# The Watershed Resources Registry (WRR)

A National Pilot To Integrate Land-use Planning, Regulatory, and Non-regulatory Decision Making Using the Watershed Approach



# What is the WRR?

- A comprehensive GIS-based mapping tool and replicable framework that analyzes watersheds and identifies the best opportunities for :
  - Protection of high quality resources
  - Restoration of impaired resources
  - Resource conservation
  - Environmental resource planning
  - Improvement of stormwater management



# Agency Collaboration and Program Integration

- Clean Water Act Sections 319, 401,402,404, 303(d)
  - Watershed planning, permit review, mitigation assessments
  - TMDL and WIP applications
  - Stormwater management
- Resource conservation/ environmental resource planning
- Green Print and Rural Legacy priorities
- Section 7 (Threatened and Endangered Species)
- Transportation and land use planning
- NEPA review

# **Benefits of the WRR**

- Facilitates multi-agency coordination
- Integrates and streamlines regulatory programs
- Promotes the watershed approach
- Smarter mitigation
- Transparent, predictable, and reliable
- Consistent All users are presented the *same* data
- Streamlines planning and regulatory efficiency, saving you <u>money</u>
- One Stop Shop!

# Modeling and GIS Analysis

• Ellen Bryson, Geographer, U.S. Army Corps of Engineers

# Watershed Resources Registry

**GIS Underpinnings** 

Ellen Bryson Geographer Baltimore District US Army Corps of Engineers



# WRR: Three Meanings

- WRR: a collaborative, ongoing partnership with EPA Region 3, several MD agencies, the Corps (Baltimore District and HQ) and several others
- WRR: a set of eight suitability analyses
- WRR: an interactive website that provides all users, including the general public, access to the findings











# Goals of GIS Presentation

- Provide an understanding of how GIS was used to create the eight suitability analyses
- Present findings outside the web site—so you can see them in isolation
- Discuss the limitations of the GIS analyses



# What is a GIS

- Spatial information—where features are on the earth's surface, along with descriptive information about the features
- A means to look at information about the earth in an integrated fashion
  - Supports sophisticated analysis, including suitability analysis



## Goals of the Eight Suitability Analyses

- To find and score areas that might present eco-opportunities
- Eco-opportunity is a place where some specific action beneficial to the resource, watershed, or environment might be undertaken
- Examples:
  - find mitigation sites for a transportation project
  - find areas to create riparian buffer zones
  - evaluate which of three proposals has least impact
  - find areas to re-create a former wetland
  - find areas to construct new stormwater management system on degraded infrastructure systems



# **Eight Suitability Analyses**

- Preserve Wetlands
- Restore Wetlands
- Preserve Riparian Zones
- Restore Riparian Zones
- Preserve Uplands
- Restore Uplands
- Preserve Healthy Stormwater Systems
- Restore Degraded Stormwater Infrastructure



# What is a Suitability Analysis?

- Similar to searching for a new house—define those qualities or factors that we are looking for in a house
- Some qualities are absolutes or "must haves"
  - within a specific school district
  - not more than \$300k
- Some qualities are relative: all other things being equal, it would be better if ...
  - two-story
  - within 1,000 feet of park
  - within 10-minute drive to train,
  - 5-minutes from a grocery store, etc.



# WRR Factors

- Decided upon by WRR Technical Advisory Committee, which included representatives of Corps, EPA, MD SHA, MD DNR, MD DOE, US FWS, FHA and others
- Identified land characteristics or qualities that matter most for each ecological goal
- Had to be 'mappable'
- Different set of factors for each of the eight analyses



# More On WRR Factors

- Some factors were absolutes: 'had to be a wetland', 'could not be a wetland'; 'could not be in open water';
- Some factors were relative: 'better if a wetland'; 'better if on poorly drained soil'; 'better within 500 feet of water'
- No weighting across the factors each factor contributed up to one point
- Most factors were simple presence or absence: is or is not a wetland; is or is not forested; is or is not already protected
- Several factors were differentiated within the factor: for example, 100-year flood plain got 1 full point; 500-year flood plain got half point



### **Factors For Wetland Preservation**

- 1. Is in a Blue Infrastructure priority watershed;
- 2. Is in a Tier II watershed
- In a Stronghold Watershed area 1 (1 <sup>8</sup>.
  pt) or 2 (<sup>1</sup>/<sub>2</sub> pt)
- 4. is in a Wetland of Special State Concern;
- 5. Is in a Sensitive Species Project Review Area (SSPRA)
- 6. Is forested

