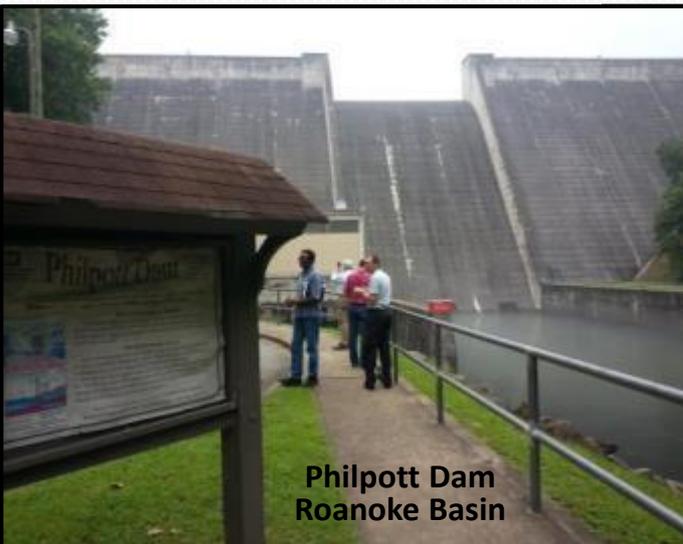


The Integrated Basin-Scale Opportunity Assessment Initiative: Phase 1 Methodology and Preliminary Scoping Assessment for the Roanoke River Basin

ORNL Webinar - February 18, 2014



Philpott Dam
Roanoke Basin



- Describe the:
 - Stepwise technical approach
 - Geospatial methodology
 - Preliminary results
- Obtain feedback to:
 - Improve the approach and methodology
 - Improve the Phase 1 Scoping Assessment for the Roanoke River basin

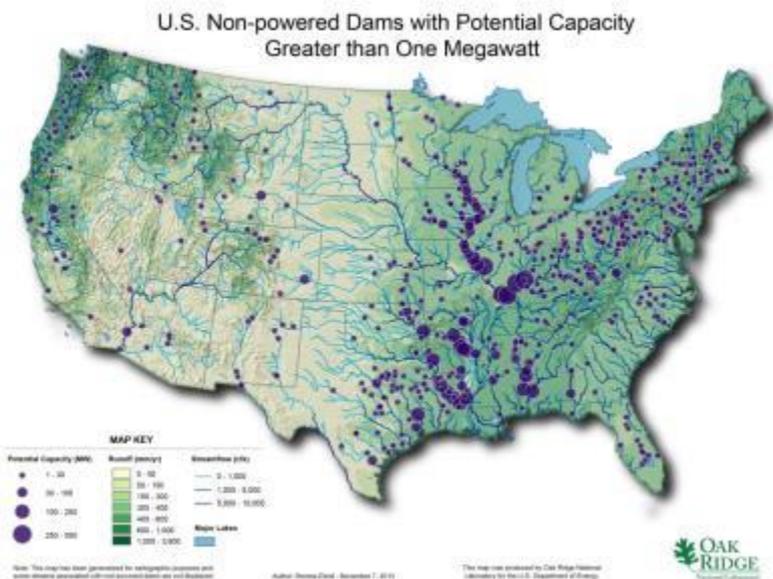
- Background on BSOA Project
- Objective of a Phase 1 Scoping Assessment
- Approach and Methodology
- Preliminary Results for the Roanoke River Basin
- Discussion and Next Steps
- Feedback

- Goal is to develop and implement an integrative approach for the assessment of hydropower and environmental opportunities at a river-basin scale.
- Experience with BSOA during 2010-2012 in the Deschutes River basin identified three phases:
 - **Phase 1 Scoping Assessment**
 - Phase 2 Stakeholder Engagement
 - Phase 3 Technical Analysis
- Oak Ridge National Laboratory and Pacific Northwest National Laboratory completed *preliminary* Phase 1 Scoping Assessments for the DOE Water Power Program in FY13.

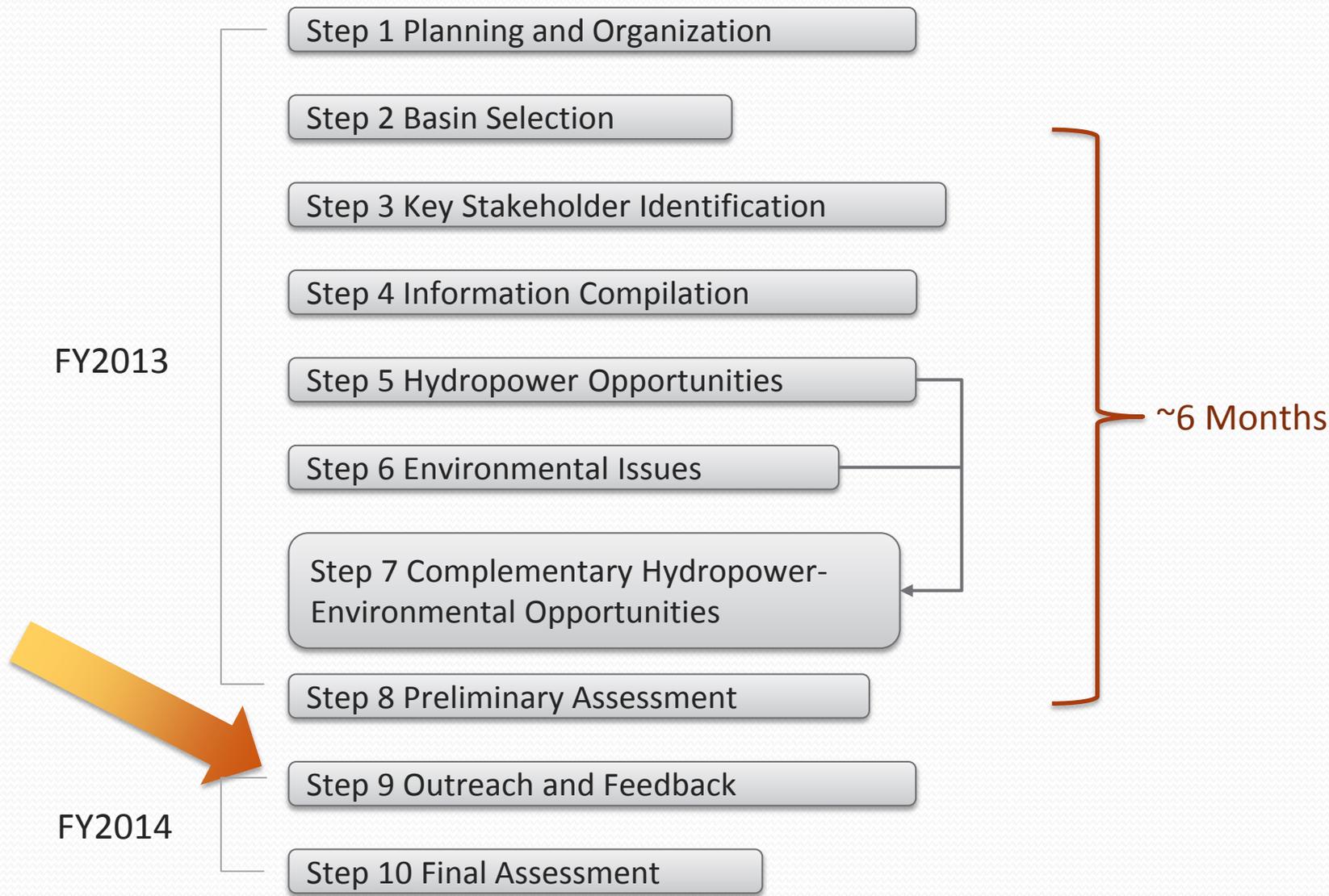
Phase 1 Objective

- Phase 1 Scoping Assessments are intended to provide initial identification, classification, rapid screening, and integration of possible *complementary* hydropower and environmental opportunities in a given basin for DOE and basin stakeholders to consider carrying forward as appropriate.
- Complementary hydropower-environmental opportunity:
 - Win-win opportunities
 - Can existing environmental improvements be made in conjunction with hydropower development that offset any impacts associated with development

- Opportunities
 - Possible actions for hydropower development or environmental improvement.
 - Hydropower
 - Powering a non-powered dam, efficiency improvements, new development
 - Environmental
 - Flow restoration, fish passage, water quality, recreation, etc.



