

40th Anniversary

SRBC

1971-2011

New York, Pennsylvania, Maryland, United States

Susquehanna River Basin Commission

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**Susquehanna River Basin Commission
Research Projects Under
Consideration/Development by SRBC Staff**

**SRBC Water Quality Advisory Committee Meeting
May 25, 2011**

**David W. Heicher
Manager, Research & Grants
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Organization of In-House Research Team

- Director, Technical Programs
- Managers for:
 - Research & Grants
 - Policy Implementation & Outreach
 - Information Technology
- Program Managers for:
 - Project Review
 - Planning & Operations
 - Monitoring & Assessment
 - Compliance
 - Restoration & Protection
- Senior Commission Scientist, Robert Pody
- Hydrologist, Dr. Jason Zhang

Primary Focus

- Applied research
 - Carried out to solve a particular problem.
 - Differs from basic research, which is performed to increase the general pool of knowledge.
- Focus on research needed to solve particular water resource problems, especially those pertinent to SRBC programs and activities (Comprehensive Plan for the Water Resources of the Susquehanna River Basin).

Identification of Priority Projects

- Developed initial list of 32 potential projects.
- Consolidated to 25 projects and conducted initial vote on priorities.
- 8 of the 25 projects received at least 2 votes (see handout with 1-paragraph descriptions).
- Developed evaluation criteria applied to the 8 projects.
 - Criteria for all projects
 - Additional criteria for projects associated with natural gas development

Evaluation Criteria (all projects)

- Support for SRBC Mission (Mission Statement)
- Support for SRBC Comprehensive Plan
 - Water Supply Primary Management Area (PMA)
 - Water Quality PMA
 - Flooding PMA
 - Ecosystems PMA
 - Chesapeake Bay PMA
 - Coordination, Cooperation, & Public Information PMA
- Support for Water Resources Program
- Support for SRBC Regulatory Program
- Urgent need regarding SRBC Programs
- Level of interest to member jurisdictions & the public
- Can be performed in cooperation with others

Additional Criteria Applied to Natural Gas Development Projects

- Support for SRBC Regulatory Program
 - Project review and approval process
 - Consumptive Use Mitigation
 - Enforcement
 - Other area of importance (if identified)
- Support for SRBC Planning
 - Consumptive Use Mitigation Plan
 - Groundwater Management Plan
 - Conowingo Pond Management Plan
 - Other area of importance (if identified)

Five top Rated Projects(4 natural gas)

- Aquatic Resource Surveys to Determine Potential Impacts Associated with Approved Water Withdrawals
- Evaluation of Passby Flow Reference Gage Determinations in the Susquehanna River Basin
- Guidance for the Siting of Water Withdrawals Serving the Natural Gas Industry
- Evaluation of Water Availability for Watersheds in the Susquehanna River Basin
- Evaluation of Climate Change Impacts in the Susquehanna River Basin and Adaptive Management Needed for SRBC Programs

