# Susquehanna River Basin

# Ecological Flow Management Study

The Nature Conservancy
Protecting nature. Preserving life.

US Army Corps of Engineers

SRBC
SUSQUEHANNA RIVER BASIN COMMISSION

# CU Mitigation Objectives

- Elimination or reduction of manmade impacts caused by CU during critical low flow periods
- Return to natural low flow conditions to ensure water availability for downstream uses including ecosystem flow needs

# CU Mitigation Plan (CUMP)

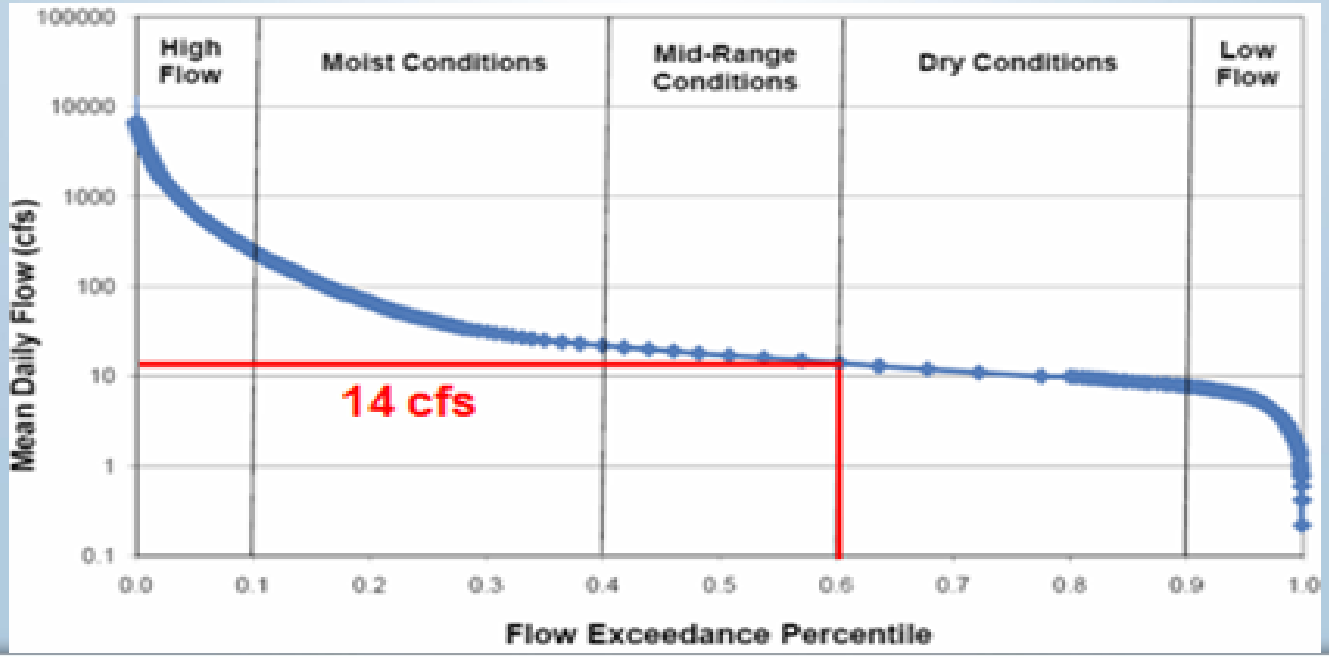
- Adopted & directed to be implemented by Commissioners in March 2008
- Includes series of recommendations for implementing the Plan
  - Assess instream flows
    - Undertake process to set flow goals based on ecosystem needs

