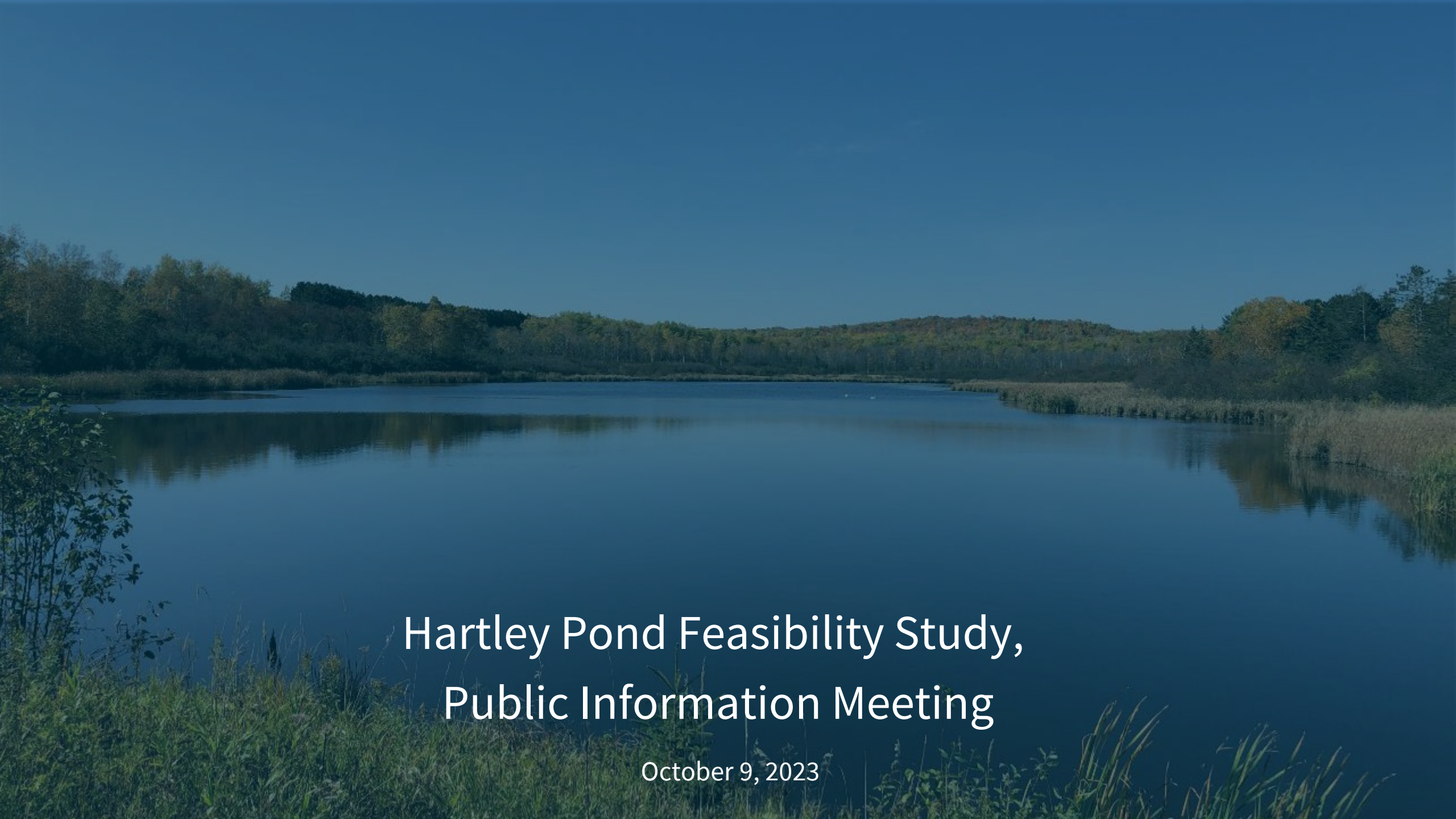


Hartley Pond Feasibility Study, Public Information Meeting

October 9, 2023

Welcome and Team Introduction

Presentation on the progress of the feasibility study
and answering of questions.
Formal public input will be subsequently managed by the City of Duluth

- **City of Duluth – Kate Kubiak**
- **Minnesota Department of Natural Resources – John Lindgren**
- **GEI – Rob Peterson, Cole Webster**
  - Beaver River Consulting – Keith Anderson
  - River System Strategies – Rebecca Eiden

Hartley Park Management Plans

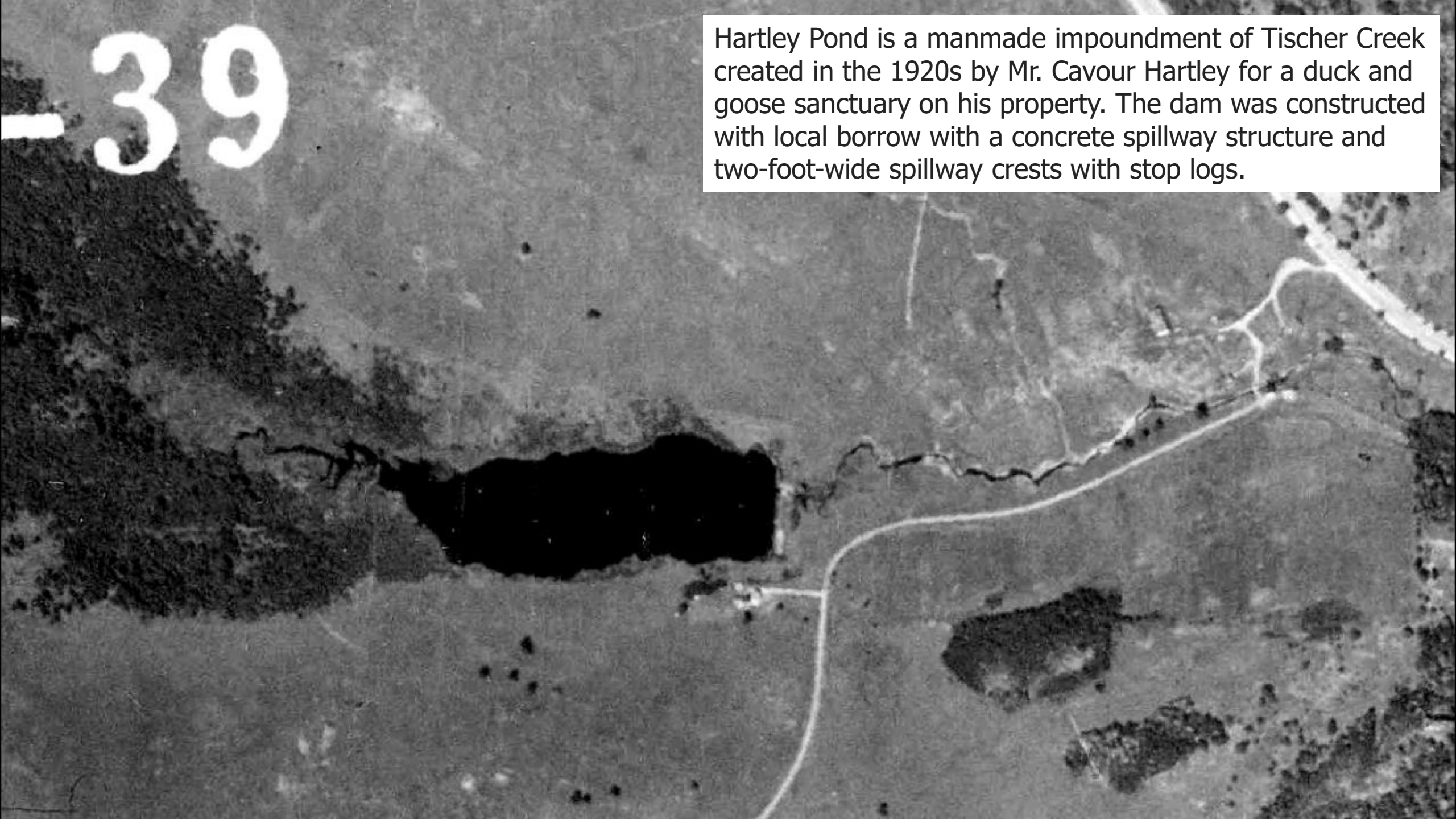
1. Hartley Duluth Natural Areas Program Management Plan, City of Duluth, 2019.
2. Hartley Park Mini-Master Plan, City of Duluth, 2014.
3. Essential Spaces: Duluth Parks, Recreation, Open Space & Trails Plan, City of Duluth, 2022
4. Restoration Strategy – Duluth Urban Area Watershed Restoration and Protection Strategy Document, MPCA, 2017.

