COG's Regional Wastewater Flow Forecast Model

Cooperative Forecasting and Data Subcommittee

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RWFFM

(Regional Wastewater Flow Forecast Model)

- Uses for the RWFFM
- Background
- Flow Projection Methodology
- Application of RWFFM Results

Uses for the RWFFM

To provide engineers, planners, and policymakers with wastewater flow projections that can be used to:

1. Enhance regional wastewater flow management & planning efforts

   (Blue Plains is a specific sub-regional example); and
2. Predict when wastewater treatment plants will reach individual nutrient (Phosphorus & Nitrogen) load caps – as designated under the Chesapeake Bay TMDLs (Total Maximum Daily Loads)

Background

- RWFFM - Demographic-based model that
  - Utilizes demographic data from COG's Cooperative Forecasting Program
  - Links the data to TAZ GIS layer
  - GIS sewershed layer for each wastewater plant's service area is then linked to TAZ layer
- Calculations - Use MS Access database
  - Demographic data recomputed on a sewershed basis
  - Incremental changes in demographic data used to forecast incremental wastewater flows

Background

- COG has been performing wastewater flow projections for many years
- Blue Plains Flow Forecast Model (BPFFM)
  - Created to computerize the calculations for Blue Plains WWTP's entire service area – DC, MD & VA (1993, 2003 update)
  - Several elements are in the process of being updated
- RWFFM - Created by expanding BPFFM to include all WWTPs in COG region

Flow Projection Methodology

- Future flows are computed for each wastewater treatment plant
- Projected Flow = Base Year Flow + Incremental Flow
  - The Base Year Flow is derived from historical flow records
  - The Incremental Flow is computed using demographic projections

Flow Projection Methodology

- Input Data--Population Demographics
  - COG has administered the Cooperative Forecasting Program since 1975
  - The Forecast includes five-year projections (2000-2040) for Employment, Households, and Population
  - COG Member jurisdictions provide data & review compiled results for approval by COG Board of Directors
  - Current version being used - Round 7.2

