Water Supply Challenges Baltimore District

Bill Haines – Water Control Team

2009 Water Supply Workshop

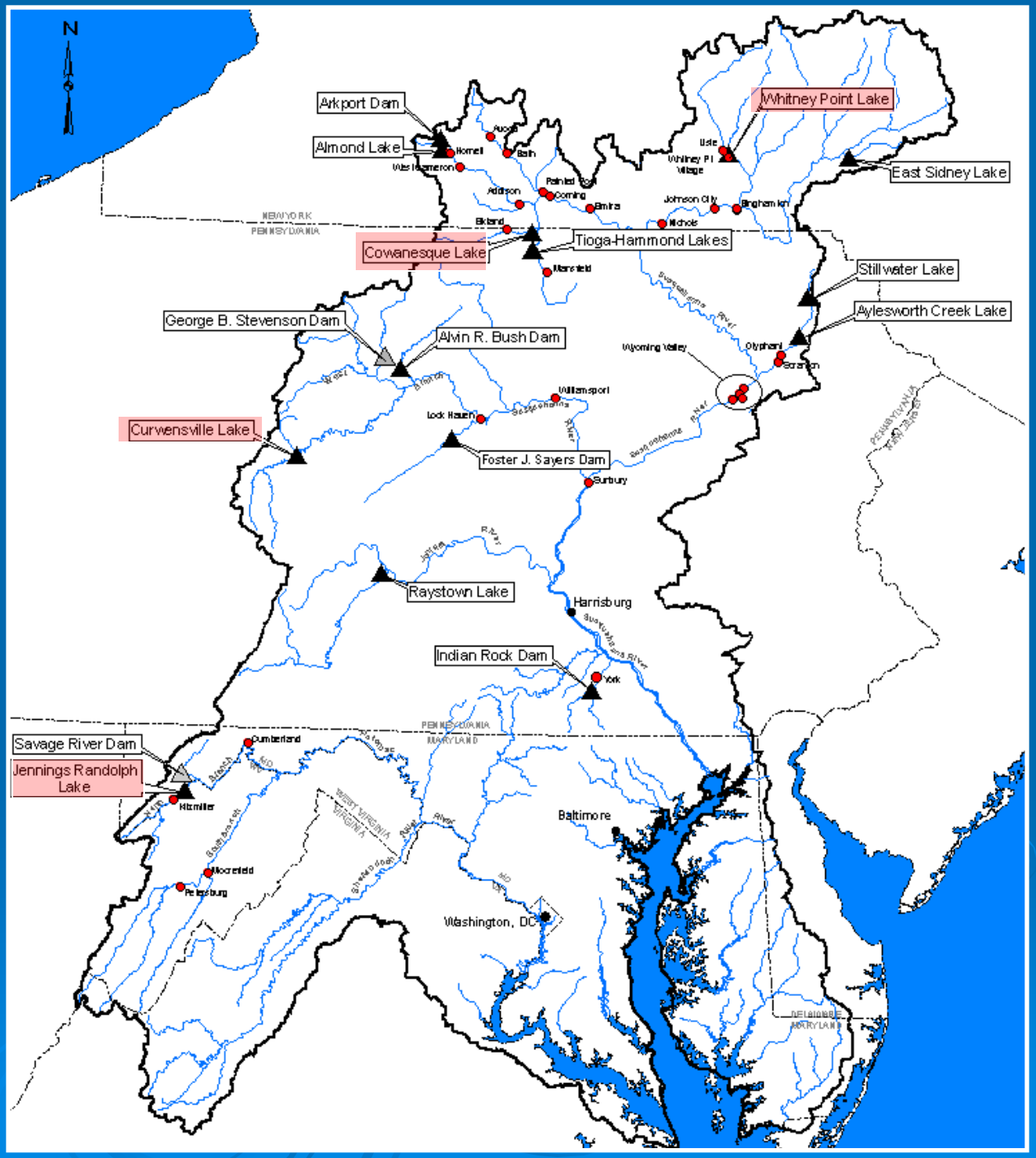
Tulsa, OK

Challenges

- Redistributing storage for sedimentation losses
- Negotiating surplus water agreements
- Managing altered needs for contracted water supply storage