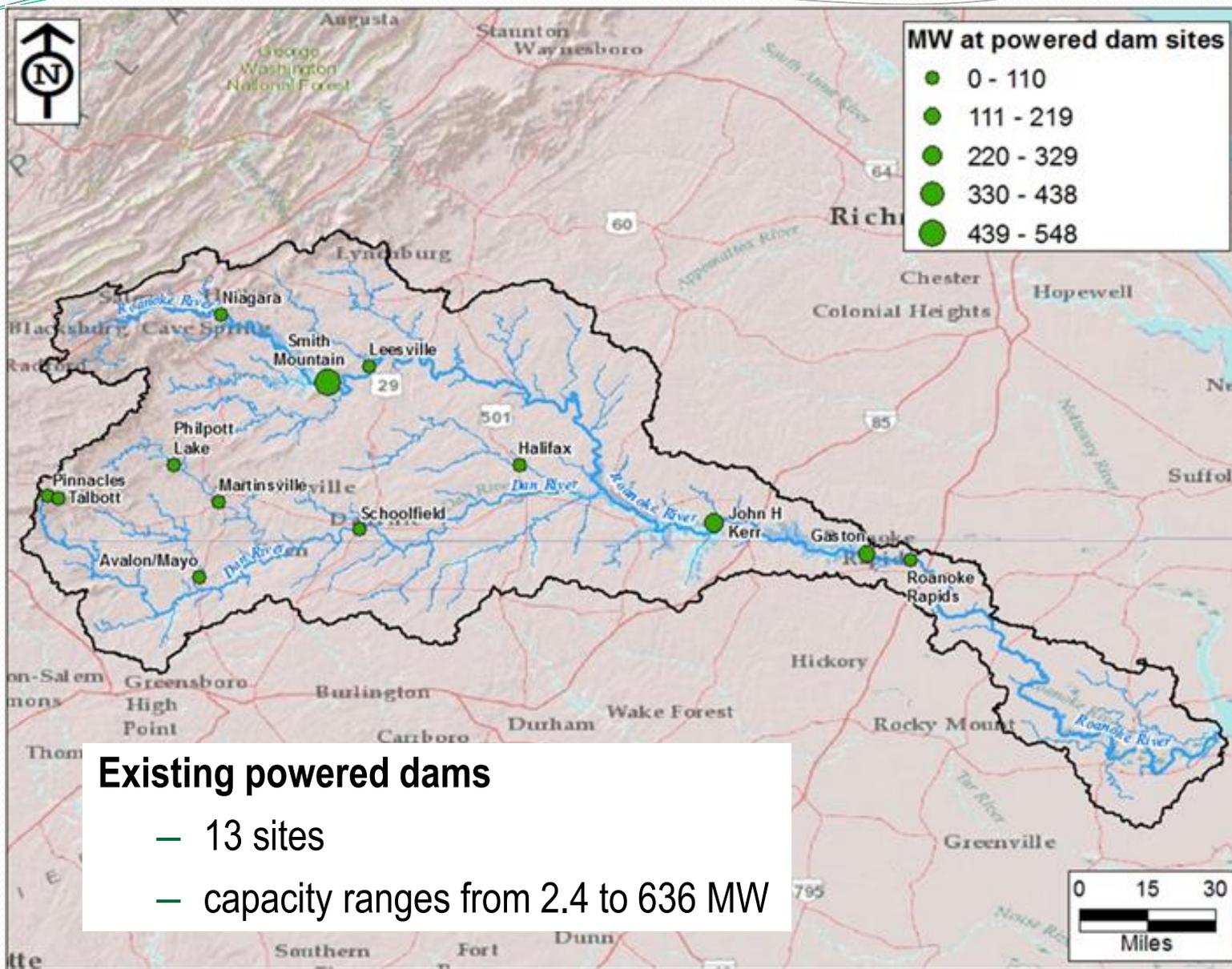
Stepwise Technical Approach

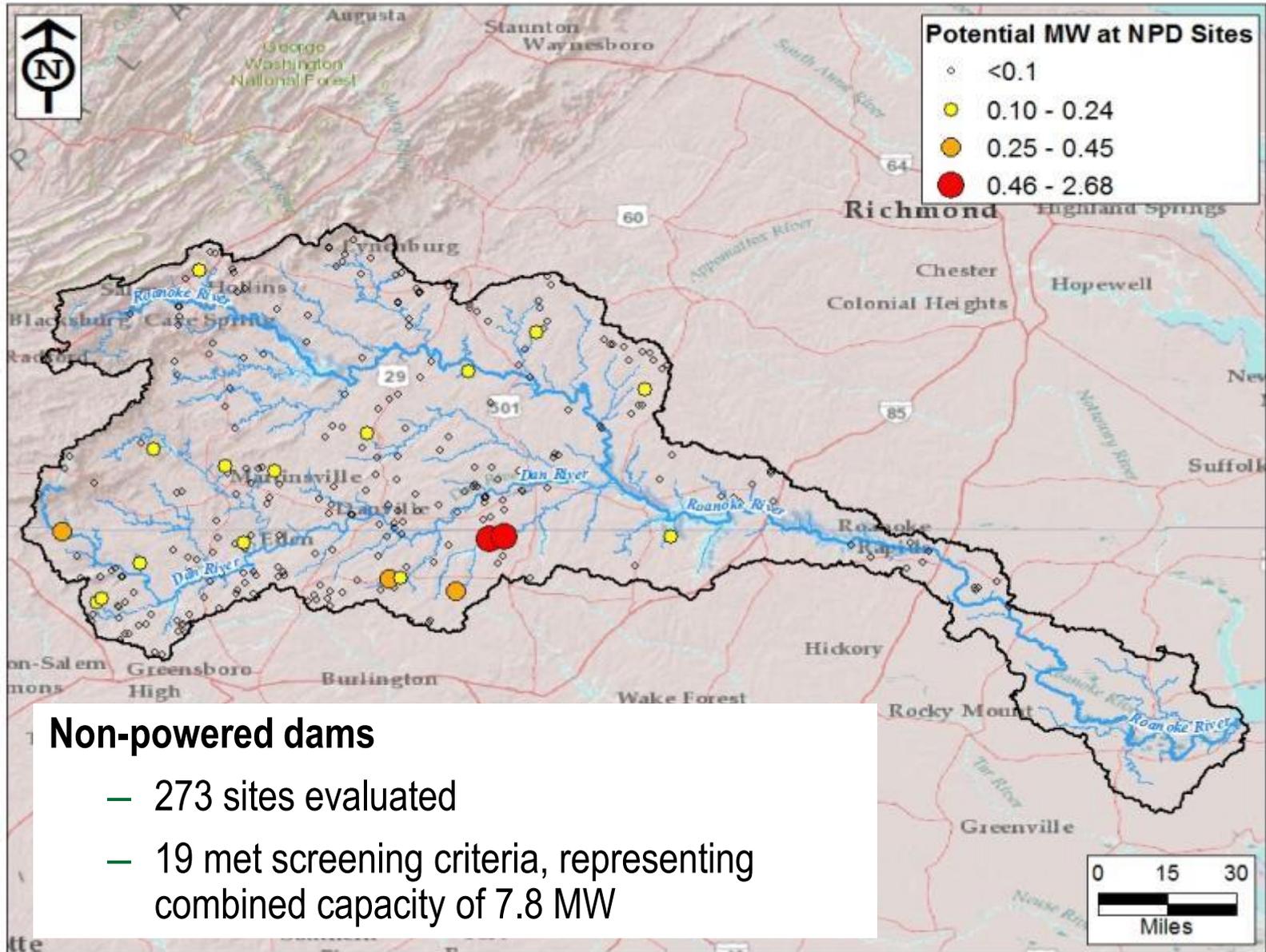


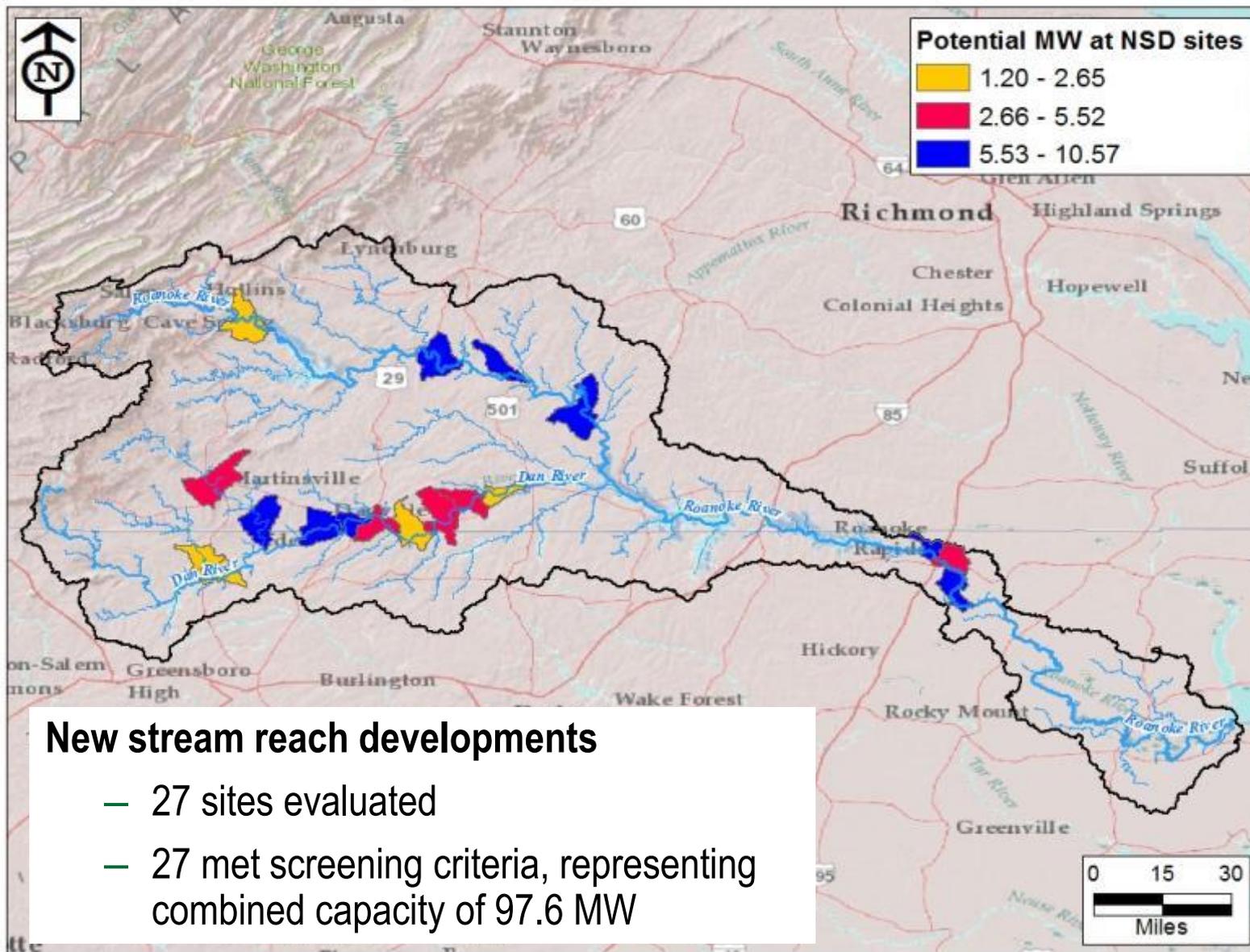
- Categories
 - Powering non-powered dams
 - New stream reach development
 - In-canal/conduit
 - Efficiency improvements at existing facilities

- Source
 - National Hydropower Asset Assessment Program (NHAAP; <http://nhaap.ornl.gov/>)
 - Other basin-specific resources

Preliminary Results







- **Categories**

- Fish Interactions
- Aquatic habitat loss/degradation
- Water quality
- Hydrology & hydraulics
- Preservation, aesthetics, recreation, etc.

