



Chesapeake Bay Program  
*Science. Restoration. Partnership.*

June 26, 2025

# Patterns and Commonalities of Influencing Factors throughout the Partnership

John Wolf, USGS

# Agenda

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**1**

## **2014 Factors**

Derived from  
ChesapeakeProgress

**2**

## **2014 Factors**

Derived from Management  
Strategies

**3**

## **2025 Factors**

Derived from AI

**4**

## **Spatial Mapping Factors**

Integrated Targeting and  
Tracking

**5**

## **Path Forward**

# 2014 Watershed Agreement



2 0 1 4

As amended, October 5, 2022

- **Factors Influencing Progress** associated with each Outcome's Management Strategy
- Many different authors
- High level factors
- Lack of consistency in Factors across Outcomes

# 2014 Watershed Agreement

CHESAPEAKE  
PROGRESS

Search

Abundant Life

Clean Water

Conserved Lands

Engaged Communities

Climate Change

About Us

Home > Conserved Lands > Land Conservation > Protected Lands

PROTECTED LANDS OUTCOME:

Factors Influencing Progress

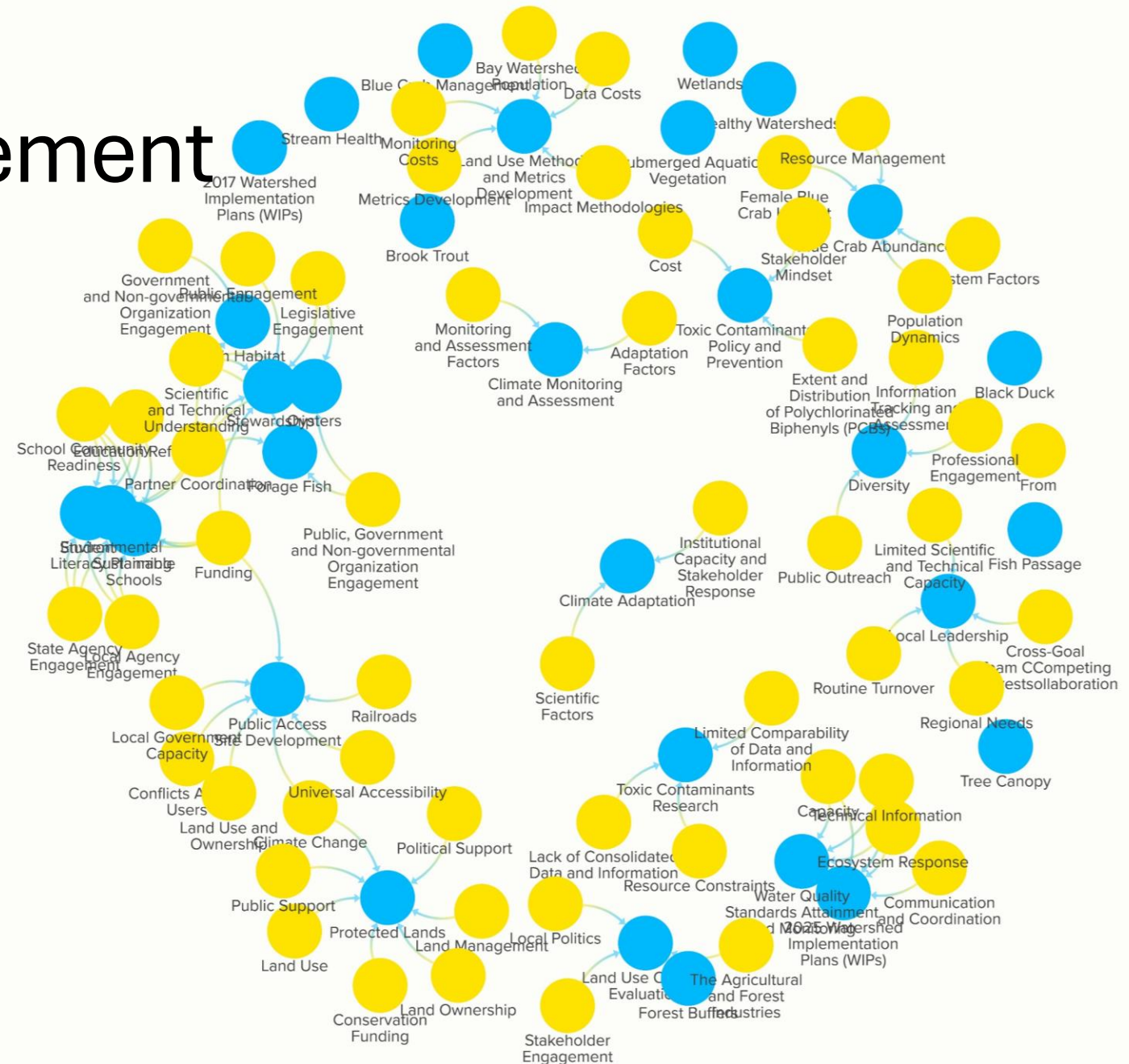
Several factors could impact our ability to protect an additional two million acres of lands throughout the Chesapeake Bay watershed. These factors have directly informed the [management actions](#) our partners will take to achieve the Protected Lands outcome.

