



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

DOE's Pacific Northwest and  
Oak Ridge National Laboratories  
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- ▶ 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 Connecticut River basin

- ▶ Background on BSOA Project
- ▶ Objective of a Ph 1 Scoping Assessment
- ▶ Approach and Methodology
- ▶ Preliminary Results for the Connecticut 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
  
- ▶ Pacific Northwest and Oak Ridge national laboratories completed *preliminary* Phase 1 Scoping Assessments for the DOE Water Power Program in FY13.

- ▶ 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.

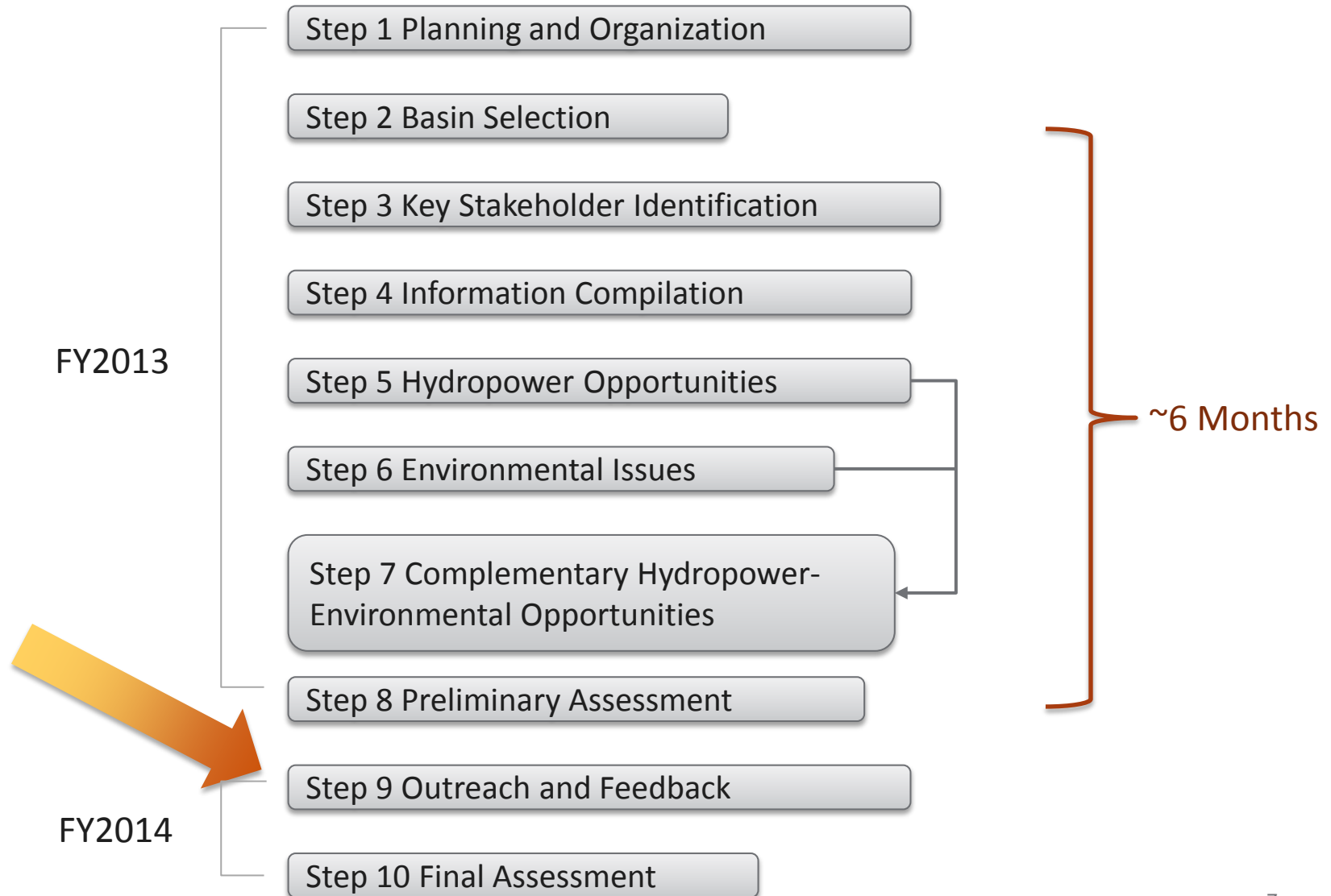
## ▶ Opportunities

- 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.