Hartley Pond Feasibility Study is identified as an action item in Hartley Duluth Natural Areas Program Management Plan and Hartley Park Mini-Master Plan

Feasibility Study

- What is this Feasibility Study?
  - A study to assess the most effective and efficient alternatives for eliminating negative impacts on brook trout and other cold-water resources considering mainly engineering and environmental factors, including effects of:
    - Stream temperatures
    - Aquatic organism passage and habitat
    - Sediment transport
    - Hydrology and hydraulics
  - Assessment includes:
    - Historical conditions, existing surface and groundwater conditions assessments, existing fish surveys, and hydrologic and hydraulic modeling
  - Feasibility study is the first step in the decision-making process. The City of Duluth will select an alternative with additional considerations, including policy, economic, and social implications

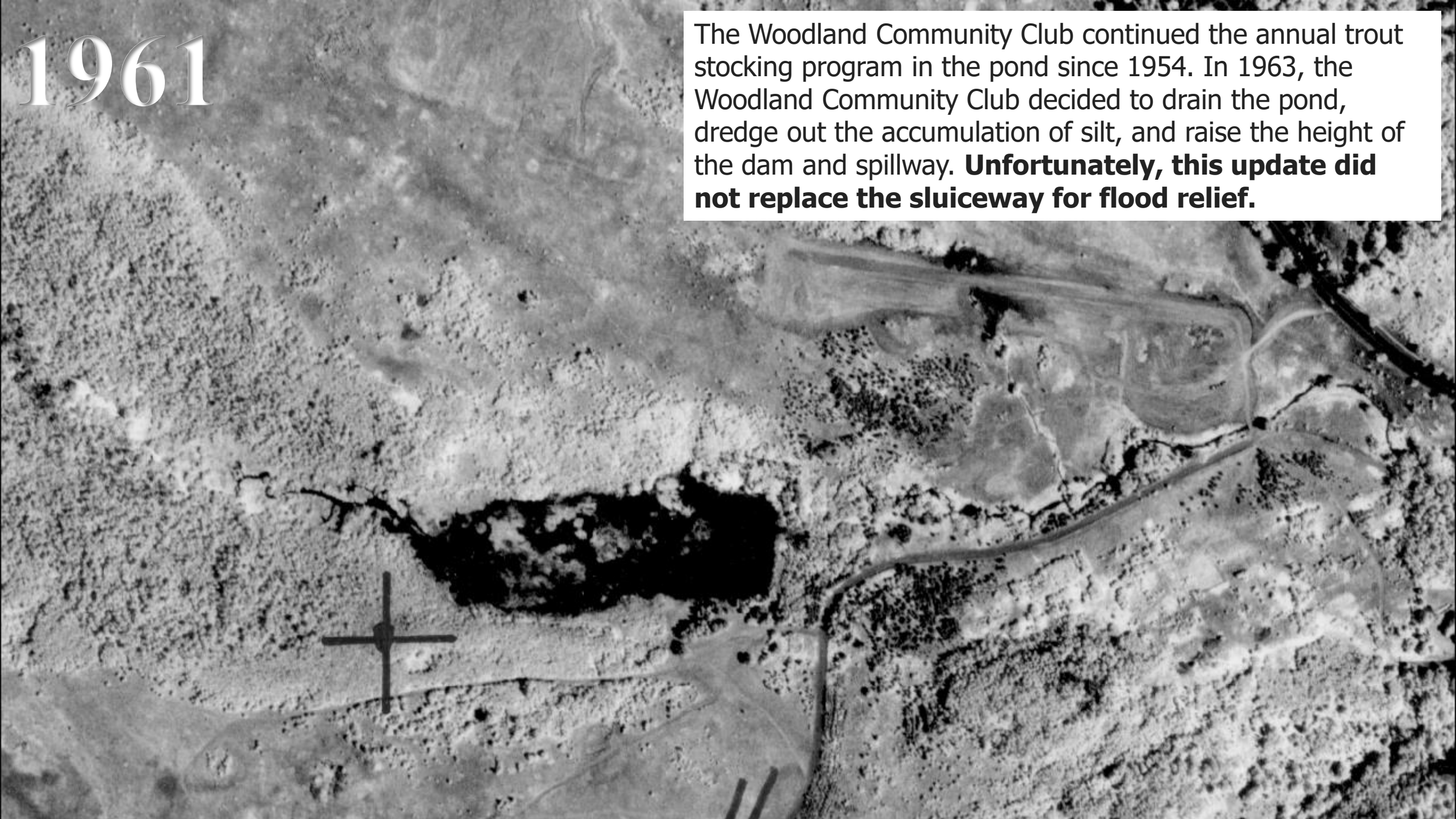
Hartley Pond and Dam History



Hartley Pond is a manmade impoundment of Tischer Creek created in the 1920s by Mr. Cavour Hartley for a duck and goose sanctuary on his property. The dam was constructed with local borrow with a concrete spillway structure and two-foot-wide spillway crests with stop logs.

In the 1930's Hartley allowed the property to go tax delinquent and was turned into Hartley Park. Various civic groups improved the area with tree planting.

1961



The Woodland Community Club continued the annual trout stocking program in the pond since 1954. In 1963, the Woodland Community Club decided to drain the pond, dredge out the accumulation of silt, and raise the height of the dam and spillway. **Unfortunately, this update did not replace the sluiceway for flood relief.**

1972

As a result, during the August and September 1972 flooding, thirty or forty feet of the earthen dam was completely washed out. In 1974, the dam was rebuilt due to mounting pressure from the Woodland Community Club and downstream property owners.

1981

In 1980 there was a dam safety inspection that noted several areas of cracking of the wing walls. This led to repair work in 1985.