Land Use

As the watershed's population grows, new development pressures are dramatically changing the landscape. Energy infrastructure, in particular, can pose a challenge to protecting geographic and cultural corridors. On the other hand, land use pressures can open opportunities for dialogue and decision-making to protect ecologically and culturally valuable lands or mitigate when impacts are unavoidable. When mitigation or sound land-use planning opens land to recreation, public demand for more protected areas and advocacy for further protection measures can increase. This can improve conservation progress.

Land Ownership

As watershed residents move toward urban areas, the value of land near commercial centers grows. As



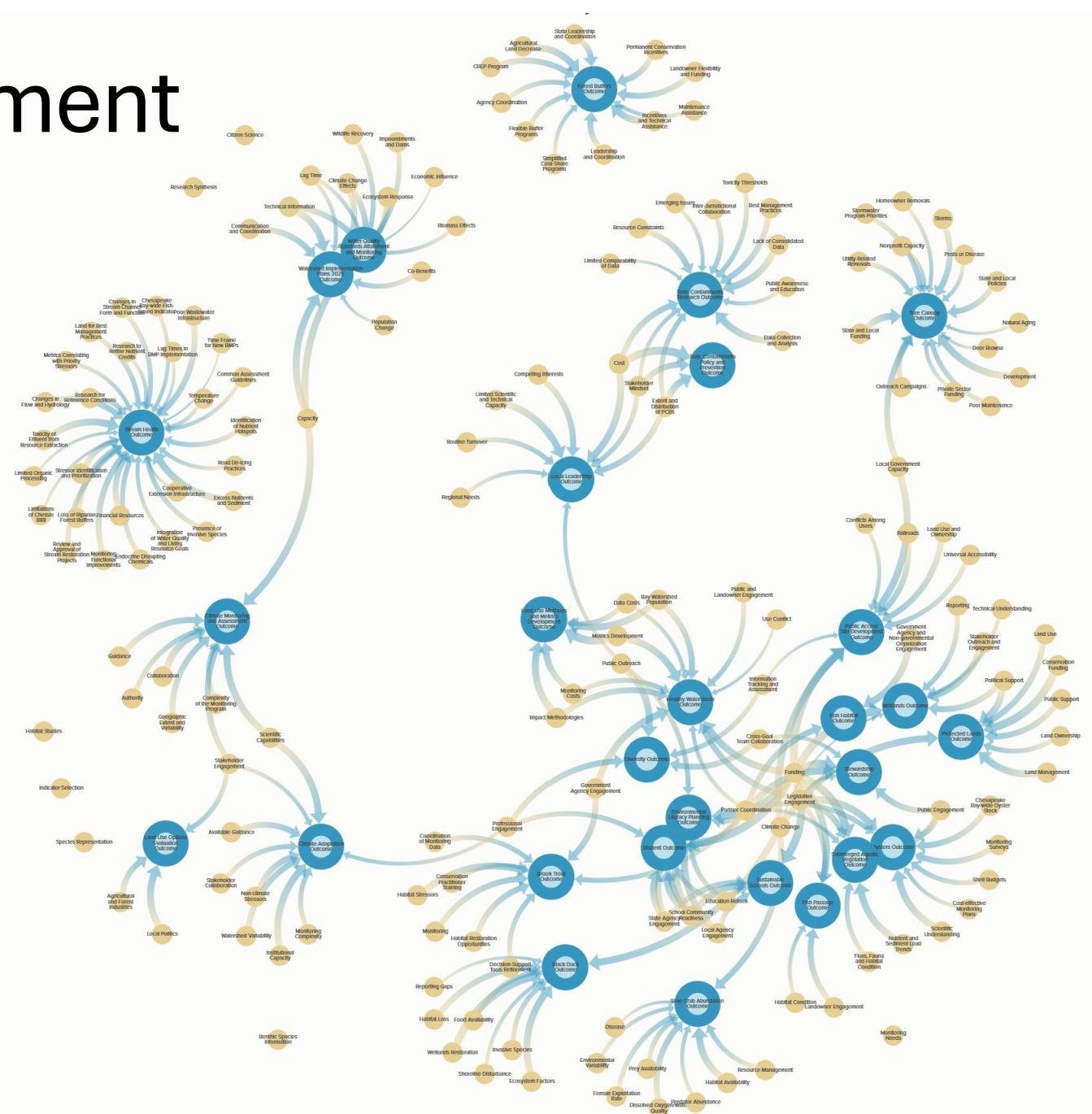
# 2014 Watershed Agreement



*The headwaters of the Rapidan River are seen near Skyline Drive in Shenandoah National Park. (Photo by Will Parson/Chesapeake Bay Program)*

## I. Introduction

In 2018, we stand at a critical juncture relative to land protection in the Chesapeake watershed. Support for watershed restoration is greater than ever and state jurisdictions and federal agencies are committed through the 2014 *Chesapeake Bay Watershed Agreement* to a goal of conserving an





# 2025 Watershed Agreement Update

- 4 Goals
- 21 Outcomes
- Associated  
Targets (under  
development)