# Ecological Flow Management Study

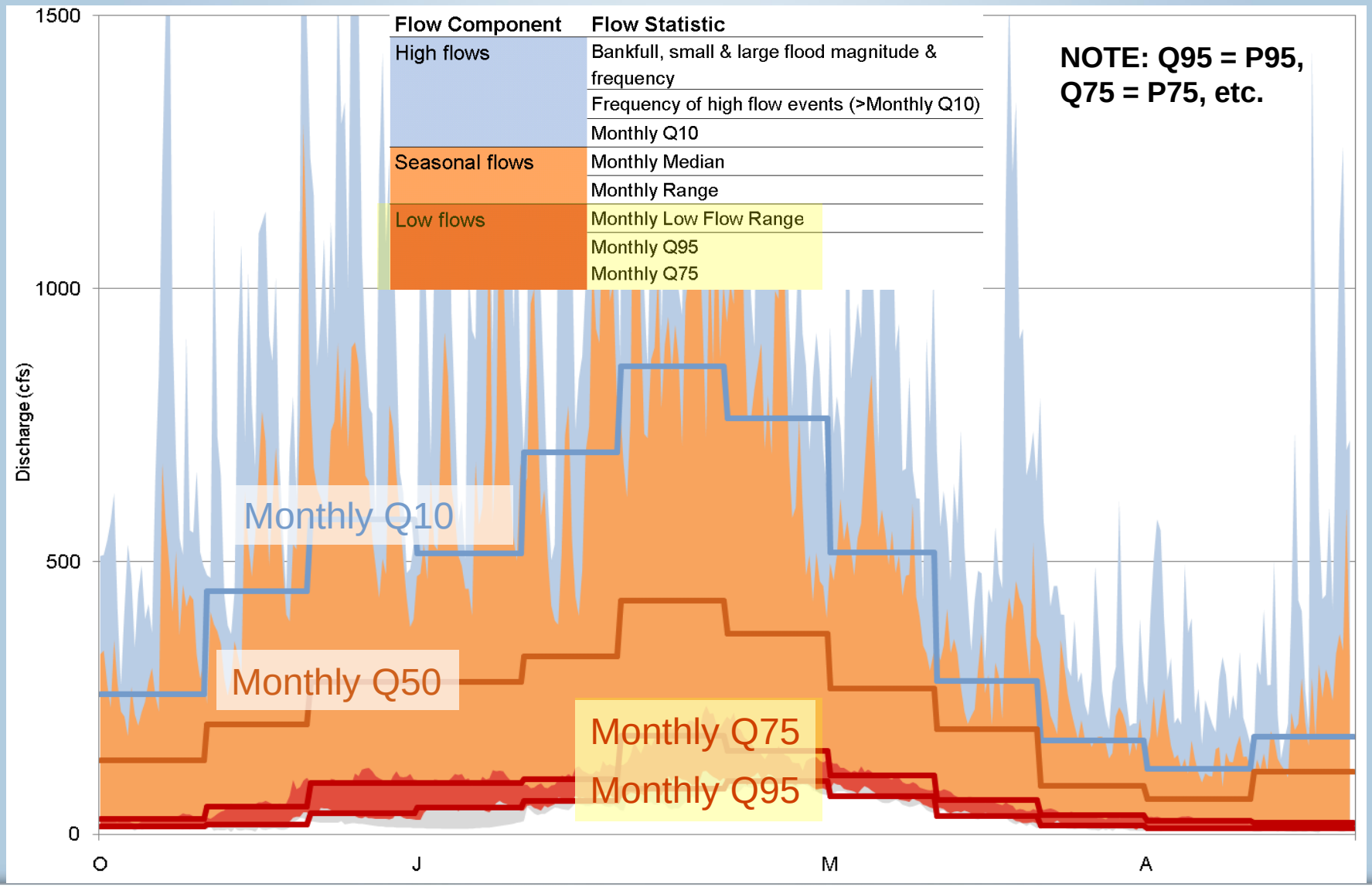
- Collaboration between USACE, SRBC & TNC under Section 729 of WRDA
- Goal: Determine ecological flow needs for Susquehanna River & tributaries
  - Flow goals will guide withdrawal approval conditions, releases from storage during low flow periods & CU mitigation planning

# Definitions

- **Percent exceedance flow** - flow value exceeded a certain percentage of time over a period of record
  - 60th percent exceedance flow (P60) = flow value exceeded 60% of time by mean daily flows in record



# Ecosystem Flow Components & Statistics



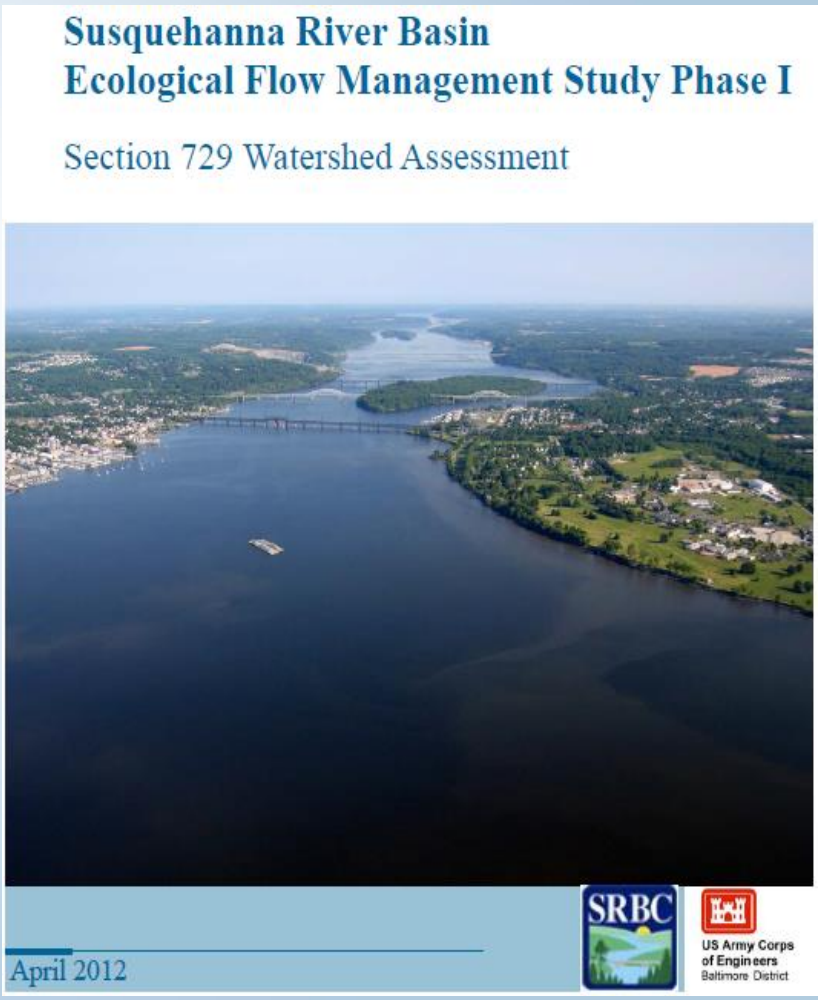
# Ecosystem Flow Recommendations

Table 5.1 Flow recommendations for the Susquehanna River ecosystem.