#2 9/18/85 WATER IN HARTLEY POND NEARLY DRAINED

#11 10/16/85 FACE OF SOUTH WALL AFTER INJECTION

#22 10/31/85 FORMS REMOVED

Class I Dam

- Although it is in satisfactory condition, Hartley Dam is classified as a *High Hazard* or Class I Dam by Minnesota Rule 6115.0340: Defined as, failure of dam would probably result in "loss of life or serious hazard, damage to health, main highways, high-value industrial or commercial properties, major public utilities, or serious direct or indirect, economic loss to the public. "
- 3% of the dams in Minnesota are classified as *High Hazard*
- This classification is made based on the potential for major consequences in the case of dam failure, rather than the likelihood of failure to occur

Dam Impacts on Trout Populations

- Habitat Fragmentation: Disrupts the longitudinal connectivity, hindering fish passage and access to upper watershed spawning habitat.
- Altered Flow Regimes: Trout are adapted to specific flow conditions, and alterations can affect their feeding and spawning behaviors.
- Sediment Accumulation: The dam can minimize sediment transport, trapping sediment upstream and degrading the channel downstream, reducing habitat quality.
- Water Temperature Changes: Trout are sensitive to water temperature fluctuations, and changes can impact their survival and reproduction.
- Genetic Isolation: Longitudinal fragmentation can isolate trout populations and cause genetic change, potentially reducing genetic diversity and resilience to future climate conditions.
- Water Quality: The dam may cause changes in water quality, including increased turbidity and nutrient levels, increased water temperature, and reduced dissolved oxygen. These water quality changes can stress trout populations.

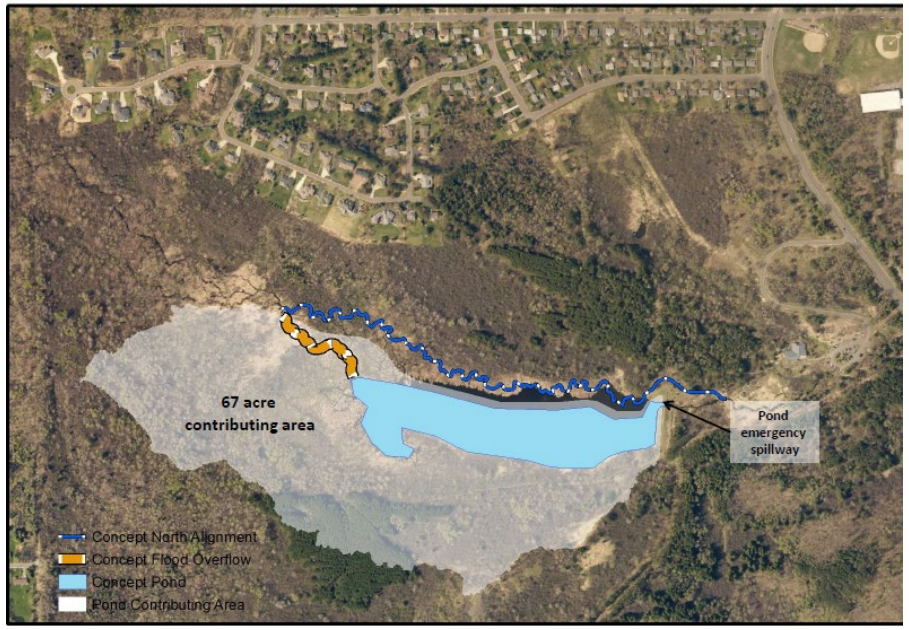
Proposed Alternatives

Alternative #1 – No Action

Alternative #2 - Construct rock arch rapids at outfall of dam

Alternative #3 - Leave dam in place, route a channel around the dam, and excavate pond to a desired depth

Alternative #4 - Remove or modify existing dam and construct a stream channel in the original stream valley. Excavate an offline pond.

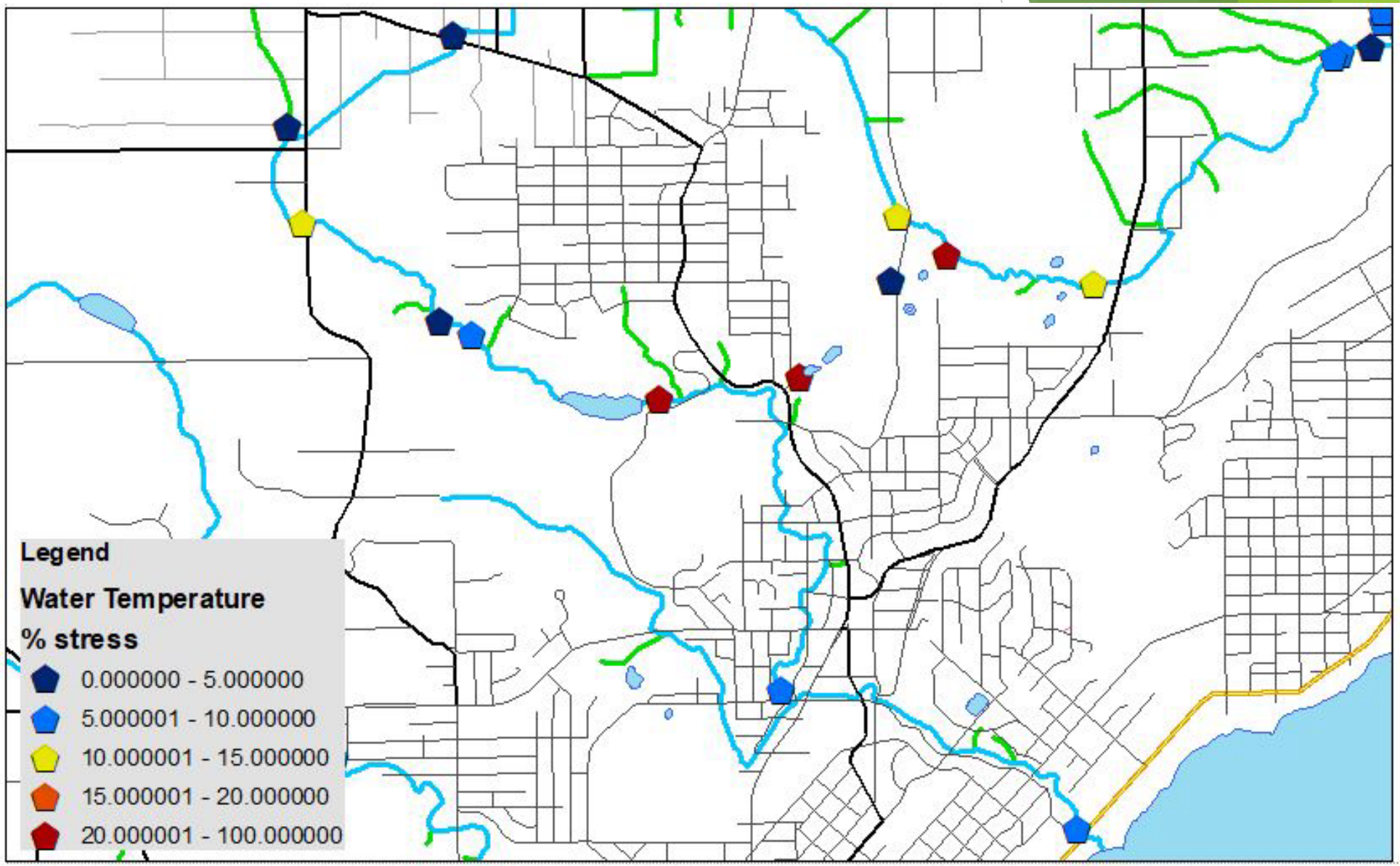


Characteristics of Hartley Pond

- Hartley Pond Max Depth: 7 feet
- Hartley Pond Surface Area: 11 acres
- Secchi depth: 5.2 feet
- Field pH: 8.4
- 2009: black bullhead, golden shiner, largemouth bass, pumpkinseed, white sucker, yellow perch
- meso to eutrophic (mid to high nutrient environment)

