

# Annex XVI – Hidden and Untapped Hydropower Opportunities

Oak Ridge National Laboratory  
Carly Hansen

ORNL is managed by UT-Battelle LLC for the US Department of Energy

## Overview of inventory building and classification of opportunities in USA



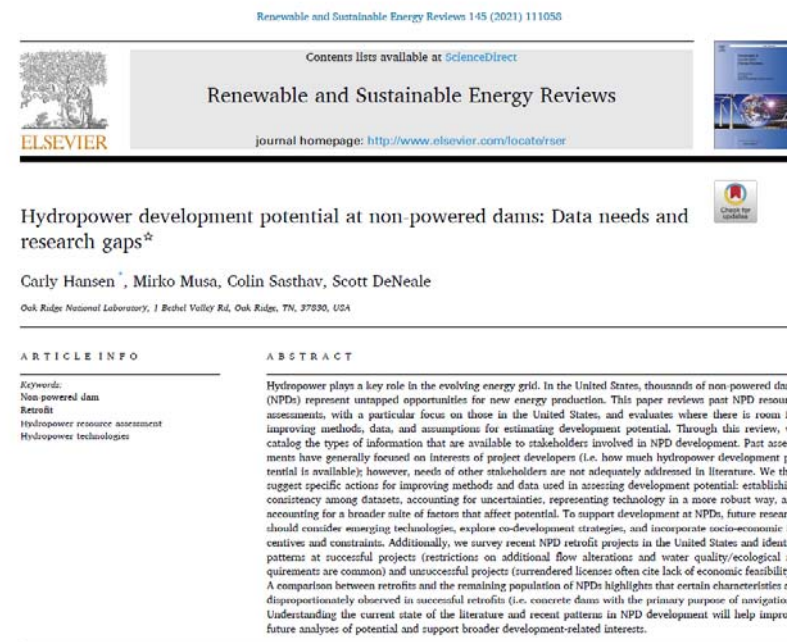
# Creating inventories of Hidden and Untapped Hydropower Opportunities: Experience in the US

- Inventories of non-powered opportunities in the US were conducted by Oak Ridge National Laboratory
  - Non-powered dams (2012)
  - Conduits (ongoing)
    - Municipal
    - Industrial
    - Agricultural
- Varying levels of detail or types of “potential”



# Creating inventories of Hidden and Untapped Hydropower Opportunities: Challenges & Considerations

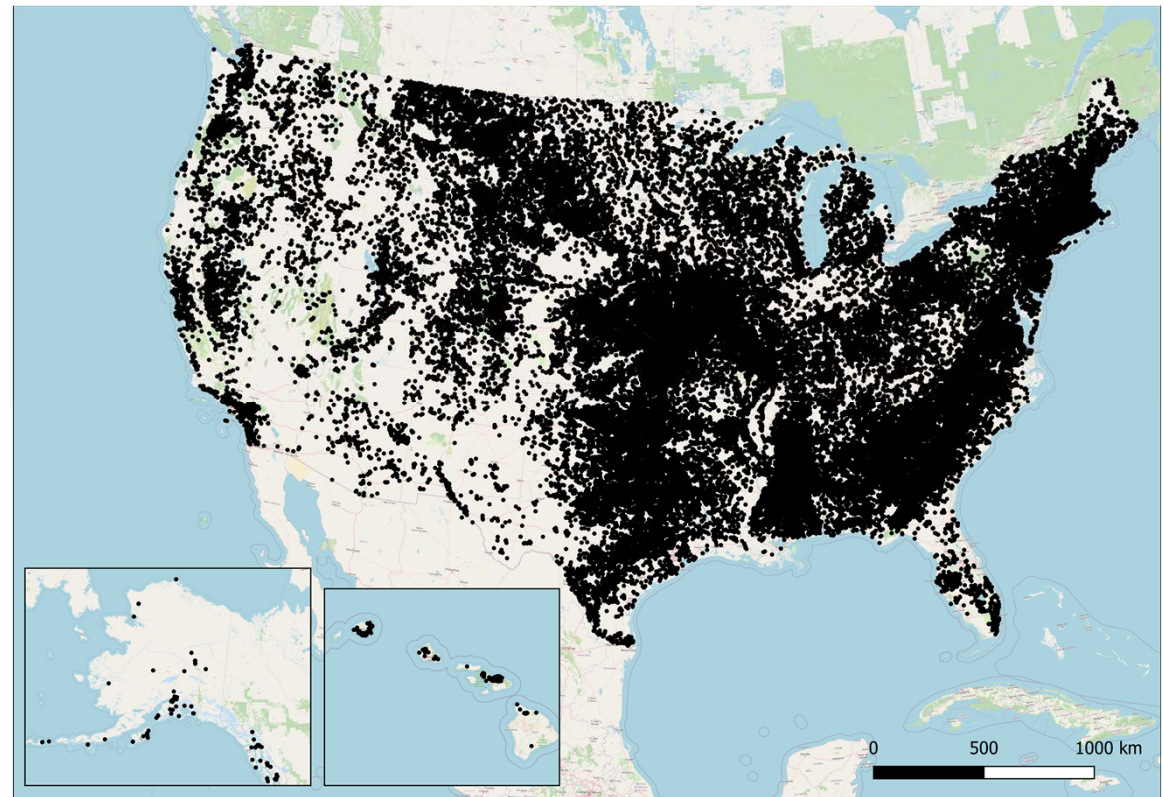
- Evaluate the current “state of the science” in preparing inventories of Non-powered dam opportunities
  - “Hydropower development potential at non-powered dams: Data needs and research gaps” in *Renewable and Sustainable Energy Reviews*:  
<https://www.sciencedirect.com/science/article/pii/S1364032121003476>