US Army Corps of Engineers
Baltimore District

Reservoirs & Local Flood Protection Projects



Water Supply Sponsors

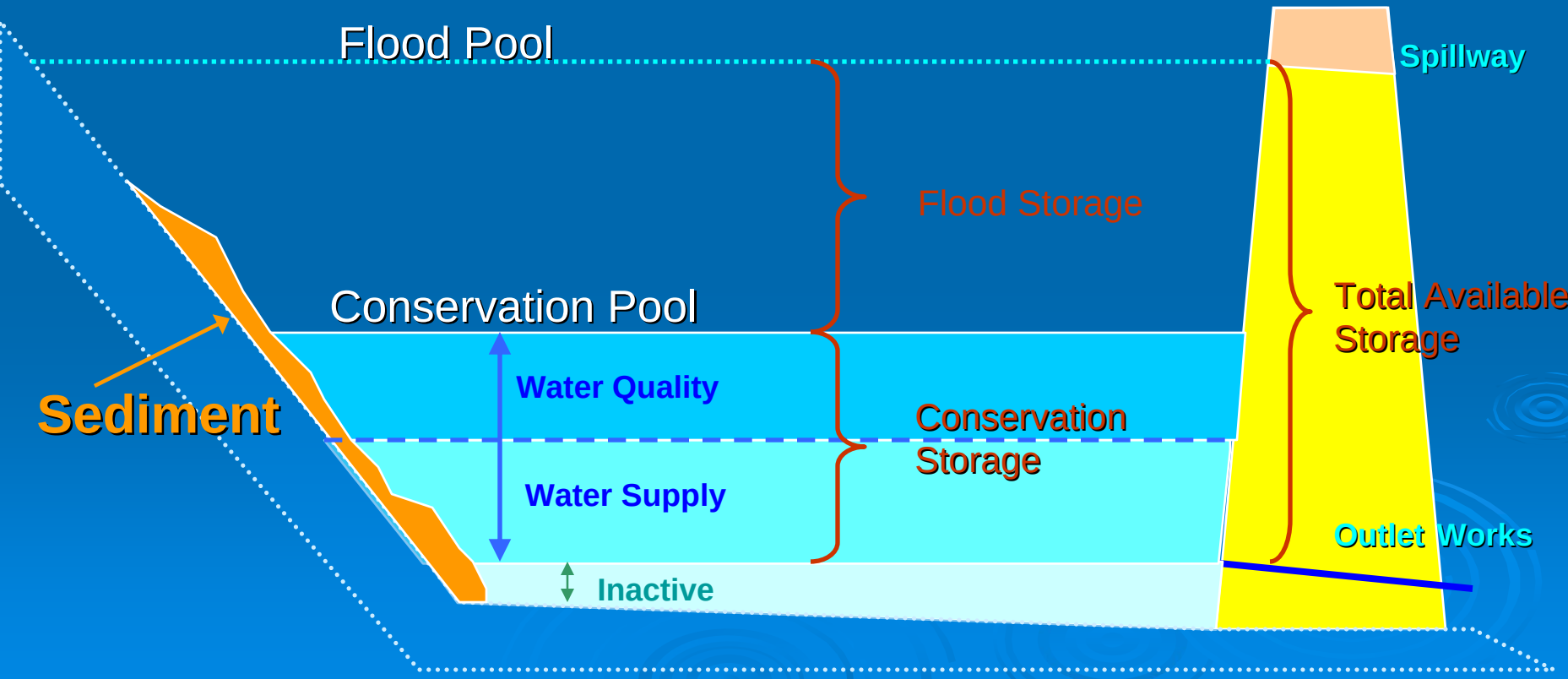
- Interstate Commission on the Potomac River Basin – ICPRB
  - Jennings Randolph Lake
    - Authorized water supply storage
- Susquehanna River Basin Commission – SRBC
  - Cowanesque Lake
    - Reallocated water supply storage
  - Curwensville Lake
    - Reallocated water supply storage

Challenge: Redistributing Storage

- Sedimentation has reduced available storage for:
  - Water quality / government conservation
  - Flood control
  - Water supply

- What is an *equitable* method for redistributing storage losses among project purposes?

Sedimentation Impacts



Storage Losses

	Cowanesque	Curwensville	Randolph
Total Available Storage, Acre-Feet			
Pre-Impoundment	86,650	124,030	128,200
Post-Survey	84,918	119,564	122,675
Storage Lost	1,732	4,466	5,525
% of Pre-Impoundment Value	2.0%	3.6%	4.3%
Total Conservation Storage, Acre-Feet			
Pre-Impoundment	30,940	9,370	92,000
Post-Survey	30,047	7,580	88,176
Storage Lost	893	1,790	3,824
% of Pre-Impoundment Value	2.9%	19.1%	4.2%

Rights of Water Supply User

- All three water supply agreements include Article 1b(1) containing language similar to the following:

  - Article 1b(1): *The [User Name] shall have the right to utilize an undivided __#__ percent (estimated to contain __#__ acre-feet after adjustment for sediment deposits) of the total usable storage space in the Project between elevations __#__ and __#__ feet NVGD (estimated to contain __#__ acre-feet after adjustment for sediment deposits). This storage space is to be used to impound water for municipal and industrial water supply.*

