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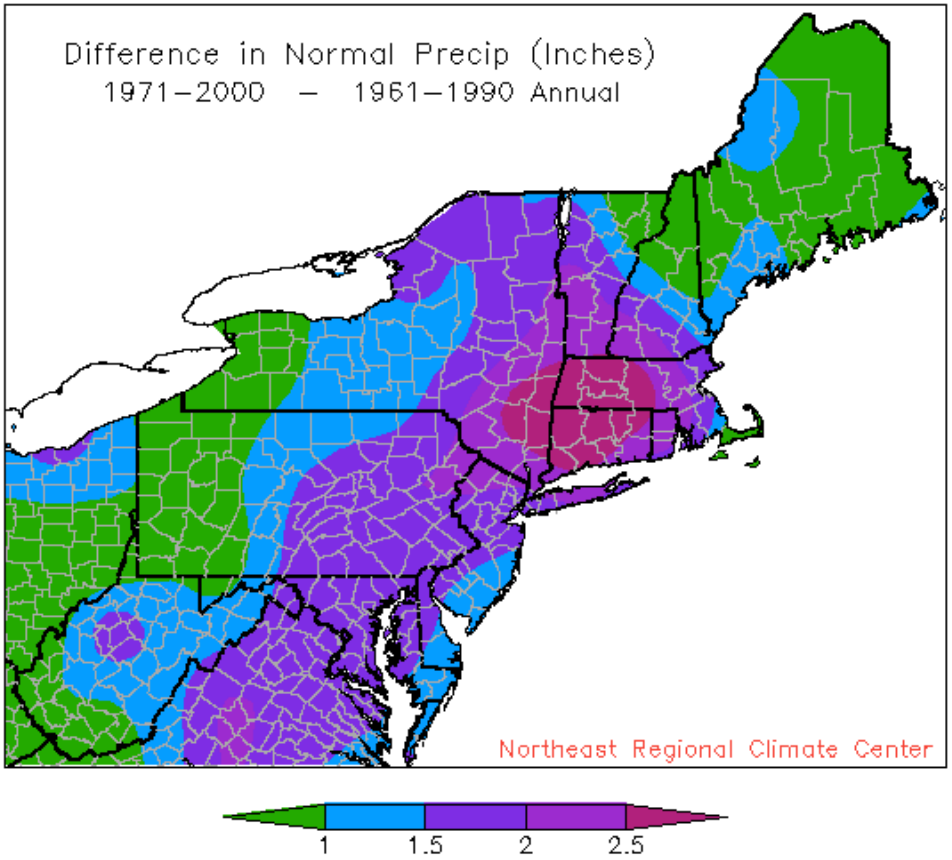
Watershed Management and Resilience in the Face of Climate Change

Marcus Griswold and Zoe Johnson, Office for a Sustainable Future

The New "Normal"