- Is within 200' (1 pt) or within 600' (<sup>1</sup>/<sub>2</sub> pt) of a stream designated for uses II, II or IV
  - Is in a Green Infrastructure area (1 extra pt for "hub"; ½ pt for "corridor")
- 9. in Chesapeake Bay Commission Critical Area (LDA or RCA only)
- 10. Is in an (unprotected) GreenPrint Targeted Ecologic Area
- 11. Is near (within 200') of protected lands
- 12. Is not in a Priority Funding Area

- Must be a wetland
- Cannot already be protected



#### **BUILDING STRONG**®

**Relative Factors** 

**Absolute** 

## Factors for Wetland Restoration

- 1. In a Blue Infrastructure priority watershed 9.
- 2. in Chesapeake Bay Commission Critical 10. Area (LDA or RCA only)
- 3. is near (200') but not in a stream or wetland; 11.
- 4. is near (200') but not in a Wetland of Special State Concern 12.
- 5. is near (within 200') but not in a Sensitive Species Project Review Area (SSPRA)
- 6. is near (200') or in a Green Infrastructure hub or corridor
- 7. in a 100-year (1 pt) or 500-year (½ pt) flood 15. plain
- is in an impaired watershed (as indicated by 16. §303-d)

- in a Tier II "watershed" ). Is within 200' (1 pt) or within 600' (½ pt) of a stream designated for uses II, II or IV
  - In a Stronghold Watershed area 1 (1 pt) or 2 (1⁄2 pt)
  - in a Trust Fund Watershed High Priority (1 pt) or Medium Priority (½ pt);
- in a Biological Restoration Initiative (BRI) watershed;
- 14. in a Green Infrastructure "gap" area;
  - in or near (200 feet) of a GreenPrint Targeted Ecologic Area is near (200') but not in a protected land

- cannot be a wetland
- cannot be forested and
- must be on a very poorly drained soils, somewhat poorly drained soils or poorly drained soil



#### **BUILDING STRONG**<sub>R</sub>

**Relative Factors** 

### Factors for Riparian Zone Preservation

In a Blue Infrastructure watershed	10.
is within 200' (1 pt), 400' (2/3 pt) or 600 '	
(1/3 pt) of the stream	11.
 is forested	
 is in a WSSC	12.
in a 100-year (1 pt) or 500-year ( ½ pt) flood plain	13.
Is within 200' (1 pt) or within 600' (½ pt) of a stream designated for uses II, II or IV	14. 15.

- 7. in a Tier II watershed
- In a Stronghold Watershed area 1 (1 pt) or 2 (½ pt)
- 9. in a Sensitive Species Project Review Area (SSPRA)

- 0. in a Green Infrastructure hub (1 pt) or a corridor (1/2)
- 1. in Chesapeake Bay Commission Critical Area (LDA or RCA only)
  - in a Targeted Ecologic Area (GreenPrint)
    - near (200') of a protected Targeted Ecologic Area (GreenPrint)
    - near (200') but not in a protected area
    - in a Priority Funding Area

- cannot be protected
- must be near (600') but not in a stream or water body
- **ITI**

#### **BUILDING STRONG**<sub>®</sub>

**Relative Factors** 

1

2

3

6

Absolute

## Factors for Riparian Zone Restoration

- 1. in a Blue Infrastructure watershed
- 2. in a Biological Restoration Initiative (BRI) watershed
- 3. in Chesapeake Bay Commission Critical Area (LDA or RCA only)
- 4. is in a 100-year (1 pts) or 500-year (½ pt) flood plain
- 5. is in a Green Infrastructure hub (1 pt) or a corridor (1⁄2)
- 6. is near (200') but not in a GreenPrint Targeted Ecologic Area (GreenPrint)
- 7. is within 200' (1 pt), 400' (2/3 pt) or 600 ' (1/3 pt) 15 is in a Wetland of Special State Concern of the stream
- 8. is in an impaired watershed (as indicated by
- must be near (600') but not in a stream or water body
- cannot be forested

- §303-d)
- 9. is in a Priority Funding Area;
- 10. Is within 200' (1 pt) or within 600' (½ pt) of a stream designated for uses II, II or IV
- 11. is in a Tier II watershed
- 12. in a High Priority (1 pt) or Medium Priority Trust Fund Watershed (½ pt)
- 13. In a Stronghold Watershed (1 extra points for "1"; ½ extra point for "2")
- 14. is in a Sensitive Species Project Review Area (SSPRA)