| Season | Flow Component | Flow Statistic | Flow Recommendations | | |
|---|---|---|---|---|---|
| | | | Headwater streams < 50 sq mi | Streams and small rivers (50 – 200 sq mi) | Major tributaries and mainstream (>200 sq mi) |
| Annual and Interannual Events | High Flows | Large flood | Maintain magnitude and frequency of annual Q0.05 (20-yr flood) | Same for all streams | Same for all streams |
| | | Small flood | Maintain magnitude and frequency of annual Q0.2 (5-yr flood) | Same for all streams | Same for all streams |
| | | Bankfull | Maintain magnitude and frequency of annual Q0.5 (Approx. 1 to 2-yr flood) | Same for all streams | Same for all streams |
| All Months | High flows | Monthly Q10 | <10% change to magnitude of monthly Q10 | Same for all streams | Same for all streams |
| | Seasonal flows | Monthly Median | Between 45th and 55th percentiles | Same for all streams | Same for all streams |
| | | Monthly Range | ≤ 20% change to area under curve between Q10 and Q75 | Same for all streams | Same for all streams |
| | Low flows | Monthly Low Flow Range | No change to area under curve between Q75 and Q99 | ≤ 10% change to area under curve between Q75 and Q99 | ≤ 10% change to area under curve between Q75 and Q99 |
| | | Monthly Q75<br>Monthly Q95 | No change | No change | No change |
| Fall | High flows | Frequency of events > Monthly Q10 | NA | NA | 1-5 events |
| Summer | | Frequency of events > Monthly Q10 | 2-8 events | 2-8 events | 2-8 events |

# EFMS Phase I Report

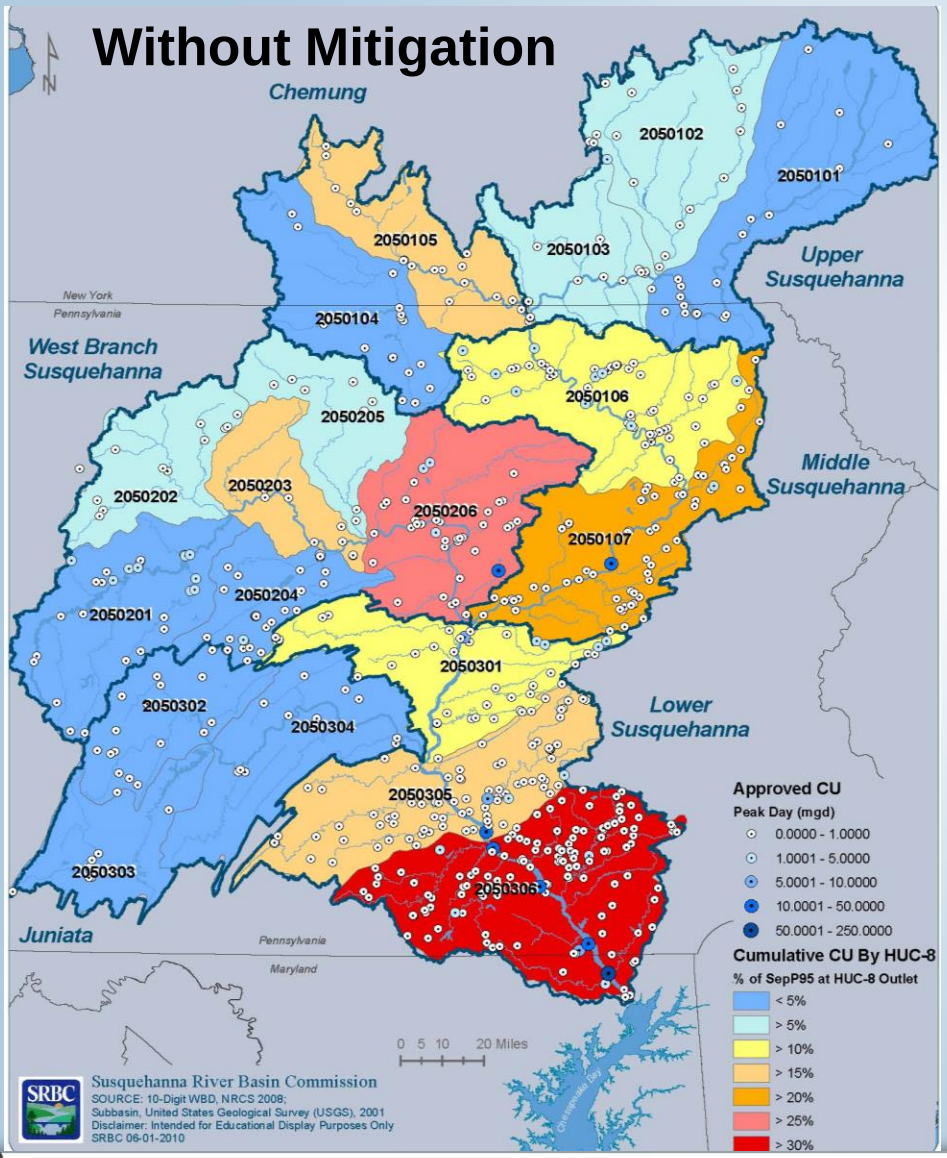
- Released April 2012
- Summarizes study methods and results
- Presents flow recommendations that support ecosystem health in Susquehanna basin
- Suggests various application options for achieving environmental flows

