Optimizing Stream Crossing Barrier Removal for Salmon Restoration

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APPALACHIAN MTN CLUB

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Funding by NOAA
Atlantic Salmon Habitat Restoration Partnership Grant

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- Results
- Next Steps

Today's Goals

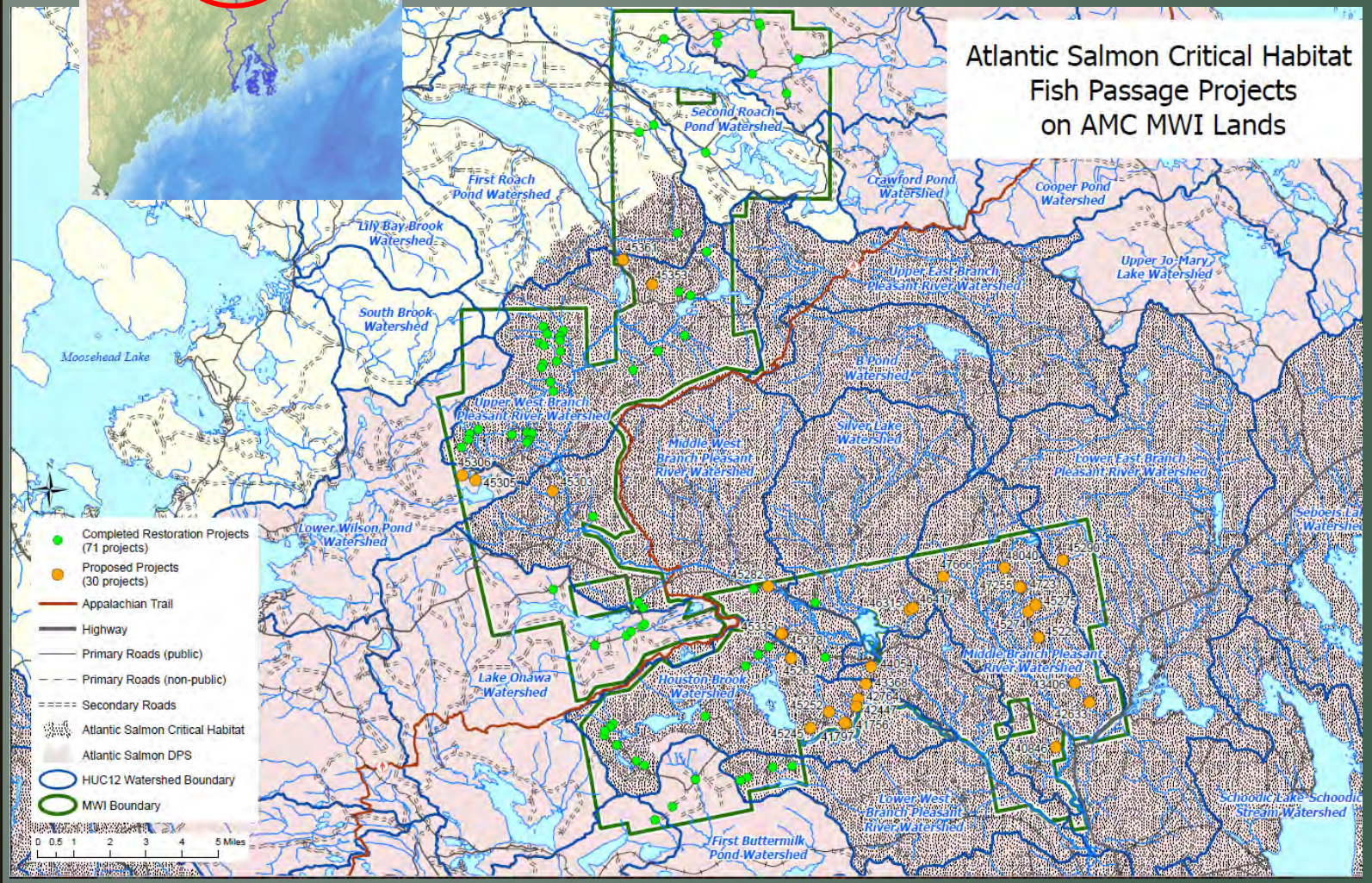
- Overview process
- Preview uses of findings
- Offer lessons learned

