The Water Resources Utility of the Future: A Blueprint for Action

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Utility of the Future Report

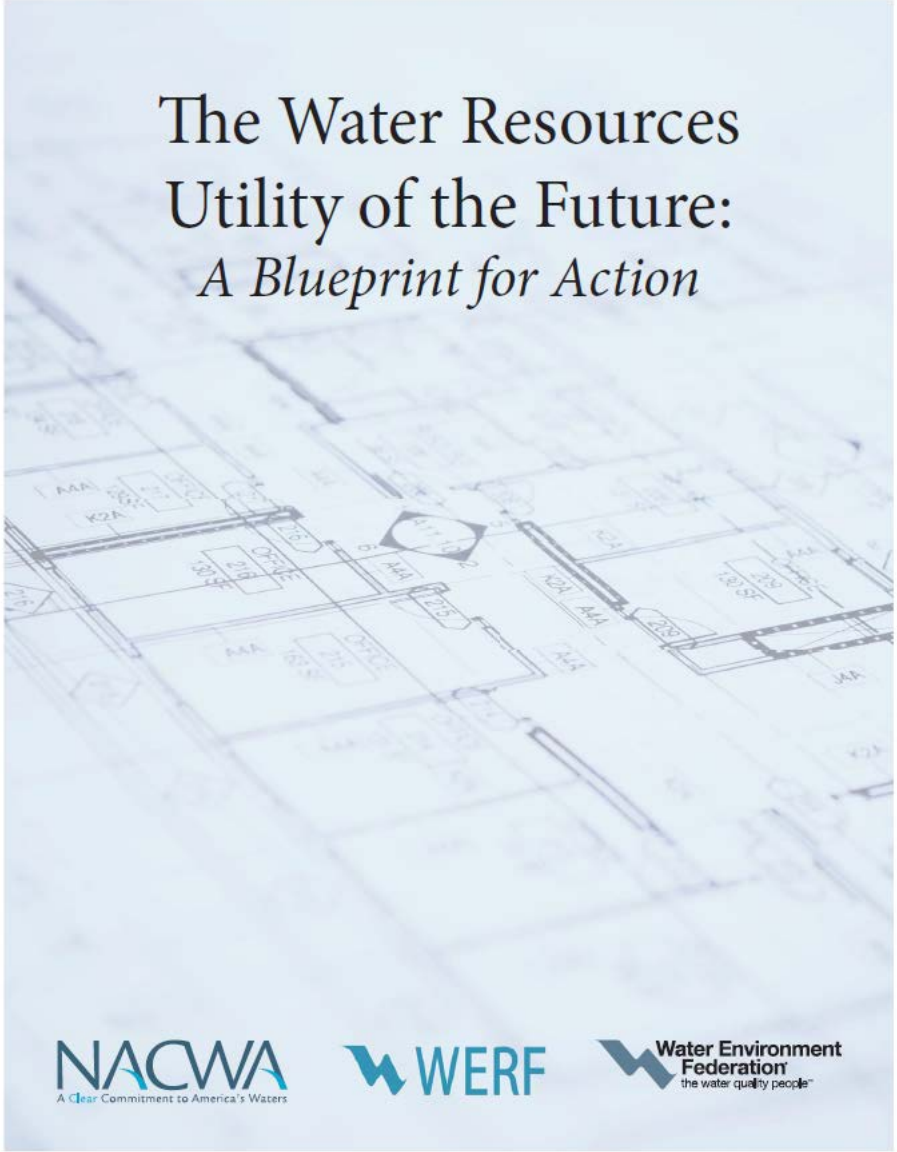
- Collaborative effort of NACWA, WEF, WERF
- Rubin Mallows Worldwide was Project Consultant (Ken Rubin)

NACWA

Water Environment Federation
the water quality people®

WERF

RUBIN MALLOWS
WORLDWIDE



A Word About Process

- Pretty quick process– started in Sept 2012 finished late Dec 2012
- Steering Committee and Task Force to provide structure and industry input, respectively
- Steering Committee – 9 members, 3 from each sponsoring organization
- Task Force – 48 members from across the industry: 31 utilities, 9 consultants, 4 academics, 4 technology firms
- An initial characterization – each sponsoring organization will take it further

Bottom Line: Major Shift of WWTF Model

PAST: Collect wastewater, move it quickly downstream, treat it to acceptable standards, and dispose of waste without harming the environment.