Stream summer temperatures

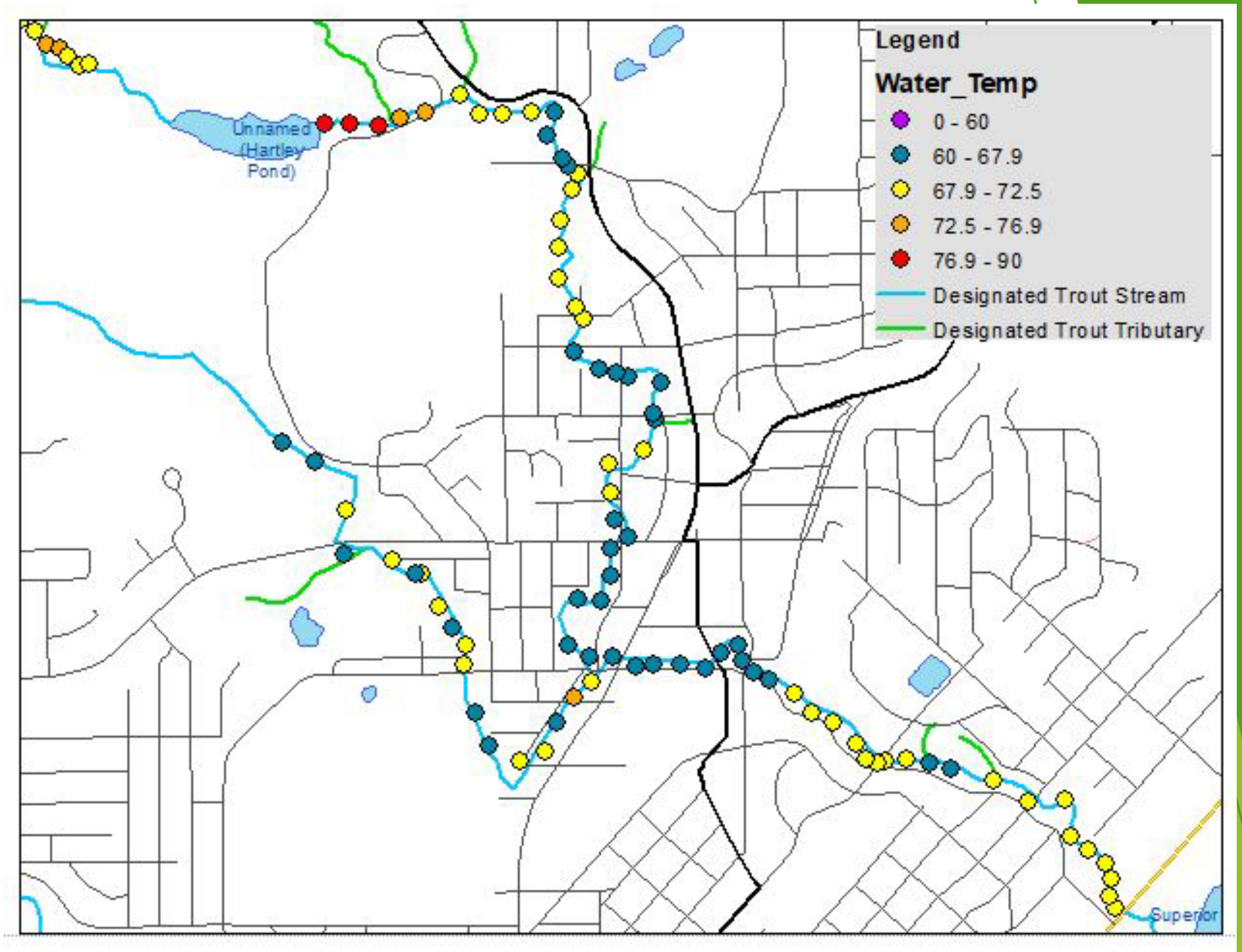
- Measure hourly from beginning of June through September
- Compare % of hours within stressful conditions for Brook Trout



DEPARTMENT OF NATURAL RESOURCES

2021 Instantaneous Temperatures Below Hartley Pond

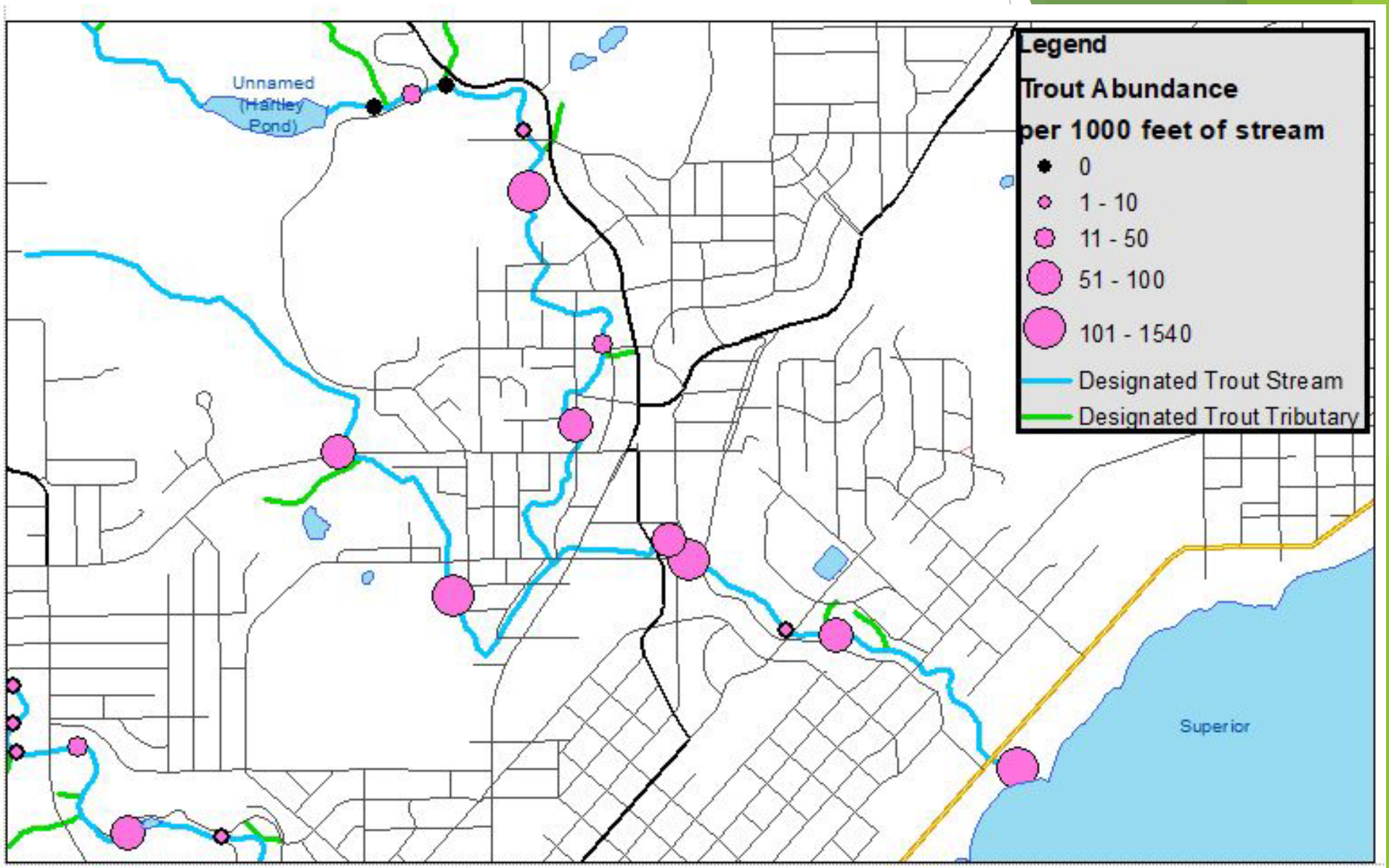
- Single measurement at peak heat within short period
- Identifies hot spots and cold spots (groundwater input)