DRAFT OUTCOME REVISIONS SUMMARY  
FRIDAY, MAY 16, 2025

Contents

**GOAL: Conserved Lands** .....2

Land Use Decision Support .....2

Protected Lands .....2

Healthy Forests and Trees .....3

Adapting to Changing Environmental Conditions .....4

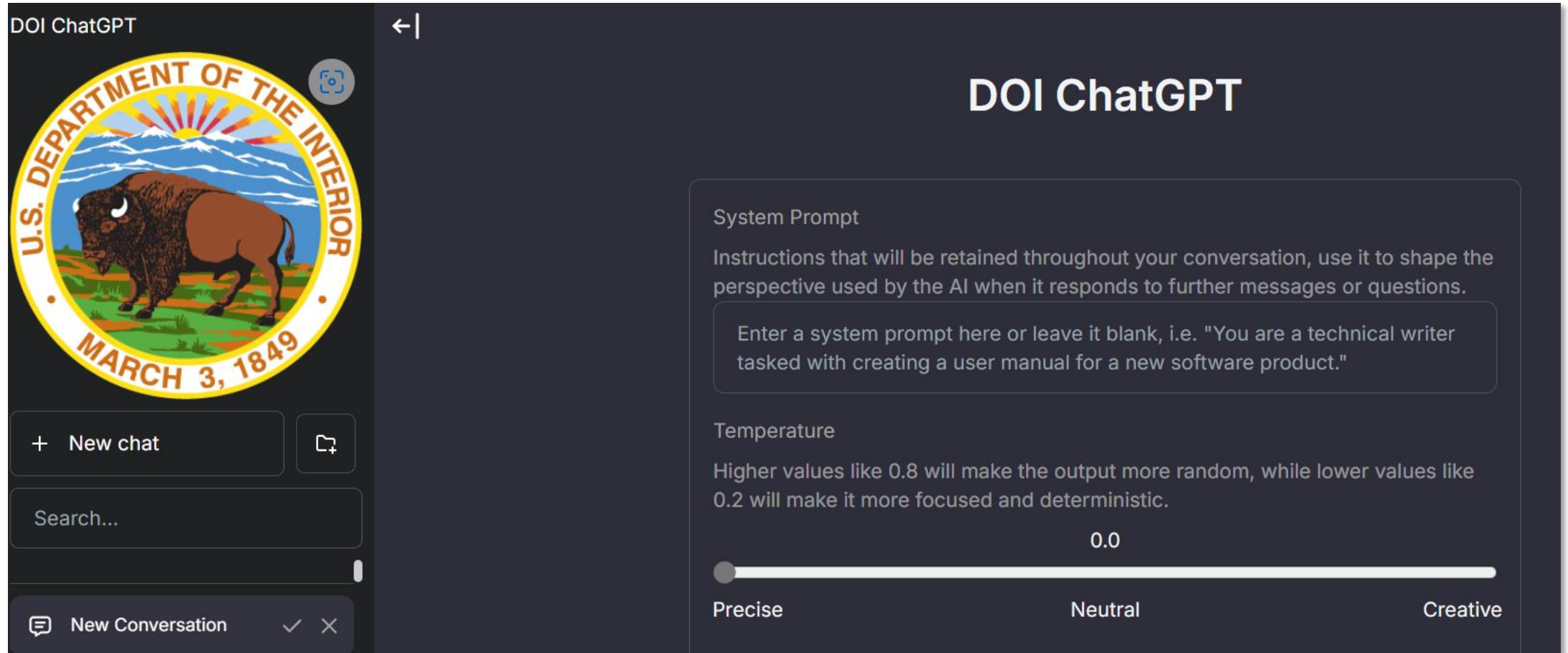
  

**GOAL: Clean Water** .....5

Water Quality Standards Attainment and Monitoring.....5

Reducing Excess Nitrogen, Phosphorous and Sediments .....6

# Establishing a Common Factors Vocabulary



# Establishing a Common Factors Vocabulary

## ChatGPT Prompt #1

The Chesapeake Bay Program Partnership is revising the Watershed Agreement which establishes Goals and Outcomes to be addressed over the next 15 years. The revised agreement will contain four Goals and 21 Outcomes. There are many factors that will influence success in achieving the Outcomes. These include **environmental factors, management actions, policy decisions, funding availability, stakeholder engagement activities, and other variables**. Using the draft agreement pasted below, please list **100 factors** that will have the greatest impact on achieving the Outcomes. This list should incorporate a common vocabulary that could be applied to multiple Outcomes. **Note that some Outcomes could be classified as Factors for other Outcomes.**



# Results – AI-derived Factors

Mappable?

## Environmental Factors

1. Water quality
2. Nutrient loading
3. Sediment erosion
4. Habitat availability
5. Biodiversity levels
6. Climate change impacts
7. Land use changes
8. Wetland restoration
9. Riparian buffer health
10. Stormwater management

## Management Actions

11. Implementation of best management practices (BMPs)
12. Agricultural management strategies
13. Urban planning and development controls
14. Fisheries management
15. Forest management practices
16. Pollution control measures
17. Restoration projects
18. Monitoring and assessment programs
19. Adaptive management strategies
20. Emergency response plans

# Results – AI-derived Factors

## Policy Decisions

- 21. Regulatory frameworks
- 22. Zoning laws
- 23. Water allocation policies
- 24. Environmental protection legislation
- 25. Funding policies
- 26. Incentives for conservation
- 27. Land acquisition policies
- 28. Interagency collaboration agreements
- 29. Public health regulations