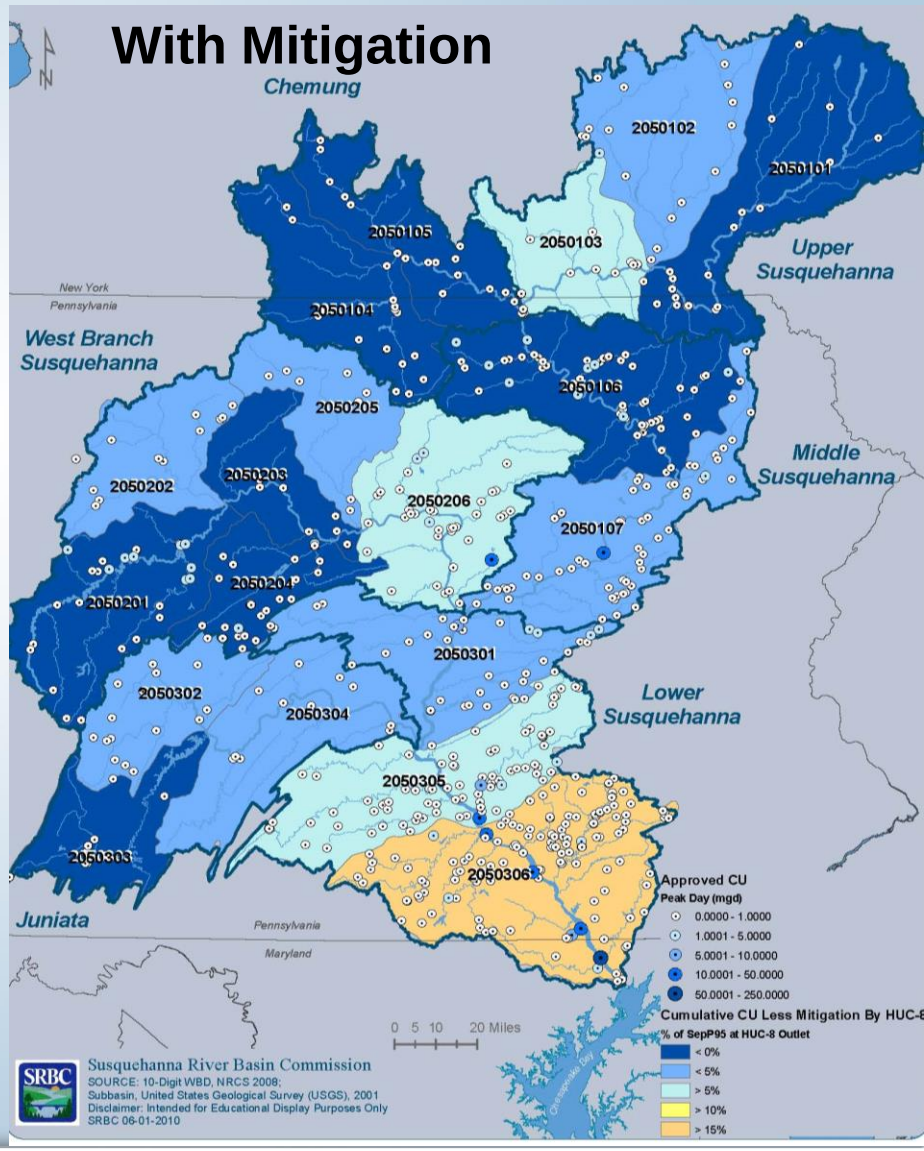


# EFMS Phase I Applications

- USACE reservoir operations
- State/private reservoir operations
- Mine pools
- Withdrawal & CU regulations
- Instream flow policies