## ▶ Complementary hydropower-environmental opportunity:

- Situation in which an existing environmental issue can be improved, either directly or indirectly, as a result of or in conjunction with a hydropower development action.

# 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



## ▶ Categories

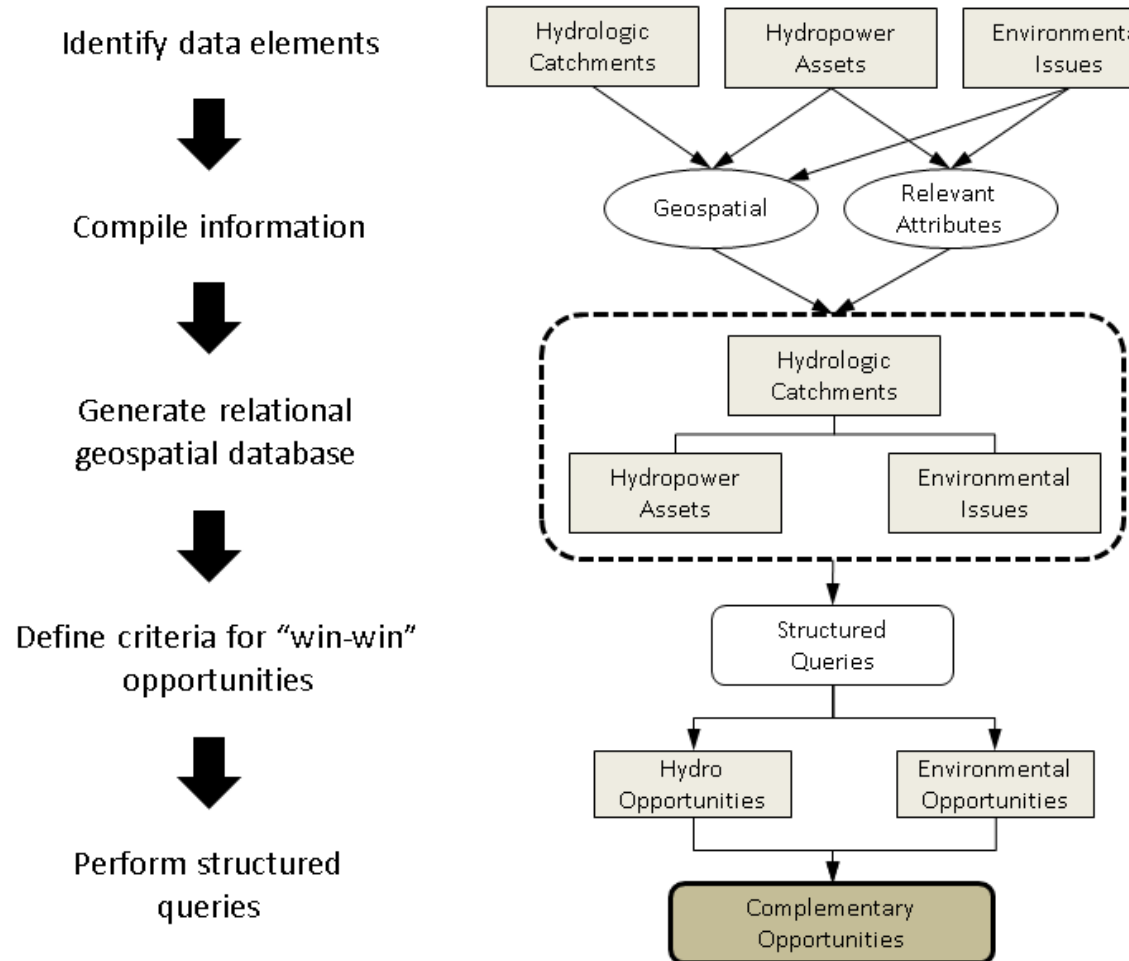
- Fish Interactions
- Aquatic habitat loss/degradation
- Water quality
- Hydrology & hydraulics
- Preservation, aesthetics, recreation, etc.