- 30. Climate adaptation policies

## Funding Availability

- 31. Federal funding programs
- 32. State funding initiatives
- 33. Local government budgets
- 34. Grant opportunities
- 35. Private sector investment
- 36. Nonprofit funding sources
- 37. Community fundraising efforts
- 38. Public-private partnerships
- 39. Economic incentives for conservation
- 40. Budget allocations for environmental programs

# Results – AI-derived Factors

## Stakeholder Engagement

- 41. Community involvement
- 42. Public awareness campaigns
- 43. Educational programs
- 44. Stakeholder collaboration
- 45. Partnerships with NGOs
- 46. Engagement with local businesses
- 47. Volunteer programs
- 48. Feedback mechanisms
- 49. Conflict resolution strategies
- 50. Inclusivity in decision-making

## Scientific Research and Data

- 51. Availability of scientific data
- 52. Research funding
- 53. Collaboration with academic institutions
- 54. Data sharing platforms
- 55. Long-term monitoring studies
- 56. Innovative research initiatives
- 57. Technology transfer
- 58. Citizen science programs
- 59. Baseline data collection
- 60. Impact assessment studies

# Results – AI-derived Factors

## Infrastructure and Technology

- 61. Water treatment facilities
- 62. Green infrastructure development
- 63. Transportation infrastructure
- 64. Waste management systems
- 65. Renewable energy projects
- 66. Data management systems
- 67. Monitoring technology
- 68. Communication technology
- 69. Flood control infrastructure
- 70. Recreational infrastructure

## Social and Economic Factors

- 71. Economic development strategies
- 72. Population growth trends
- 73. Land ownership patterns
- 74. Community resilience
- 75. Cultural values and practices
- 76. Economic dependency on natural resources
- 77. Job creation in environmental sectors
- 78. Equity in resource distribution
- 79. Public health considerations
- 80. Tourism impacts

# Results – AI-derived Factors

## **Legal and Institutional Framework**

- 81. Enforcement of environmental laws
- 82. Institutional capacity
- 83. Governance structures
- 84. Transparency in decision-making
- 85. Accountability mechanisms
- 86. Intergovernmental relations
- 87. Legal challenges to policies
- 88. Institutional collaboration
- 89. Capacity building for local agencies
- 90. Conflict of interest regulations