# Low Flow Augmentation



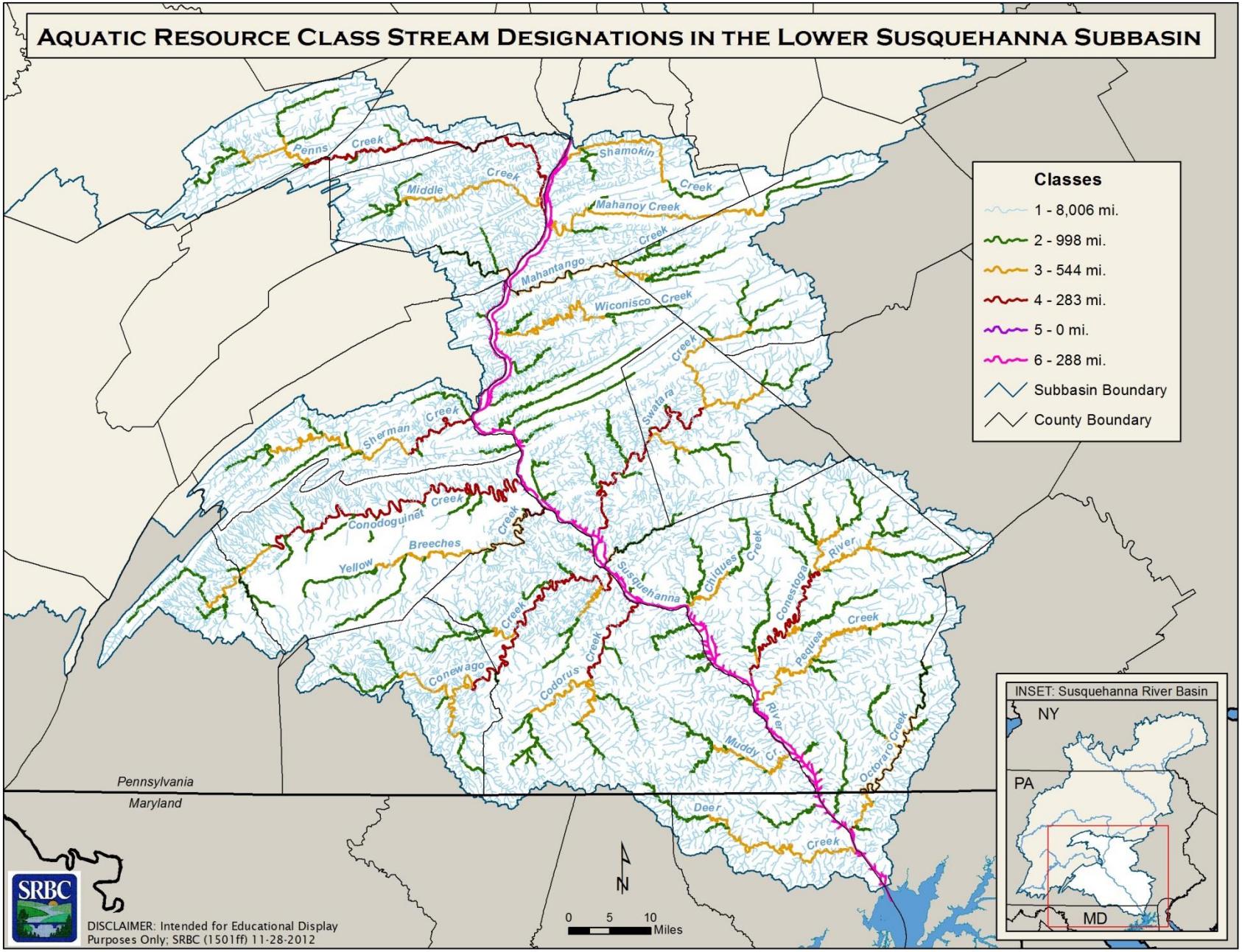



# Low Flow Protection Policy Goals

- Develop new policy to replace former “passby” policy (No. 2003-01) that:
  - Reflects current science & standards
  - Addresses lessons learned over last 9 years
  - Incorporates TNC ecosystem flow recommendations
  - Provides provisions for protection of headwaters to mainstem rivers

# LFPP – Main Components

1. Aquatic Resource Classes
2. Hydrologic Analyses
3. Cumulative Water Use Assessment
4. *De minimis* Withdrawals
5. Passby Flow / Conservation Release Calculation
6. Special Cases