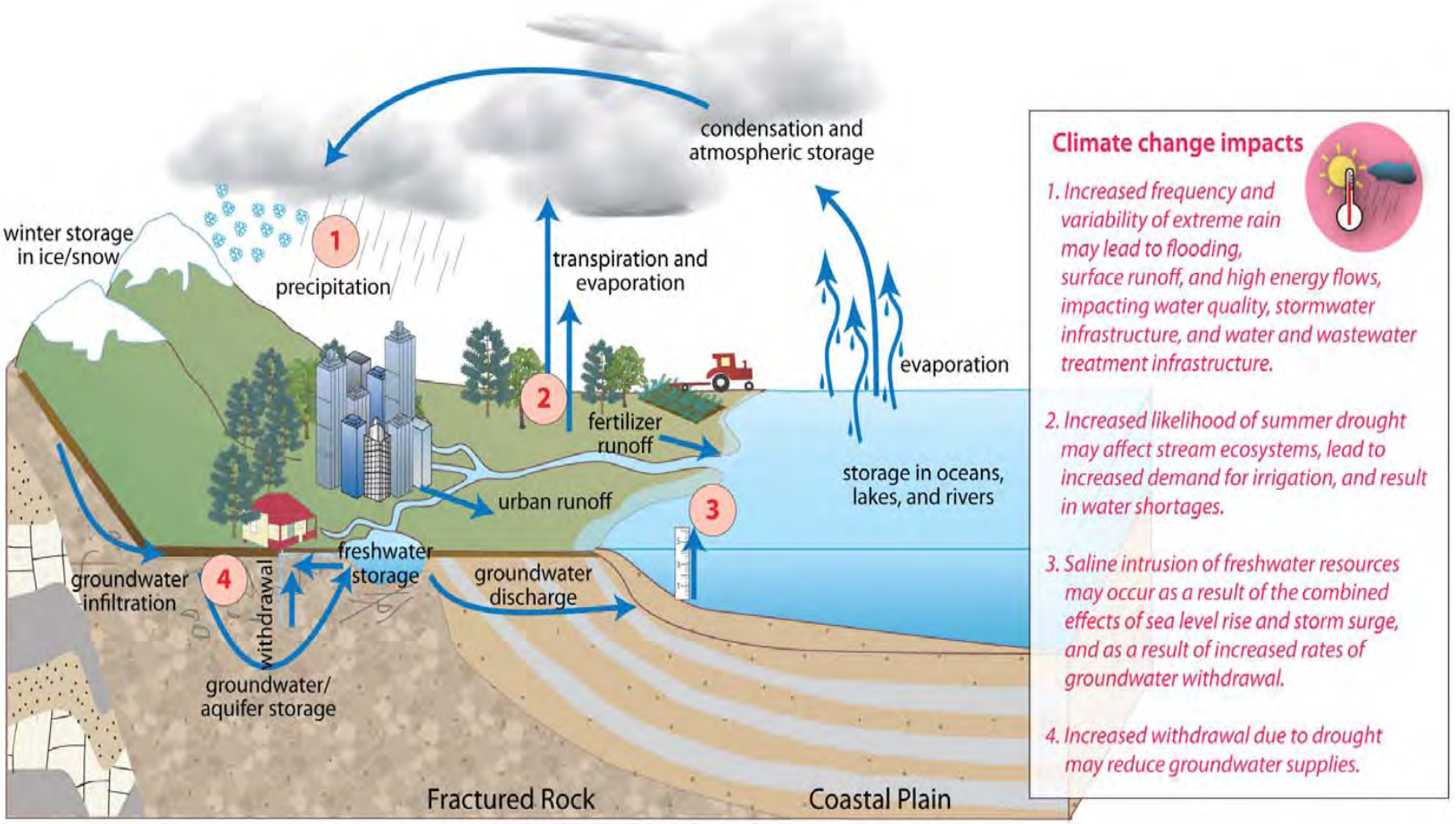
- Piedmont most affected
- Rising
  - Rainfall (~2")
  - Max Temp (1.4 F)
  - GDD (60-80)
- Falling
  - Snow (2-4")
  - HDD (80-100)