FUTURE: Manage resources to generate value for the utility and its customers, improve environmental quality at least cost to the community, and contribute to the local economy

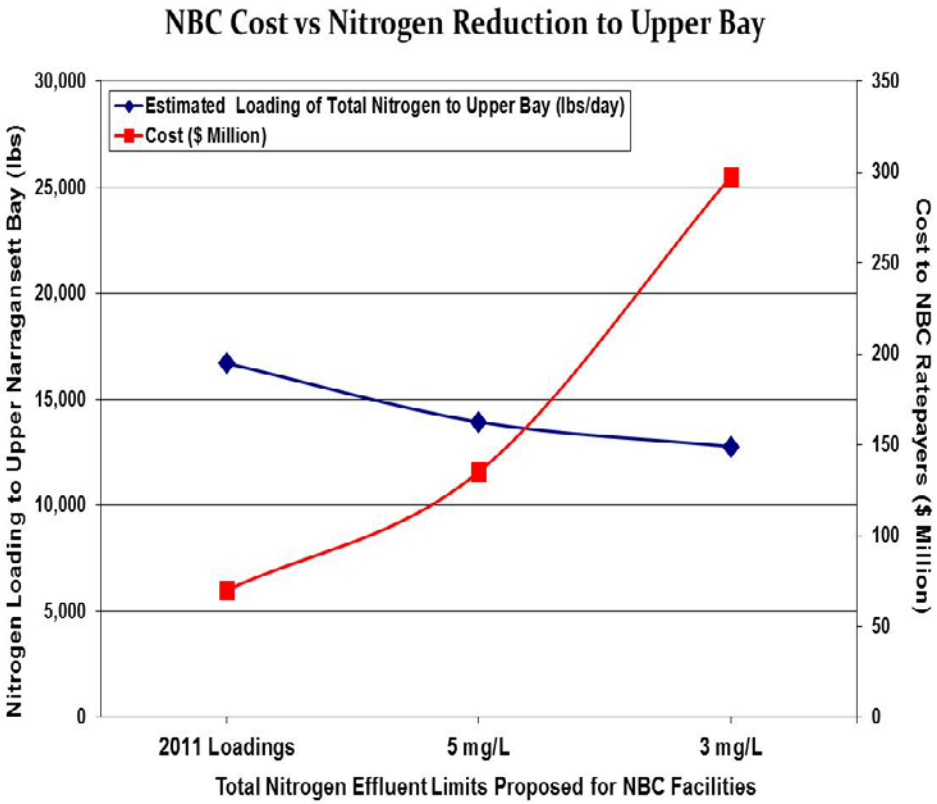
Utilities Today: World Class Sophistication

- Industry serves 90+ percent of the US population
- Manage over $500 billion in net assets
- Finance about $25 billion in capital investments/yr
- Manage combined budget of more than $55 billion/yr
- Responsible for a workforce of about 50,000
- Remove more than 90% of organic inputs, estimated 55% of nutrients, and nearly all harmful bacteria.
- Account for less than 10% of remaining water quality impairment of the nation's rivers, streams, lakes, reservoirs, and coastal shoreline and about 30% of impaired estuaries.

But…its not all good

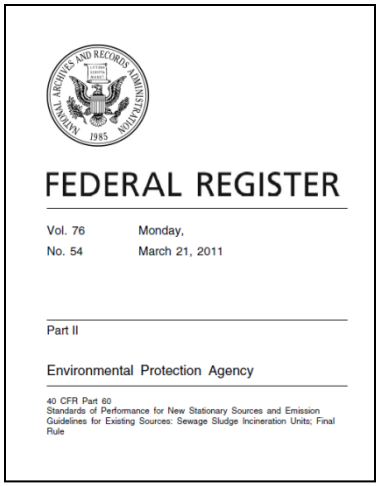
What's Behind the Paradigm Shift?