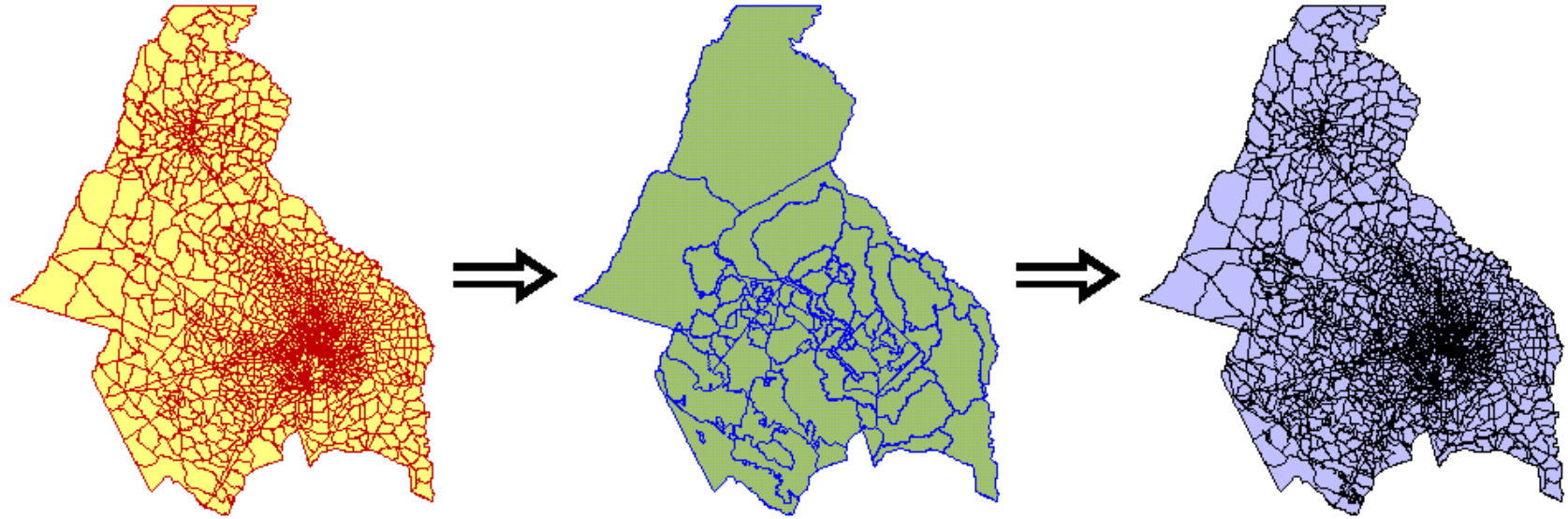
Flow Projection Methodology

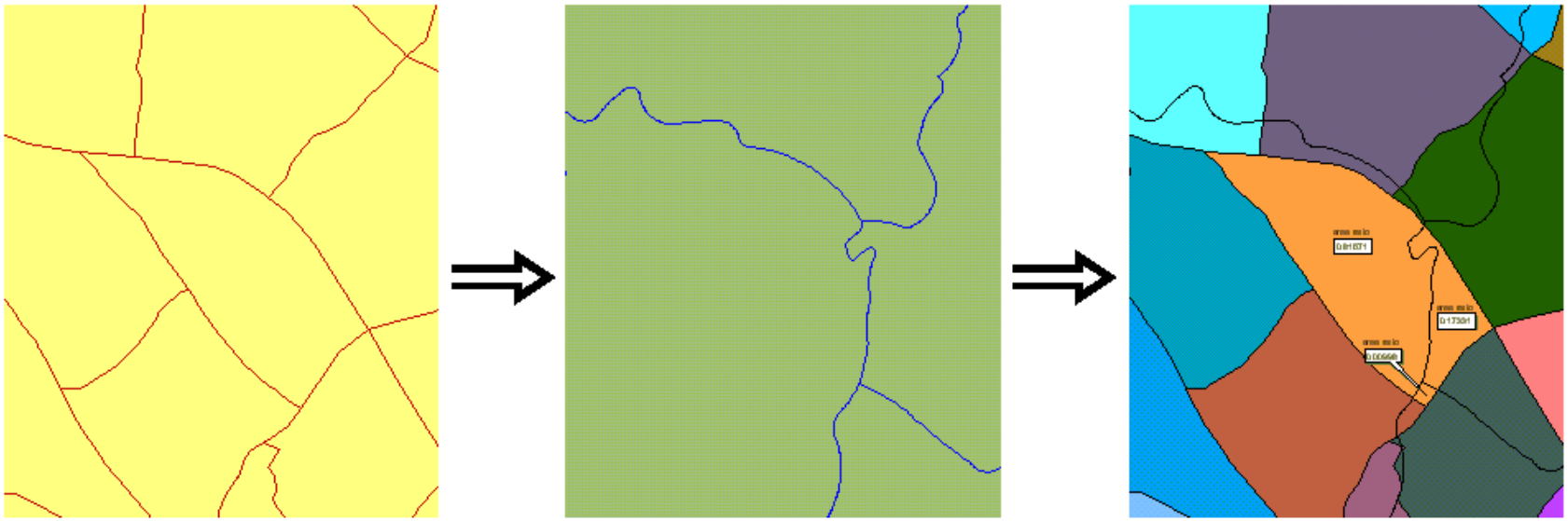
- Input Data--Flow Factors
  - Flow factors (for Households and Employment only) are applied to incremental demographics to compute incremental wastewater flows
  - Summing the base flow and the incremental flows yields total future flow
  - Flow factors can be customized (e.g., sub-sewershed basis, household type, etc.)