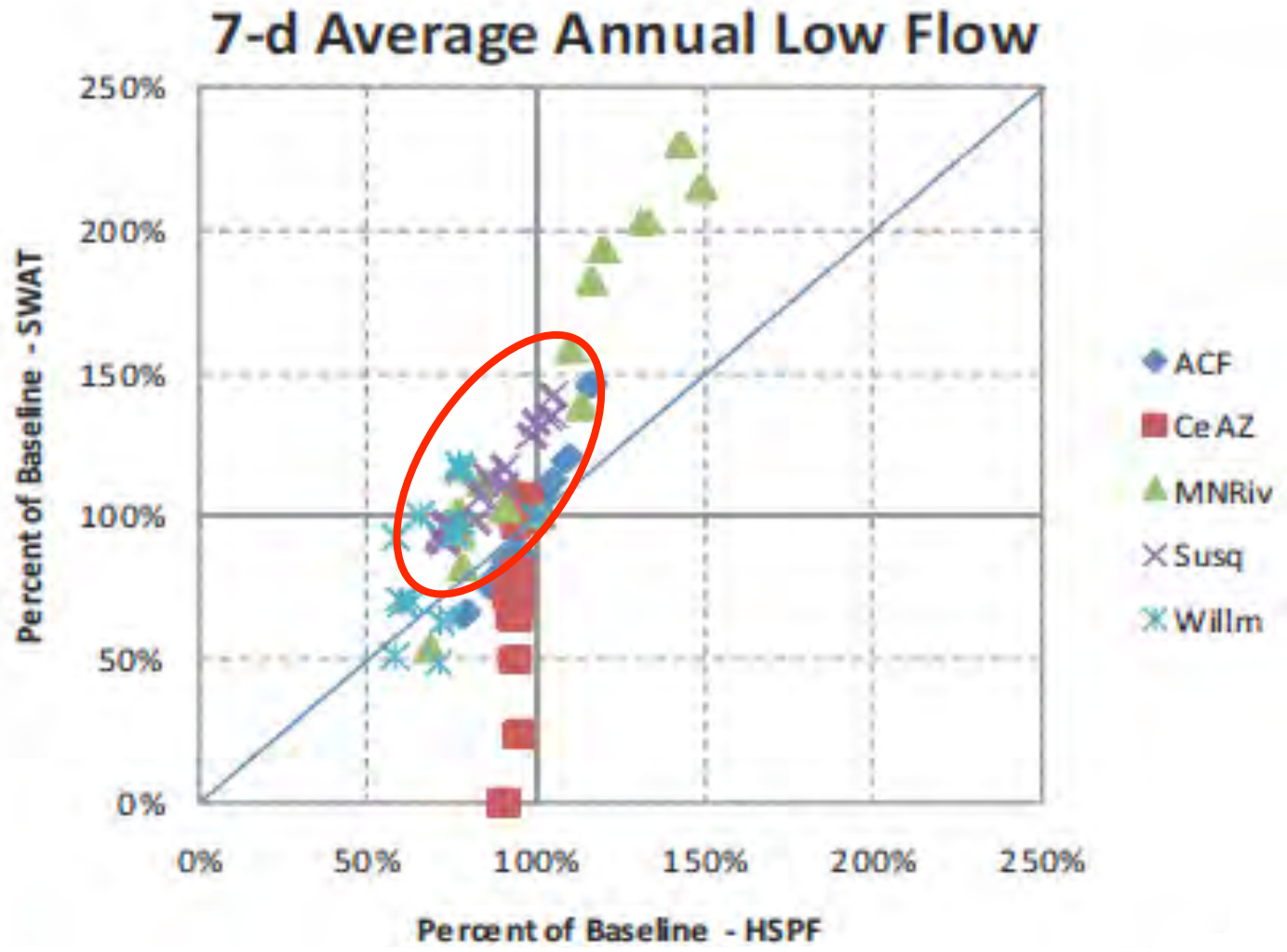
2010 and 2011: A Time for Breaking Records

- August and September of 2011 wettest
- July of 2010 and 2011 hottest
- Hurricane Irene set new records for stream gages in some parts of Maryland and below a major dam (Conowingo)