- Traditional inter-governmental partnership to collaborate for clean water has nearly disappeared
- Command & Control methods dominate
- Result is more litigation!
- Utilities are way out on the unit removal curve



What's Behind the Paradigm Shift?

- The CWA regulatory regime was built for an economy and an ecology that's now 40 years old
- Many elements are out of date
- Today's Economic Environment:
  - "No New Taxes" politics
  - Personal Income has stagnated
  - Utility Costs have skyrocketed
  - Deleveraging of balance sheets
  - Clean water agencies are struggling to make ends meet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Part II

Environmental Protection Agency

40 CFR Part 60
Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units; Final Rule

Welcome to the "Utility of the Future"

PAST

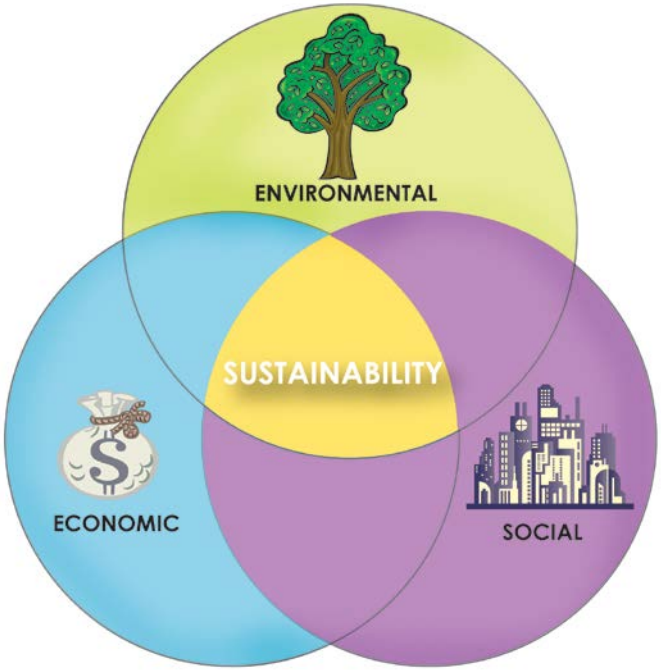
Collect, Remove, Treat, Dispose Safely

FUTURE

Motivation	Activity	Innovation
Increase Revenue	Water Reuse	• Industrial Cooling, Recharge, Landscape, Golf Course Irrigation
	Materials Recovery	• NH_4, P Compounds, N Compounds, Metals
	Materials Conversion	• Bioplastics, Pyrolysis Fuel Oil, Algal Biomass, Solid Fuels, Fertilizers
	Biosolids Reuse	• Liquid Fertilizer
	Energy Generation	• Photovoltaics, Wind Turbines
Reduce Cost	Energy Efficiency	• Energy Efficient Equipment & Networks
	Energy Recovery	• Methane & Hydrogen Recovery, Heat Recovery
	Operating Efficiency	• Automation and Smart Operations, Asset Management, Sourcing
Support Community & Economy	Growth Planning	• Sectoral Expansion, Targeted Upgrades, Managed Package Plants
	Green Infrastructure	
	Community Partnering	• NPS Controls, Biowaste Conversion To Methane, Green Infrastructure

Delivering Triple Bottom Line Results

Activity	Environmental Effects	Utility Effects	Community Effects
Energy Efficiency Energy Recovery Operating Efficiency	↓ Fossil fuels ↓ Greenhouse gases ↓ Air pollution	↑ Carbon credits ↓ Energy demand ↓ Operating cost	↑ Technology jobs ↑ Household incomes ↑ R&D investment ↑ Local GDP ↑ Tax receipts ↑ Balance of trade
Water Reuse Materials Recovery Materials Conversion Biosolids Reuse Energy Generation	↑ Fresh water ↑ Ecosystems ↓ Loadings to waters ↓ Saltwater intrusion ↓ Landfilling ↓ Net CO_2	↑ New revenue ↓ Biosolids disposal cost ↓ Compliance cost	
Growth Planning Green Infrastructure Community Partnering	↓ Groundwater Pollution and Runoff ↓ Saltwater intrusion ↓ Methane emissions	↑ Community partnerships ↑ Tipping fee revenue ↓ Maintenance cost ↓ Energy costs	↑ Manufacturing jobs ↑ Household incomes ↑ Local GDP ↑ Tax receipts