# Creating inventories of Hidden and Untapped Hydropower Opportunities: Challenges & Considerations

- Wide variety of data/sources
- Disparity in quality, lack of controlled vocabulary
- Difficult to represent hydroclimate uncertainty and operational variability
- Difficult to represent complexity of retrofit design solutions at a high level/large scale

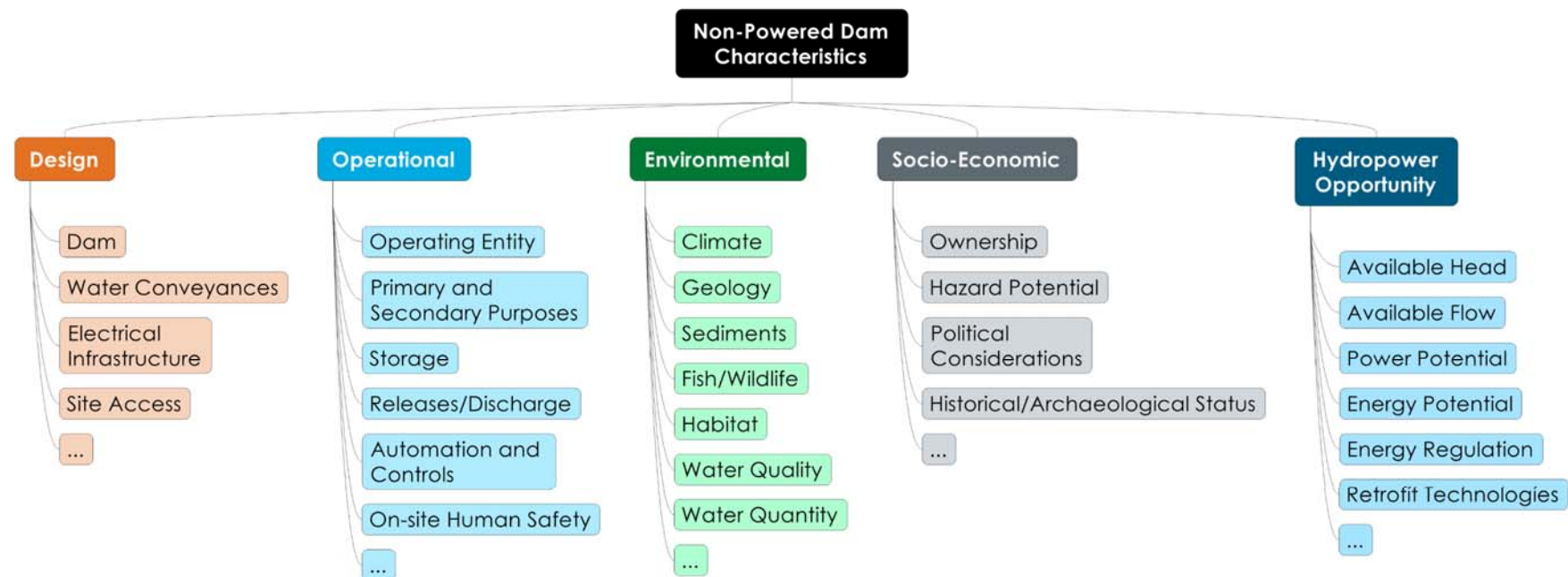


Data source: USACE National Inventory of Dams

# Inventories + classification to resolve complex objectives

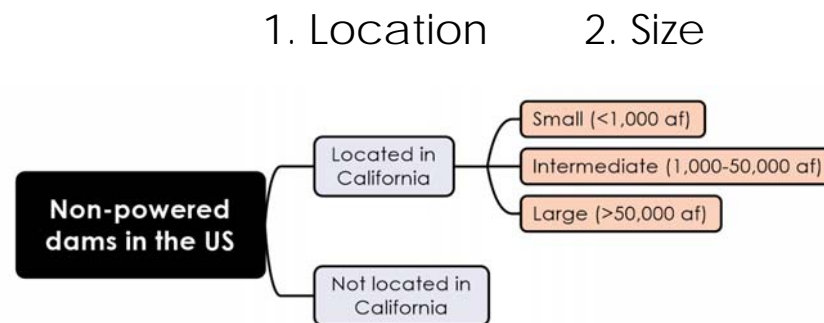