Climate Change and Our Water

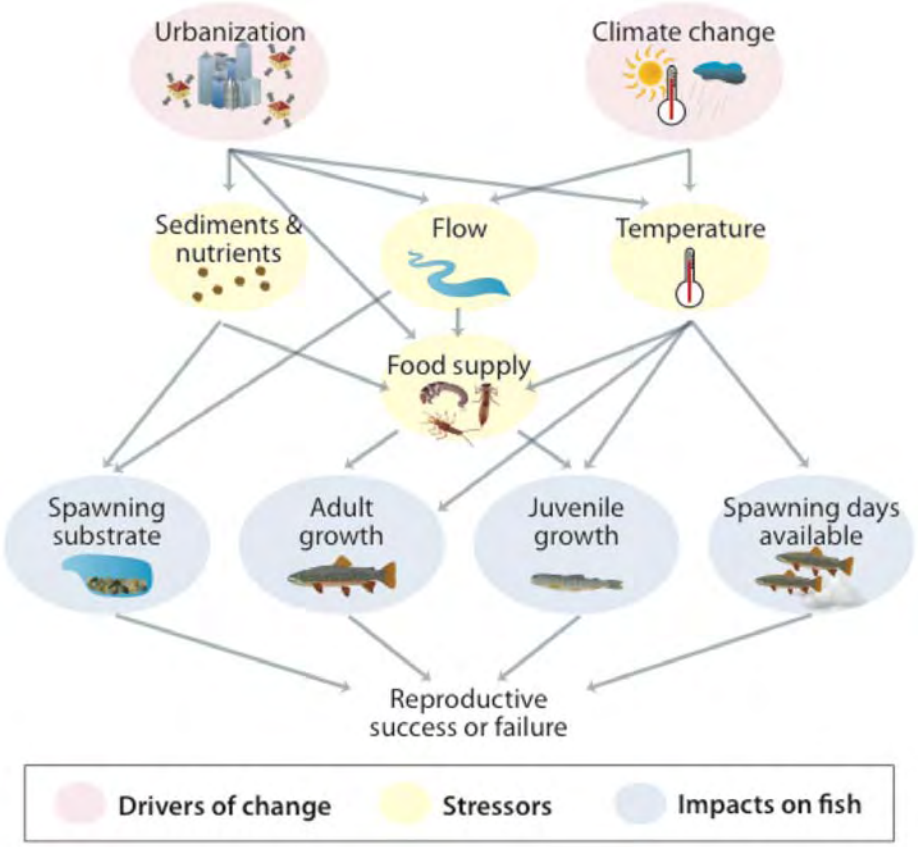


What about Extremes?



Climate Change Threatens Ecosystem Health

- Water temperatures increase by up to 6F
- Smaller fish
- Loss of small wetlands and intermittent or ephemeral streams
- Habitat and water quality degradation



Flooding Will Place our Health at Risk

- Rain and storms have driven 3.3 Billion gallons of sewage into waterways in Maryland
- More runoff places drinking water at risk

Sector-Based Adaptation Planning

Basic Principles for Adaptation

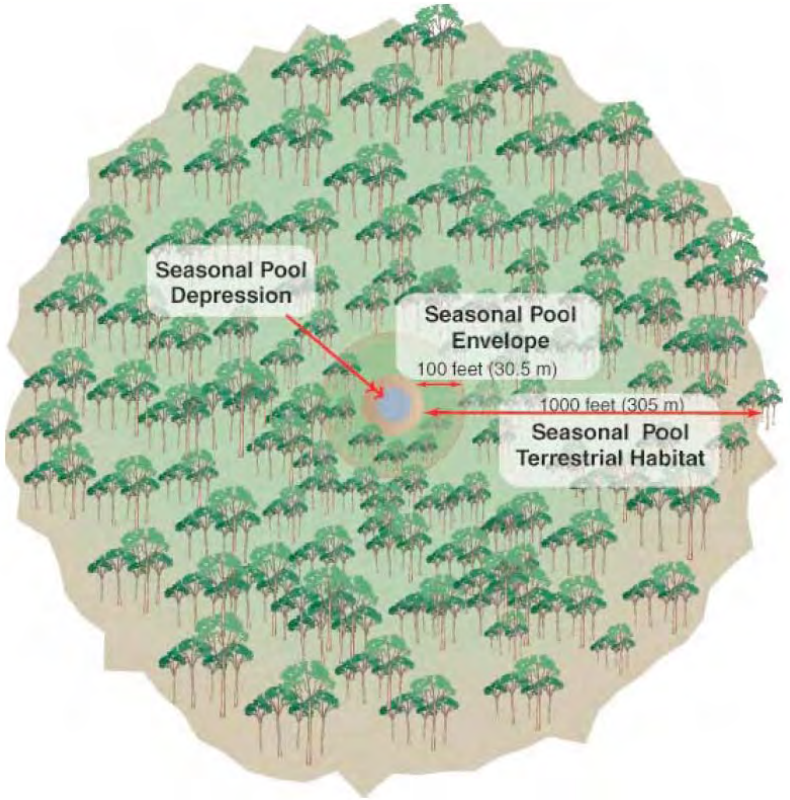
- Maintain benefits of current programs and seek co-benefits
- Invest according to risk
- Limit creation of additional risks
- Measures should not increase greenhouse gases or stresses to the environment