- **Sources**

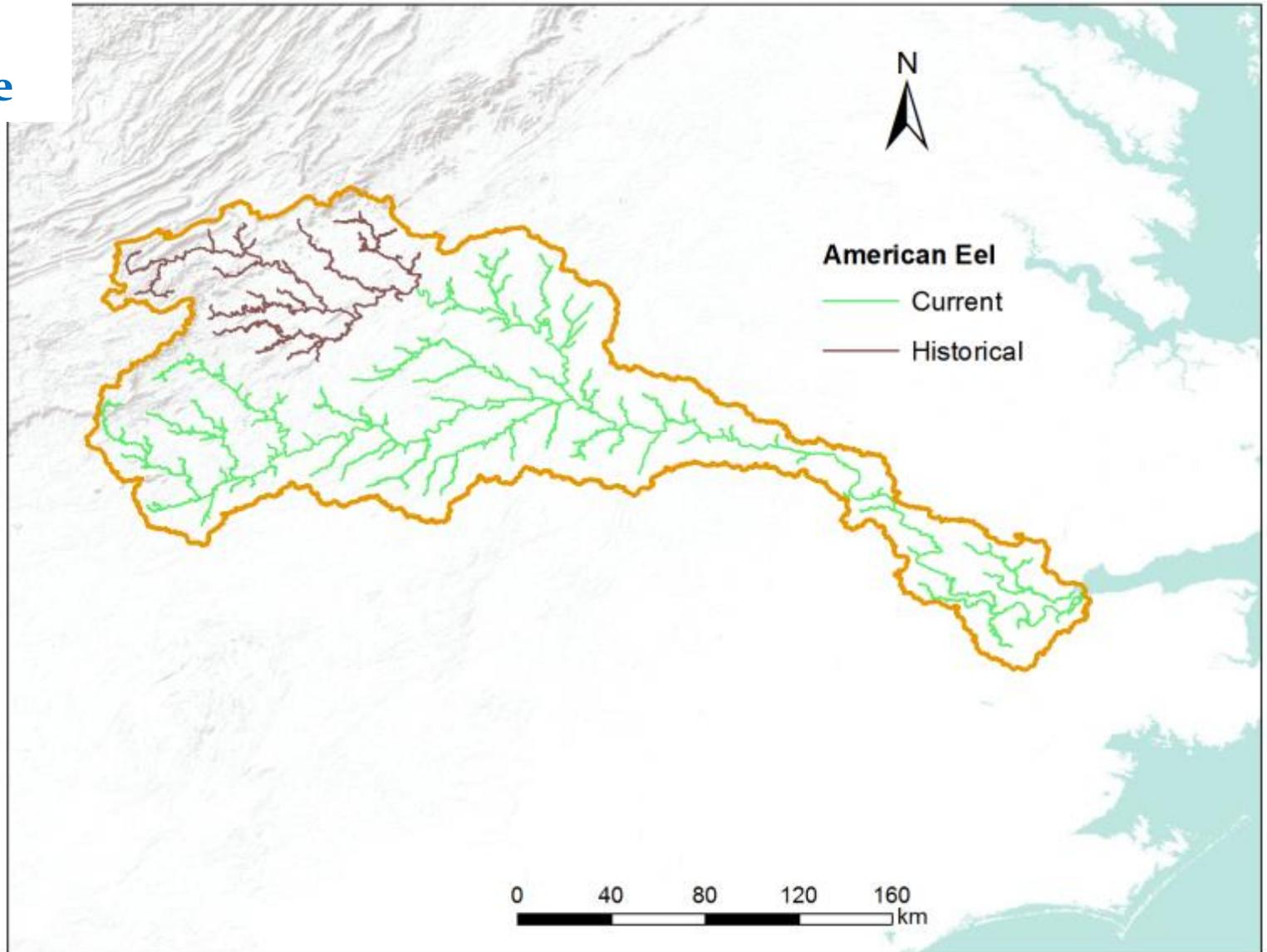
- Watershed planning documents
- Stakeholder reports
- Environmental Impact Statements
- Water-quality certifications
- Regulatory filings for hydropower projects
- Nationally available environmental data

- Fish Interactions
 - USGS National Anthropogenic Barrier Dataset
- Water quality
 - EPA 303d Listed Waterbodies
- Aquatic habitat
 - NatureServe, USFWS Critical Habitats, National Fish Habitat Action Plan
- Hydrology
 - National Hydrography Dataset, USGS Surface Water Data
- Other
 - National Protected Area Database, American Whitewater Database

Defining Environmental Opportunities

Example:

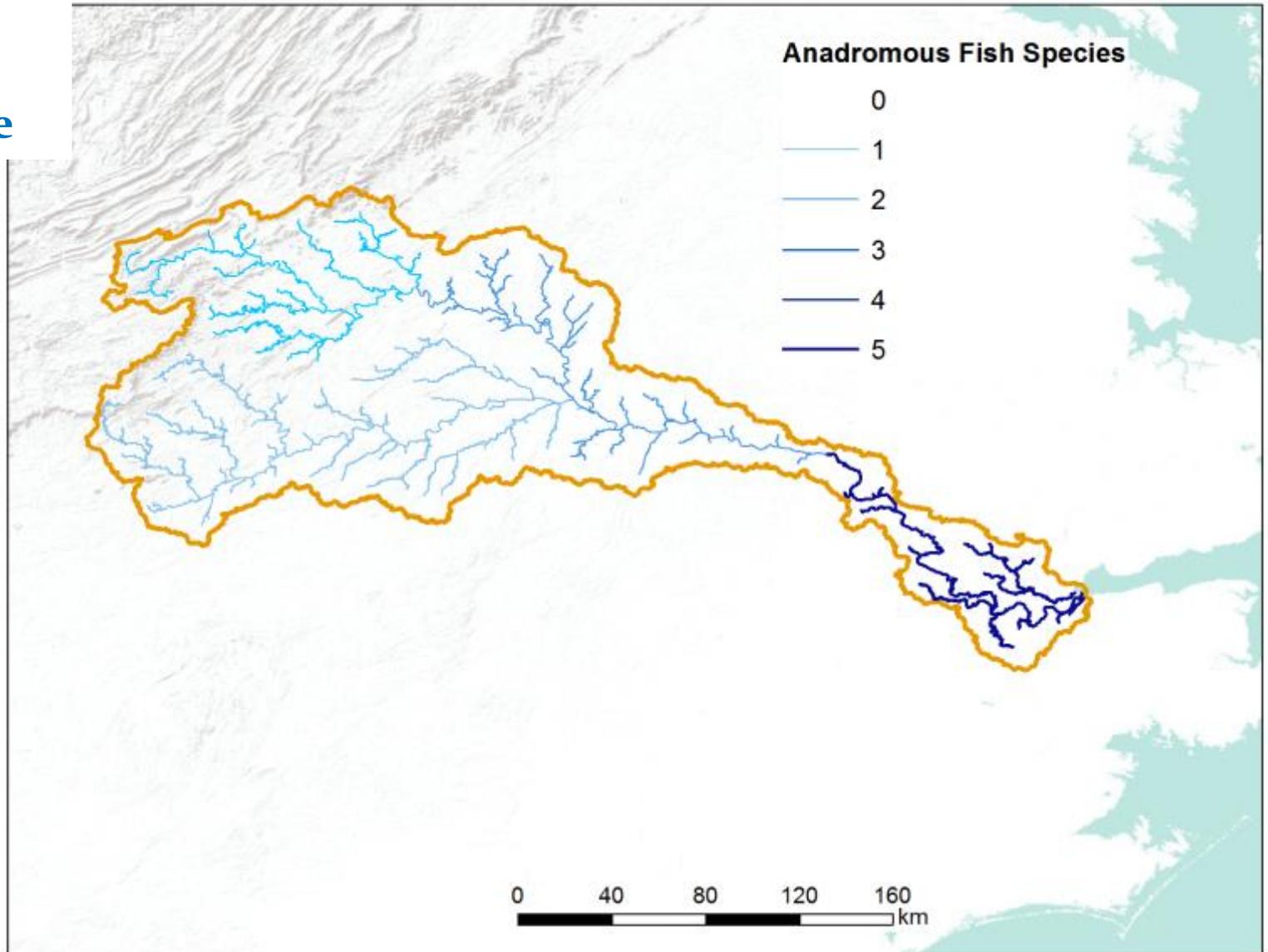
Fish Passage



Defining Environmental Opportunities

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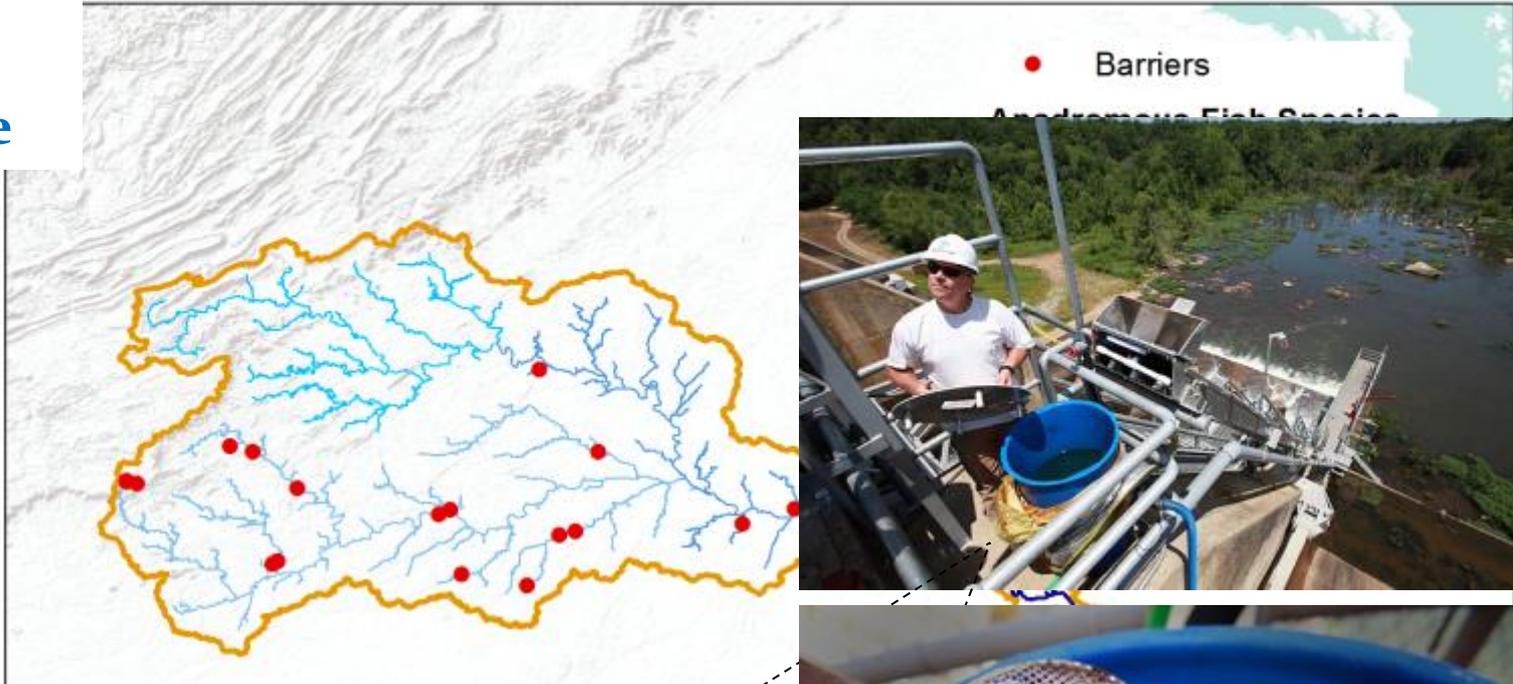
Fish Passage



Defining Environmental Opportunities

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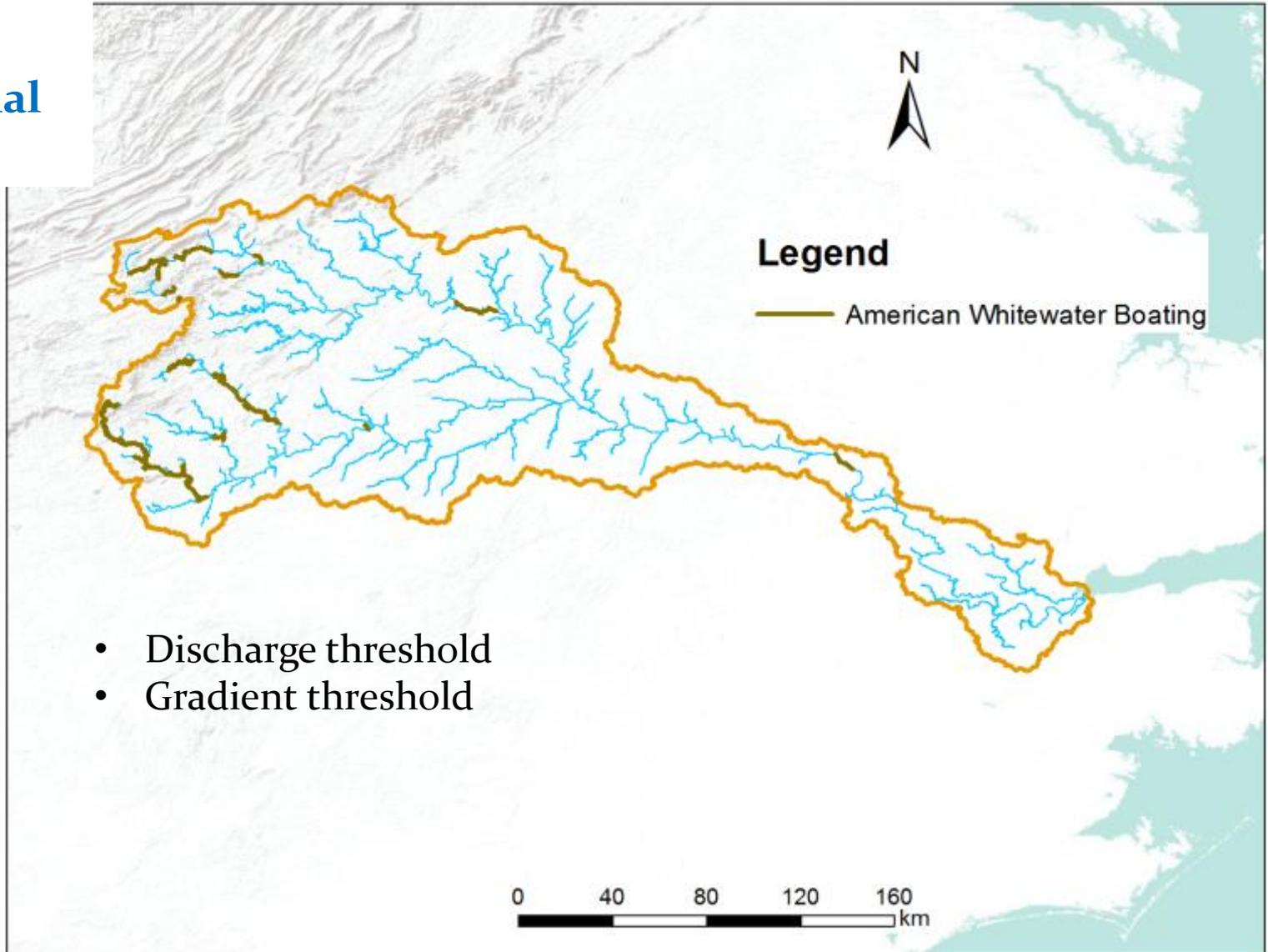
Fish Passage



Defining Environmental Opportunities

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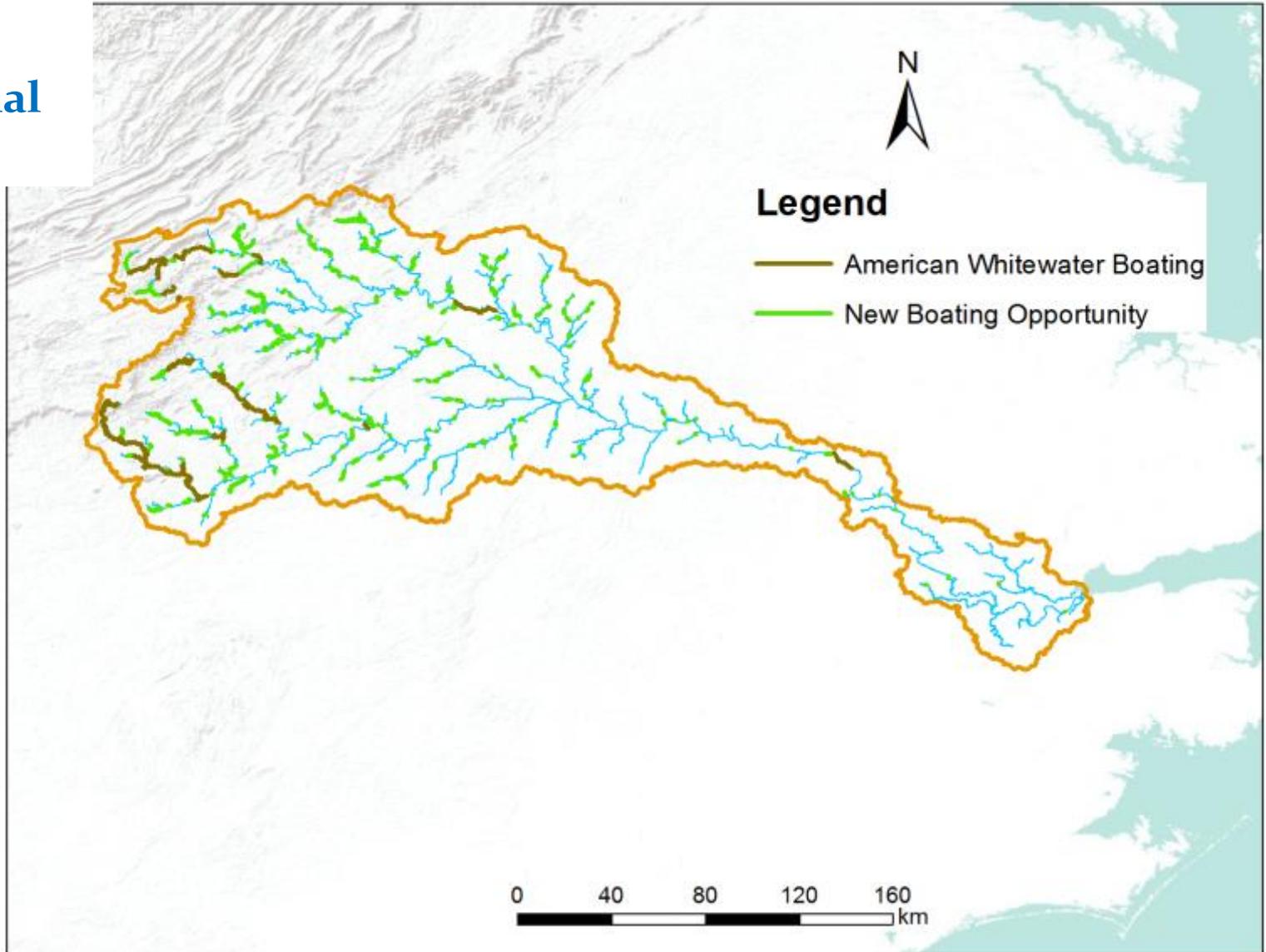
Recreational
Boating