## **External Influences**

- 91. National policies and priorities
- 92. International agreements
- 93. Economic trends
- 94. Technological advancements
- 95. Public opinion and media influence
- 96. Global environmental issues
- 97. Natural disasters
- 98. Political climate
- 99. Demographic shifts
- 100. Environmental advocacy movements



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# Ranking Factors by Outcome

## ChatGPT Prompt #2

From the list below, identify the top 10 factors affecting the achievement of the [Stream Health Outcome](#) of the proposed Chesapeake Bay Watershed Agreement

### *Stream Health*

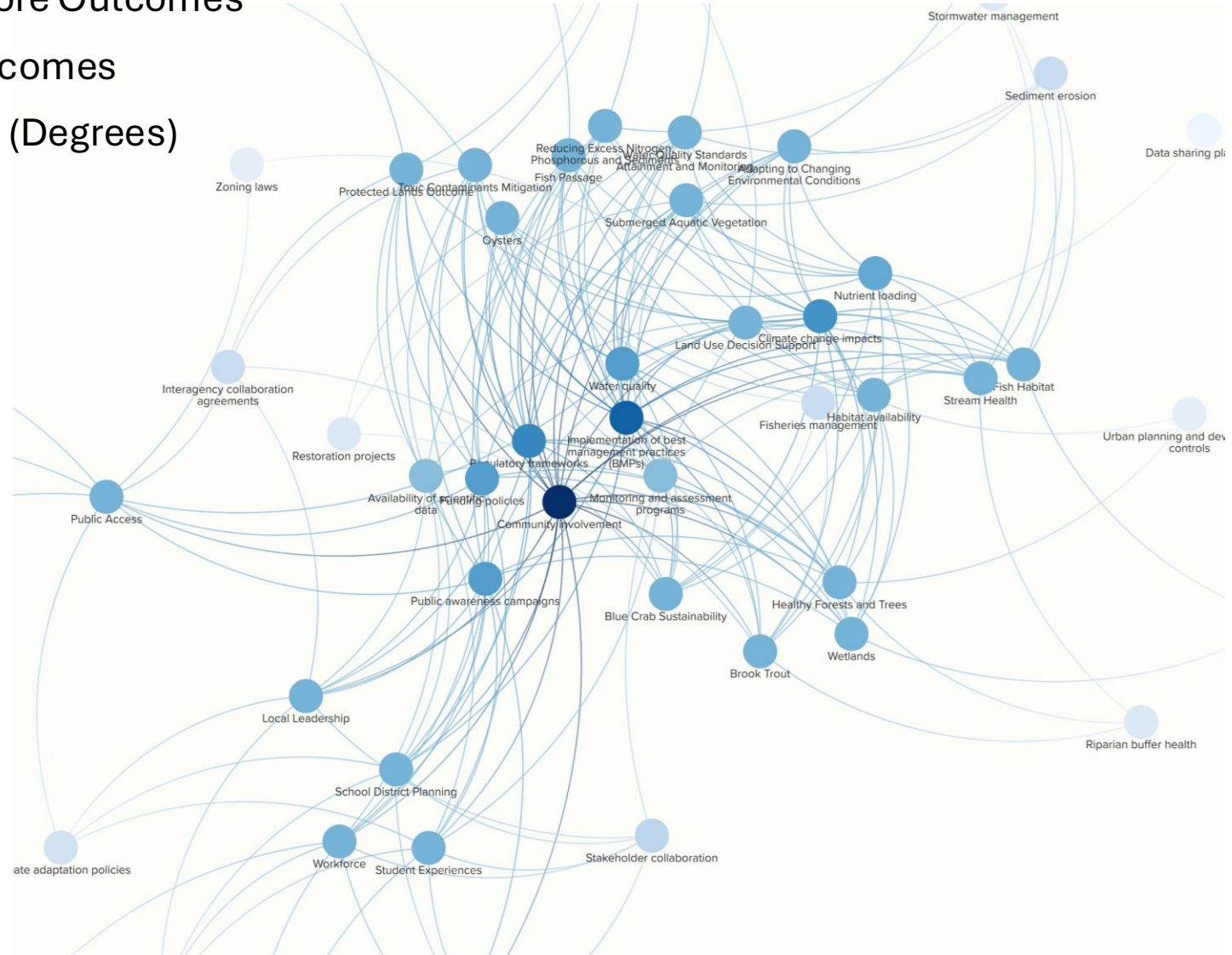
- *Continually improve and protect local stream health and function, including their living resources and ecosystem services throughout the watershed using the best available science to inform land management, planning, and conservation.*

Summarize the results in a table that includes columns for the Outcome name, the Factor Name, a Description of the Factor, and a column for the factor rank where the most important factor is assigned a value of 10, the next most important factor is assigned a value of 9, the next most important factor is assigned a value of 8, etc.