UTF Example: Methane Use at East Bay MUD

- Enhanced Methane Production by adding food scraps and grease from local restaurants, and waste streams from wineries and farms to sludge digesters
- Reduces volume of food waste by 90%
- Saves $3 million a year in electricity costs
- **Plant is energy independent** and sells electricity back to the grid – first of its kind
- Prevents significant methane releases to the environment
- Qualifies for carbon reduction credits

UTF Example: Nutrients Recovery at Hampton Roads

- Ostara Nutrient Recovery Technologies' Pearl process
- Recovers 85% N and 40% P
- Converts to Crystal Green slow release fertilizer
- **No additional costs to HRSD**
- Significant savings to ratepayers
- Increases plant efficiency
- Replaces mined P fertilizer at fraction of its cost
- Significant reduction in carbon footprint
- Also at Clean Water Services, OR, York PA, Saskatoon BC, London UK

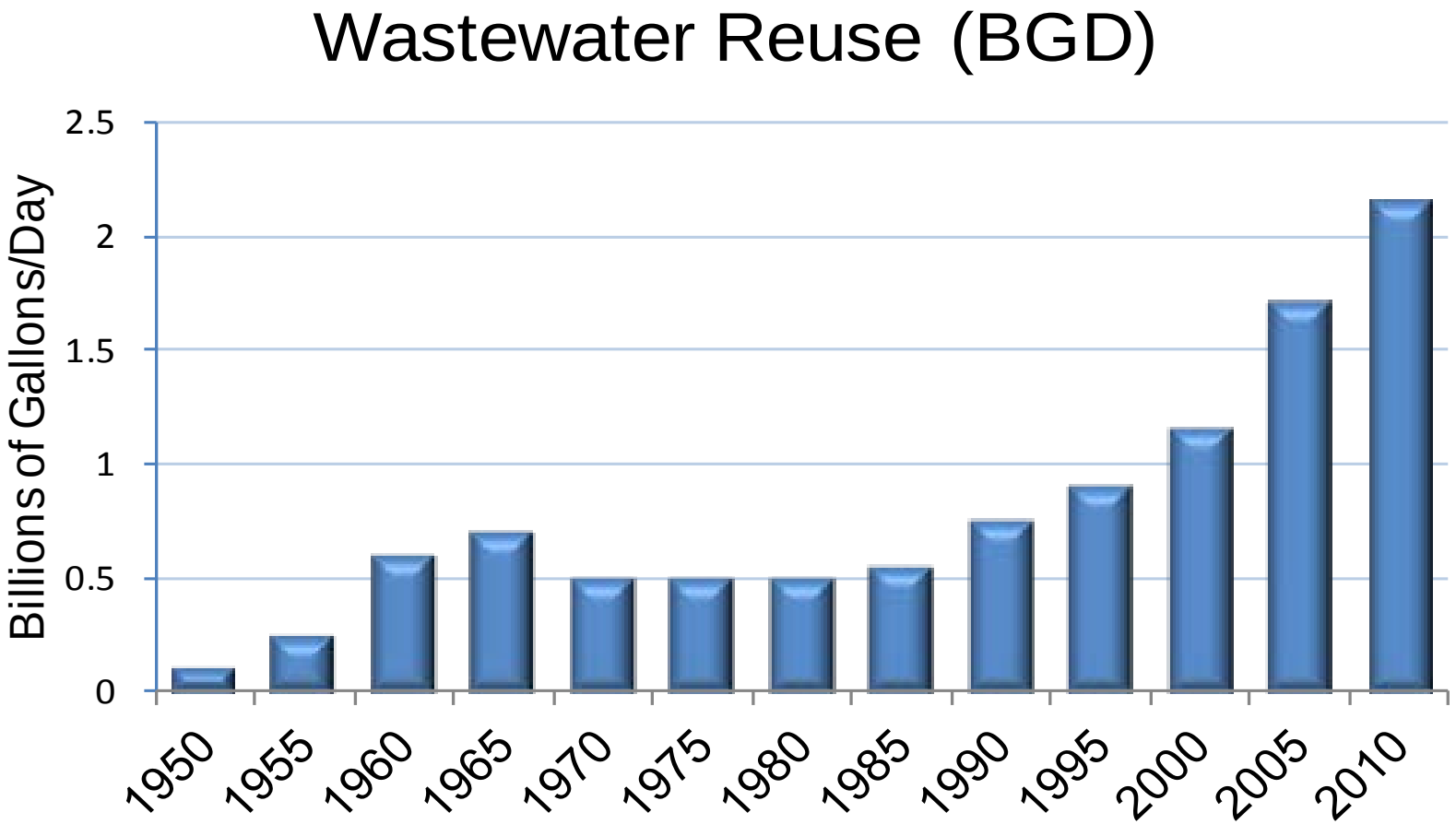
UTF Example: Solar PV – Its Everywhere

- Boulder, CO
- Pueblo, CO
- Telluride, CO
- Corvallis, OR
- Raleigh, NC
- Phoenix, AZ
- Pima County AZ
- San Diego County, CA
- Tulare, CA
- Charlotte, NC
- Hackettstown, NJ
- Philadelphia, PA
- Oroville, CA
- Nantucket, MA

UTF Example: Wind Turbines – They're Everywhere

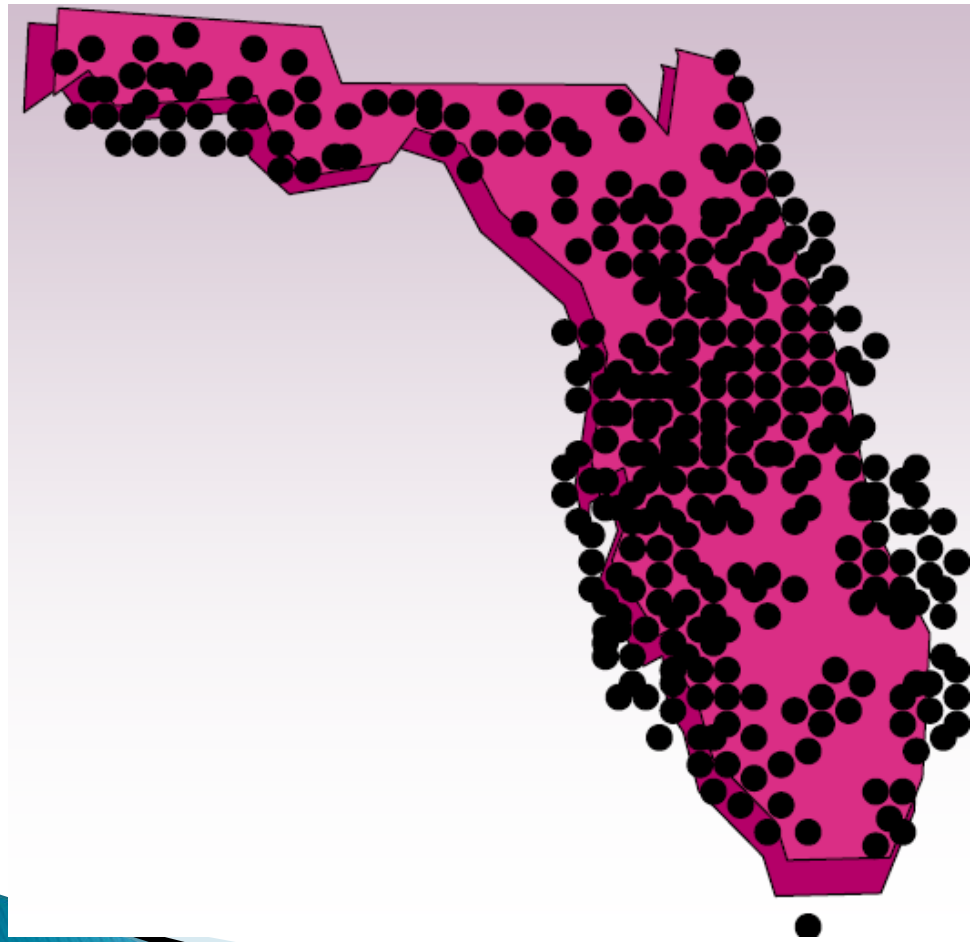
- Atlantic County, NJ
- Bayshore, NJ
- Browning, MT
- Guthrie, OK
- Narragansett Bay Comm., RI
- Muskegon County, MI
- Fall River, MA
- Falmouth, MA
- Cascade ,WI
- Evansville, WI
- El Dorado, KS
- Perry, IA
- MWRA, MA
- Ashtabula, OH