#### **BUILDING STRONG**<sub>®</sub>

**Relative Factors** 

Absolute

## Factors for Preserving Uplands

- 1. In a Blue Infrastructure priority watershed
- 2. in Chesapeake Bay Commission Critical Area (LDA or RCA only)
- 3. Is in an area of potential Forest Interior Dwellings Species Habitat
- 4. is forested

**Relative Factors** 

Absolute

- 5. is in a Green Infrastructure hub (1 pt) or a corridor (1/2)
- 6. is in an impaired watershed (as indicated by §303-d)
- 7. Is near (within 400') but not in a protected area
- 8. is in a Sensitive Species Project

**Review Area (SSPRA)** 

- 9. is near (200') but not in stream or water body
- Is within 200' (1 pt) or within 600' (½ pt) of a stream designated for uses II, II or IV
- 11. Is in a Tier II watershed
- 12. Is in a Targeted Ecologic Area (GreenPrint)
- 13. Is near (200') but not in a protected Targeted Ecologic Area (GreenPrint)
- 14. Is within 200 feet of a Wetland of Special State Concern
- cannot be developed (commercial, institutional, high or medium density residential, transportation)
- cannot already be protected
- cannot be a wetland or open water



## **Factors for Restoring Uplands**

8.

13.

- 1. In a Blue Infrastructure priority watershed
- in Chesapeake Bay Commission Critical 9. Area (LDA or RCA only) 2.
- Is within 200' (1 pt) or within 600' (1/2 pt) of a stream designated for uses II, II or 3. 10. IV
- is in an impaired watershed (as indicated 11. 4. by §303-d) 12.
- 5. Is in a Tier II watershed
- 6. Is in an area of potential Forest Interior Dwellings Species Habitat
- 7. Is in a Green Infrastructure hub or corridor

Is in a Sensitive Species Project Review Area (SSPRA)

Is near (within 200 feet of) but not in a protected Targeted Ecologic Area (GreenPrint)

Is in or near (within 200 feet) of an already protected area

in a High Priority (1 pt) or Medium Priority Trust Fund Watershed (½ pt)

- Is in a Targeted Ecologic Area (GreenPrint), whether protected or not
- Is near (within 200 feet) but not in a Wetland of Special State Concern

- cannot be forested
- cannot be a wetland
- cannot be developed



#### **BUILDING STRONG**

**Relative Factors** 

Absolute

### Factors for Preserving Healthy Hydrologic Infrastructure

- In a Blue Infrastructure watershed;
- The area has well-drained soils
- is in a 100-year (1 pts) or 500-year (½ pt) flood plain
- Is within 100 feet (1pt) or 500 feet (½ pt)
  of a 303-D listed stream;
- in an area that drains to a 303-D listed stream;
- is in a Tier II watershed
- In a Stronghold Watershed (1 extra points for "1"; ½ extra point for "2")
- is forested
- is forested riparian buffer (1 pt if within 200', 2/3 point if within 400' and 1/3 pt if

within 600')

is forested near (200') or in an area where impervious surfaces are relatively higher

is relatively high in impervious surfaces;

- in an unprotected Targeted Ecologic Area (GreenPrint);
- within 200 feet of a protected Targeted Ecologic Area (GreenPrint);
- is near (200') but not in a protected Targeted Ecologic Area (GreenPrint);
- in a Priority Funding Area
- is in a wetland

- cannot be a wetland
- cannot already be protected
- cannot be open water

Ĩ

#### **BUILDING STRONG**<sub>®</sub>

**Relative Factors** 

Absolute

# Factors for Restoring Degraded/Failing Stormwater Infrastructure Systems

- 1. In a Blue Infrastructure watershed
- 2. in a Biological Restoration Initiative (BRI) watershed
- in an area that was developed before 1985 (1 pt) 7. or between 1985 and 2000 (1/2 pt)
- 4. is area of relatively higher impervious surfaces
- flood plains

**Relative Factors** 

Discouraged

- forested areas
- karst geology
- in a wetland

- 5. is in an impaired watershed (as indicated by §303-d)
- Is within 200' (1 pt) or within 600' (<sup>1</sup>/<sub>2</sub> pt) of a stream designated for uses II, II or IV
  - In a Stronghold Watershed (1 extra points for "1"; ½ extra point for "2")
- 8. is in a Tier II watershed