AQUATIC RESOURCE CLASS STREAM DESIGNATIONS IN THE LOWER SUSQUEHANNA SUBBASIN
Classes
1 - 8,006 mi.
2 - 998 mi.
3 - 544 mi.
4 - 283 mi.
5 - 0 mi.
6 - 288 mi.
Subbasin Boundary
County Boundary
Penns Creek
Middle Creek
Shamokin Creek
Mahanoy Creek
Mahantango Creek
Wiconisco Creek
Swatara Creek
Sherman Creek
Conodoguinet Creek
Yellow Breeches Creek
Susquehanna River
Chiques Creek
Conestoga River
Pequea Creek
Conewago Creek
Codorus Creek
Muddy Creek
Octoraro Creek
Deer Creek
Pennsylvania
Maryland
INSET: Susquehanna River Basin
NY
PA
MD
N
0 5 10 Miles
SRBC
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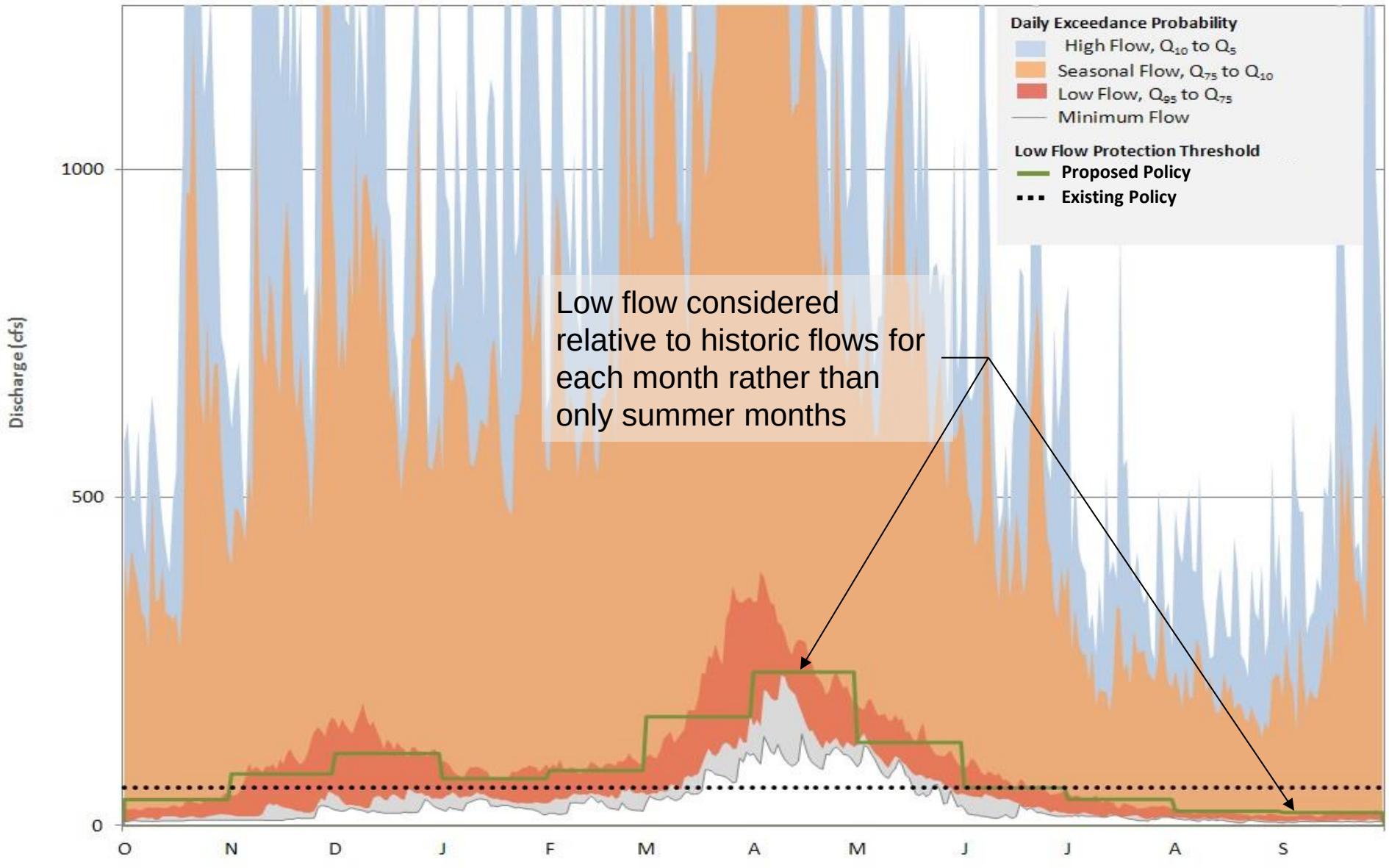
# Former Policy 2003-01 vs. Adopted LFPP



# EFMS Phase II Scoping

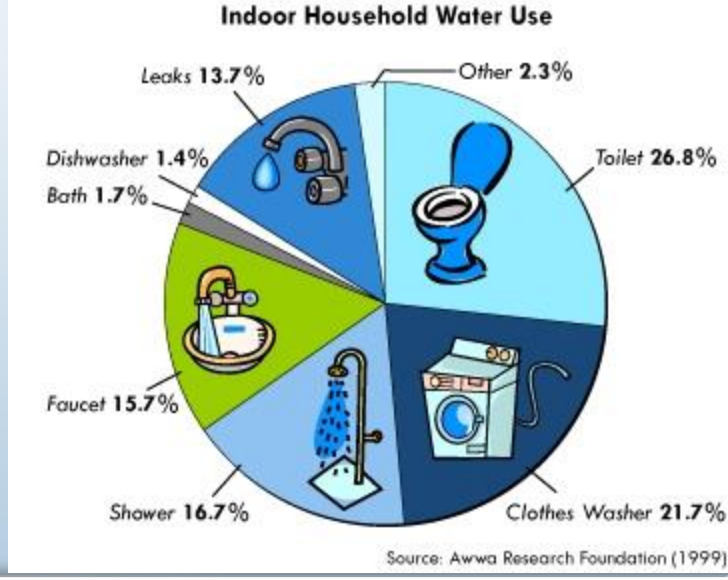
- Document existing conditions
- Examine reservoir alternatives
  - USACE, state/private, mine pools
- Investigate programmatic alternatives
- Assess operational alternatives
- Explore regulatory alternatives
- Needs & benefits analysis