Introduction

- Meet the Team
  - Appalachian Mountain Club
  - Inter-Fluve
  - TNC
- Piscataquis Context
  - Watershed reconnected to sea
  - Predominantly private crossings
  - Priority Watershed for Atlantic Salmon
  - Some of the best Salmon habitat, but average passability at crossings is only 10%
  - Aging infrastructure
  - Native Brook Trout stronghold

The Optimization Study: Enabling Conditions

- Data availability: Maine stream crossing barriers database and prioritization
- AMC land acquisition efforts and watershed conservation goals
- Broad partner support (Fed, State, NGO, Private) for crossing replacement
- Need for tool to evaluate cost between priority projects



The Optimization Study: Desired Outcomes

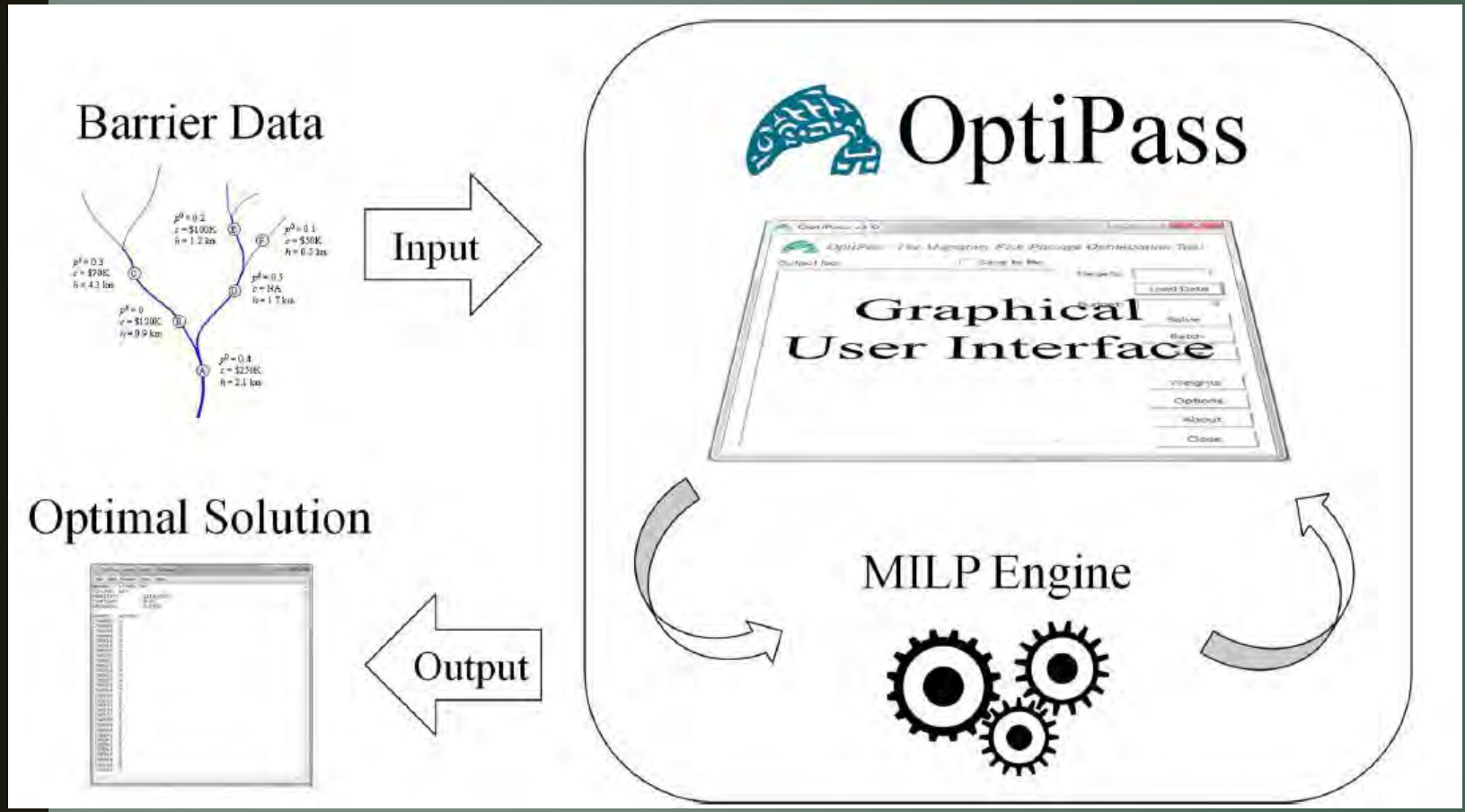
- Provide decision-support tool; best deployment of resources
- Shape planning for future projects
  - Leverage unprecedented funding
  - Identify priority/focal systems early
  - Strengthen partnerships
- Heightened understanding of cost estimate