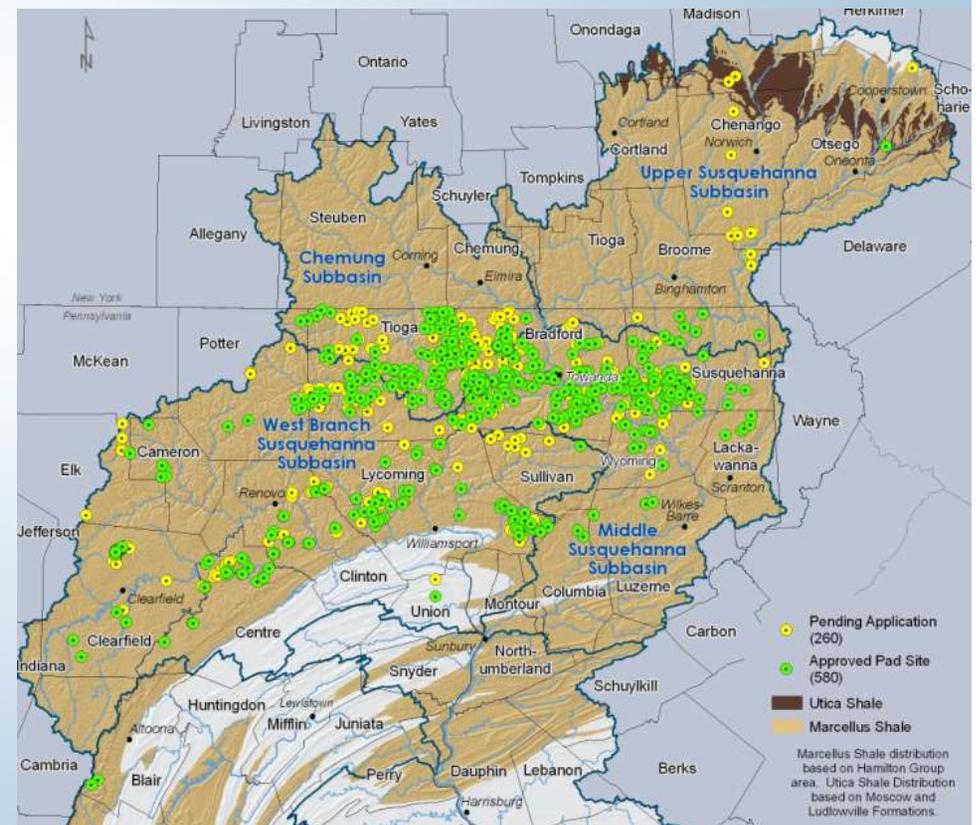
Projects Currently Funded by SRBC

(approved at December 16, 2010 Commission meeting)

- Aquatic resource surveys to determine potential impacts associated with approved water withdrawals (Described in previous presentation by Matt Shank)
- Evaluation of passby flow reference gage determinations in the Susquehanna River Basin
- Both projects:
 - Related to and driven by natural gas development activities.
 - Provide sound science to support SRBC regulatory program.
 - Performed by SRBC staff.

Evaluation of Passby Flow Reference Gage Determinations in the Susquehanna River Basin

- Passby flows used to help protect:
 - Aquatic resources
 - Competing users
 - Instream flow uses
- Especially important for withdrawals on small streams where water is used for natural gas development.
- Think “interruptible withdrawal”



Problem:

(Passby Flow Reference Gage Determinations)

- The basin's stream gaging network has limitations in spatial and hydrologic coverage.
- Local stream monitoring may not be practical at some locations.
- Need to make assumptions regarding the relationship between hydrology at reference gages and hydrology at ungedged withdrawal sources.
- Need to rely on reference gages to estimate conditions at ungedged sites.



Project Purpose:

(Passby Flow Reference Gage Determinations)

- Evaluate the predictive accuracy associated with using trigger gages and/or reference gages to estimate passby flow conditions at ungaged project sites.



Scope of Work

(Passby Flow Reference Gage Determinations)

Task 1: Identify and characterize a sample of approved projects with passby flow requirements on ungaged streams.

- Query SRBC's HYDRA database to identify 20 approved surface water withdrawals with passby flow requirements on ungaged streams.
- Ensure that 10 of the withdrawals selected have trigger gages for passby flow compliance.
- Ensure that a variety of water use sectors and locations throughout the basin are selected.
- Include information on stream source and location, selected reference gage, prescribed passby flow, and (where applicable) trigger gage & trigger flow.

Scope of Work

(Passby Flow Reference Gage Determinations)

Task 2: Develop a protocol for collecting field discharge measurements.

- Conduct a literature review on the use of spot discharge measurements at ungaged sites to establish a correlation with low- and baseflow measurements at regional continuous record gages.
- Use the literature review as a framework to develop a protocol specifying:
 - Required number of measurements
 - Period during which measurements should be taken
 - How low- and baseflow field conditions should be determined

Scope of Work

(Passby Flow Reference Gage Determinations)

Task 3: Collect field discharge measurements at approved projects during low- and baseflow conditions.