## ▶ Sources

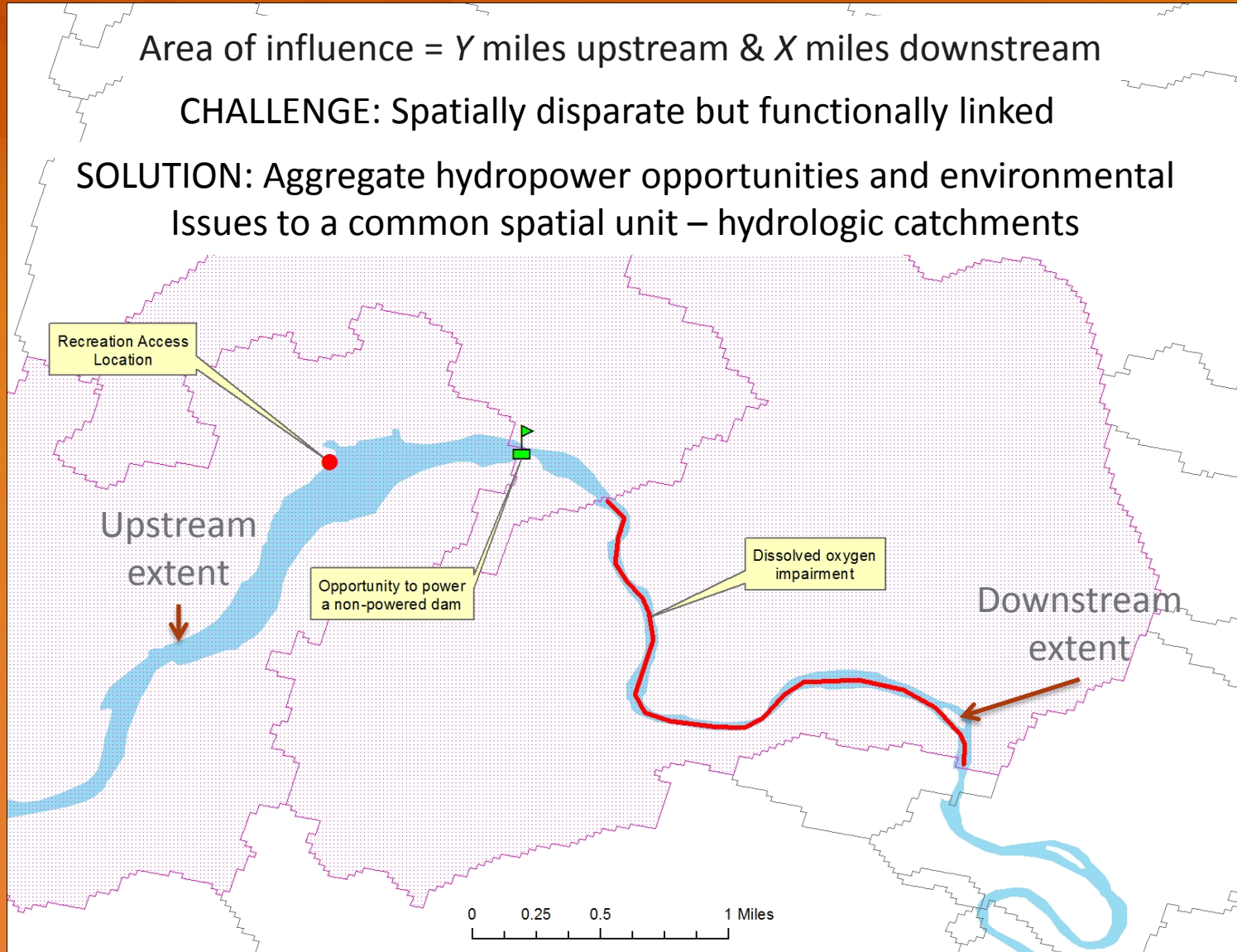
- Watershed planning documents
- Stakeholder reports
- Environmental Impact Statements
- Water-quality certifications
- Regulatory filings for hydropower projects
- Nationally available environmental data

