A Structured Decision Analysis for Prevention, Management, and Mitigation of Cyanobacterial Harmful Algal Blooms at [Fill in] State Park, New York—A Structured Decision Analysis [Add date and location of workshop if one was held; otherwise leave blank]

By [Add the participants and facilitators who helped developed the analysis, for example: Jennifer Graham,1 Gabriella Cebada Mora,2 and Rebecca Gorney3]

1U.S. Geological Survey.

2New York State Office of Parks, Recreation and Historic Preservation.

3New York State Department of Environmental Conservation.

Abstract

[250–500-word abstract that briefly describes the park setting, the history of cyanobacterial harmful algal blooms (CyanoHABs), the key fundamental objectives, the alternative strategies considered, how the strategies were evaluated, and the path forward.]

Background

Park Setting

[Describe the park, its setting in the watershed, its infrastructure, its use, and other aspects that might be relevant to the decision. Consider including 1–2 maps (fig. 1) or other graphics that show the setting.]

[Insert map of park]

**Figure 1.** Map of land cover in [fill in] State Park and its topographic watershed.

Water Quality and History of Cyanobacterial Harmful Algal Blooms

[Describe the waterbody, the quality of the water, and the history of cyanobacterial harmful algal blooms (CyanoHABs).]

Decision Makers, Partners, and Stakeholders

[Describe who has authority to make decisions concerning management of CyanoHABs in the lake or waterbody. Describe other agencies that might need to be consulted. Describe the important stakeholders who have a vested interest in the decision.]

Trigger and Urgency

[Describe what has prompted the need for a management strategy at this time, as well as the expected timeline for intervention.]

Objectives

[Describe the fundamental objectives that are important to the decision maker and stakeholders in the context of managing CyanoHABs at this park. See the draft set of fundamental objectives in Graham and others (2022) for inspiration and organization.]

Alternatives

[Brief introductory sentence or two about how the alternatives were developed.]

Action Elements

[Describe the individual types of actions considered in each of four categories: watershed management options; in-lake management options; risk mitigation and communication options; and research and monitoring options. Include text describing each category. Also, consider assembling the options into a strategy table (that is, a menu of options from which strategies can be created) (table 1).]

**Table 1.** Strategy table for management of cyanobacterial harmful algal blooms at [fill-in] State Park. Each column represents a menu of potential options within a category. A full strategy is characterized by choosing one or more options from each column.

|  |  |  |  |
| --- | --- | --- | --- |
| **Watershed options** | **In-lake options** | **Risk mitigation and communication** | **Research and monitoring** |
| * No management * Erosion management * Develop/implement a Clean Water Plan (9E) * Municipal separate storm sewer system (MS4) partnerships * (Add additional options as needed) | * None * Aquatic invasive removal * Hypolimnetic aeration * Ultrasonic treatment | * None * Education about eutrophication * Signs and risk education * Environmental education | * None * Periodic monitoring * Sediment cores * Nutrient monitoring |

Alternative Strategies

[Describe 4–6 strategies that were developed from the strategy table that represent a range of reasonable approaches to CyanoHABs management at the park.]

Analysis of Consequences

[Describe how the alternative strategies were evaluated against the fundamental objectives. Summarize that evaluation, perhaps in a consequence table (table 2).]

**Table 2.** Consequence analysis of the cyanobacterial harmful algal bloom management strategies for [Fill in] State Park against the fundamental objectives. The cells of the table show the expected performance of each strategy in terms of the corresponding objective. The green-shaded cells mark the strategy that performs best for a particular objective, and the pink-shaded cells mark the strategy that performs worst for a particular objective. The desired direction is indicated under each objective as either maximizing or minimizing outcomes.

| Alternative | Objective 1 | Objective 2 | Objective 3 | Objective 4 | Objective 5 | Objective 6 | Objective 7 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Desired direction* | *Maximize* | *Maximize* | *Minimize* | *Maximize* | *Maximize* | *Minimize* | *Maximize* |
| 1: Current management strategies |  |  |  |  |  |  |  |
| 2: [name] |  |  |  |  |  |  |  |
| 3: [name] |  |  |  |  |  |  |  |
| (Add additional rows as needed.) |  |  |  |  |  |  |  |

Critical Uncertainty

[Describe whether there is critical uncertainty that impedes the choice of management strategy. If there is, articulate the competing hypotheses (for example, the causes of the CyanoHABs), and possibly include a value-of-information table. Discuss what could be gained from experiments or research to reduce uncertainty before committing to a management strategy.]

Tradeoffs

[Describe the barriers to choosing a preferred strategy—are there multiple objectives, critical uncertainty, or other challenges? How were these tradeoffs navigated to arrive at a preferred strategy for implementation or to identify a path forward?]

Implementation Questions

[Describe the plan for implementation. Include perhaps the following:

* + What does it take to get the funding in place?
  + What needs to be done to get through the permitting?
  + What partners need to be engaged?
  + Timeline—for implementation and for benefit to be observed]

Next Steps

[Provide a brief summary of the outcome of the decision analysis and what immediate steps are recommended.]

References Cited

Graham, J.L., Cebada Mora, G.M., Gorney, R.M., Ball, L.C., Mengelt, C., and Runge, M.C., 2022, A structured decision-making framework for managing cyanobacterial harmful algal blooms in New York State Parks: U.S. Geological Survey Scientific Investigations Report 2022–5053, 22 p., 3 app., <https://doi.org/10.3133/sir20225053>.