Defining Environmental Opportunities

Example:

Recreational
Boating



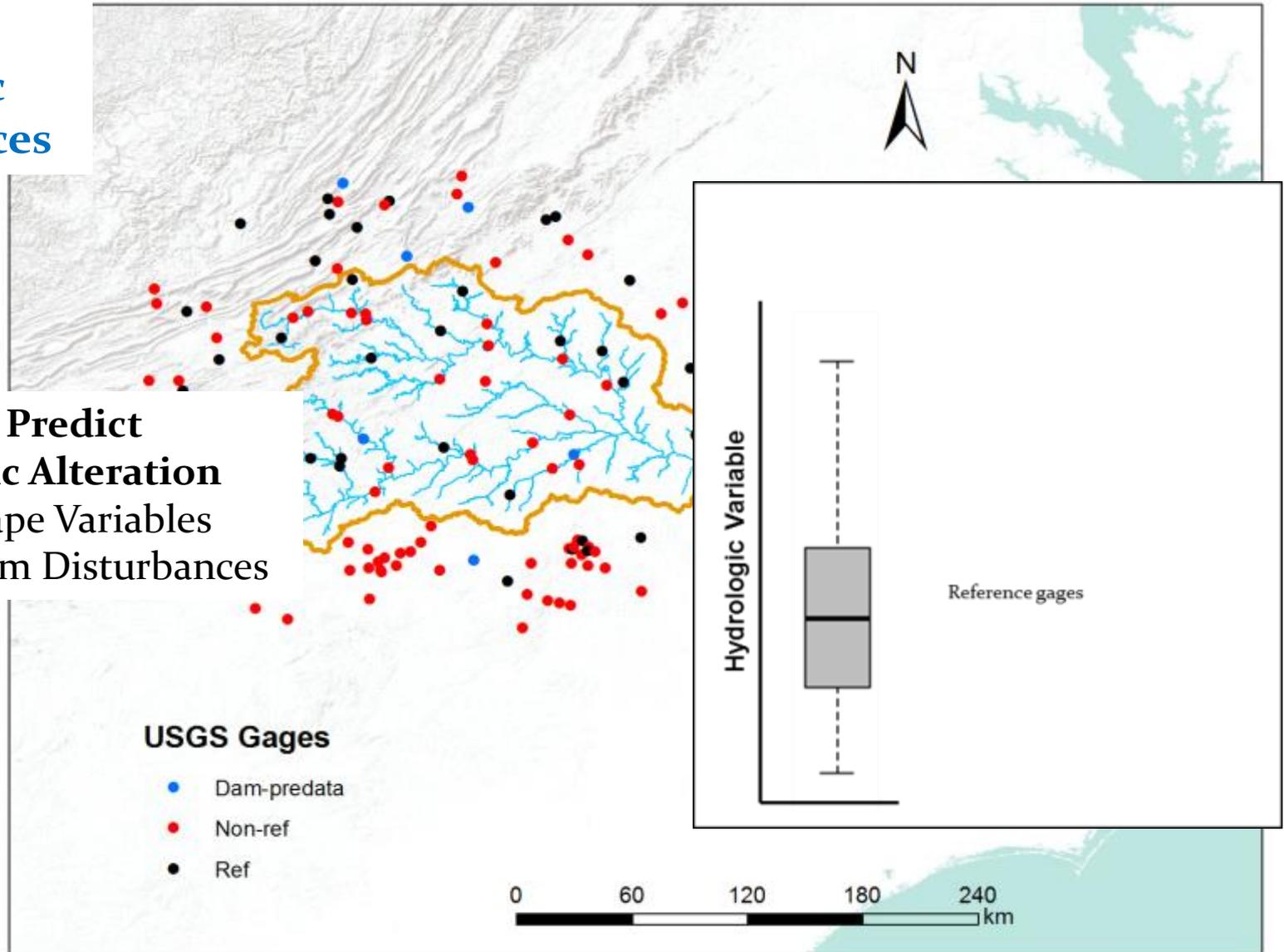
Defining Environmental Opportunities

Example:

Hydrologic Disturbances

Models to Predict Hydrologic Alteration

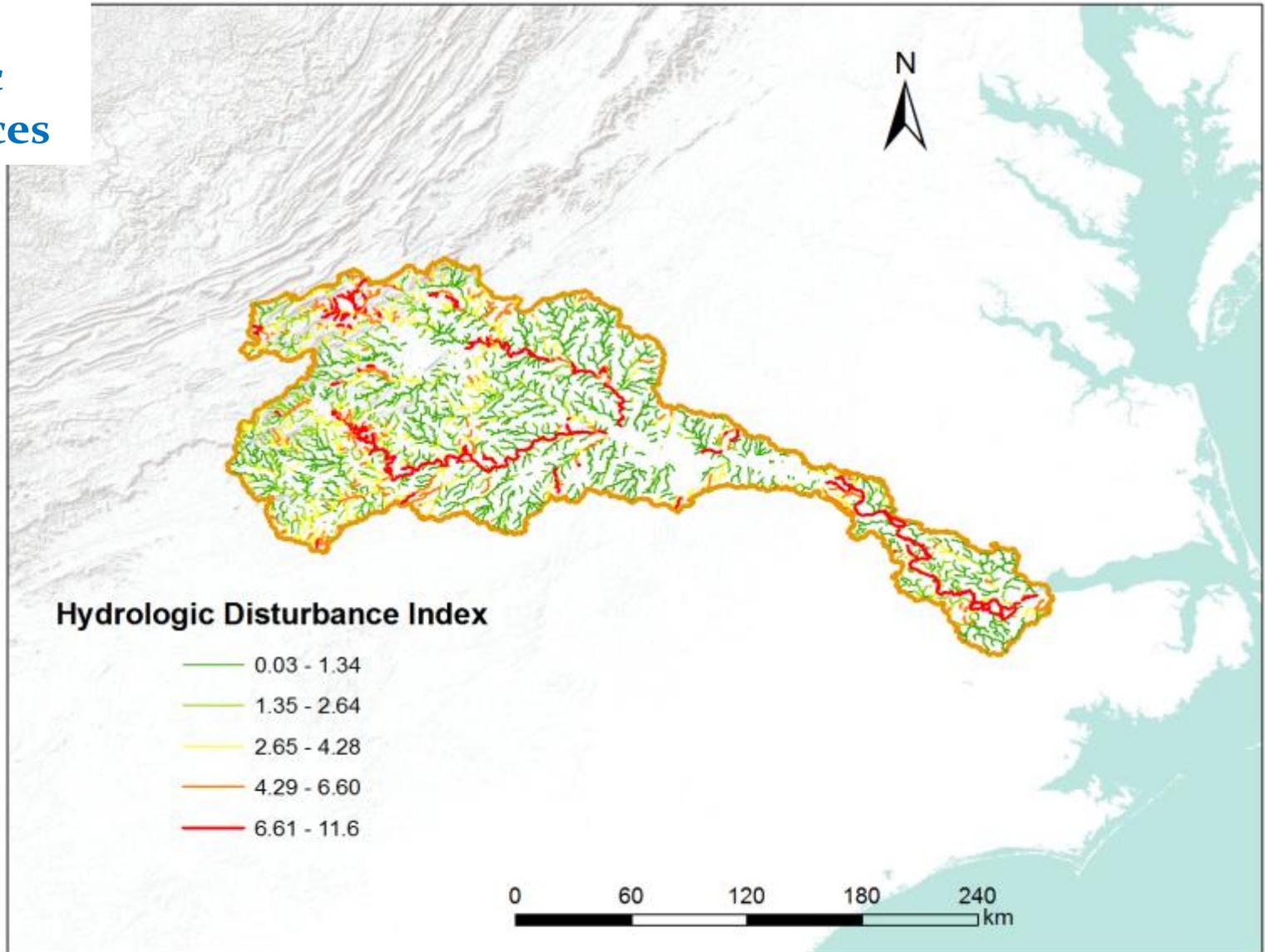
- Landscape Variables
- Upstream Disturbances



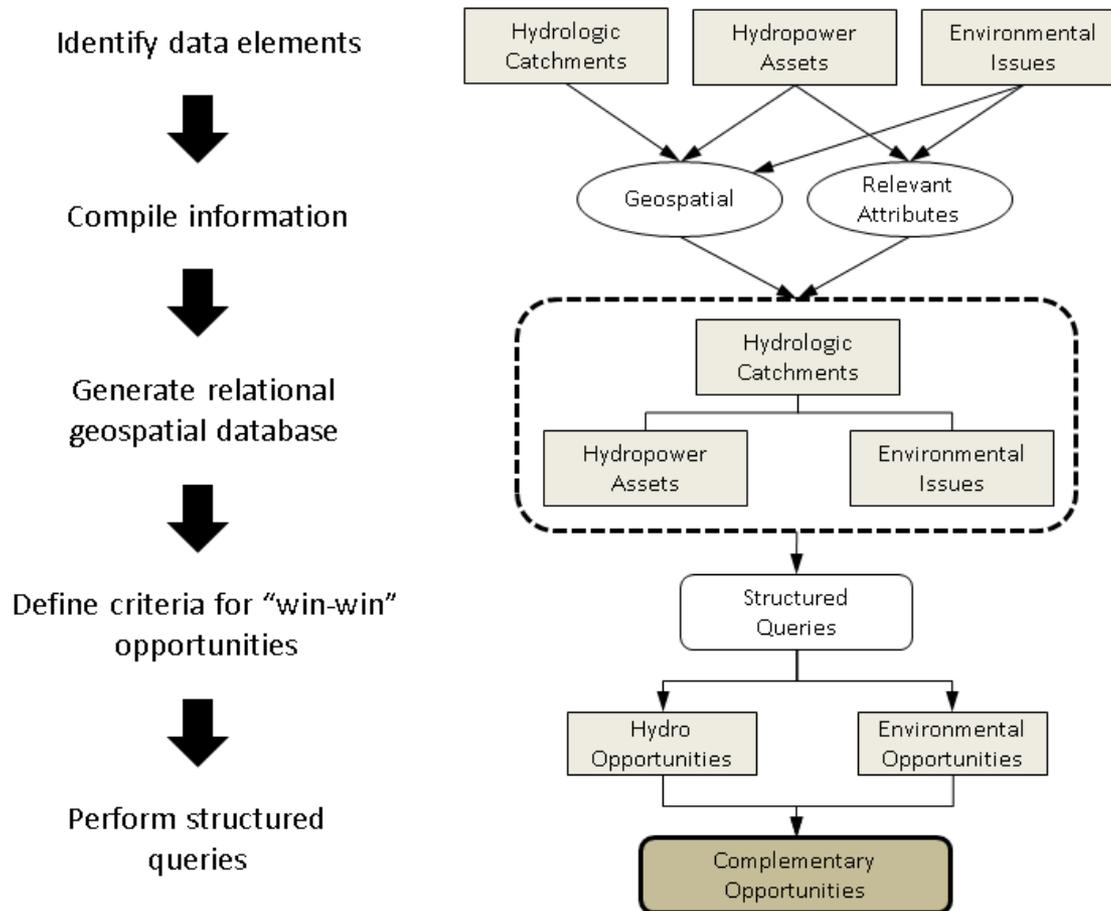
Defining Environmental Opportunities

Example:

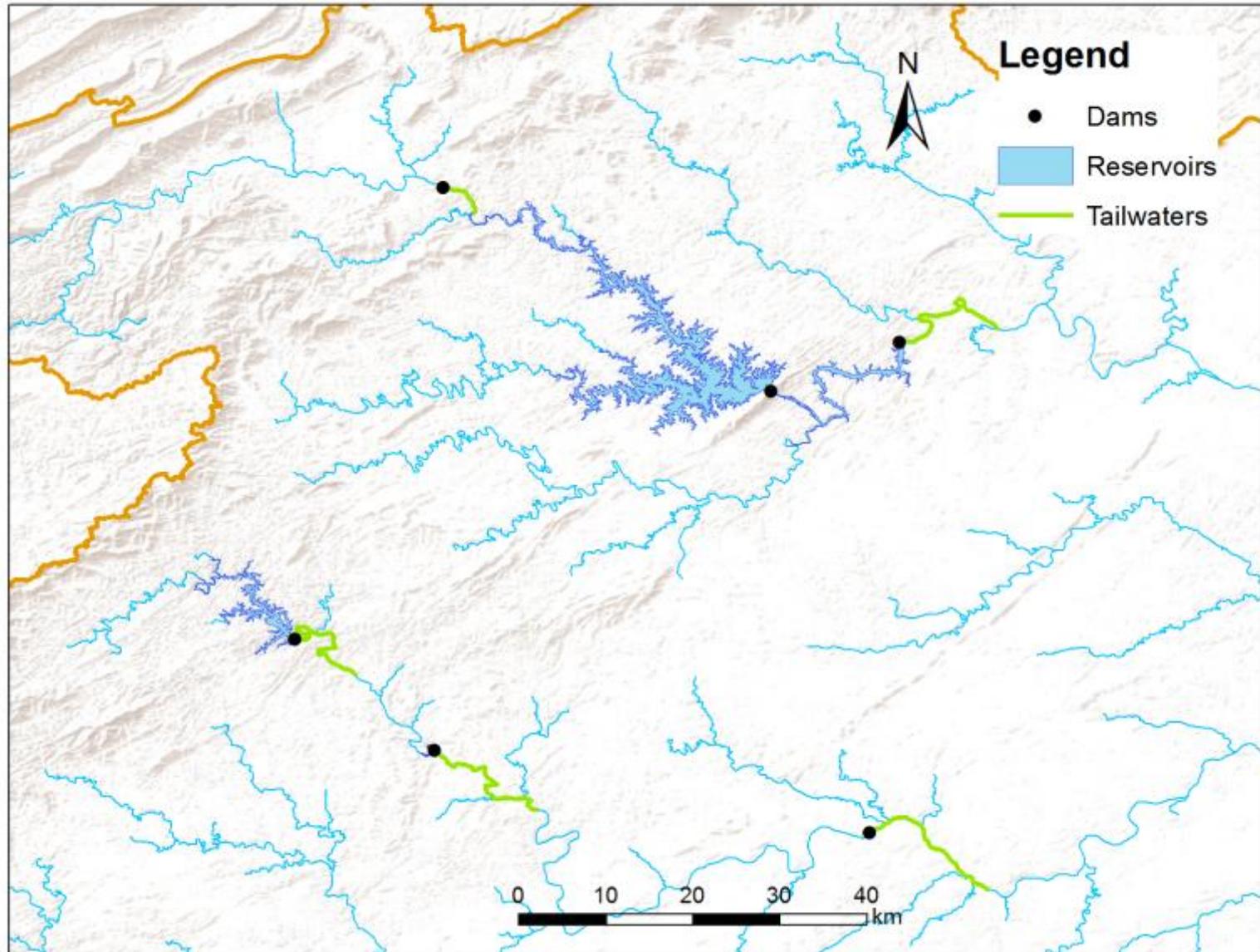
Hydrologic
Disturbances



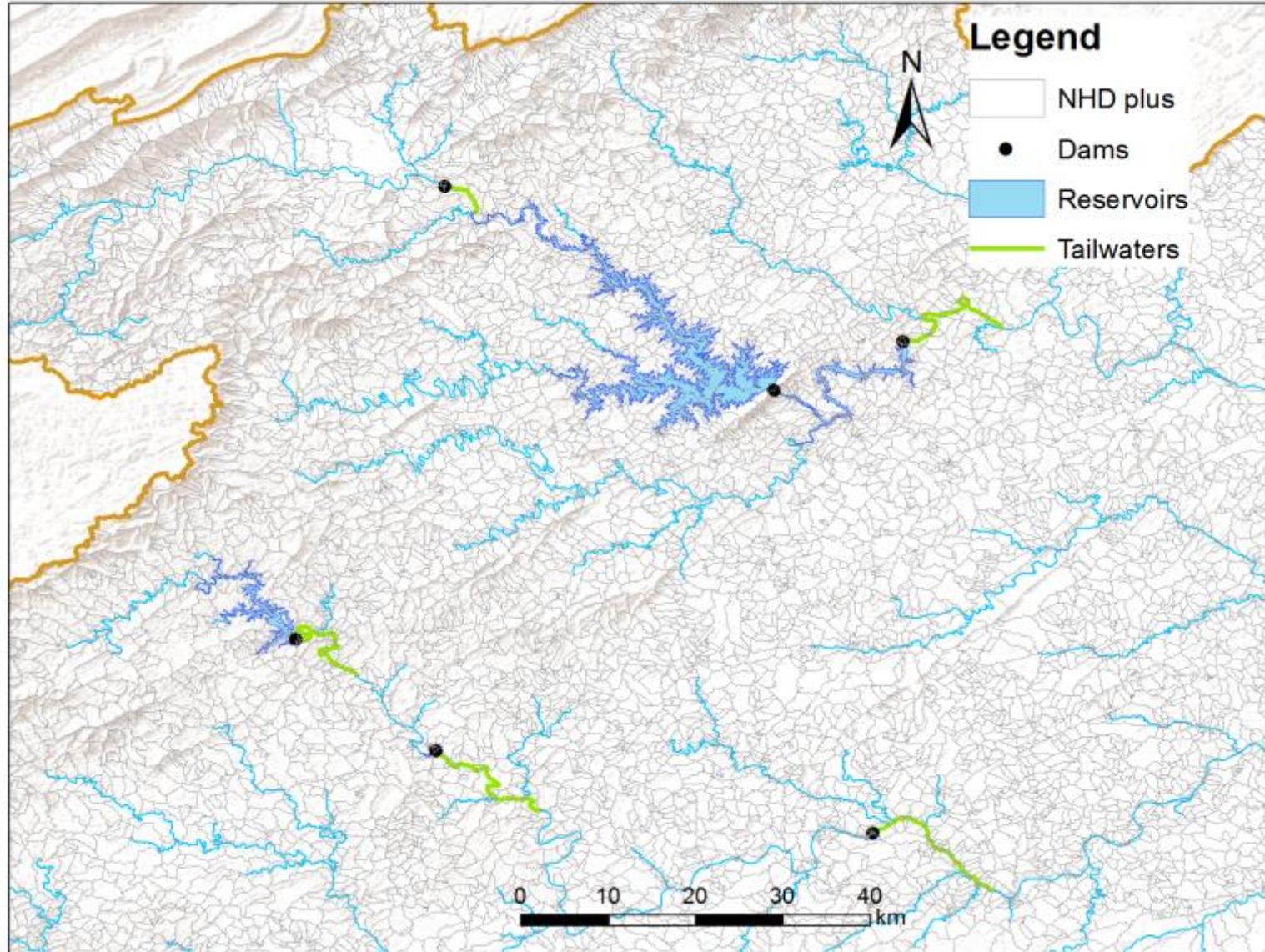
BSOA Data Model & Process Flow



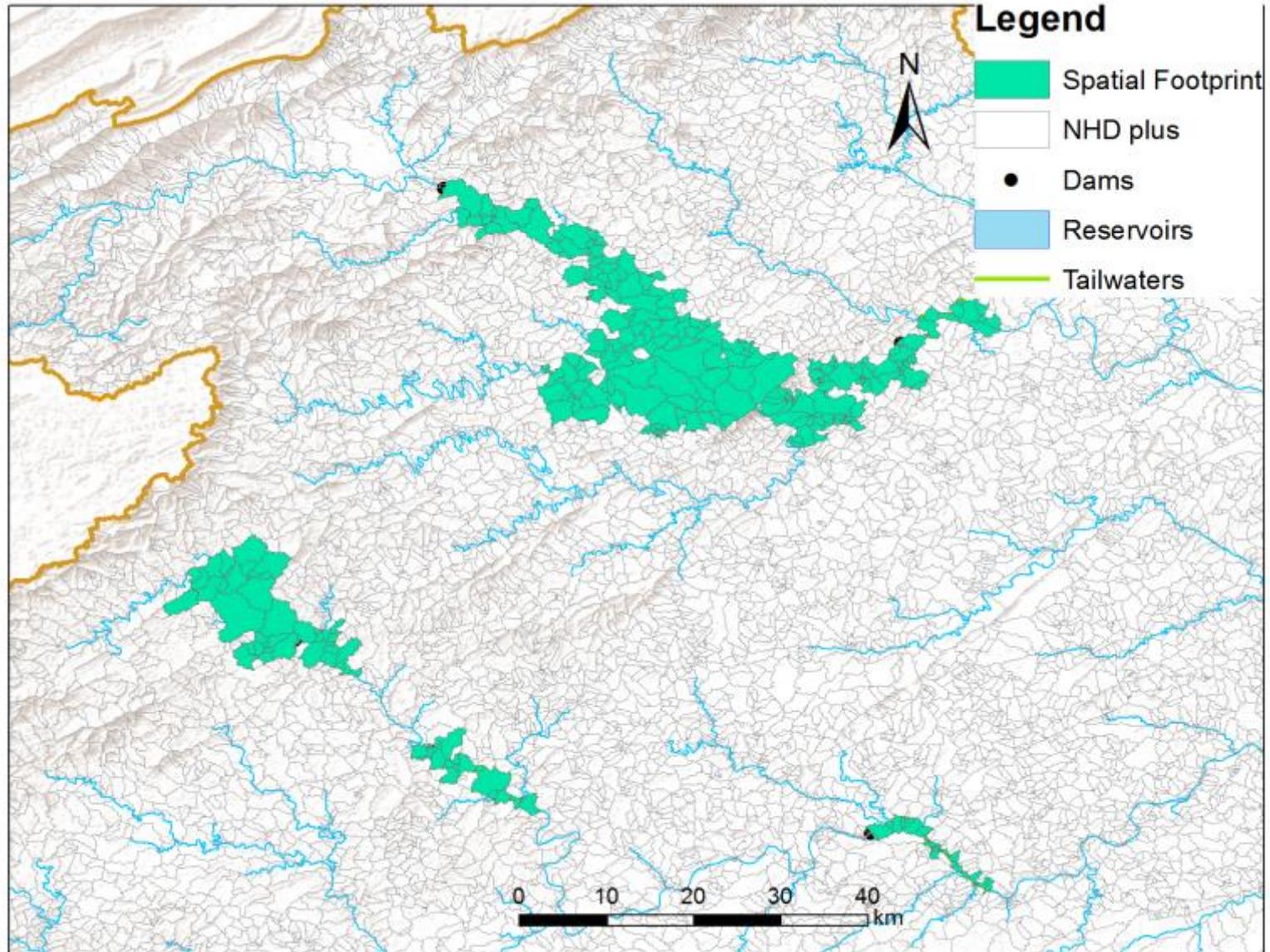
Establishing Spatial Footprint of Hydropower Opportunities