Resilient Watershed Characteristics

- Riparian Zones
  - Wide as possible
  - Floodplain connection
  - Diverse vegetation
  - Few invasive species
- Habitat
  - Deep pools
  - Bank habitat
  - Complex

Building Resilience:
A Focus on Ephemeral Habitats

- High elevation
- Seeps/springs
- Vernal pools
- Non-flowing streams
- Cool water hyporheic inflows
- Tributary junctions



Enhance Ability to Detect Change

- Identify climate sensitive regions and ensure stream gages are located
- Protect reference sites
- Couple with temperature, nutrient and weather data

Build Adaptive Capacity

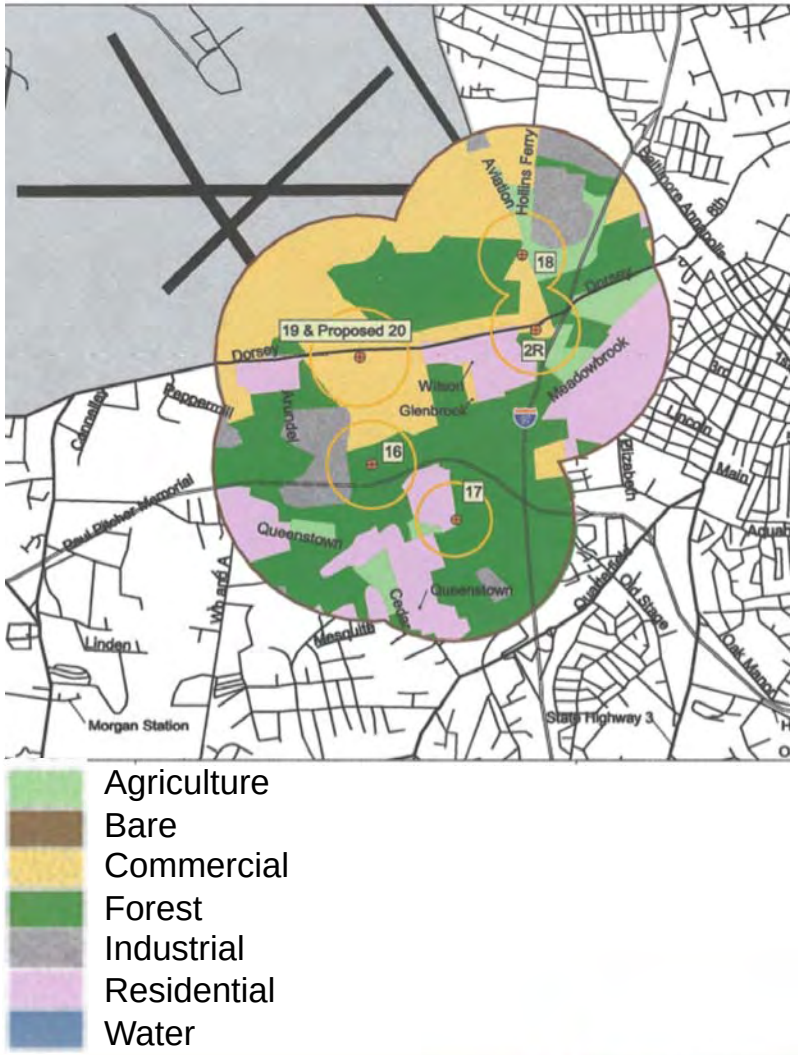
- Enable communities to understand risks and participate in management strategies
  - Education and climate knowledge
  - Local governance
  - Monitor, evaluate and share information