- Collect repeat discharge measurements at the 20 locations identified according to the protocol developed.
- For preliminary planning purposes, staff assumed that a minimum of 10 repeat measurements will be needed at the 20 locations.

Scope of Work

(Passby Flow Reference Gage Determinations)

Task 4: Evaluate the predictive accuracy associated with use of the trigger and/or reference gages to estimate passby flow conditions at the ungaged sites.

- Extract available reference and/or trigger gage daily streamflow data during the data collection period.
- Compile field discharge measurements for each of the 20 sites
- Conduct statistical analyses using the above datasets to evaluate the predictive accuracy.
- Provide results for each of the 20 locations, summarized regionally, and evaluated to determine trends.

Schedule

(Passby Flow Reference Gage Determinations)

- Milestone 1: Identify and Characterize approved projects with passby flow requirements on ungaged streams by March 1, 2011 (complete).
- Milestone 2: Develop protocol for collecting field measurements by June 1, 2011.
- Milestone 3: Complete field data collection by November 1, 2011.
- Milestone 4: Complete evaluation and brief report by December 31, 2012.

Other Natural Gas Related Projects Under Consideration by SRBC Research Team

- Guidance for the Siting of Water Withdrawals Serving the Natural Gas Industry
 - Reconsidering whether to pursue project, based on potential advantages/disadvantages to landowners and legal issues.
- Evaluation of Water Availability for Watersheds in the Susquehanna River Basin



Evaluation of Water Availability for Watersheds in the Susquehanna River Basin

- Desired Result of Water Supply Primary Management Area (PMA) of SRBC Comp Plan:
 - to meet immediate and future water needs of the people of the basin for domestic, municipal, commercial, agricultural, and industrial water supply, and recreational activities, in order to maintain sustainable economic viability, protect instream uses, and ensure ecological diversity through regulation and planning.

First Goal (of 6) Under Water Supply PMA:

- Support and encourage sustainable use of water for domestic, industrial, municipal, commercial, agricultural, and recreational activities in the basin.
- Manage water resources beginning at the watershed level to assure short-term resource availability and long-term balance between healthy ecosystems and economic viability. (under narrative for goal)
- Actions needed under the above goal:
 - Determine water availability through water budget assessments to establish local sustainable limits for water use development.
 - Protect healthy ecosystems and instream flow needs, including recreation.

Problem:

(Evaluation of Water Availability for Watersheds)

- How much water is available for development in individual watersheds, while minimizing impacts to natural flow regimes and ecosystems?
- Increased demand by public water supplies, power production, and especially the natural gas industry



Problem (Continued):

(Evaluation of Water Availability for Watersheds)

- SRBC is actively refining an approach to evaluate cumulative impacts of water use in watersheds of the basin.
- This evaluation will require quantification of:
 - Existing and projected consumptive use (or net withdrawal)
 - Existing availability of water



Project Purpose:

(Evaluation of Water Availability for Watersheds)

- Apply available hydrologic information and documented instream flow needs (anthropogenic and ecological) to determine water availability for individual watersheds in the Susquehanna River Basin.



Other Background Information

(Evaluation of Water Availability for Watersheds)

- Work will be based on evaluation of natural flow regimes and acceptable limits of hydrologic alteration.
- Couple results with cumulative impact analyses and existing water resource planning efforts (addressed outside the scope of this research) to determine the net amount of water potentially available for development in each watershed.
- Results will be used to guide regulatory and planning programs based on both individual and cumulative impacts.

Scope of Work

(Evaluation of Water Availability for Watersheds)

Task 1: Evaluate accepted methods for determining water availability at the watershed scale and identify a preferred methodology to be applied throughout the basin.