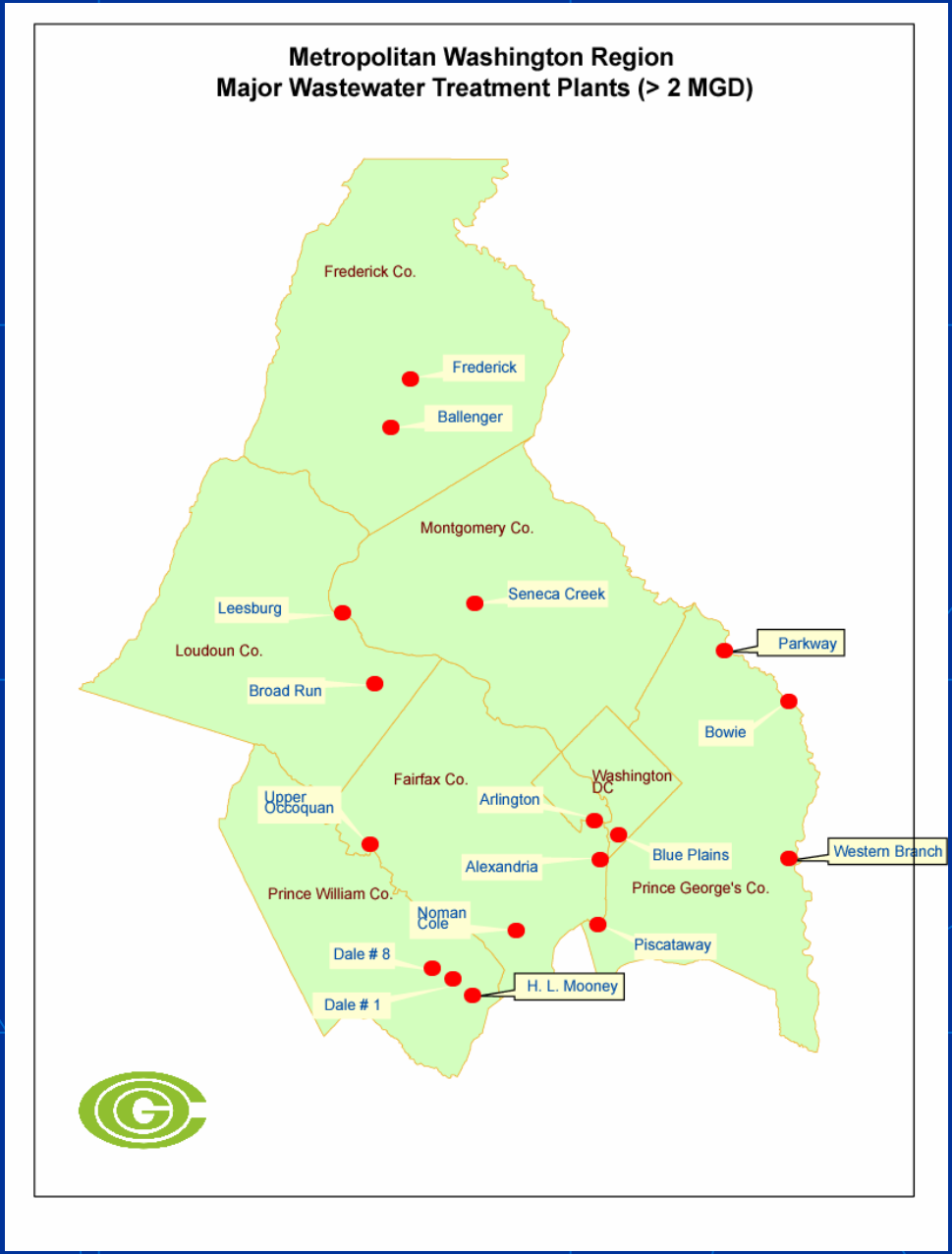
Population Zones

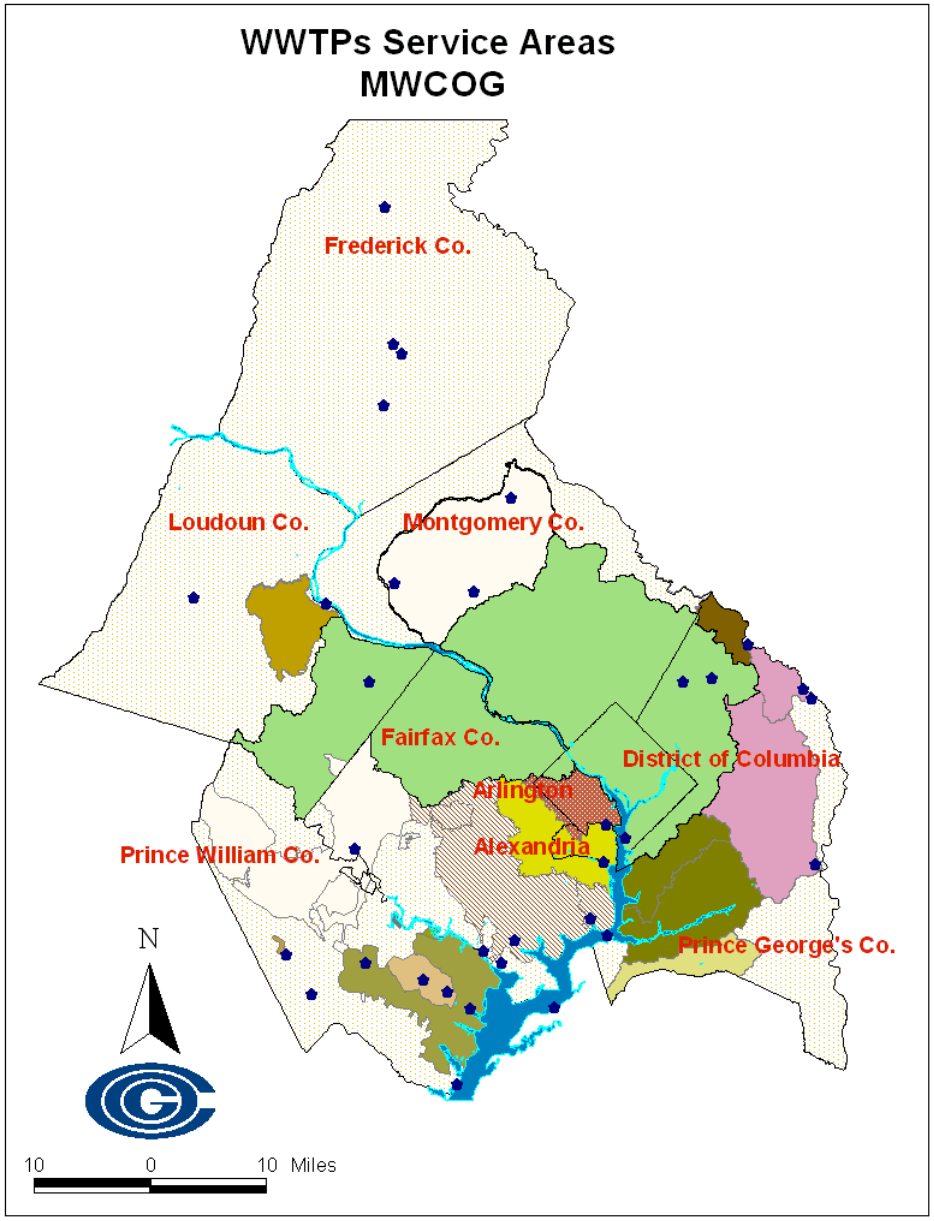
Subsewersheds

Intersected Layer

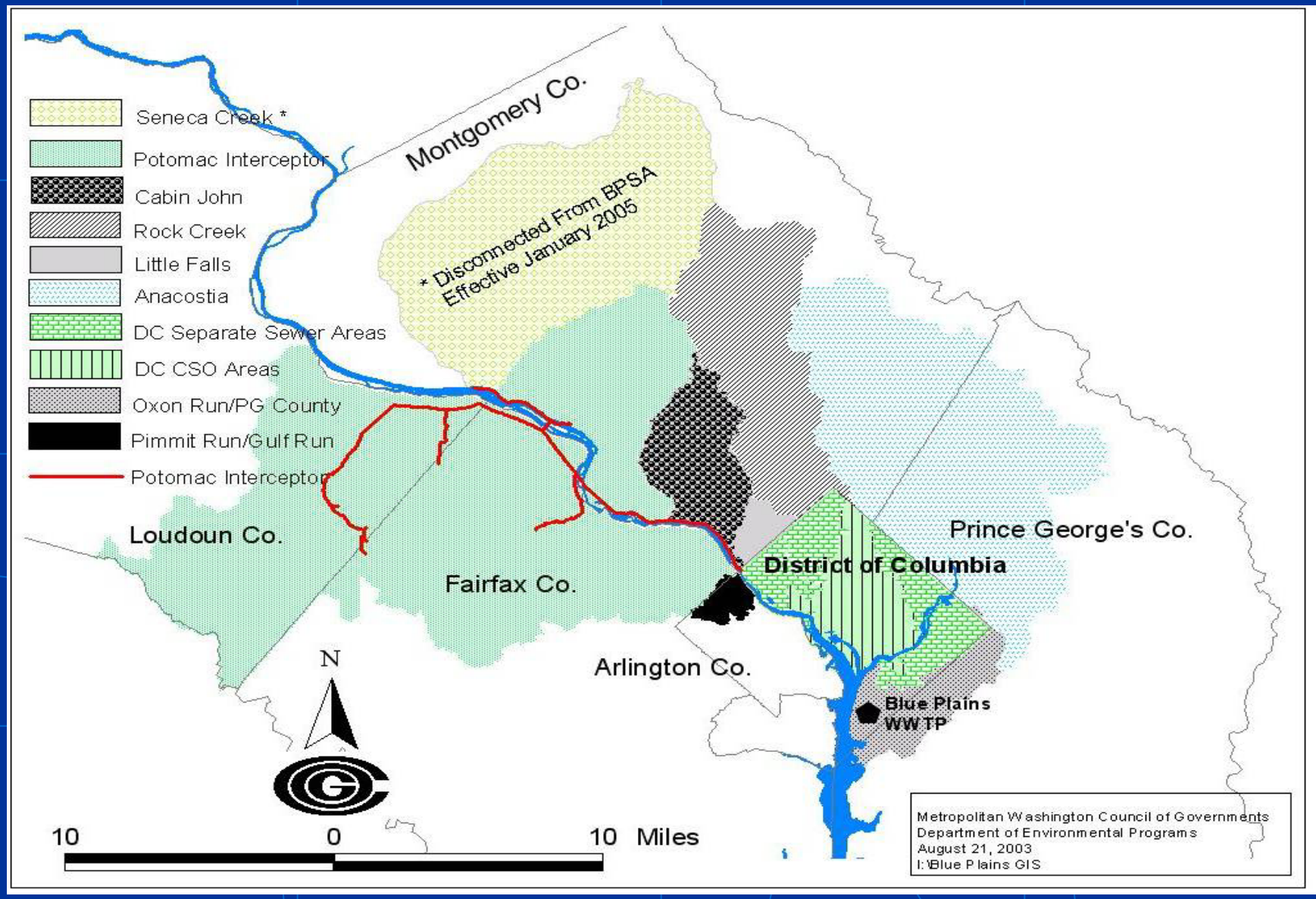





Metropolitan Washington Region
Major Wastewater Treatment Plants (> 2 MGD)
Frederick Co.
Frederick
Ballenger
Montgomery Co.
Seneca Creek
Leesburg
Loudoun Co.
Broad Run
Parkway
Bowie
Fairfax Co.
Washington DC
Arlington
Upper Occoquan
Blue Plains
Western Branch
Alexandria
Prince George's Co.
Prince William Co.
Noman Cole
Piscataway
Dale # 8
H. L. Mooney
Dale # 1


WWTPs Service Areas
MWCOG
Frederick Co.
Loudoun Co.
Montgomery Co.
Fairfax Co.
District of Columbia
Arlington
Alexandria
Prince William Co.
Prince George's Co.
N
10 0 10 Miles

