crew calls/FAQs/reoccurring issues
  - Provide feedback on crew performance (e.g., AV Reports, Post survey QA)

7. Collaboration & Integration with Other Programs

- Leverage partnerships in data collection
  - USGS/BLM or other fed agencies with long term or large-scale monitoring (TRENDS work)
  - Incorporate continuous monitoring/technology
  - Integration with other existing monitoring programs to satisfy certain data needs of NARS (RMN of reference sites)
  - More publicity and information sharing
  - In regions and across state boundaries
- Coordination with other EPA programs
  - EPA research/OST
  - Evaluation of data with other EPA-CWA programs (e.g., 319, wetland mitigation, NPDES)
  - Quantify the ROI of knowledge and support for CWA at the national/regional/ecoregional and local levels

8. Survey Design & Site Selection

- Use sample frames with better resolution
  - Increased resolution at the regional scale
  - Improve sample frame for wetlands and talk to states about their definitions of lakes

    - Better mapping leading to improved sample frame
    - Refine list frame of sites to reduce non-target visits
    - Improve/modify the site selection process
- Facilitate State and NARS sample frame integration
    - Comparability with state scale specific survey designs
    - Provide the clear statistical design of the survey for both the NARS and aid in state intensification design
    - Make the NARS sample frames relevant to the states (focus on stream & lake assessment units in ATTAINS)
    - More sites/better fidelity to population so that sampling better meets state needs
- Modify survey design
    - Address concerns with study design before changing implementation strategy
    - White paper that describes the "design" of surveys; how to merge/nest various designs for analysis
    - Redistribute number of sites across resources (e.g., do we really need 1000 rivers; could these units be used to increase state sample sizes above threshold where they are likely to cooperate)
    - Revisit target populations for resource groups – can they vary by state or at least have some subpopulation de-emphasized?
    - More sampling sites
    - Repeat visits to the same sites from year to year

9. Assessment of the variability of single samples

- Do an intensive study in a few states with frequent visits one summer to a handful (but statistically significant) number of lakes to understand their variability and see if the one data NARS is adequately capturing conditions
- Site specific assessment (repeats/continuous)
- Use of continuous monitoring information around NCCA sampling sites to better assess WQ and benthic conditions; more likely possible with NARS 2.0 with less stations each year

10. Technical Assistance

- Training on random site selection
    - More training on the statistical design and how to use those tools to improve state intensification studies
- Biological data analysis
    - Develop algorithms for identifying unique species occurrence in all survey data sets
    - Provide metric calculators & tools along with bug & fish data
    - Trainings on MMI calculations
    - Help states develop lake biological methods using NARS data
    - Develop national BCG
- Physical Habitat data analysis

- Convert phab data to a user friendly index
- Trainings on phab calculations
- Develop habitat assessments (streams/lakes) that are streamlined and readily useable for states & tribes

11. NARS Objective

- Recognize it may not make sense to try to make it everything to everyone – won't likely be anything good to anyone if do…
- States not equipped to tease out climate change trends in state data – NARS could fill this gab
- Focus on what makes sense at a national level and understand it's okay if that doesn't answer questions at the state level (build state programs monitoring/assessment capacities)

12. Reference Sites

- Sample reference sites every year as part of the sentinel lakes network
- Support continuous monitoring at reference sites
- Addition of state scale reference sites
- Participation in lake and stream RMN with reference sites
- Assist states with matching reference sites
- More reference site data

13. Funding

- Increase amount given to States
  - Funding has been relatively flat over length of surveys; makes this tough to sell to manages
  - Increase funding to states for field work & training
  - Give more money to states with larger areas (higher travel costs for remote sites)
  - Allow for cost increases in survey implementation before distribution of $8000/site
  - Personnel shortages
- Guarantee long-term funding for program
  - Stability of funding on more frequent basis
- Improve contracting procedures
  - More timely lab contracts to allow more time for states to decide on lab participation
  - Multi-year grants
- Allow more freedom in use of initiative funds and leftover NARS funds
- Funding for intensifications
  - Assistance with sampling more sites
  - Add continuous monitoring and frequency samples