- ▶ Fish Interactions
  - TNC Northeast Aquatic Connectivity Tool, 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

## BSOA Data Model & Process Flow



# Linking Hydropower Opportunities & Environmental Issues

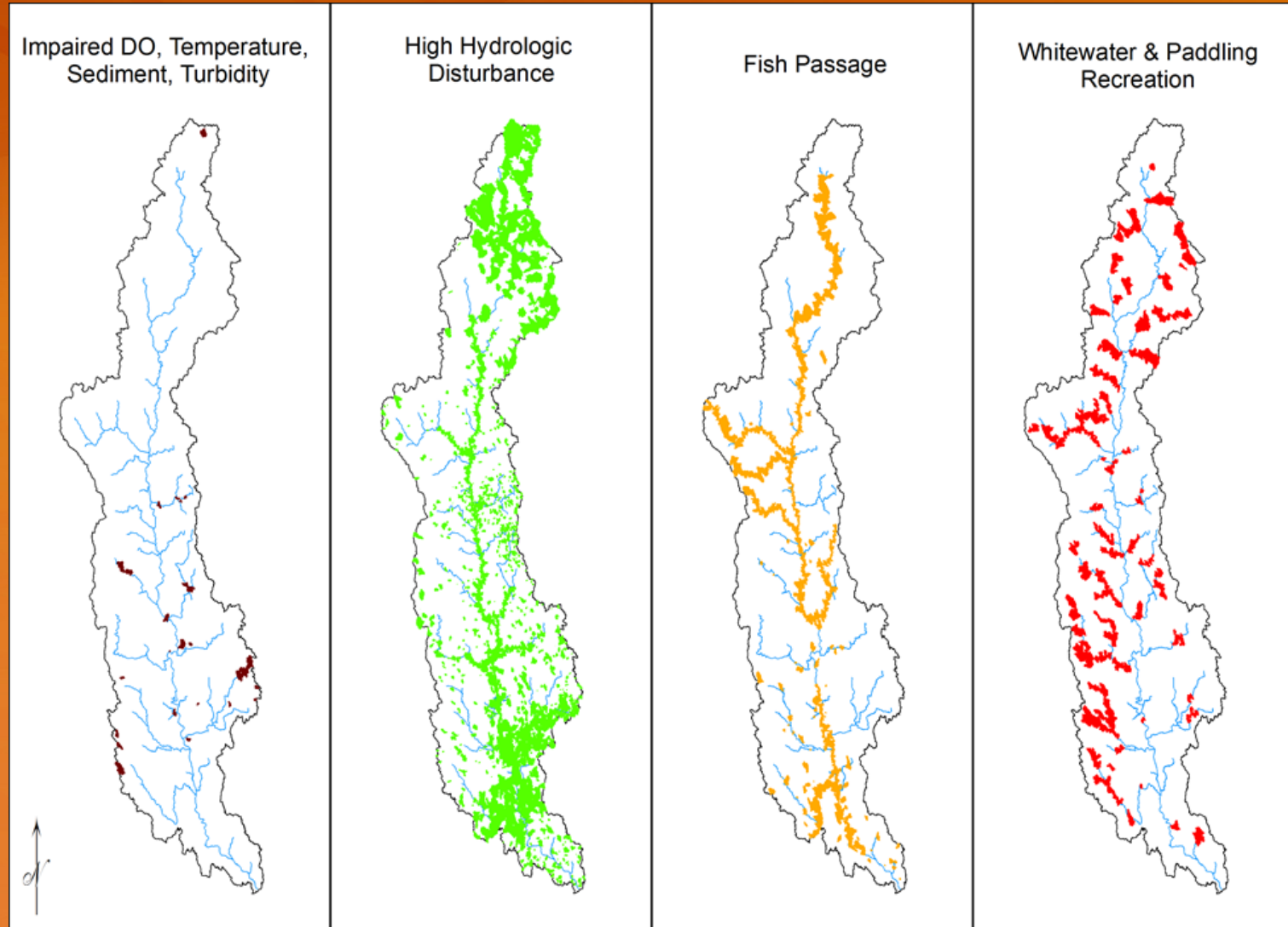


# Key Environmental Issues



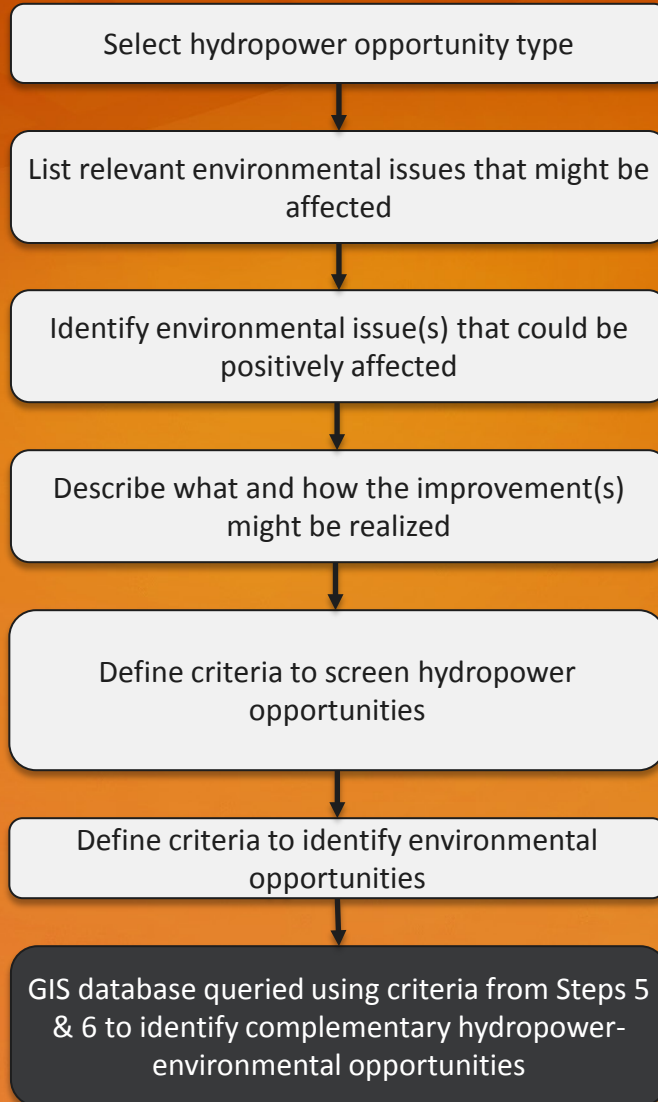
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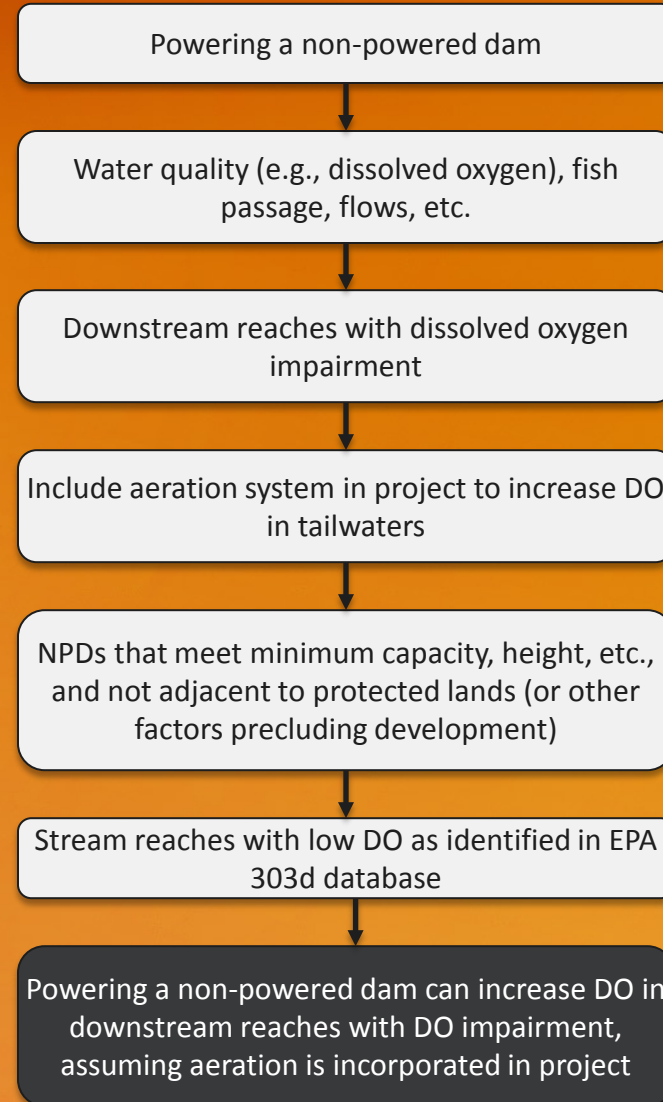