# Steps in the Analysis

Acquired input data

- Summed up (totaled) how many of the relative factors were found at each location across the state
- Removed areas that did not meet one or more of the absolute requirements
  - Reclassified sums or totals into a score between one and five stars and created zones where that score predominated



## **Acquire Spatial Data**

- Nationally available datasets
  - Land use / land cover
  - Streams, lakes, water bodies
  - NWI Wetlands mapping
  - Impaired (303 d listed) streams
  - Flood Plains (100-year and 500year)
  - Drainage classifications for soils
  - and others

State-specific datasets

- DNR wetlands mapping
- Green infrastructure
- Stronghold watersheds
- Chesapeake Bay Critical Areas
- Priority Funding Areas
- Blue Infrastructure
- Land use / land cover
- Targeted ecologic areas
- Biological Restoration Initiative (BRI) watershed
- And others



### Sum up Factors, Get Total, and Remove Ineligibles







Fourth Relative Factor

0

0

1

1/2

1/2

0

0

0

1/2

1/2

0

0

0

1

0

0

Ø

1

1

1

3

3 1/2

3 1/2

 $1\frac{1}{2}$ 

0

0

1

1

1/2

1

2

4

Absolute Factor



Simple Overlay: Sum Up All Desirable Factors Found in each area 2 2 ½



### Put In Classes of One to Five Stars



# Sum Up Factors

- Summed up factors across the entire state
- Deepest green shows where the most factors were found
- White shows where none were found
- Example shows Upland Preservation
- Maximum possible was 14 but the highest scoring cell scored only 12



# **Remove Ineligible Areas**

- Areas that don't meet absolute factors are removed from consideration
- Areas not eligible are shown in gray
- Total points received in eligible areas is not changed
- Example shows Upland Preservation



### Put Into Classes of One to Five Stars



### **One Through Five Stars**

- Now have ecological opportunity zones of varying sizes and scores. Zones are statistically different from their neighbors
- For each opportunity zone, we have a score—one to five stars.
- Also have the size of the zone. How large is this 'opportunity'?



# Details of "Star" System

- Each of the eight suitability analyses will have zones with one to five stars—somewhere in the state.
- However, any smaller area might not have all zones. Not every watershed will have all the opportunity classes—one through five stars—represented in it.
- Every single location within a zone of opportunity might not possess the given factors—the zones indicate that a very strong predominance of those factors were found
- Zones that receive the same number of stars might not have the same identical factors, but they do represent comparable opportunities
- A zone receiving one star is acceptable and might be the best achievable, given other project constraints
- The web site will allow you to find the *best* opportunity in your given area. The highest scoring areas for a given score will appear first



## **Riparian Zone Preservation**



## **Riparian Zone Restoration**



# **Upland Preservation**



# **Upland Restoration**



## Healthy Stormwater Infrastructure Preservation


### Degraded Stormwater Infrastructure Restoration



#### **BUILDING STRONG**<sub>®</sub>

## Wetland Preservation



#### **BUILDING STRONG**®

## Wetland Restoration



#### **BUILDING STRONG**®

## **Important Points**

- The more stars the better
- A five star is the best—a really wonderful area
  - A one star is not a 'bad' site—it could be the best you can get
  - One through five stars are found for each analysis across the state. But any smaller area might not have all stars represented
- Using the WRR you will be able to find the best opportunity—the highest rated area and the largest of that area—in any given area you are looking at



## In Closing

- We have identified those areas that are likely to present good ecological preservation and restoration opportunities
- A particular zone does not represent a precise site, more a great neighborhood where you're likely to find what you want.
- A site visit and additional research are necessary to confirm findings
- Data grow old quickly; data are not always correct; data are not highly precise (30 meter resolution data)
- Other factors, like an interested property owner, are not factored in.
- The WRR results are not prescriptive; project managers, applicants and others are free to reject or accept the suggested areas to search



## WRR Products

- Outreach Website
- User's Guide
- Model Testing and QA/QC ReportsWeb Application





# WRR Application Technology Stack

- - ArcGIS Server 9.3.1
  - SDE (SQL Server Backend)
  - Web ADF (.NET Framework)
  - IIS Version 7