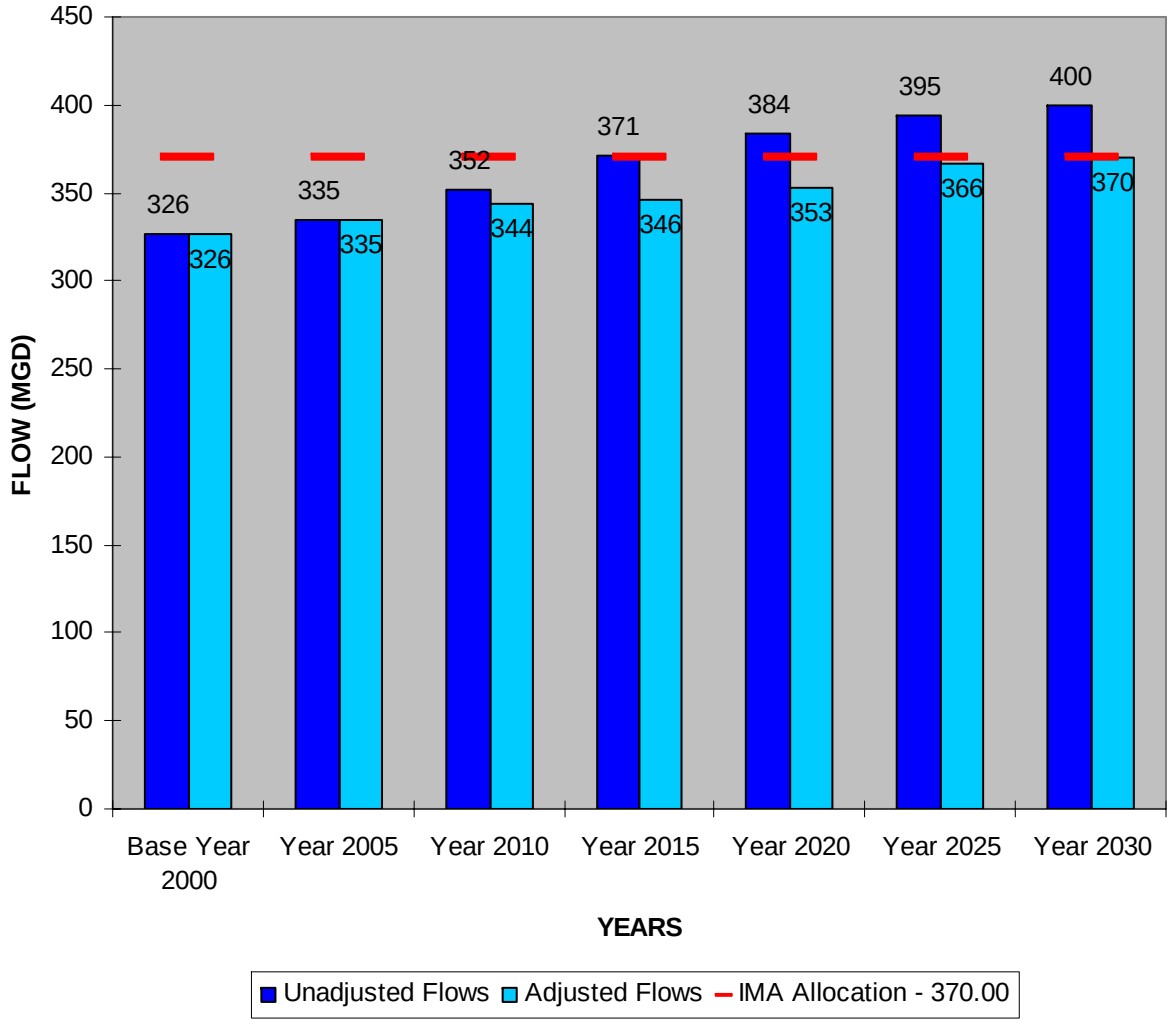
Blue Plains Service Area Map



Application of RWFFM Results

- RWFFM Updates
  - Updating sewered/septic areas, plants, base year flows, etc.
  - Blue Plains Service Area Study (2003 report being updated)
- COG's GW 2050 Effort
  (e.g., growth/capacity metrics)
- Chesapeake Bay Program (see graphic)
  - 2030 Growth Scenarios work
  - Bay TMDL (wastewater load) cap loads