Improve Water Supply Resilience

- Develop state water plan
- Encourage counties to plan across boundaries in WREs
- Integrated management of surface and groundwater
- Upgrade buildings, distribution systems, and other infrastructure to withstand flooding events
- Identify backup and alternative water sources

Protect Water Supplies

- Avoid development in high risk areas
- Prioritize funding streams for source water/wellhead protection
  - In water and sewer plans
  - Water Resource Elements
  - CW/DW SRF
  - Ecosystem Markets and land conservation efforts



Value Natural Processes

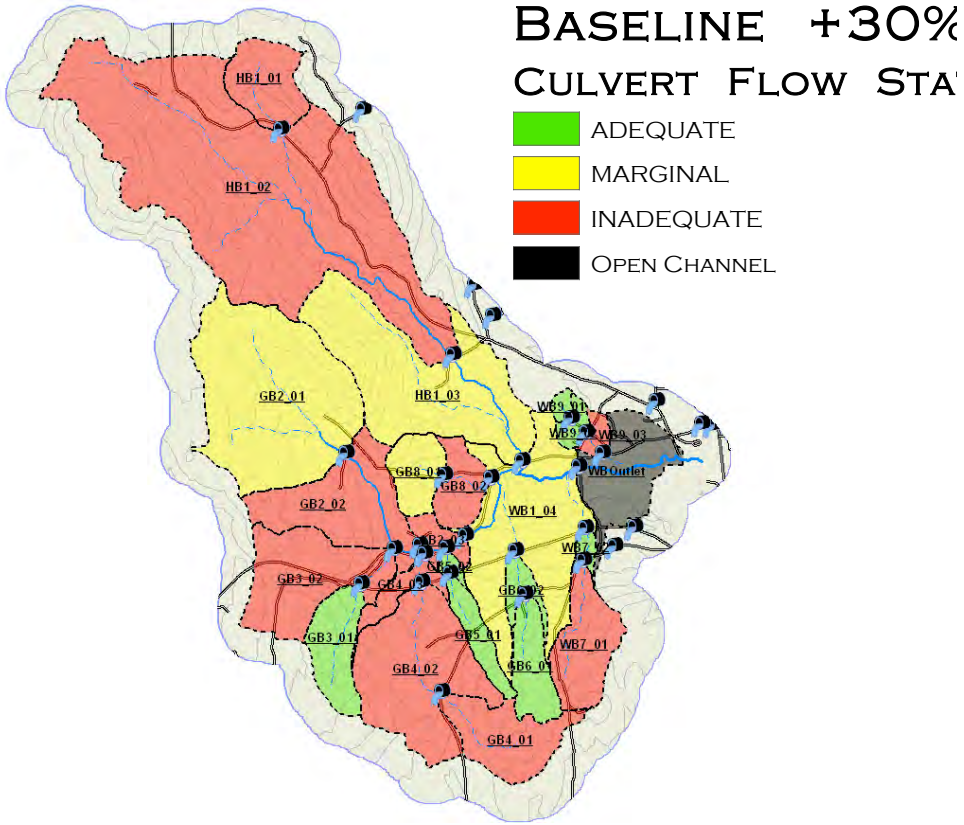
- Address ecosystem services
- Increase floodplain connectivity and wetland protection and restoration