The Optimization Study: Process

- Meet with local municipalities
- Hone study parameters and datasets with local experts
- Evaluate OptiPass as the primary tool
- Collect and massage input data
- Conduct the study
  - Run scenarios and output format determined iteratively
  - Document workflow
  - Communicate results
- Groundtruth and evaluate optimized results for real-world implementation

The Optimization Study: OptiPass

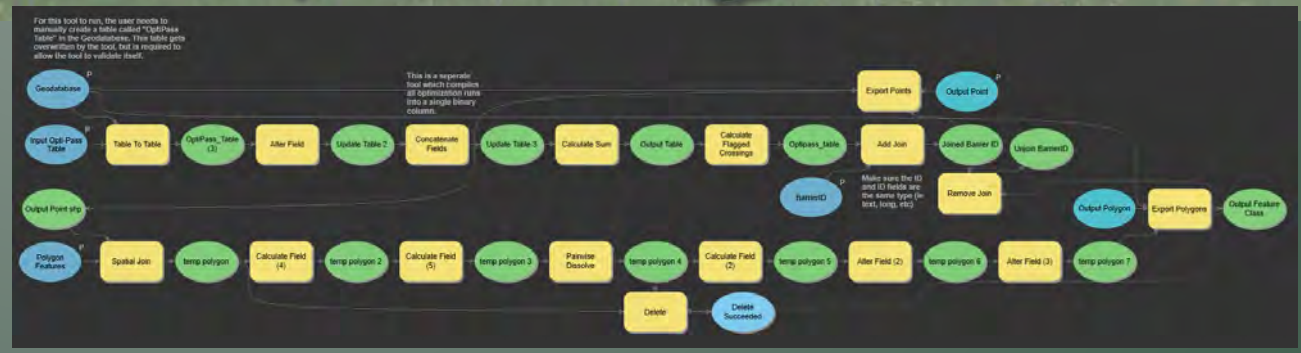
- Dedicated migratory fish passage optimization software
- Developed by **Ecotelligence LLC**
- Free for non-profit work; paid commercial license
- Limitations
  - No braided systems
  - Anadromous fish target; not potadramous species
  - Text based input/output
  - Binary pass /no-pass solution set
- Outputs
  - Optimized populations of barriers
  - Total-cost increments