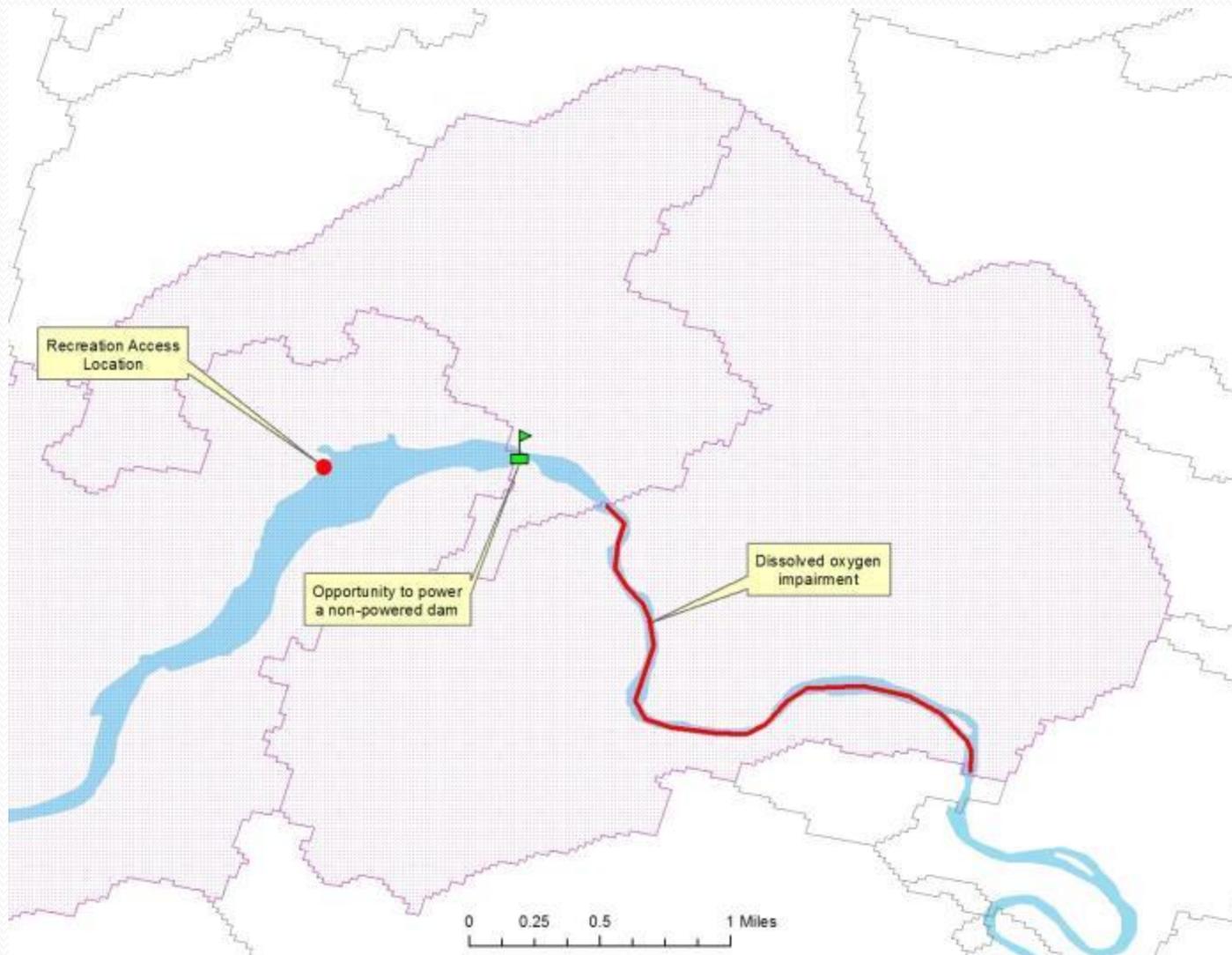
Establishing Spatial Footprint of Hydropower Opportunities



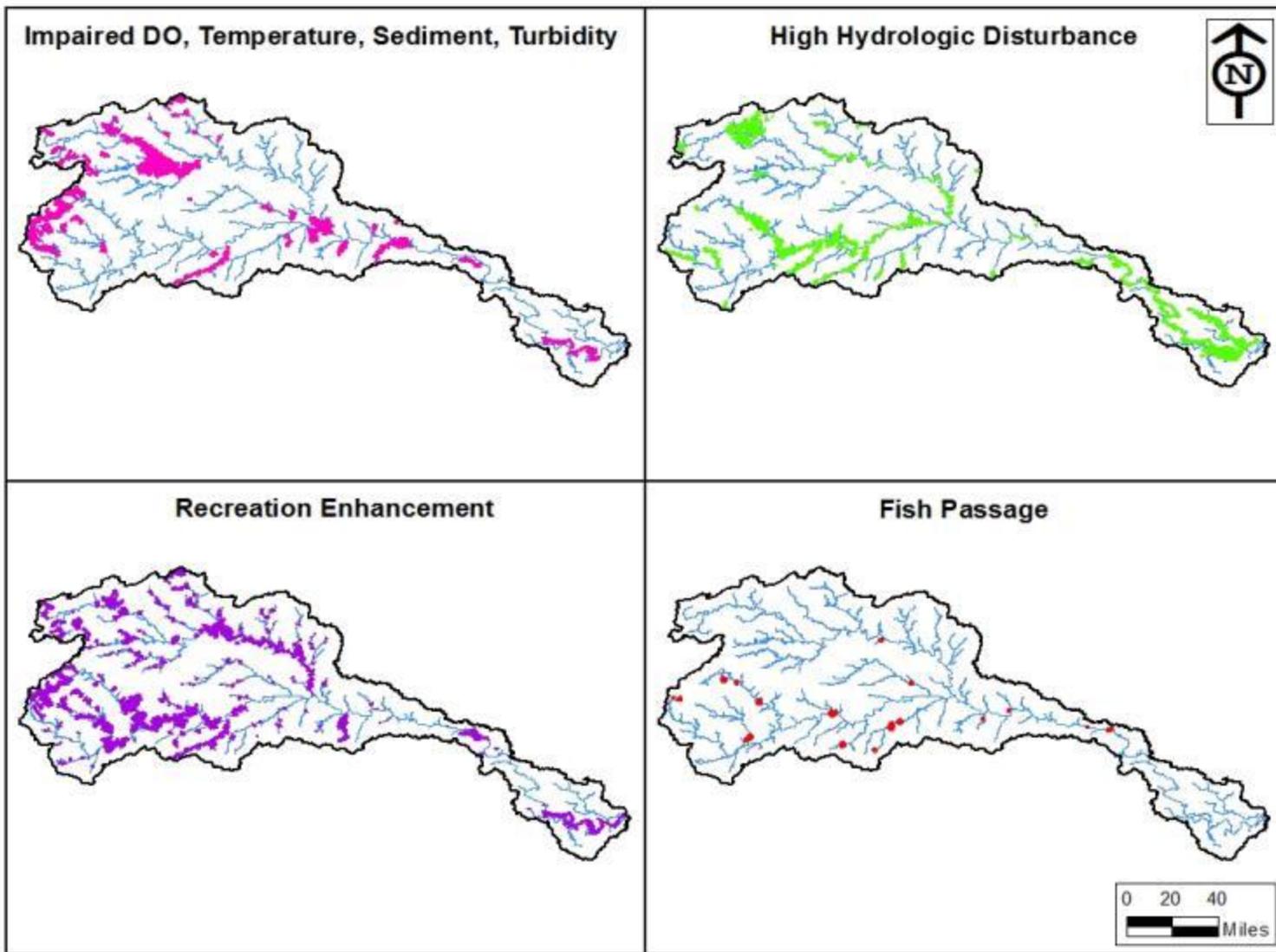
Establishing Spatial Footprint of Hydropower Opportunities