# Opportunity Analysis

## Sequence



## Example



- ▶ 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

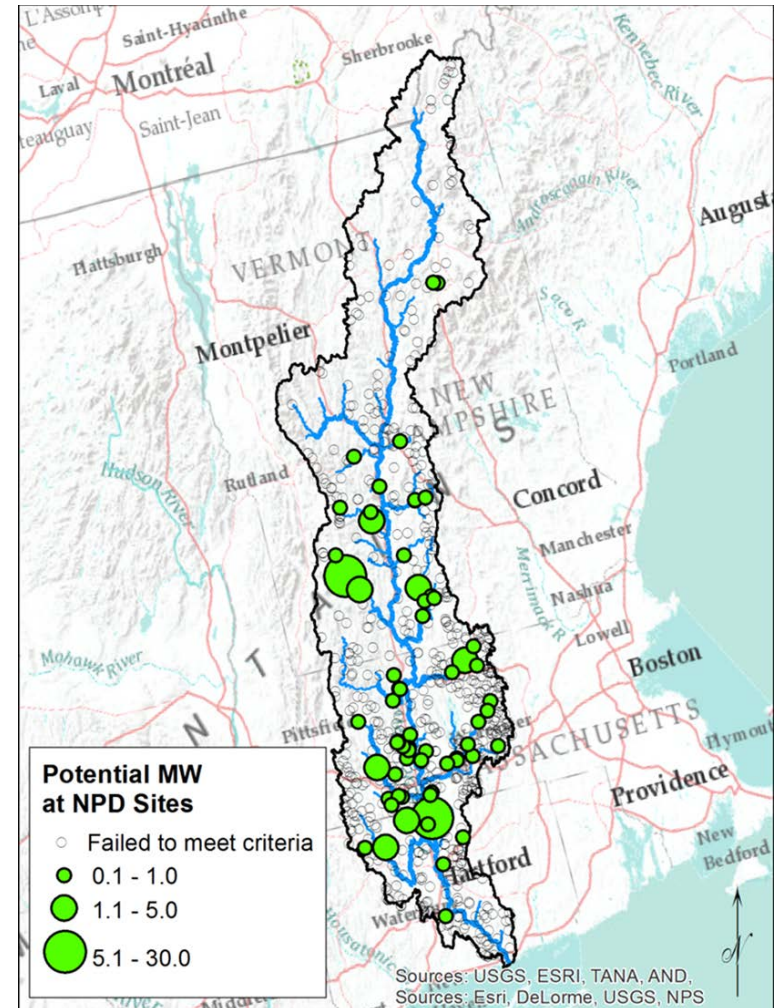
# Complementary Hydropower- Environmental Opportunities