Enhance Protection of Ephemeral and Headwater Systems

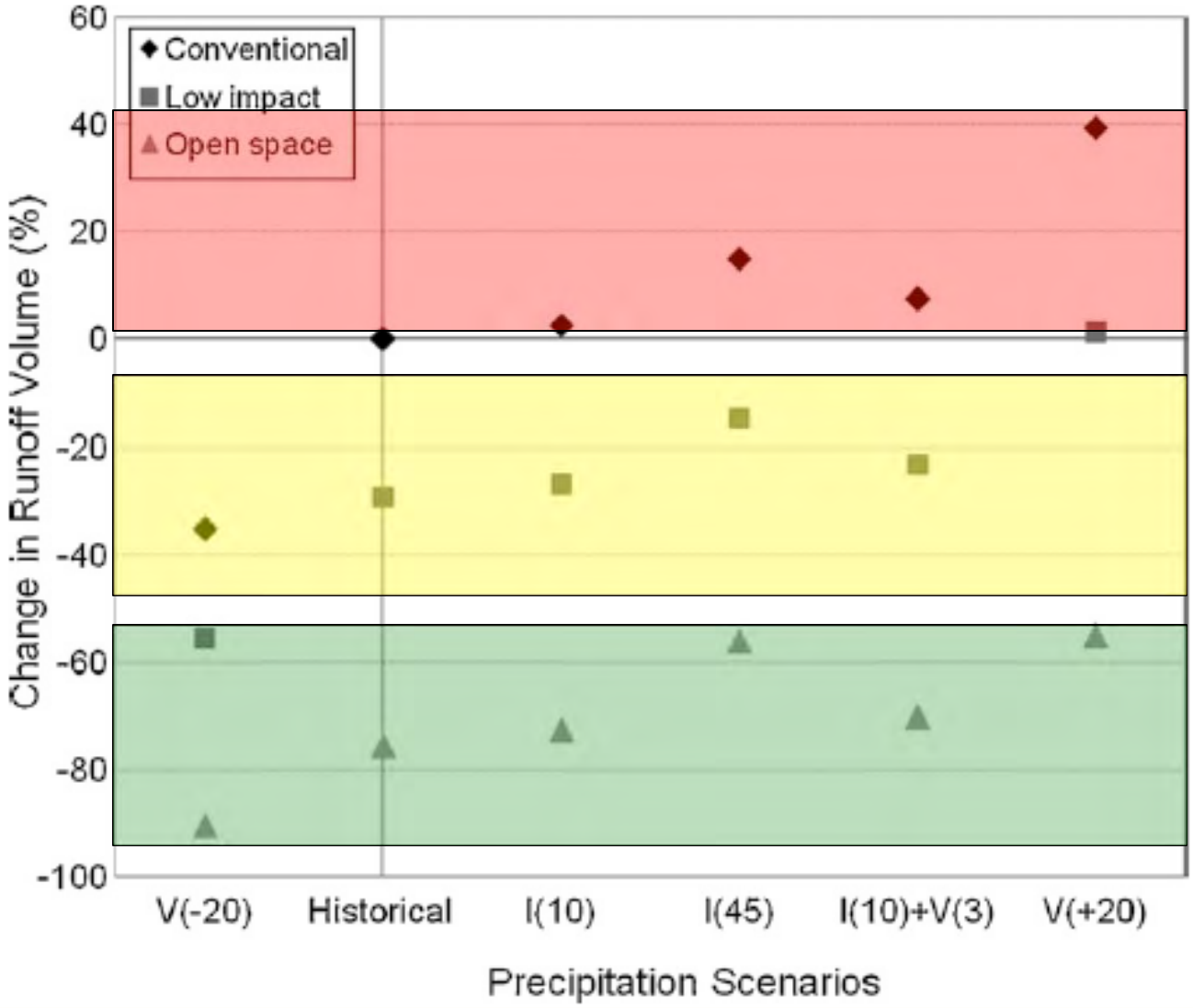
- Develop standardized field protocol and mapping effort
- Protect through local planning process
- Develop adequate impact regulations

Reduce Impacts of Flooding and Stormwater

- Evaluate design guidelines and accelerate ESD
- Ensure sustainable flows
- Reduce impervious surface cover