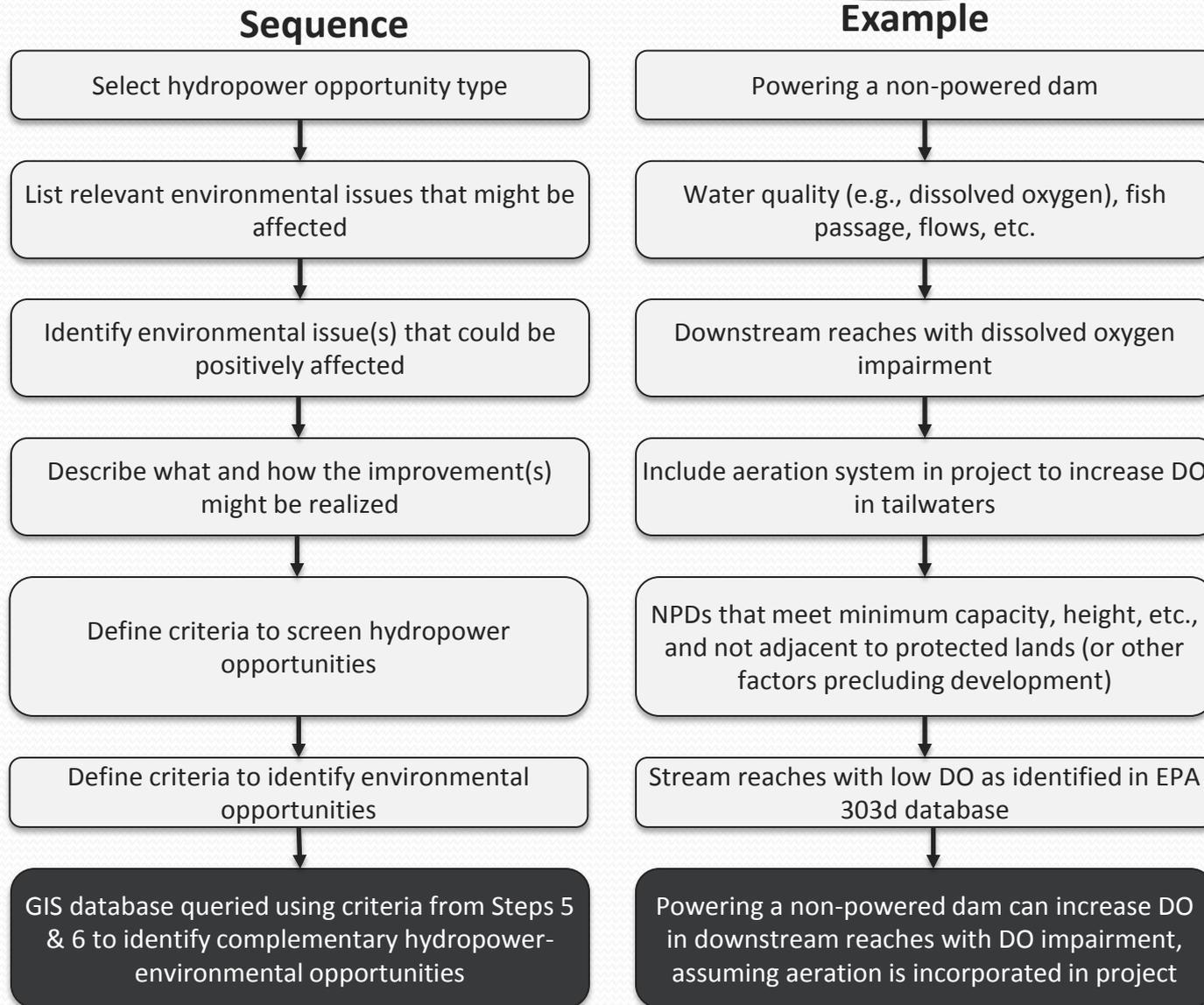


Linking Hydropower Opportunities & Environmental Issues



Overview of Key Environmental Issues





- Potential generating capacity
 - <0.1 MW for non-powered dams
 - <1.0 MW for new sites
- GAP Status 1 or 2 lands
 - Permanent protection from conversion of natural land cover
- Wild and Scenic River stretches
- No new sites between ocean and lowest dam
- Presence of T&E species habitat
 - May not necessarily preclude development in some cases
- Other protected areas

Complementary Hydropower- Environmental Opportunities

- Powering non-powered dams (NPD) or new stream-reach development (NSD) may:
 - Increase dissolved oxygen in downstream reaches, assuming aeration is incorporated into new development
 - Provide better flow management in downstream reaches to mitigate:
 - Temperature
 - Sedimentation
 - Hydrologic disturbance
 - Whitewater paddling
 - Create opportunity to improve fish passage via dam removal or facility modifications

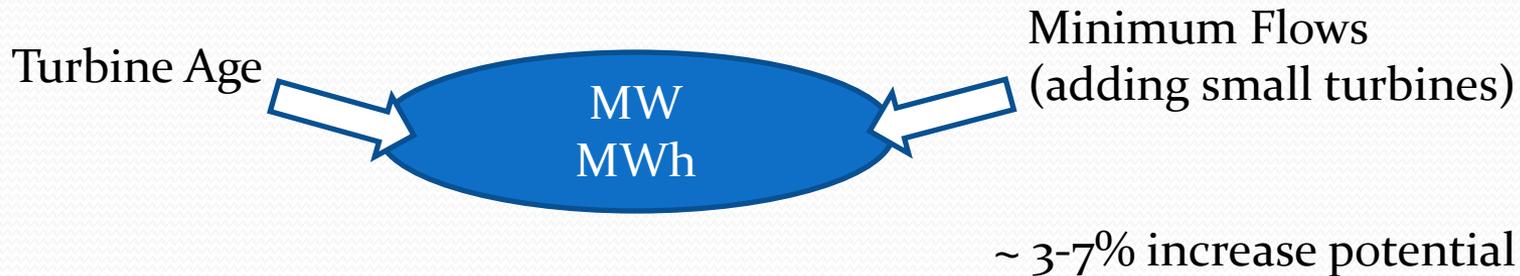
Summary of Complementary Hydropower-Environmental Opportunities

Environmental Opportunity	Non-Powered Dams		New Site Developments	
	Number	MW	Number	MW
Aeration increase DO downstream	0	0	0	0
Flow management to mitigate sedimentation/turbidity	3	0.85	2	2.51
Flow management to mitigate temperature impairment	1	0.42	0	0
Flow management to mitigate hydrologic disturbance	4	1.04	15	63.9
Flow management for existing whitewater/paddling	2	0.65	NA	NA
Improvements to fish passage, either through facility modification or dam removal.	2	2.98	0	0
Improve or create trout fishing	2	0.69	NA	NA
Provide new whitewater boating opportunity	2	0.32	13	54.2
Improve or create reservoir fishing access	1	0.30	18	61.0
Total sites/MW with at least one potential environmental opportunity*	9	4.8	27	97.6

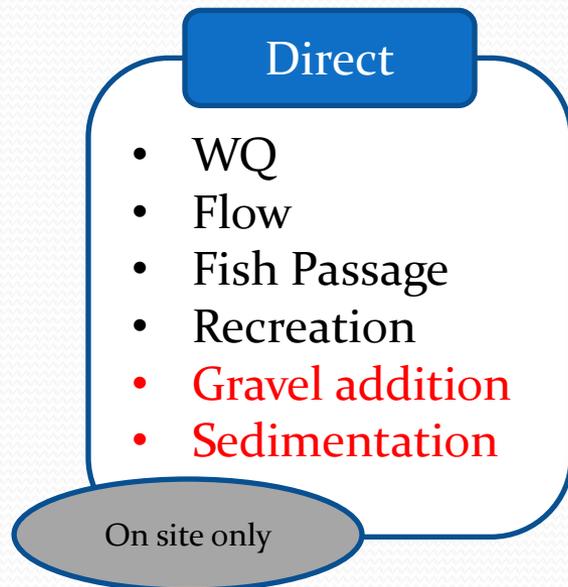
*Note: The total number of sites and megawatts is not equal to the sum of the data in the rows above because some hydropower sites have more than one environmental opportunity.

- Strengths
 - Geospatial model applicable to other basins
 - Rapid (6 months or less)
 - Criteria can be customized to basin needs and stakeholder interests
- Challenges
 - Complex relationships between hydropower opportunities, environmental issues, and stakeholder interests
 - Relating hydropower opportunities and environmental issues that are spatially disparate but functionally linked
 - Identifying most relevant environmental issues
 - Exploring potential interactions among opportunities
 - Variable data availability

- Explore efficiency improvements at existing dams



- Develop methodology to explore indirect interactions



- Detailed Fish Passage assessment
- Package and disseminate
- Conduct Ph 1 scoping assessment in Big Horn River basin
- Revise methodology based on feedback
- Update the Connecticut and Roanoke assessments

- Objectives
 - Clear? Appropriate?
- Methods
 - Understandable? Repeatable? Other datasets?
- Results
 - Make sense? Reasonable? Meaningful? Useable?
- Other points?
- Contacts
 - bevelhimerms@ornl.gov, (865) 576-0266
 - mcmanamayra@ornl.gov, (865) 241-8668