- ▶ 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



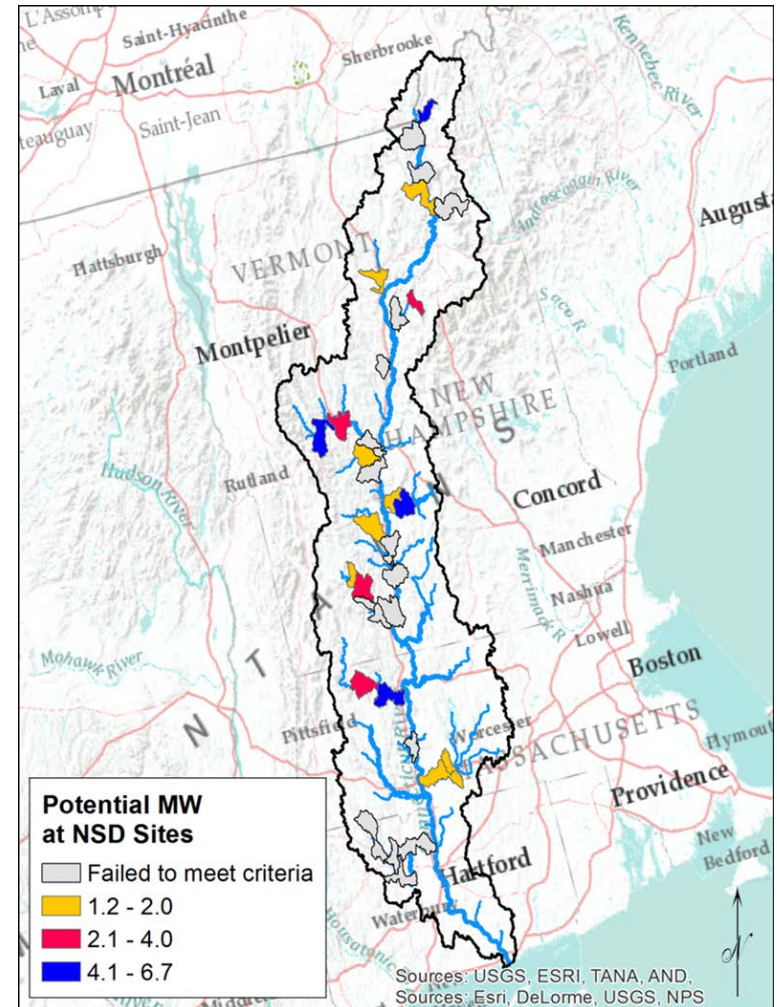
# Preliminary Results

- ▶ Non-powered dams
  - 692 sites evaluated
  - 66 met screening criteria, representing combined capacity of 69.5 MW
  - 17 provided at least one complementary opportunity, representing 20.7 MW



# Preliminary Results

- ▶ New stream reach developments
  - 60 potential sites evaluated
  - 27 met screening criteria, representing combined capacity of 46.1 MW
  - 20 provided at least one complementary opportunity, representing 35.2 MW



# Summary of Complementary Hydropower-Environmental Opportunities

Environmental Opportunity	Non-Powered Dams		New Site Developments	
	Number	MW	Number	MW
Aeration increase DO downstream	0	0	1	1.66
Flow management to mitigate sedimentation/turbidity	0	0	0	0
Flow management to mitigate temperature impairment	2	9.1	1	1.2
Flow management to mitigate hydrologic disturbance	7	6.4	17	30.4
Flow management for whitewater/paddling	8	12.3	NA	NA
Improvements to fish passage, either through facility modification or dam removal.	11	16.0	8	15.5
<b>Total sites/megawatts with at least one potential environmental opportunity*</b>	<b>17</b>	<b>20.7</b>	<b>20</b>	<b>35.2</b>

\*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.

NA = not applicable.

## ▶ 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

- ▶ Develop methodology to explore indirect interactions
- ▶ 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?

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