UTF Example: Wastewater Reuse Growing Fast



Source: USGS and other sources

A Look at Florida's Reuse Program



- 420 wastewater reuse systems
- 465 BGY capacity, 263 BGY reused (2011)
- 40% landscape, 25% aquifer recharge,15% agricultural, 15% industrial cooling, 5% fire protection, toilet flushing, car washes

Emerging Technologies

- CNG from biogas for vehicles and CHP Projects
- Solar algae harvesting to recover nutrients and generate biogas
- Microbial fuel cells using algae to generate electricity from wastewater
- Constituent-specific storm water filtration and local reuse
- Various forms of solid fuel from biosolids as coal substitutes

Great Story, So Why Does Industry Need Help?

- Fundamentally the *market is working* and will likely continue to work, *but in a slow, clunky, and geographically uneven way*.

- Without help and change:
  - transaction costs will be needlessly high
  - technology adoption rates will be needlessly slow
  - communities and politicians will be under-informed
  - benefits shown here won't be widely realized

- The Utility of the Future is being held back by:
  - certain structural barriers and resistance to change
  - regulatory pressure
  - fiscal pressure
  - political pressure
  - *risk of technology failure*

Blueprint: Create Environment of Innovation

Creating a vision for the future of the wastewater industry, the Report:

- Identifies a range of changes to legislation, administrative practices, and programmatic structures.
- Identifies things clean water agencies are already doing and suggest more of it, as well as more widespread adoption, and
- Calls for some bold, transformative thinking around new ways of doing business.

#1: Encourage Clean Water Agencies to Lead Innovation at the Watershed Scale

Regulatory flexibility on discharge limits linked to environmental results using modified TMDLs or alternative watershed-based solutions.

- **POTWs need to be lead stakeholders in their watersheds**
- Trading (good models in Ohio River Valley, LI Sound, and maybe emerging in Chesapeake watershed)
- Adaptive management (good model in Wisconsin)
- Alternative approaches to ecosystem and habitat restoration (model emerging in Narragansett Bay)
- Use USDA and state resources for conservation programs to help bring other pollution sources, mainly Agriculture, to the table.

#2: Remove Barriers and Provide Incentives for Technology Developers to Partner with Utilities

A few logical, enabling initiatives can further the UOTF agenda and help capture triple bottom line results

- Reform federal/state renewable energy credit and similar programs
- Amend the Sewage Sludge Incinerator (SSI) rule (March 2011): use multi-media risk assessment instead.
- Relax the private-use test for tax-exempt bonds that finance public energy recovery/production projects.
- Amend state Renewable Portfolio Standards eligibilities to include energy recovery projects from biosolids.
- Clarify state water use rights for reclaimed wastewater
- Amend SRF eligibilities to include wastewater reuse.

#3: Speed Up the Pace of Innovation and Rate of Technology Adoption

Jumpstart Innovation by de-risking a conservative industry

- Establish Applied Research Projects Agency – Water, similar to ARPA – Energy: high-risk, high-reward R&D
- Establish an ARPA-W risk offset facility
- **Implement a 50-state program of reciprocal technology certification**
- Wastewater reuse investment tax credits for private firms that invest in rural or low income communities
- Water markets to define rights for recycled water

#4: Organizing and Managing Our Own Future

The Task Force does not have all the answers, but is prepared to advocate for change:

- Educate and work with Congressional Caucus
- Knowledge management: Help POTWs evolve into the "Industry of the Future"
- Form new intergovernmental partnership on Resilience of Clean Water Infrastructure
- Enact a 21st Century Watershed Act
- More Collaboration to achieve common water quality and restoration goals
- Report available on-line at NACWA, WEF & WERF websites

Questions ???