DEPARTMENT OF NATURAL RESOURCES

Trout in Tischer Creek- below Hartley Pond

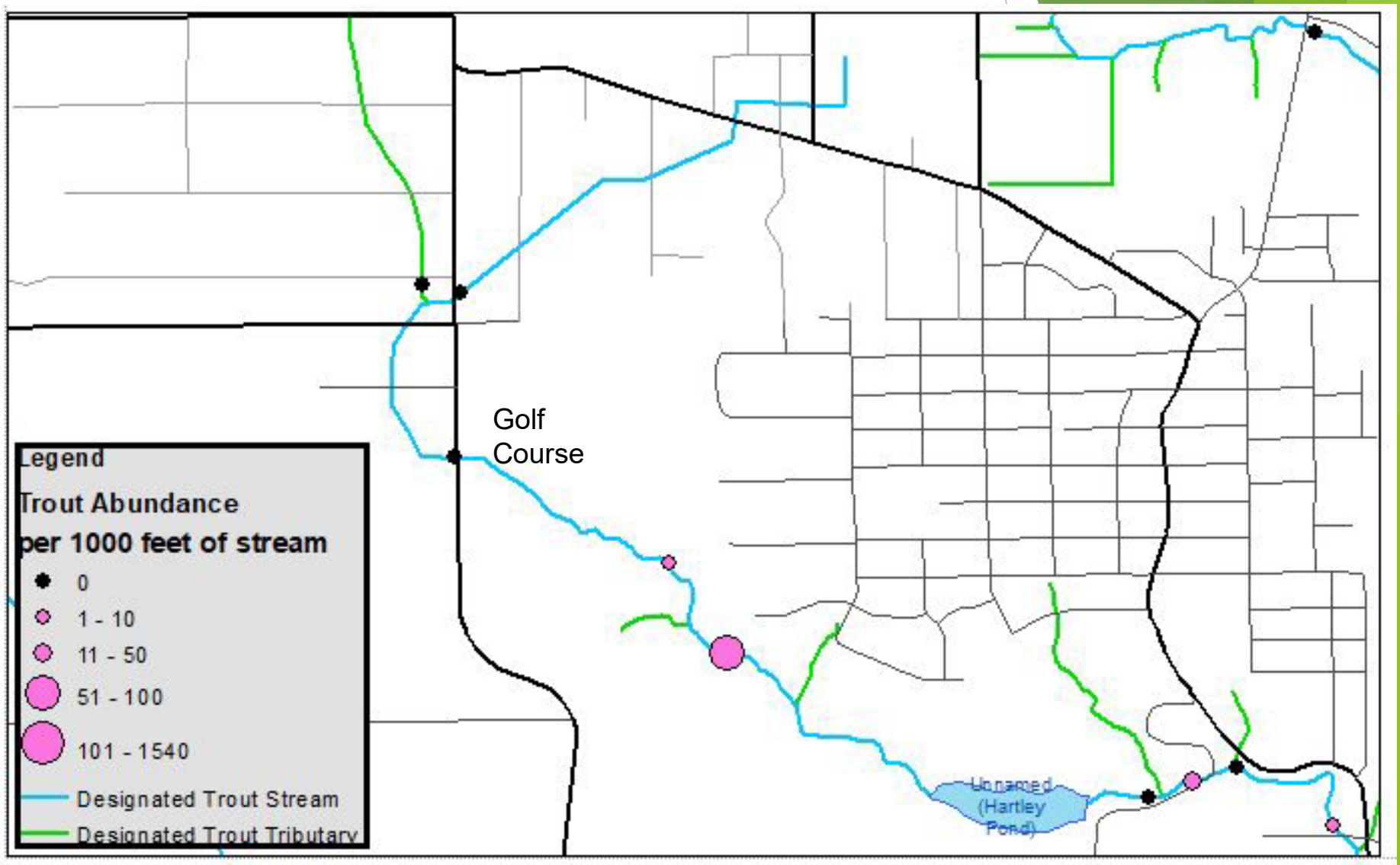
Generally good populations in lower stream reaches with few or no trout below Hartley Pond outlet (Hartley Park)