## WRR Application

- Outreach & Resources
  - <u>http://watershedresourcesregistry.org</u> (.com & .net)





## State Highway Administration Case Study

 Sandy Hertz, Deputy Director, Office of Environmental Design, Maryland State Highway Administration

### The Watershed Resources Registry

### It's Role in Transportation Decision Making

#### PRESENTED BY SANDY HERTZ, DEPUTY DIRECTOR OFFICE OF ENVIRONMENTAL DESIGN



Maryland Department of Transportation

SHA's Mission Statement:

*"Efficiently provide mobility for our customers through a safe, well-maintained and attractive highway system that enhances Maryland's communities, economy and environment."* 



## **Current and Ongoing Initiatives**

Capital Program

Roadway Maintenance

Bay TMDL

### **Capital Program**





Watershed Resources Registry Case Study



Watershed Resources Registry Case Study

### **Capital Program**

	Costs	Time	Cost Savings w/WRR	Time Savings w/WRR
Site Search	\$50,000	4 months	\$37,500	3 months
Design	\$210,000	18 months	\$70,000	6 months
Agency Coordination/MDE Consultant Review	\$10,000	12 months	\$2,500	3 months
Total	\$365,000	2.5 years	<u>\$110.000</u>	<u>1 year</u>

SHA's Mission Statement:

*"Efficiently provide mobility for our customers through a safe, well-maintained and attractive highway system that enhances Maryland's communities, economy and environment."* 



## **Current and Ongoing Initiatives**

Capital Program

Roadway Maintenance

Bay TMDL

### **Roadway Maintenance**

#### THE WRR CAN HELP SHA TARGET FOR SENSITIVE AREAS WHERE MAINTENANCE ACTIVITIES SHOULD BE ADJUSTED BASED ON WATERSHED NEEDS.

### Sensitive Water Resources Adjacent to SHA Roads



#### Watershed Resources Registry Case Study

SHA's Mission Statement:

*"Efficiently provide mobility for our customers through a safe, well-maintained and attractive highway system that enhances Maryland's communities, economy and environment."* 



## **Current and Ongoing Initiatives**

Capital Program

Roadway Maintenance



### The Chesapeake Bay TMDL

- Clean Water Act, Section 303(d)
- "Pollution Diet"
- EPA's Largest TMDL
- Pollution Limits (Nitrogen, Phosphorus, Sediment)
- 6 States and DC
- Watershed Implementation Plans (WIP)
- 2025 Goal



### **TMDL Requirements in MS4 Permit**

#### **DRAFT MS4 Permit TMDL language:**

- TMDL Implementation Plan
  - Addresses all TMDLs, Local and Bay
  - o 1 year to develop a plan
  - 5 years to Restore 20% of Pre-1985 Impervious Surfaces
  - (Expected Pavement Restoration by Stormwater Controls – Alternative strategies allowed)

- TMDL Compliance
  - Develop Benchmarks for meeting WLAs in All EPA approved TMDLs
  - Local TMDL

(Known pollutants so far – Toxics such as PCB, Trash, Bacteria, Heavy Metals, pH, Chlorides, Sediments etc.)

• Chesapeake Bay TMDL

(Known pollutants - Nitrogen, Phosphorus, Sediment)



Watershed Resources Registry Case Study

### SHA TMDL Restoration Goal

 By 2017, add stormwater management to an additional 20% of impervious area currently not already restored to the maximum extent practicable (MEP) and achieve 60% of our targeted waste load allocations for N, P, and TSS.

Description	2017 Target	2025 Target
20% Impervious Cover Treatment (in acres)	5,133	TBD
N-EOS Reduction (lbs/AC)	90,485	150,808
P-EOS Reduction (lbs/AC)	10,555	17,592
TSS-EOS Reduction (lbs/AC)	5,268,036	8,780,060

### Our Approach





- Construct new stormwater management facilities/BMPs
- Documentation and upgrade of existing non-structural highway features that provide water quality – swales
- Upgrade Existing Stormwater Facilities
- Stabilize eroding outfalls and channels
- Reforestation and tree planting
- Stream buffer planting
- Stream restoration/stabilization
- Pavement Removal
- Shoreline Stabilization
- Wetland creation