# Reservoir Alternatives

- Evaluation of potential flow augmentation from:
  - USACE reservoirs
  - State reservoirs
  - Private reservoirs
  - Mine pools
  - Abandoned quarries

# Programmatic Alternatives

- CU demand reduction
- Conjunctive uses
- Water conservation
- Others

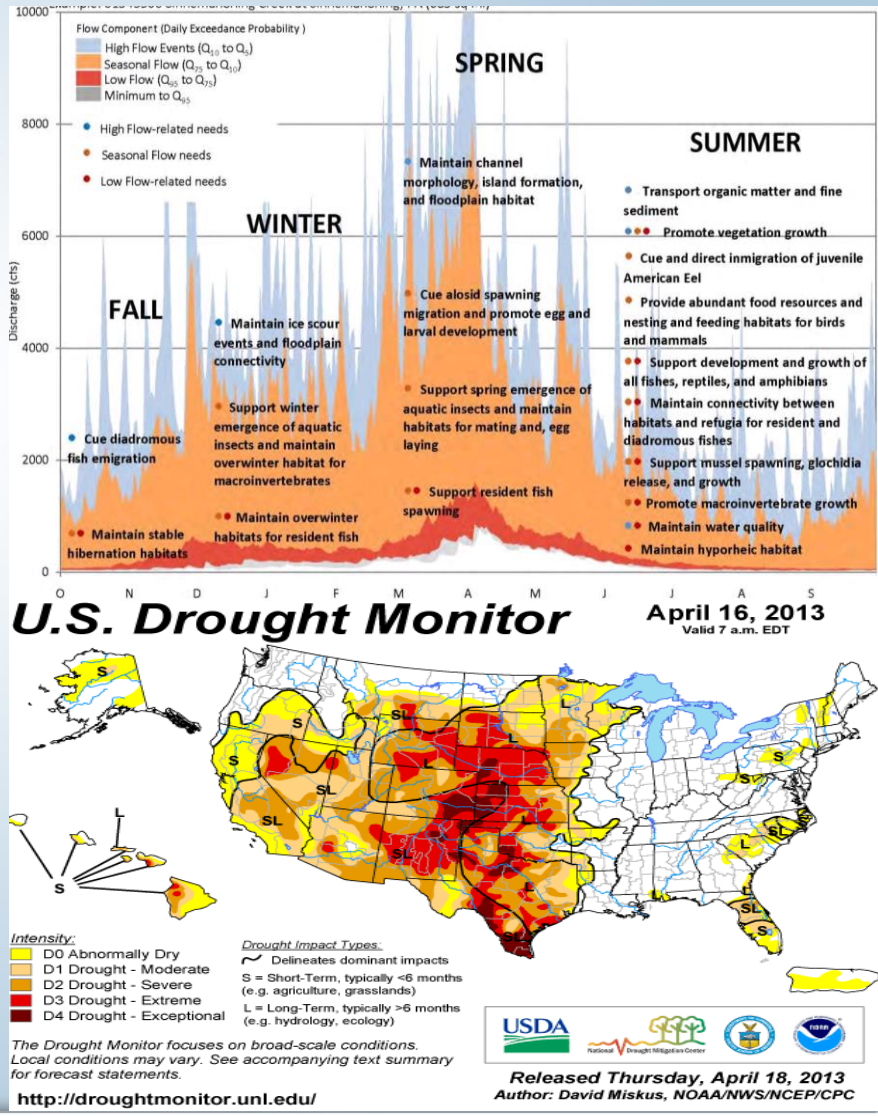


# Operational Alternatives

- Power generation facility efficiency upgrades
- Irrigation practices
- Back-up water sources
- Diversions
- Others