- Using inventories to drive classification:
  - **Provides an efficient way to tackle problems involving large populations**
  - **Enables summaries and comparisons**
- Diversity in data, stakeholders, and objectives has led to an effort to create flexible dam classification and exploration tools

# Inventories + classification to resolve complex objectives



Which characteristics does classification need to be based on?

# Inventories + classification to resolve complex objectives



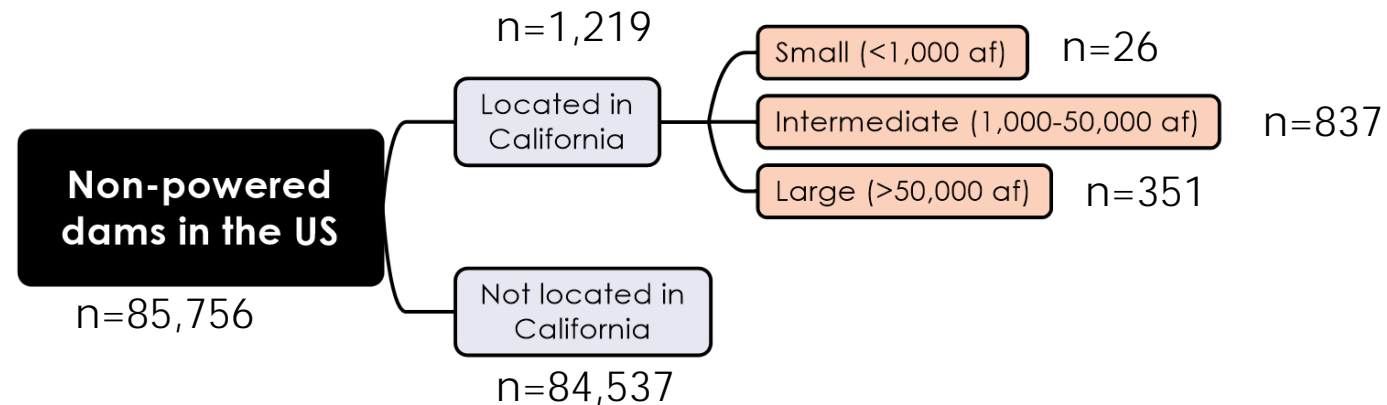
How do you prioritize characteristics or subset data?