B. The NARS 2.0 Design Implementation Proposal

1. Potential Benefits

- More stability/predictability/consistency in budget and staffing
- Increased engagement by management (i.e., can see progress quicker, NARS would be a part of annual workload and avoid needing re-commitment by managers every five years)
- Indicators
  - Changes in protocols could be adopted more readily
  - NARS would be more responsive to emerging issues
- More planning time
  - Site recon, site evaluation, landowner permission requests
  - Spread out work load of sampling across years
- Annual training may be unnecessary (i.e. increased retention of knowledge of protocols if sampling every year)
- Potential for quicker data delivery and annual reporting
- Greater power to detect trends
- Enhanced reporting opportunities
  - Across resource types and ability to identify cross cutting issues
  - Integrate NARS results to protection/improvement goals and direct environmental results
  - Ability to see impacts of weather & annual climate variation; reduce hydrological variability
- Aids intensification efforts at state level

2. Challenges

- Personnel capacity
  - Pressure on states with limited staff or staff who sample all resources
  - Requires more staff in States and at EPA
  - Lack of specialists within the state (fish, veg taxonomy)
- Sampling error (e.g., will sampling a small number of sites lead to poor performance in the field/poor data quality?)
- Logistics of sample tracking
- Training for all surveys every year
- Data validation/QA/Analysis
  - Requires data management streamlining
  - Need a permanent QA staff
  - Adjustment/disruption to ORD data analysis?
- Reporting (i.e., need to determine how often reports will be written and what reports will include)

3. Impact on Partners

- State by state impacts (i.e. may increase or decrease participation in NARS)
  - Smaller states may drop out if too few sites per year
  - Larger states may have increased travel costs
- Contracts and coordinating multiple state agencies that sample
- Forced to streamline work
- Coordination challenges at the regional level (e.g., AVs, etc)
- May need to redesign state intensifications
- NARS could be institutionalized into annual work plan
- Equipment sharing issues
- Budget challenges (i.e., may be tough to commit for 5 years)
- Difficult to participate in training if continue the current training structure
- Personnel
  - Increased workload on state taxonomists
  - State lab capacities
  - Seasonal crews

4. Specific information we need to know before deciding to implement or not

- Understand effects on participation
  - How many states will continue to participate?
  - Understand why states don't participate now and how to address these barriers
- Justification for the need for the improved power to detect trends
  - Will the statistical power to detect trends increase for states?
  - Analysis of error for NARS 2.0 (e.g., sampling error)
  - Practical implications for policy makers
- Financial considerations
  - How much will it cost?
  - How contracts will be administered (1 yr vs. 5 yrs)?
  - How will reduced funding be addressed?
  - Can States subcontract work for different surveys?
- Sampling logistics
  - How annual sampling & site replacement will work
  - Approaches to state intensifications based on the NARS 2.0 implementation
- How trainings will be conducted
- How data management will be adapted
- How data processing and data delivery to partners will be adapted
- Clear path forward for reporting structure
- How to better communicate with managers/policy makers

5. Key considerations in deciding to go to NARS 2.0

- Continue improvement tracks regardless of change (i.e. strengthen NARS 1.0 before moving forward with NARS 2.0)
- Don't break the positives of NARS in order to get to NARS 2.0
- Focus on streamlining indicators/ methods across surveys
- Keep the ability to be reactive to changing needs and issues (i.e. NARS needs the ability to innovate and stay relevant)
- Ensure faster data delivery and communication of dataset availability
- Ensure quicker reporting
- Support States in getting more value from NARS and NARS data
- Give States enough sites/support so that it can be used for State condition
- Improve sample frame to be more representative at a State level
- Focus on communication and messaging of NARS (e.g., create communications committee; make NARS relevant to Congress, stakeholders, public, etc.)
- Analyze data across resource types
- Keep reference sites
- Will require efficiencies to be implemented in training
    - One nationwide training for each resource or combine trainings for all resources
    - Leverage assistance visits as training opportunities (e.g., AVs prior to training to determine if full training is needed)
    - Pilot proposed changes in one region and use results from AVs to evaluate how well crews were trained with different approaches
    - Implement a certification program
    - Use videos for training and for crews to use as method refreshers
- Evaluate the risk of changing the approach in the current political climate