- Review literature including TNC's Ecosystem Flow Recommendations.
- Identify and evaluate methods that have been used to determine water availability in the Mid Atlantic and other regions.
- Identify preferred methodology for use in the Susquehanna River Basin.

Scope of Work

(Evaluation of Water Availability for Watersheds)

Task 2: Apply preferred methodology to determine water availability for watersheds in the basin.

- Determine appropriate watershed scale for analyses.
- Develop list of reference gages for use in representing hydrologic flow regimes and flow statistics.
- Apply preferred methodology to three pilot watersheds.
- Refine methodology and apply to watersheds throughout the basin.

Scope of Work

(Evaluation of Water Availability for Watersheds)

Task 3: Develop a Geographic Information System (GIS) to simulate and illustrate water availability for watersheds in the basin.

- Develop GIS containing watershed polygons at the determined scale.
- Couple determined quantities of water available with respective watersheds.
- Simulate and illustrate water availability for watersheds using the GIS.

Scope of Work

(Evaluation of Water Availability for Watersheds)

Task 4: Prepare technical report.

- Document literature review, justification for preferred methodology, determination of water availability, and development of GIS.
- Provide recommendations for implementation through existing and future SRBC regulatory and planning programs and activities.

Schedule (Pending further review and approval)

(Evaluation of Water Availability for Watersheds)

- Milestone 1: Complete literature review and selection of preferred methodology 6 months after project initiation.
- Milestone 2: Complete determination of water availability for watersheds 12 months after project initiation.
- Milestone 3: Complete GIS development 18 months after project initiation.
- Milestone 4: Complete project and final report 24 months after project initiation.



Susquehanna River Basin Commission Natural Gas Related Research Projects

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May 25, 2011

QUESTIONS?

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Evaluation of Climate Change Impacts in the Susquehanna River Basin and Adaptive Management Needed for SRBC Programs

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Problem:

(Evaluation of Climate Change Impacts)

- Long and short term changes in water quantity and quality have the potential to impact all 6 PMAs in SRBC's Comprehensive Plan.
- Coupled with sea level rise, climate change has potential to impact ecosystems and public water supplies in the lower Susquehanna River as well as Chesapeake Bay.
- Need to know how climate change will impact SRBC programs, and adaptive management required.



Draft Scope of Work

(Evaluation of Climate Change Impacts)

Task 1: Collect and review the scientific literature relevant to climate change impacts on water resources in the basin and each subbasin.

Task 2: Summarize current and future climate change impacts on water resources in the basin.