Conservation Storage

Storage Redistribution Guidance

- All three water supply agreements also include Article 1g containing language similar to the following:
  - *… When … the findings of such sedimentation survey indicate any Project purpose will be affected by unanticipated sedimentation distribution, there will be an equitable redistribution of the sediment reserve storage space among the purposes served by the Project including municipal and industrial water supply. The total available remaining storage space in the Project will then be divided among the various Project features in the same ratio as was initially utilized. … Such findings and the storage space allocated to municipal and industrial water supply storage shall be defined and described as an exhibit which will be made a part of and modify this agreement …*

Flood + Conservation Storage

Storage Redistribution Options

- Option #1 = Redistribute WS & WQ/government storage space according to conservation storage ratios

- Implications:
  - Holds conservation pool at existing elevation
  - Storage losses below conservation pool are shared between WS & WQ/government
  - Storage losses above conservation pool are taken out of flood storage
  - Little need to modify recreation features or outlet structure
  - Conforms to Article 1b(1)
  - Preferred by CENAB

Storage Redistribution Options

- Option #2 = Redistribute FC, WS, & WQ/government storage according to total available storage ratios

- Implications:
  - Conservation pool elevation may need to be adjusted (up or down)
  - Recreation and outlet features may need physical modification, with associated costs. Who pays?
  - Future sediment surveys may necessitate additional pool adjustments & costs
  - Conform to Article 1g ??

Storage Redistribution Options

- Option #3 = Assign all storage loses below conservation pool to WQ/government

- Implications:
  - Holds conservation pool at existing elevation
  - Sponsor retains originally contracted WS volume
  - WQ/govt storage takes entire hit on losses, maybe running out of WQ/govt storage eventually
  - No need to modify recreation features or outlet structures
  - This is current status until current agreement is amended
  - Preferred by WS sponsors

Storage Redistribution Options

- Option #4 = Remove sediment from lake

- Implications:
  - Temporary
  - Costly
  - Adverse environmental impacts

Redistribution ???

- What is *fair* & *equitable*?
- Pool level adjustments & costs are concerns
- Should storage redistribution be based on total available space or conservation space?
- How are results of future sediment surveys handled?

Challenge: Negotiating Surplus Water Agreements

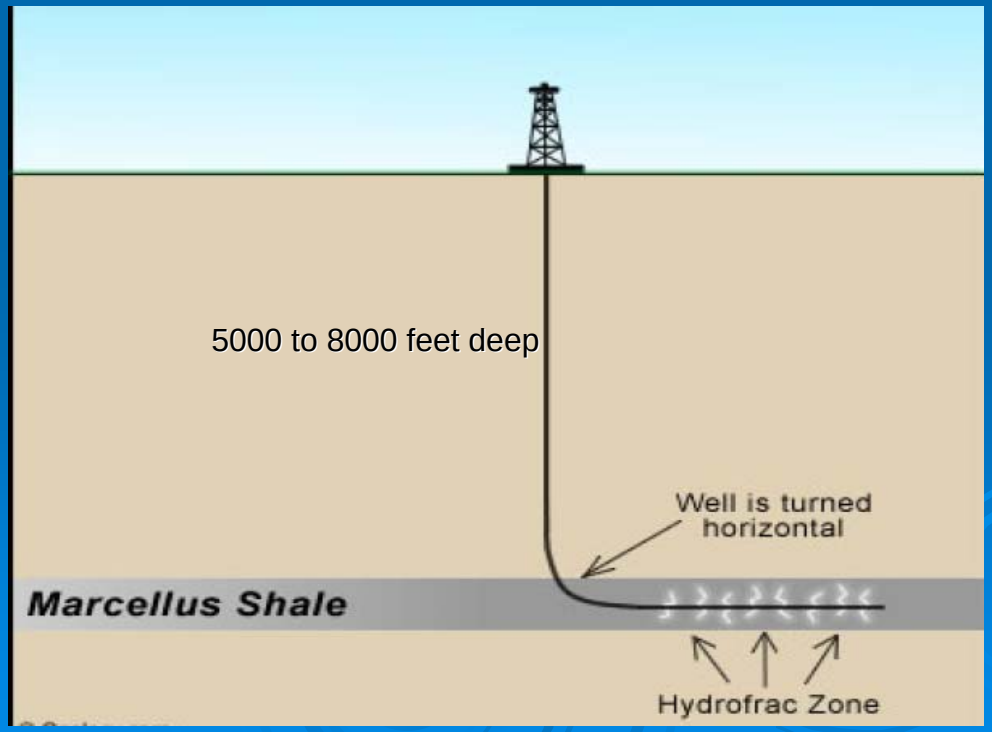
- Private energy companies are beginning to extract natural gas from Marcellus shale
  - Development process is water-intensive, but temporary
  - Potential adverse impacts
- How should District respond to requests for temporary surplus water?