DEPARTMENT OF NATURAL RESOURCES

Trout in Tischer Creek- above Hartley Pond

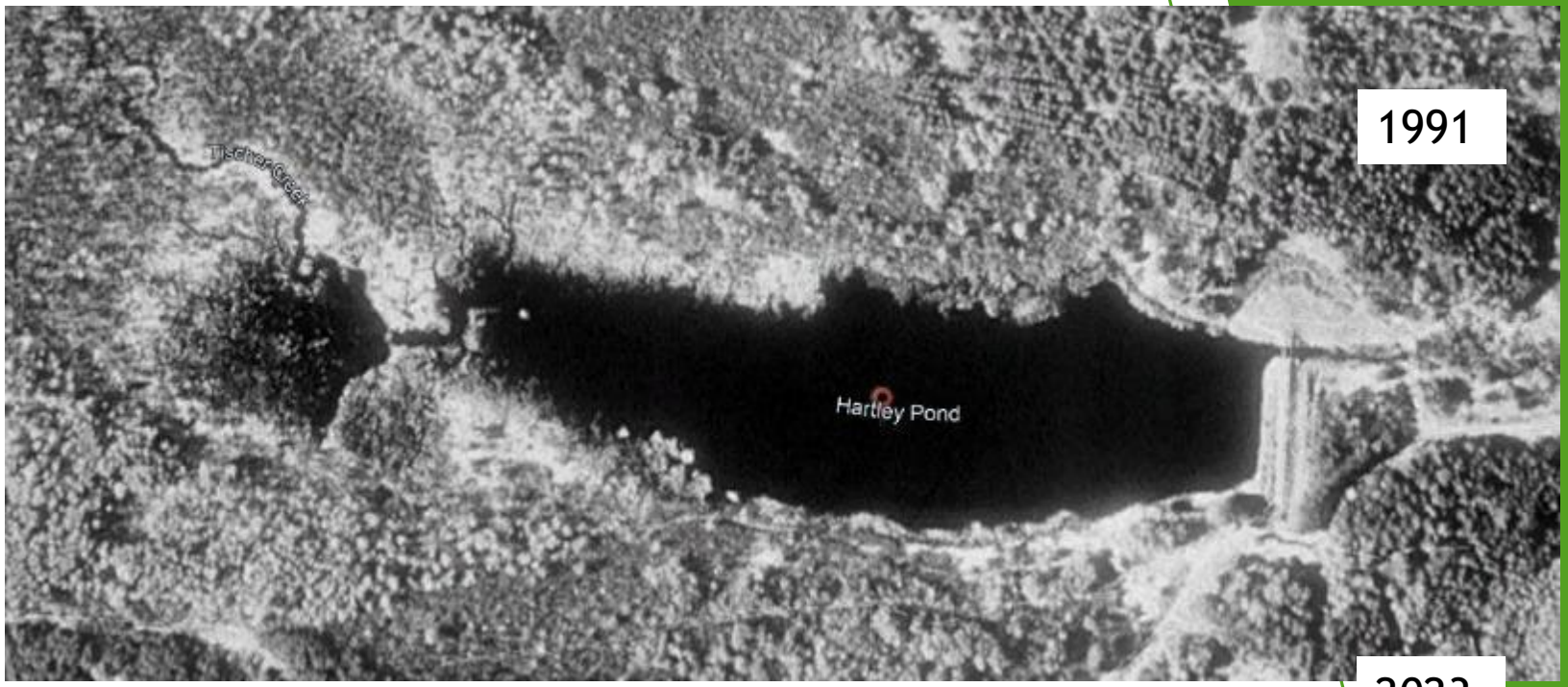
Mostly absent with small remnant population upstream of Hartley Pond

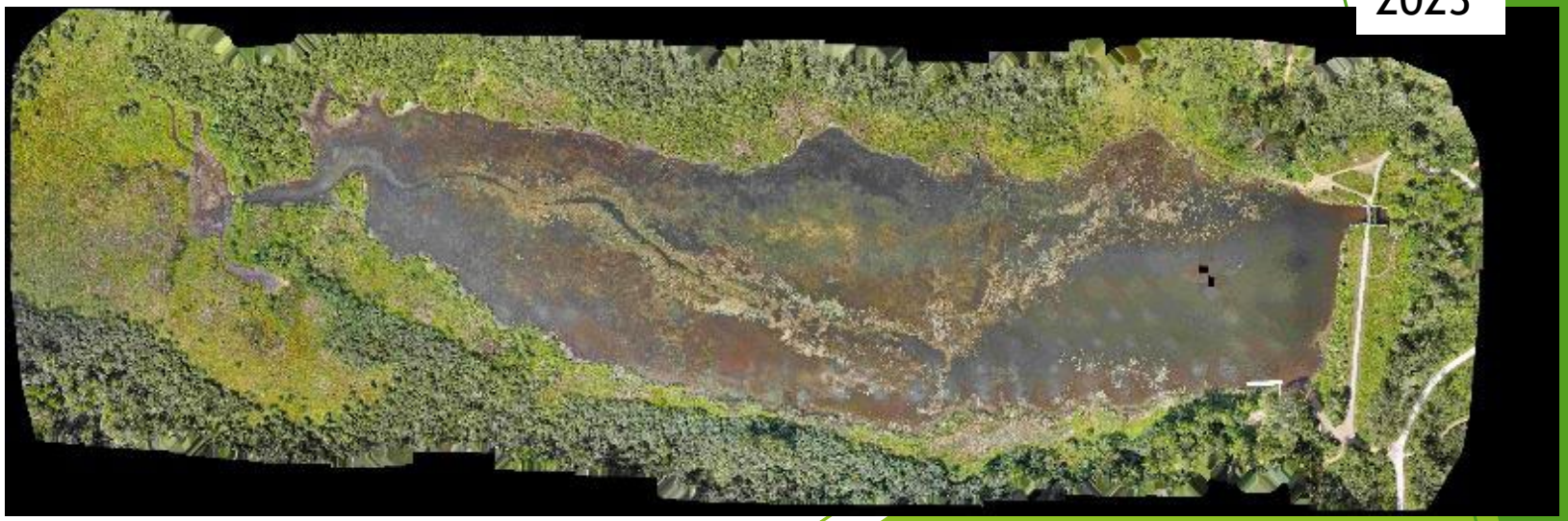


DEPARTMENT OF NATURAL RESOURCES

Man Made Barriers and Impoundments - Critical Issues

- Fish passage
  - Trout population isolation
  - Blocked access to upstream spawning/ refuge habitat
- Sediment transport
  - Increase stream erosion downstream
  - Filling of impoundments
- Temperature and Discharge

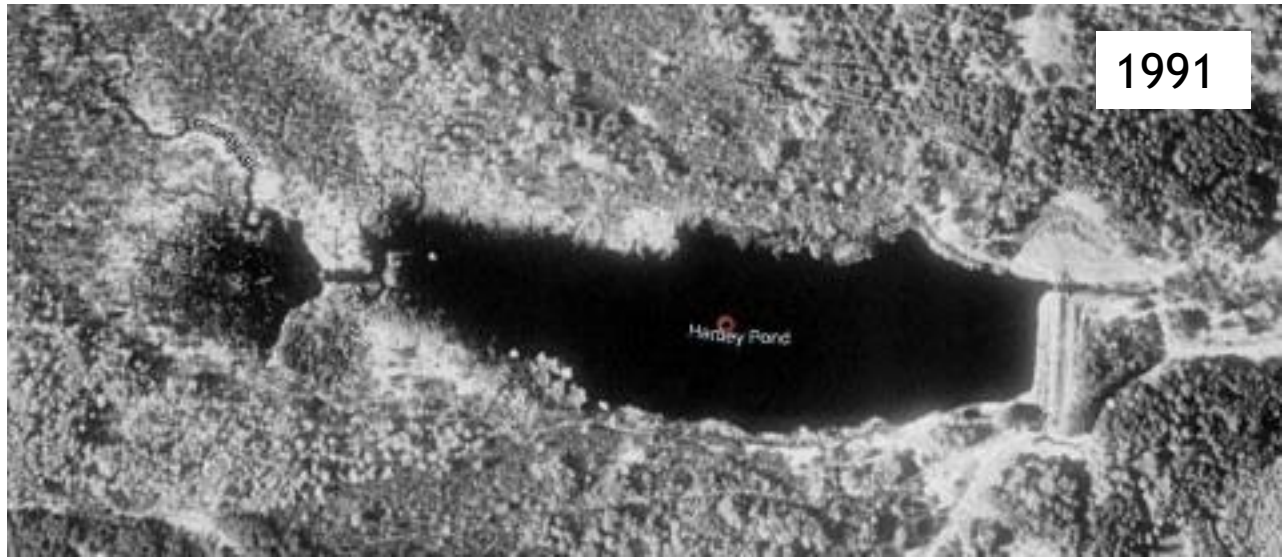




DEPARTMENT OF NATURAL RESOURCES

Value of Hartley Pond

- Habitat for waterfowl such as ducks, geese and swans
- Regularly used by anglers, although the quality of the fishery is poor
- Used by the public for canoeing, kayaking, swimming, skating and dog swimming
- It is considered pleasing to the public that recreates within the Park, but the aesthetic quality is degrading
- Used by Hartley Nature Center and other local educational entities for environmental programming