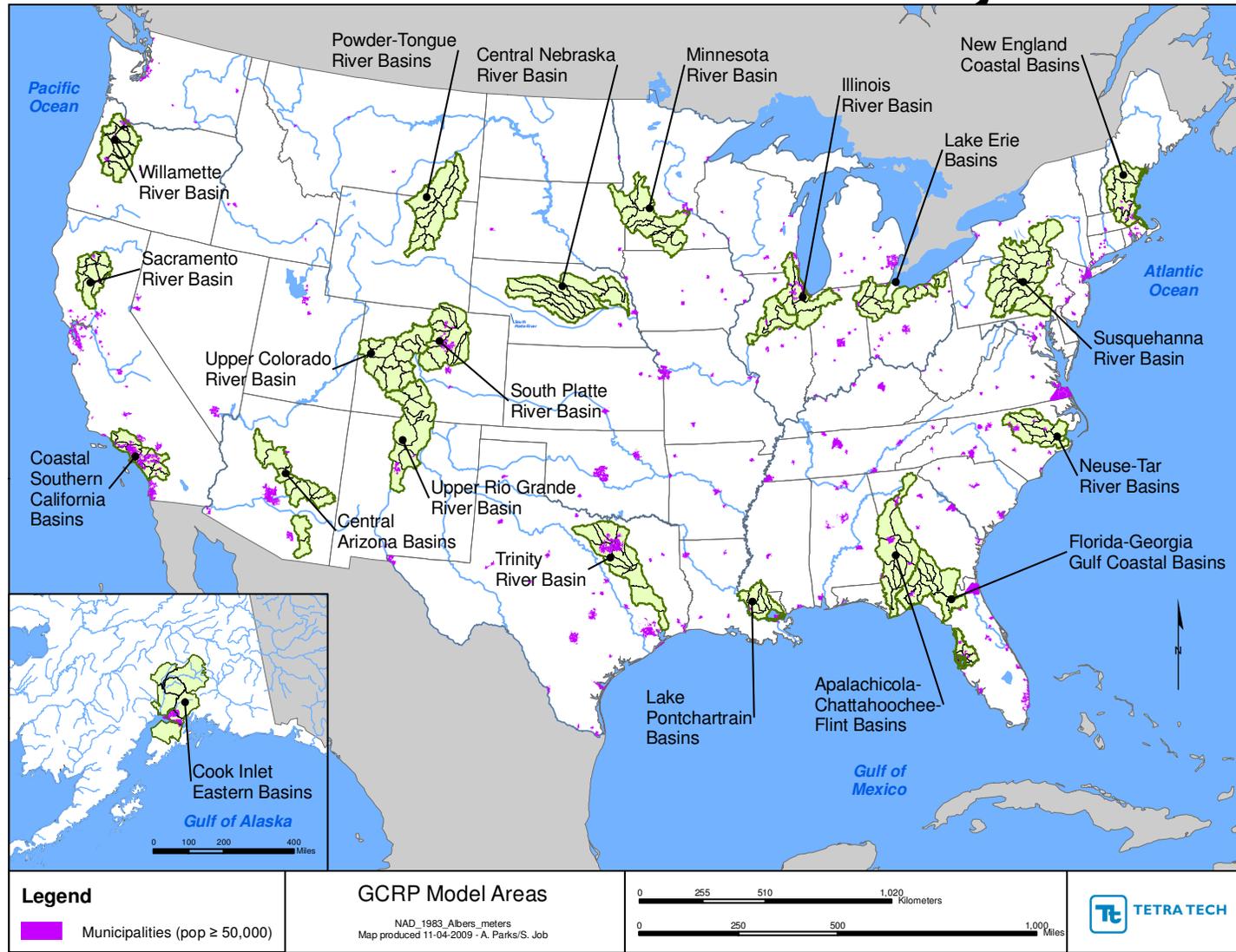
Task 3: Identify potential impacts on desired results, goals, and actions in Comprehensive Plan and make recommendations for adaptive management.

Task 4: Prepare final report.

Climate Change Research Proposal Currently on Hold Pending Results of USEPA 20-Watershed Climate Change Study

- Being conducted by USEPA's Global Change Research Program (within ORD).
- Watershed modeling in 20 large watersheds across the US to examine sensitivity of both streamflow and water quality to potential changes in climate and land use.
- Much of work being performed under contract with Tetra Tech, with subcontracts to Aqua Terra, Texas A&M, Stratus Consulting, and FTN Associates for climate change science and modeling support.

20 Watersheds - Study Sites



20-Watershed Study Goals

- Characterize sensitivity of stream flow and water quality (N,P, & sediment) in different regions of the country across a range of climate and land-use change scenarios.
- Assess how modeling results are influenced by the use of different techniques for downscaling climate data.
- Explore methods for scaling information from watersheds up to the national scale and down to more local scales (SRBC subbasins?)
- Provide a watershed context for future, more detailed studies in selected locations.

20-Watershed Study

- Study is unique in using a consistent modeling methodology and common set of climate and land-use scenarios in multiple locations across the nation.
- Susquehanna is one of 5 watersheds selected as a pilot study watershed where both the HSPF (Hydrologic Simulation Program-Fortran) and SWAT (Soil and Water Assessment Tool) models are being used.
- Remaining 15 watersheds are being simulated using SWAT only.
- Study participants expect to publish a series of papers on results.
- Full report scheduled for 2012.



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