Marcellus Shale

- Underlies 72% of Susquehanna River Basin
- Recent technological advances (hydrofracing) have made natural gas extraction economically feasible
- Some sites already operating, many more proposed

Hydrofracing

- Hydraulic Fracturing: uses water under pressure to create fractures / fissures in shale so natural gas can be extracted



Small Footprint
Big Impact

Hydrofracing Impacts

- Uses 5 to 25 AF of fresh water to create each well
- Extraction continues during low flow periods
- Many sites located in headwater areas near high quality streams
- Some sites located near reservoirs
- Flowback water requires treatment:
  - Brine
  - Hydrocarbons
  - Metals
  - May be slightly radioactive

Temporary Water Supply

- NAB has recently received first request from private company for temporary water supply from a Corps reservoir
- More are likely
- SRBC is considering “bundling” requests from multiple users

Surplus Water

- **Section 6, FCA of 1944**
  - Corps can sell surplus water
  - Surplus water definition:
    - Water no longer needed for original authorized purpose, or
    - Water that could be used *temporarily* for municipal & industrial needs
- **Suitable for small amounts for periods under 5 years**
- **Surplus water availability based on:**
  - Non-federal need for water supply
  - Project characteristics
  - Location
  - Season

Surplus Water Agreements

- Requirements:
  - Written request
  - Corps letter report providing justification
  - Sales agreement & repayment schedule
- Approval authority
  - District Engineer <100 AF
  - Division Engineer <500 AF
  - Chief of Engineers <1000 AF
  - ASA(CW) >1000 AF

Surplus Water & Hydrofracing ???

- What is surplus water?
- What is Corps policy on supporting energy development & independence?
- Should we contract with individual companies?
- What are cumulative impacts of many small requests?
- What is appropriate price for surplus water?
  - By project (range is from $25 to $500 per AF)
  - Sub-basin average
  - Basin-wide composite (about $125 per AF)
- Is it OK to bundle requests?

Gas Well Fire – Sep 2008
Kettle Creek Lake

Challenge:
Responding to Altered Needs for Contracted Water Supply Storage

- Non-federal sponsors are proposing to change criteria for making water supply releases

- Does Corps have authority to deviate – perhaps significantly - from original release criteria that were basis for NEPA documents?

Competing Demands for Conservation Storage

- Municipal and industrial water supply
- Environmental improvements
- Recreational releases
- Hydropower
- Consumptive use
  - Electric utilities
  - Agriculture

Consumptive Use

- Large & growing problem in Susquehanna Basin
- SRBC regulates consumptive use
- Threshold for emergency action was Q7-10
- Options:
  - Eliminate consumptive withdrawal
  - Provide consumptive use make-up water
  - Pay fee to SRBC

Storage Reallocation for Consumptive Use Make-up

- Cowanesque Lake
  - Reallocated 24,300 AF from FC to WS
  - Raised lake 35’
  - Relocated recreation areas
  - Added multi-level ports to outlet tower
- Curwensville Lake
  - Reallocated 5,400 AF from seasonal FC to WS
  - Did not change lake level
  - Made minor changes to recreation facilities
- WS storage contracted to SRBC (1980’s & 90’s)

Reallocation Assumptions

- Q7-10 trigger for beginning consumptive use make-up releases
- Recreation facilities designed to accommodate once in 10 year drawdown
- Storage sufficient to satisfy consumptive use at 2 large electric utilities during drought of record
- NEPA documents based on these assumptions

Fast Forward 10-20 years

- Consumptive uses have increased
- SRBC has modified its consumptive use regulations
- SRBC is requesting modification of current operating agreement with Corps to:
  - Add new trigger locations
  - Raise thresholds for triggering WS releases
  - Make more frequent requests
- Joint SRBC/Corps investigation is underway, funded by SRBC

Potential Impacts

- Reduced recreation usage (lost revenue)
- Environment affects
  - Beneficial downstream (most years)
  - Adverse in lake
- Water management
  - Drawdowns
    - More frequent
    - Earlier
    - Longer
  - Greater potential to deplete WS storage before end of low flow period

Altered Water Supply Needs ??

- What should be District posture regarding modified water supply needs that adversely affect our reservoirs?

“We’ll never know the worth of water till the well go dry.”

- 18th century Scottish proverb