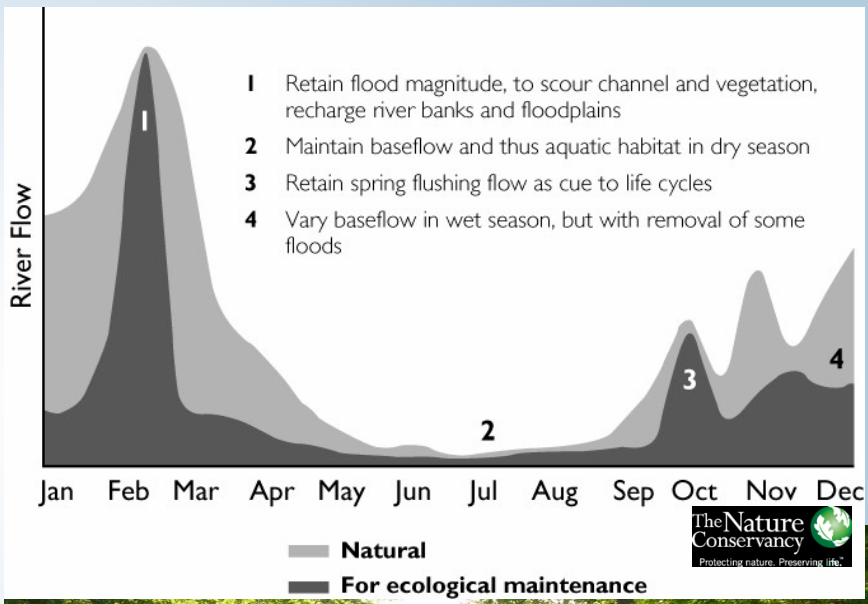
# Regulatory Alternatives

- Refined withdrawal & CU regulations
- Instream flow policies
- Drought contingency plans
- Watershed caps
- Mitigation requirements

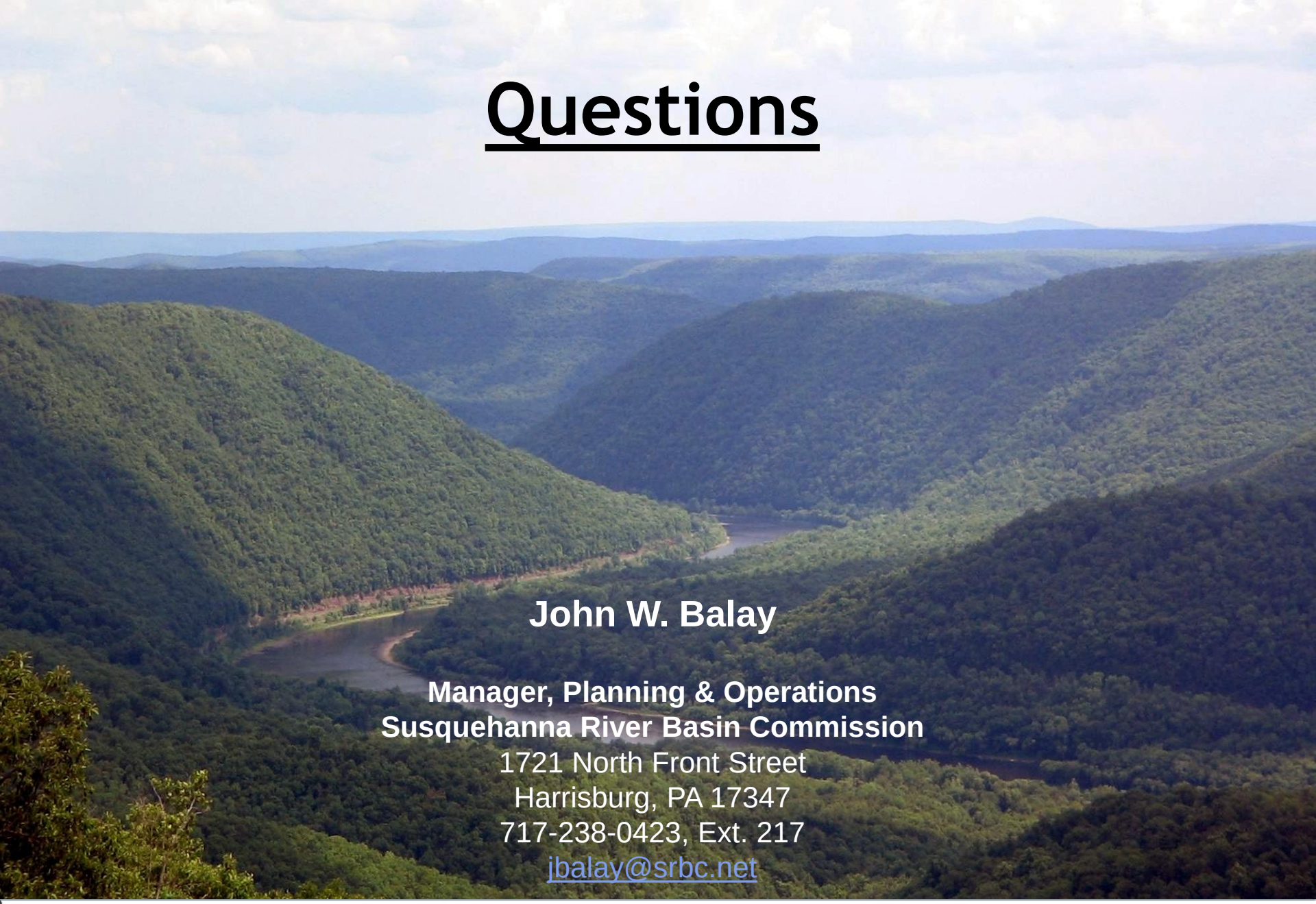


# EFMS Phase II - Next Steps

- USACE-SRBC cost shared
- PMP & supporting documents prepared
  - Under USACE reviews
- Commission approvals
- Awaiting federal funding
- Initiate 2-year study
- Agency/stakeholder coordination




# Questions



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