OptiPass developed by
Dr. Jesse O'Hanley, Ecotelligence LLC

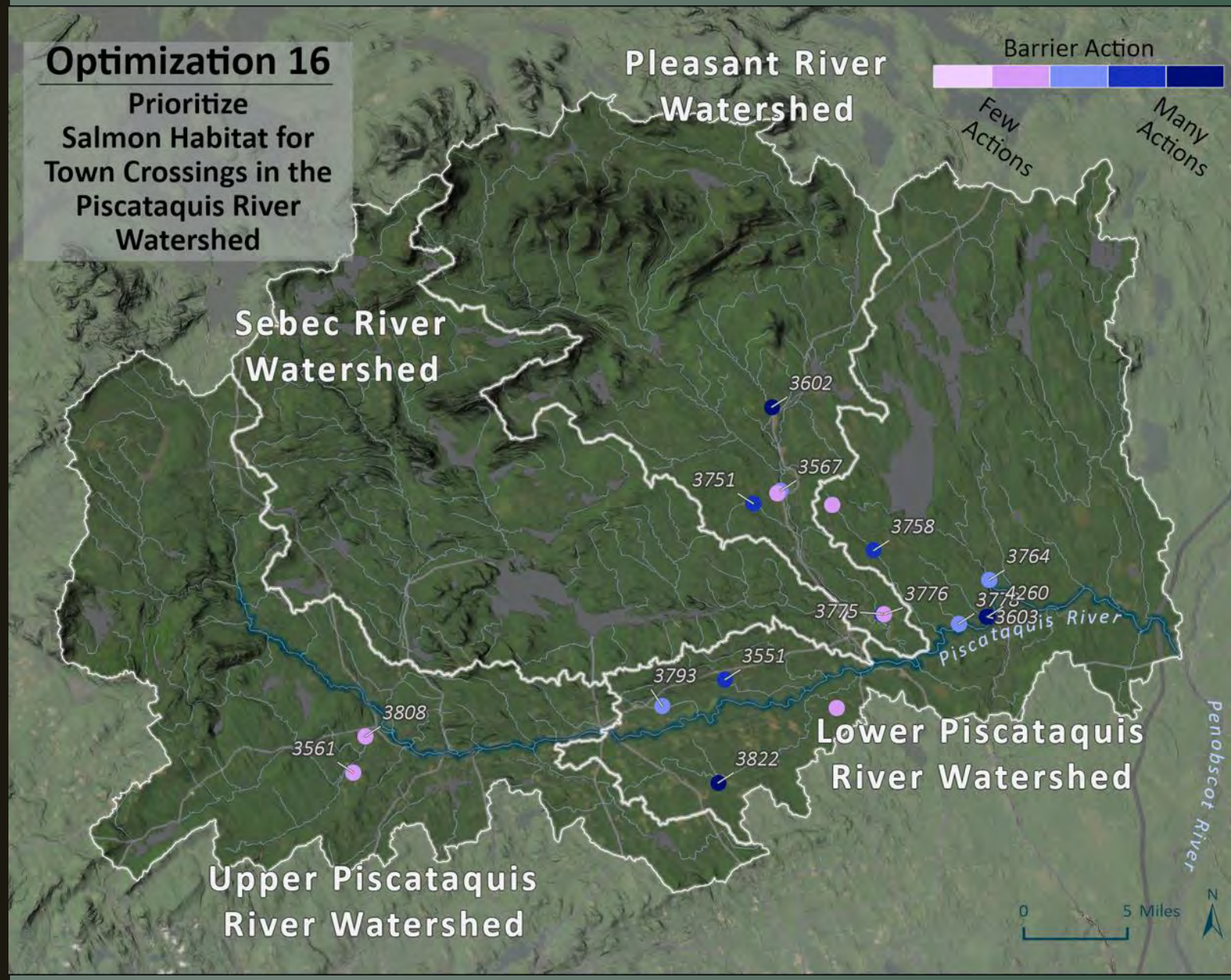
The Optimization Study: Data and Analysis

- Watershed-wide crossings database
- Salmon habitat and other stream parameters
- River network barrier relationship
- Cost estimate based on road type, bankfull width & contingency
  - Assembled cost database
- Optimizations run for a range of sub-basin areas, road types, and habitat targets
- GIS tool developed to convert text file to shapefile; provide points for specific barriers, polygons to summarize barriers in an area



The Optimization Study: Results

- Identify barriers based on frequency of inclusion in optimized solution sets
- Populations of barriers maximizing salmon habitat for available budget
- Watershed- and subwatershed-scale optimizations for specific habitats and road types
- Crossing cost order-of-magnitude estimates