WASTEWATER FLOW PROJECTIONS
BLUE PLAINS TOTAL



Based on Preliminary Round 6.3 Cooperative Forecasts, RWFFM Run 7/01/03

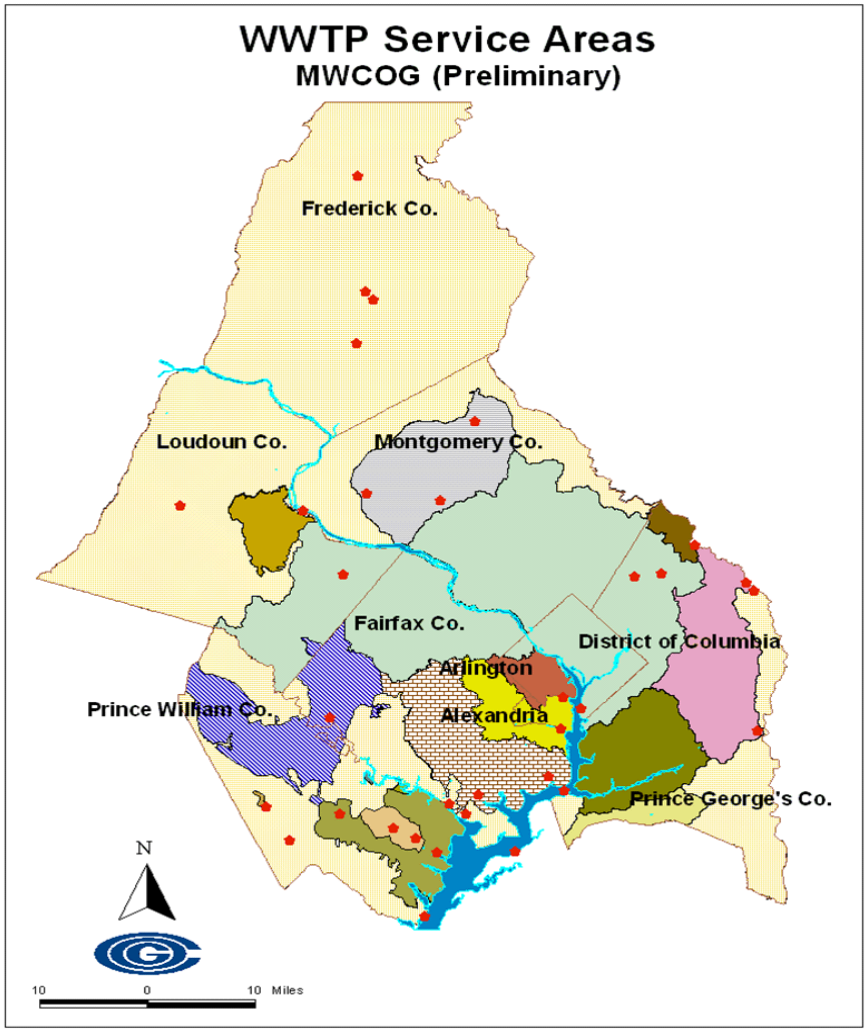
(Example Only - Projections currently being updated, 9/1/09)

Potential Metric : Wastewater Capacity / Nutrient Load Cap

- Annual Nutrient Load Caps (primarily Nitrogen - TN) are based on a Plant's Design Capacity Flow and a specific TN concentration

- TN concentrations are generally set at 3-4 mg/l

- Therefore, flows are a reasonable indicator of how close a plant is to reaching both its design capacity and its nutrient load cap



CBP's Forecasting Population on Sewer vs. Septic: Modeling service area based on population distribution