Evolution of Hartley Pond

- Maximum amount of open water and least amount of submerged aquatic vegetation after dam upgrade in 1974
- Sediment transported from upstream is deposited in Hartley Pond
- Fine sediments result in increased growth of submerged plants
- Yearly plant decay and additional deposit of sediment reduce depth
- Process accelerates as depth decreases
- At a critical minimum depth the habitat converts to an emergent marsh
- Hartley Pond is nearing the late stages of pond evolution

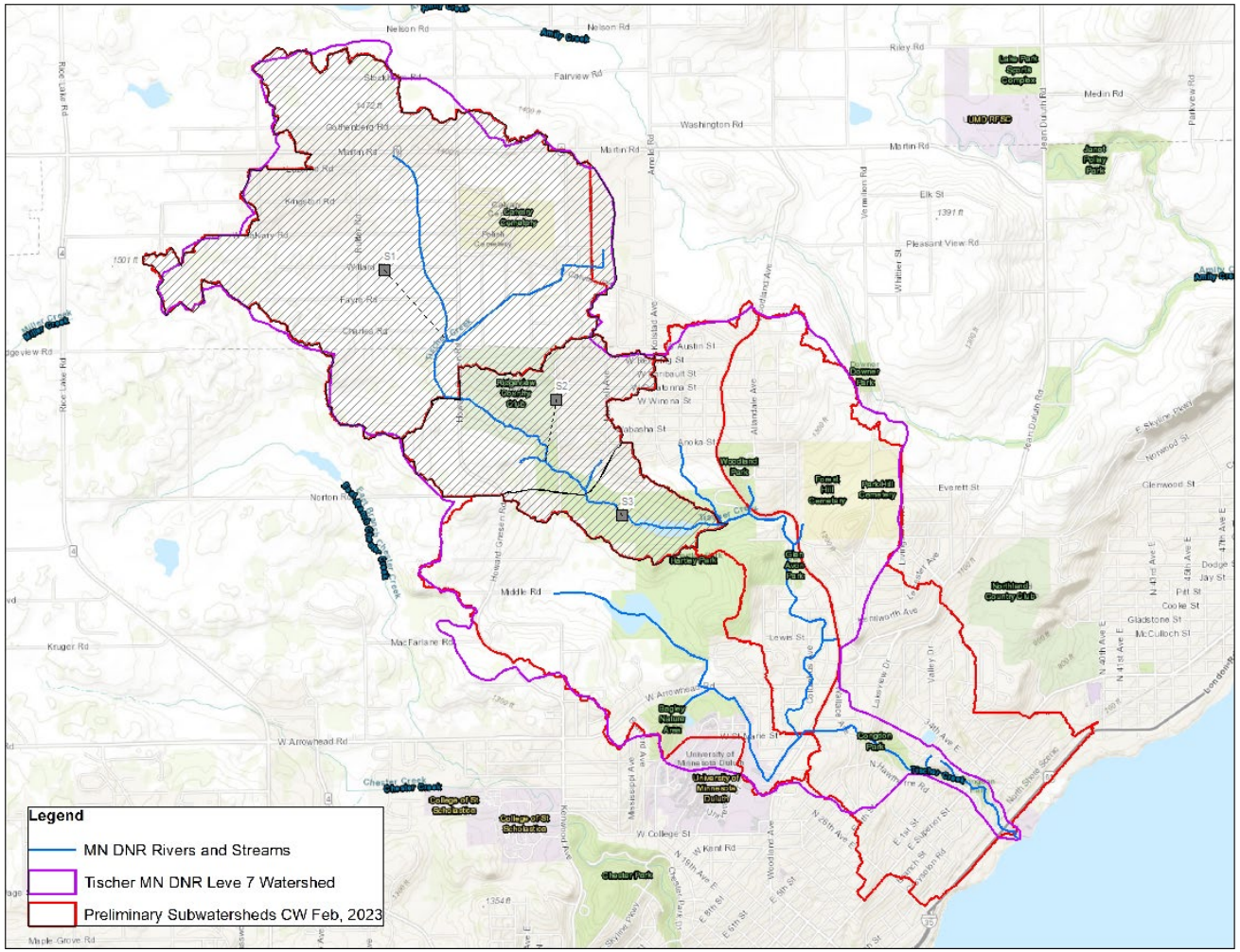
Hydrologic and Hydraulic Modeling

- Purpose – evaluate the alternatives in relation to how Hartley Pond/Dam affects 100-yr peak water flows downstream
  - Hydrology and hydraulics
  - Completed using modeling software, available data, historical records
  - Hartley Pond and downstream as focus area

- ***Existing conditions*** – understand the current state of Tischer Creek/Hartley Pond
  - Underlying assumptions – how wet the soil is before the rain event, how heavy the rainfall event is, etc.
    - We assumed water storage in Hartley Pond is available, unlike FEMA's model assumption
- ***Evaluate alternatives***
  - How will each alternative handle these flows?
  - What is the estimated resulting flood extent?

Existing Conditions

- Used 100-yr (1% chance), 24-hr rain event
  - 6.41” in 24-hours
- Assumed Hartley pond/dam water level set to 9-ft, right at the lip of spillway
- Estimated Hartley pond peak inflow – 1,028 CFS
- Estimated Peak outflow – 650 CFS
- Pond reduced the peak flow by 378 CFS
- 2003 USACE study estimated 1,290 CFS peak flow reduced to 970 CFS (320 CFS reduction)