# Ranked Factors

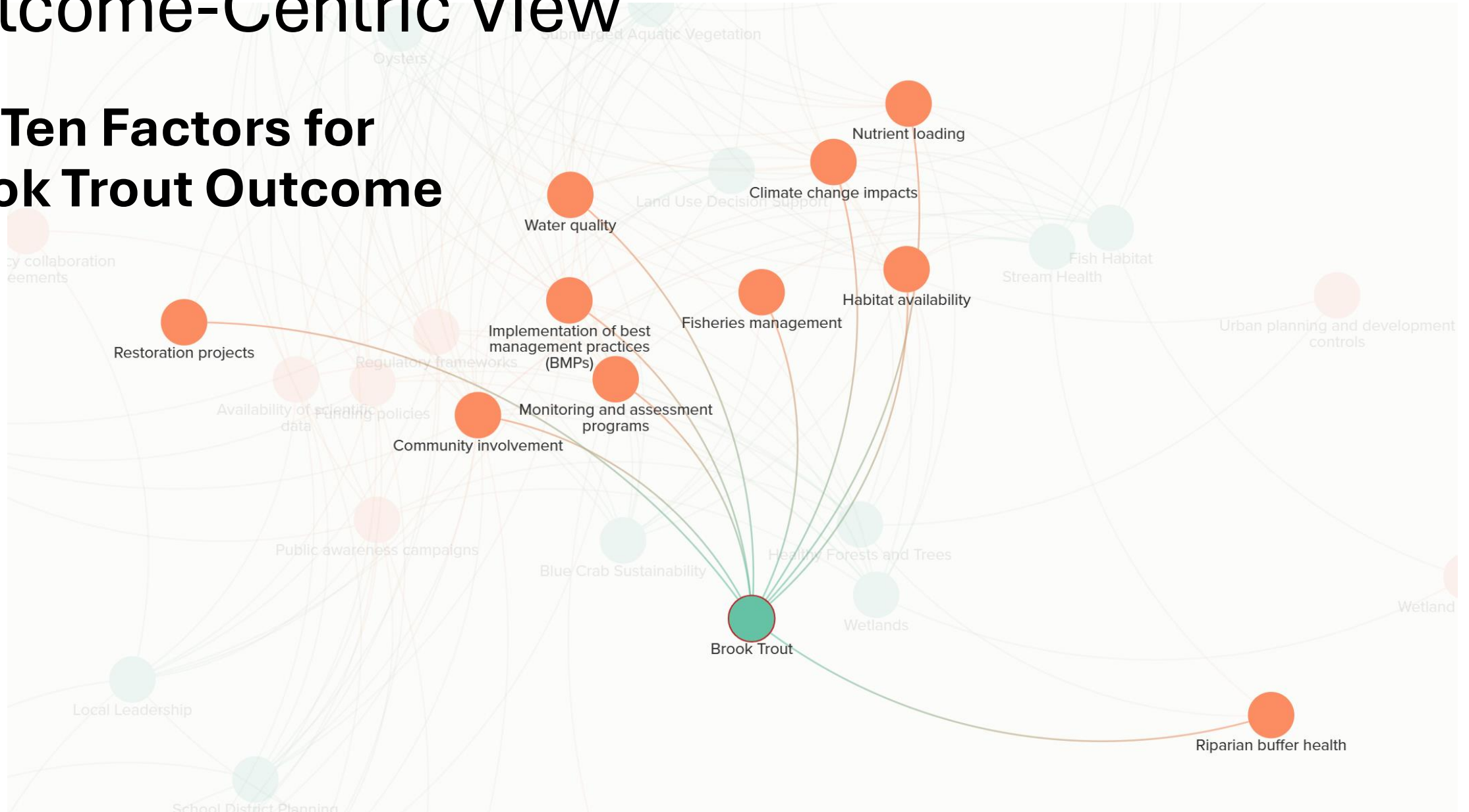
- 62 Factors were in the top ten of one or more Outcomes
- Factors with the most connections to Outcomes
- Darker blue represents more connections (Degrees)