# Inventories + classification to resolve complex objectives

Data management platform needs to configure  
organizational structure to reflect selections made by  
an individual

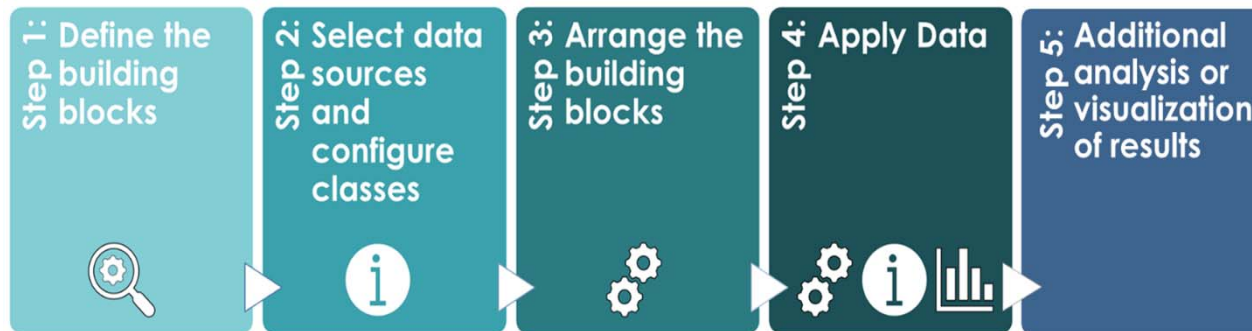
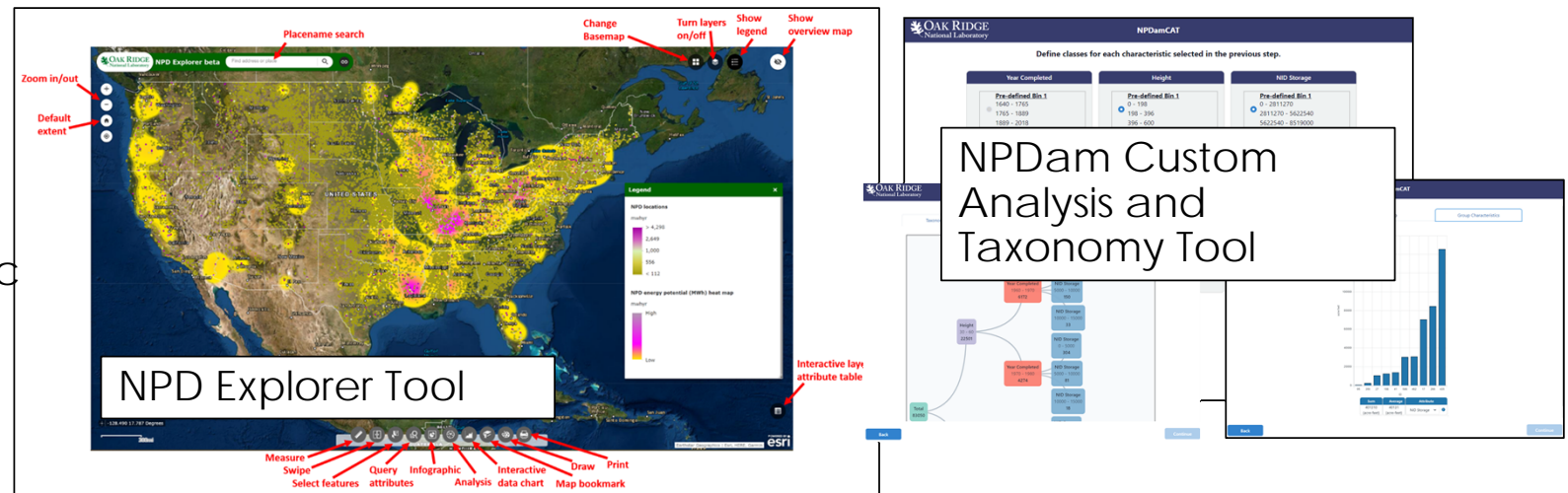
# Inventories + classification to resolve complex objectives



Data from the inventory are applied, giving meaning to the classification structure

# Inventories + classification to resolve complex objectives

Ongoing development of tools enabling exploration/classification of the inventory



Mapping or exploring distributions, variation of information across different classes

# Inventories + classification to resolve complex objectives

- Caveat: We must also consider when generalizations about a group or category of facilities may not hold
- Benefits of a flexible approach to classification of opportunities:
  - **Customized approach:** Tailor the structure of the taxonomy to the specific priorities and objectives of the individual
  - **Accounts for uncertainty/data deficiencies:**
    - Identify gaps in available data
    - Enable sensitivity analysis