ESD: A Climate Buffer

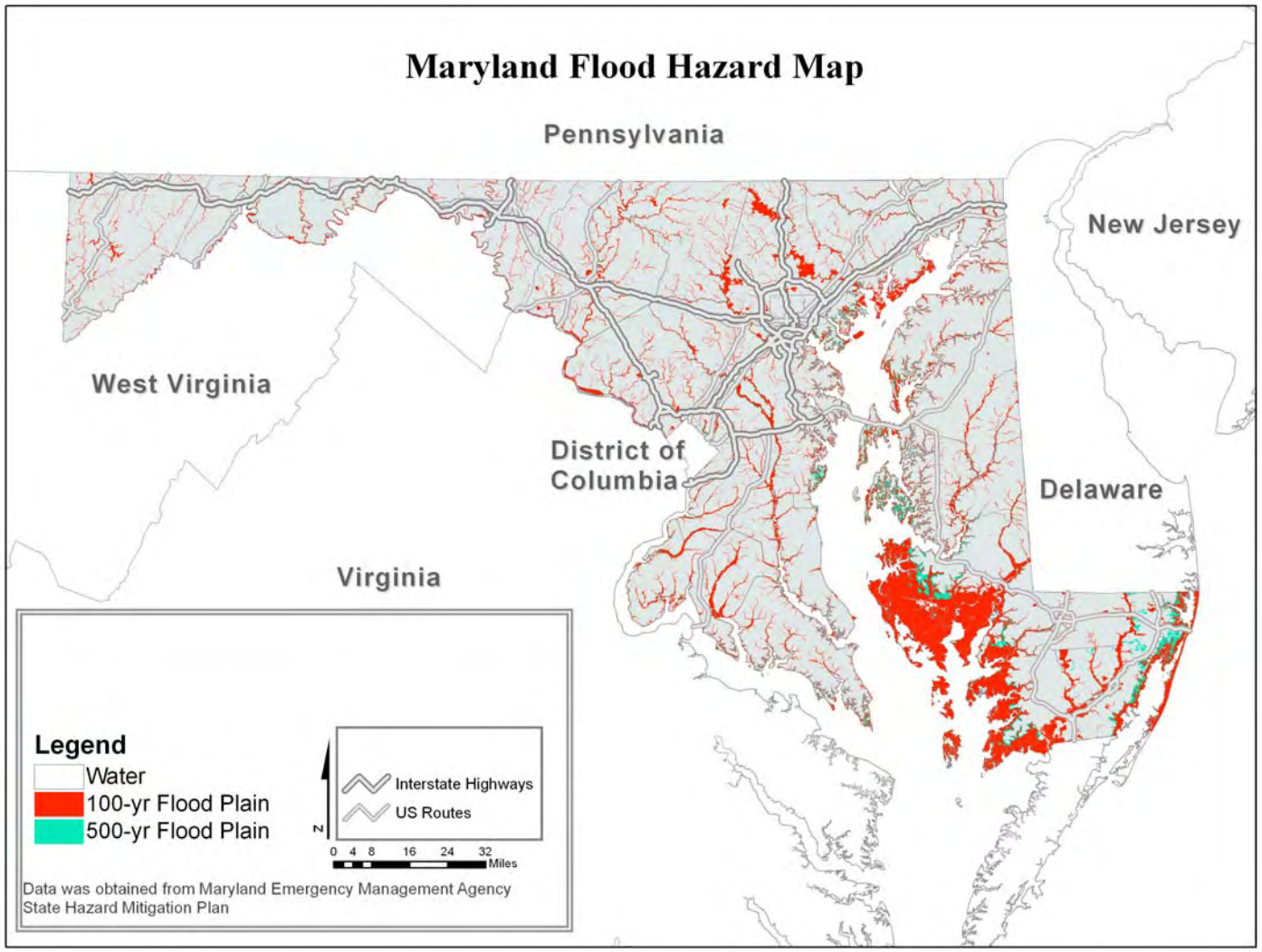


Conventional SWM

ESD

Open Space

Guidance for Land Use Planning



Moving Forward

- Tools
  - Risk maps and web based tools
  - Guidelines for design and planning
  - Adaptation metrics
- Research
  - Socioeconomic, ecological, and regulatory impacts of strategies and policies
  - Coupling between mitigation and adaptation
  - Developing management thresholds
  - Changes in hydrology: flooding and water supply
- Education (e.g. www.madeclear.org)

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