### WRR Opportunities and TMDL Strategies

### • SWM Restoration/Preservation

Wetland Restoration

### Upland Restoration/Preservation

- Riparian Restoration/Preservation
- Stream Restoration Future

Montgomery	]			
Select a Watershed				
All Watersheds		•		
Select Potential Op	portunities:			
O Upland Preserva	tion	Opland Restoration		
O Wetland Preservation		Wetland Restoration		
Wetland Preserv	vacion	Vietianu Nestoration		
Wetland Preserver     Riparian Preserver	vation	Riparian Restoration		
<ul> <li>Wetland Preserve</li> <li>Riparian Preserve</li> <li>Stormwater National Stormwater Preserve</li> </ul>	vation cural ervation	© Riparian Restoration © Stormwater Compromised Infrastructure Restoration		
© Wetland Preserv © Riparian Preserv © Stormwater Nat Infrastructure Pres Select Score:	vation cural ervation Select S	© Riparian Restoration © Stormwater Compromised Infrastructure Restoration		
<ul> <li>Wetland Preserv</li> <li>Riparian Preserv</li> <li>Stormwater Nat Infrastructure Pres</li> <li>Select Score:</li> <li>*</li> <li>* *</li> </ul>	vation cural ervation Select S = v	© Riparian Restoration © Stormwater Compromised Infrastructure Restoration		
<ul> <li>Wetland Preserve</li> <li>Riparian Preserve</li> <li>Stormwater Nate</li> <li>Infrastructure Press</li> </ul> Select Score: <ul> <li>★</li> <li>★ ★</li> <li>★ ★ ★</li> </ul>	vation cural servation Select S = Where A Any Ar	© Riparian Restoration © Stormwater Compromised Infrastructure Restoration core Operator: Acres is Greater Than (>): ea		
<ul> <li>Wetland Preserv</li> <li>Riparian Preserv</li> <li>Stormwater Nat Infrastructure Pres</li> <li>Select Score:</li> <li>*</li> <li>*</li> <li>* *</li> <li>* *</li> <li>* * *</li> <li>* * *</li> </ul>	vation cural ervation Select S = v Mhere Any Ar	© Riparian Restoration © Stormwater Compromised Infrastructure Restoration core Operator: Acres is Greater Than (>): ea 💌		



#### Watershed Resources Registry Case Study

### SHA Strategies – SWM



### SHA Strategies – Watershed Level



Watershed Resources Registry Case Study



Watershed Resources Registry Case Study

### SHA Strategies – Site Level (ArcMap)



Watershed Resources Registry Case Study

### SHA Strategies – Site Level



Watershed Resources Registry Case Study

### **Summary of Case Study Findings**

- Ensures a watershed-based approach to implementation planning
- Encourages protection of high quality resources and restoration of impaired resources
- Integrated approach (saves time/money)
- GIS-based compatibility

### **Questions?**

**THANK YOU!** 

Watershed Resources Registry Case Study

## We need your input...

- Evaluating the WRR Application
  - User Interface / functionality
  - Intuitiveness
- Evaluating the Suitability Analyses
  - Logic
  - Appropriate data layers used
- Identifying missing pieces or updates
- Field Validating / Evaluating the WRR outputs
- Even if you will not use this type of application in your normal work flow, we value your input as a program expert

## **GIS Project Schedule**

- Upgrade GIS Web App AGS Version 10.1
  - Utilizing State iMap Template
- Enable Site Assessment Enhancement Allow end users to upload field findings
- Update Stormwater Models Expert
   Panel to be developed by members of TAC

## **Overall Project Schedule**

- Open end-user evaluation period October 2012 July 2013 (Agency End-users)
- End-user WRR Conference Calls January 2013
  - TAC and EPA will schedule conference calls with Agency end-user / testers to gather feedback.
- Collect initial comments March April 2013
  - TAC collects initial contacts in order to get an impression of user feedback and plan for future meetings
## **Overall Project Schedule**

- Field evaluation and site visits May or June 2013
- **Review of comments and feedback** August November 2013
- Complete model changes and updates October 2013
   April 2014
- Report back to participating agencies on model
  changes October 2013 February 2014
- Webinar / Webcast review of comments and model
  changes Spring 2014



WRR Proposed Workflow Process

## Thank You!

Christine Conn, DNR – <u>CConn@dnr.state.md.us</u>

Ellen Bryson, USACE -<u>Ellen.A.Bryson@usace.army.mil</u>

Sandy Hertz, SHA – <u>Shertz@sha.state.md.us</u>

Mike Herzberger, MES – <u>Mherz@menv.com</u>