Rank	Label	Value
#1	Community involvement	21
#2	Implementation of best management practices (BMPs)	17
#3	Regulatory frameworks	14
#4	Climate change impacts	13
#5	Public awareness campaigns	12
#6	Water quality	12
#7	Funding policies	12
#8	Nutrient loading	11
#9	Adapting to Changing Environmental Conditions	10
#10	Blue Crab Sustainability	10
#11	Brook Trout	10
#12	Fish Habitat	10



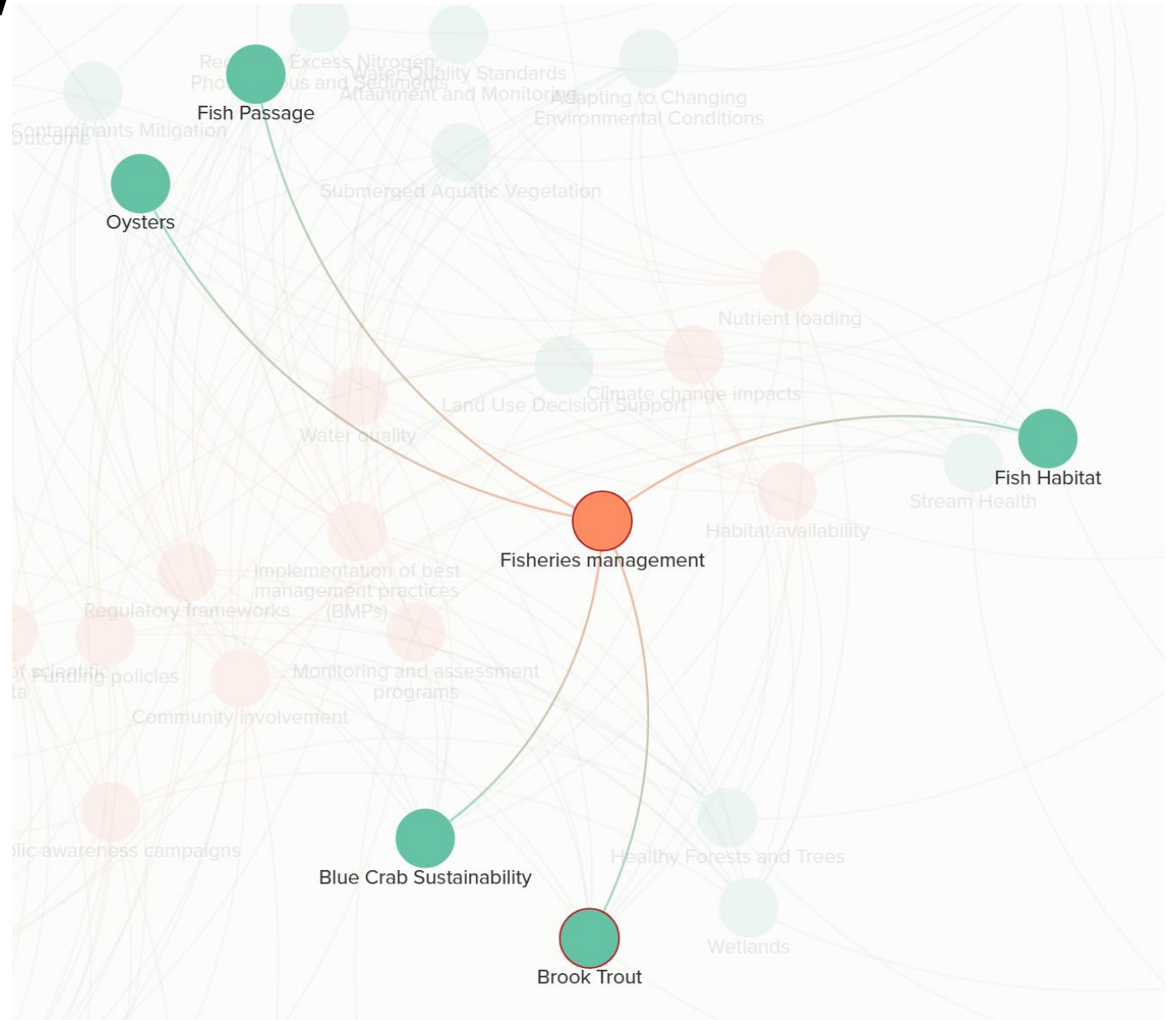
# Outcome-Centric View

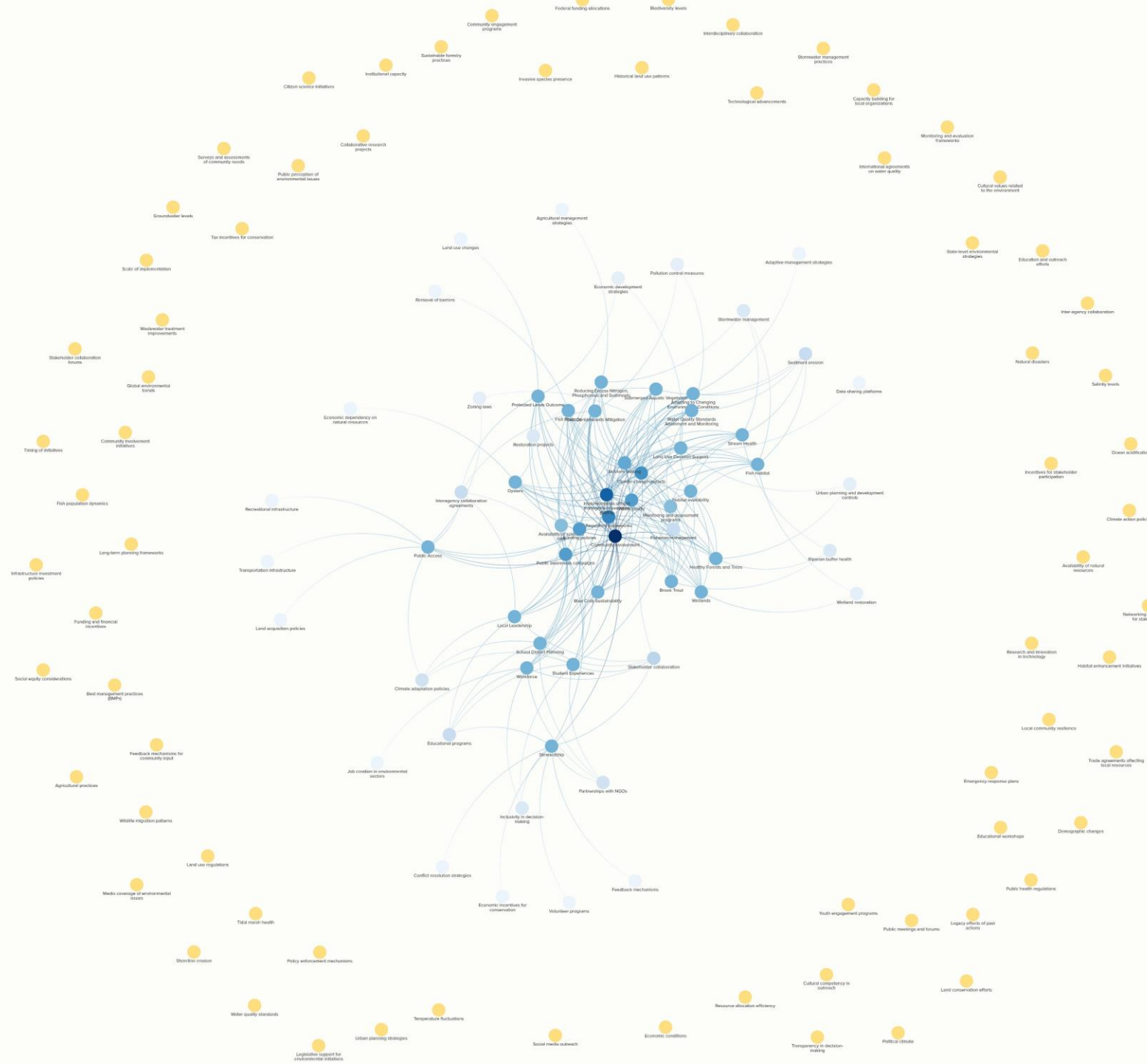
## Top Ten Factors for Brook Trout Outcome



# Factor-Centric View

**Which Outcomes are impacted by Fisheries Management?**







# Potential Path Forward

- Strive for consistency in new Management Strategies Factors
  - Common vocabulary/picklist for Factors affecting progress
  - Workgroup/Coordinator involvement/review of draft factors list
- Potentially consider ranking Factors based on
  - Consideration of controllability of factors
  - Consideration of level of effort required to address factors
  - Which factors are quantifiable? Which are mappable?
  - Can/should they be used for geographic targeting (B2025 SC recommendations)