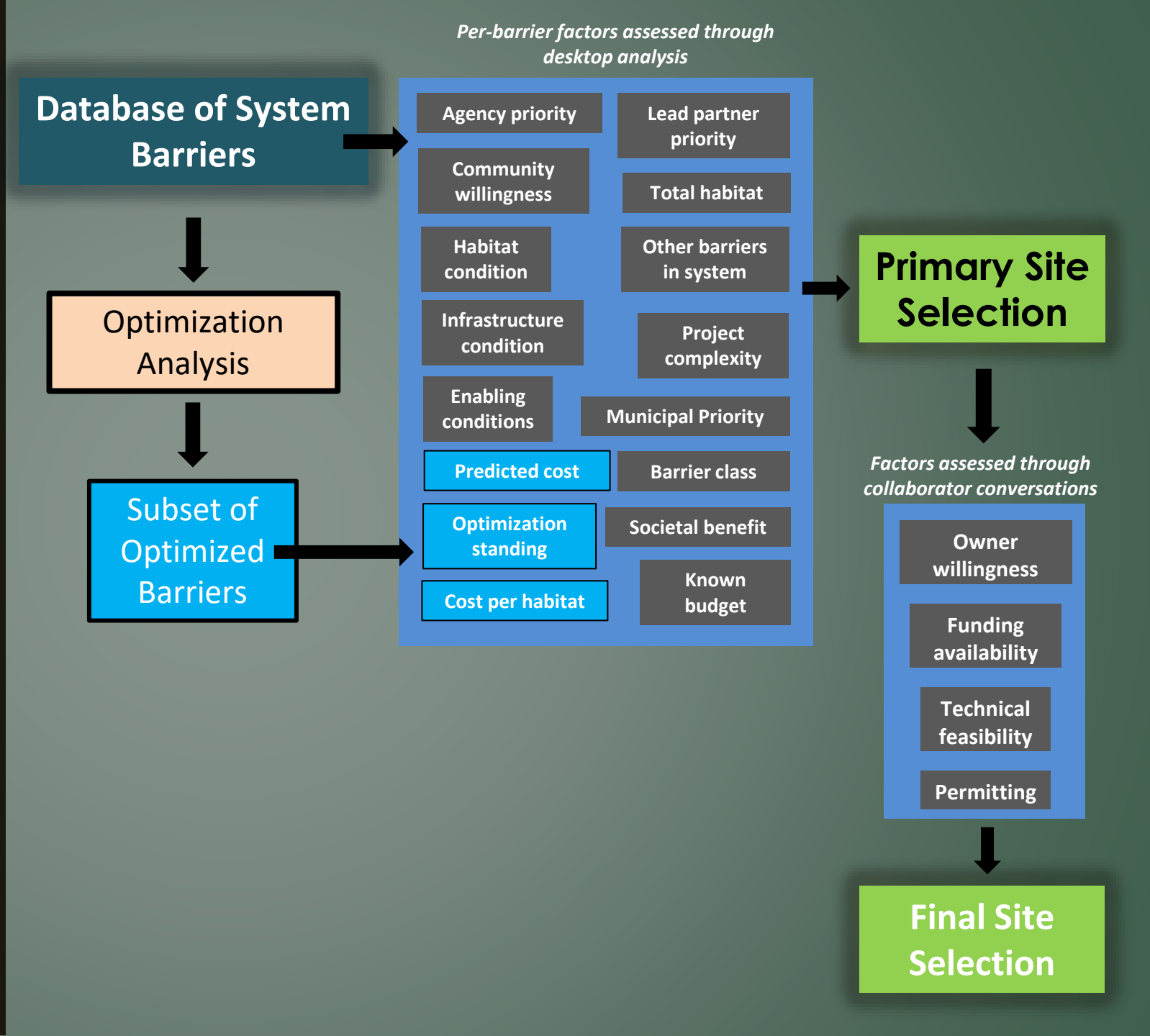
Next steps: Address Crossings

- Use study results to identify three municipally-owned crossings to replace
- Intersection of ecological value and infrastructure need
- Post processing and groundtruthing of results is key; many hours
- Share study results for partners
- Partial funding from NOAA Salmon Recovery Grant

Lessons Learned

- Input data accuracy and completeness is key
- Leave room for process adjustments
- Study Results already useful
  - Crossing cost estimate
- More left to refine
  - Optimized stream networks
  - Improved cost estimates
  - Need data on completed projects
- Partnerships are key

- Optimization is the beginning, not the end, of project selection



Thank you!

Special thanks to:
- NOAA
- Ecotelligence LLC

Questions?