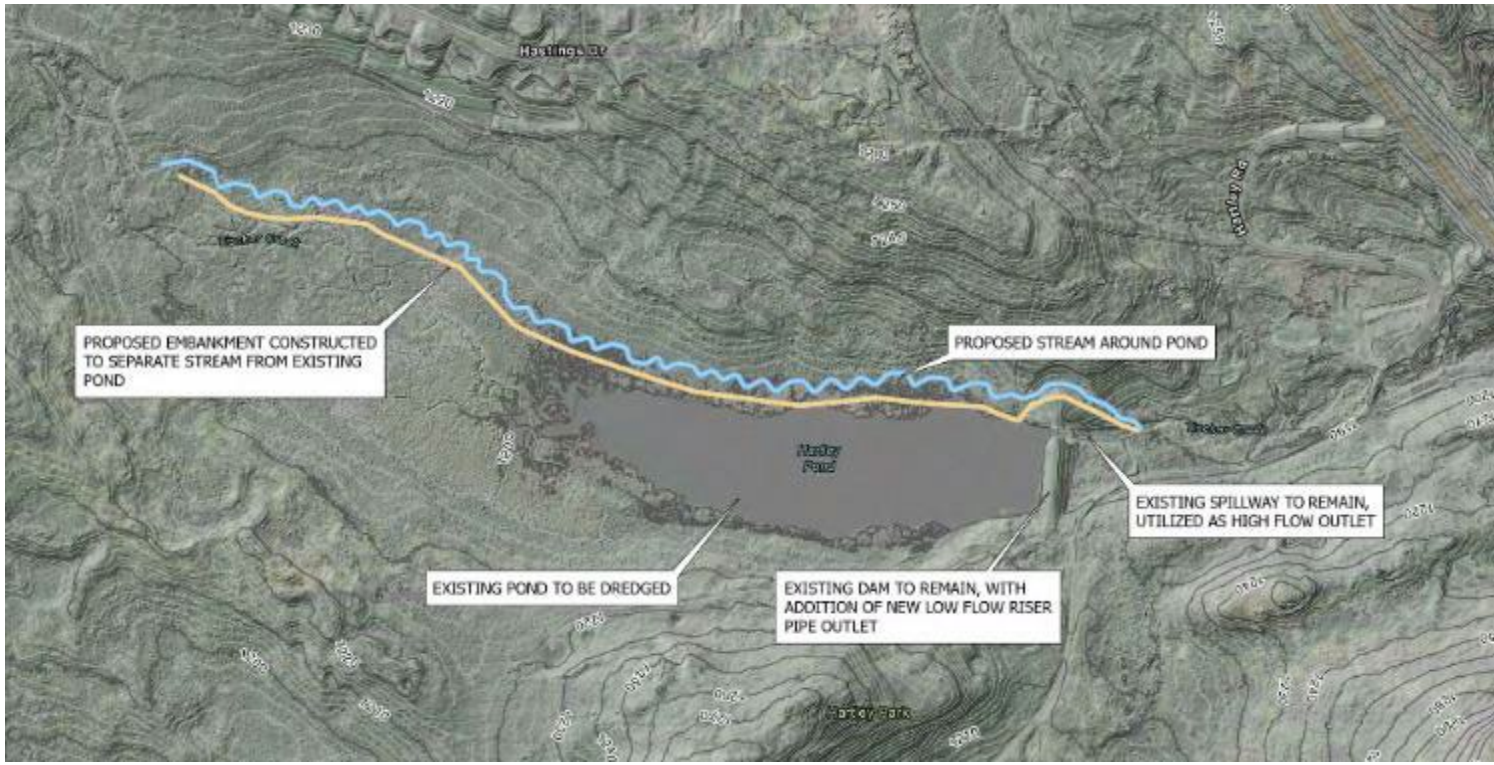


Alternatives We Hydraulically Modeled

- No Action – Leave as is (Existing Conditions)
- Alternatives modeled:
  - Stream Route-Around
    - Route stream to the north and through existing secondary spillway channel
    - Excavate existing pond to desired depth
  - Dam Removal
    - Remove dam
    - Construct new stream through pond area
    - Excavate one or two off channel ponds

Stream Route-Around Alternative

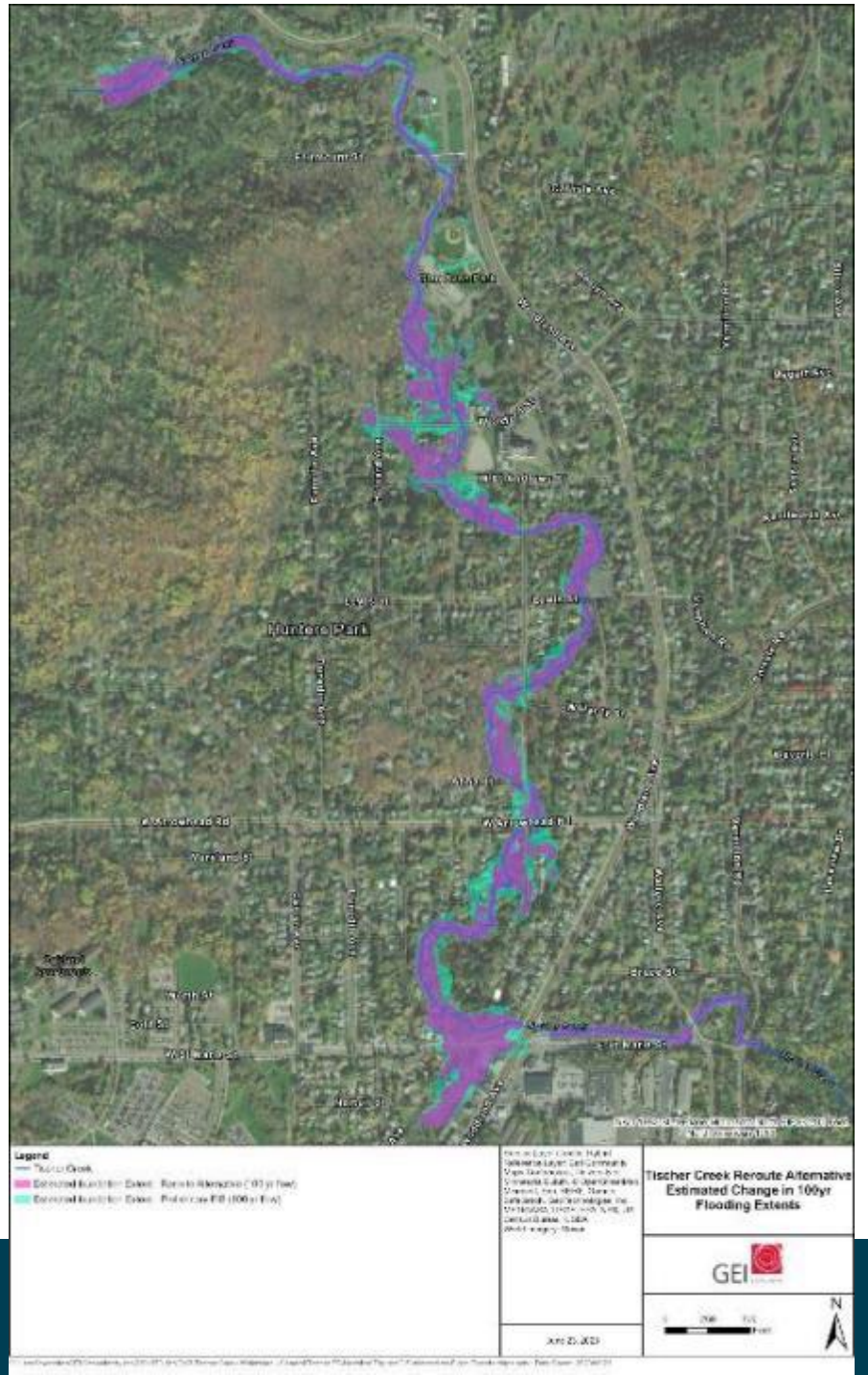
- Proposed re-routed channel carries most of the flow north of the pond
- Flow above top of bank at the west end of that channel flows over a weir and into Hartley Pond
- There are two spillways out of Hartley Pond – 6.4-ft diameter standing drainpipe (primary) and existing dam as secondary spillway



Stream Route Around – Downstream Analysis Results

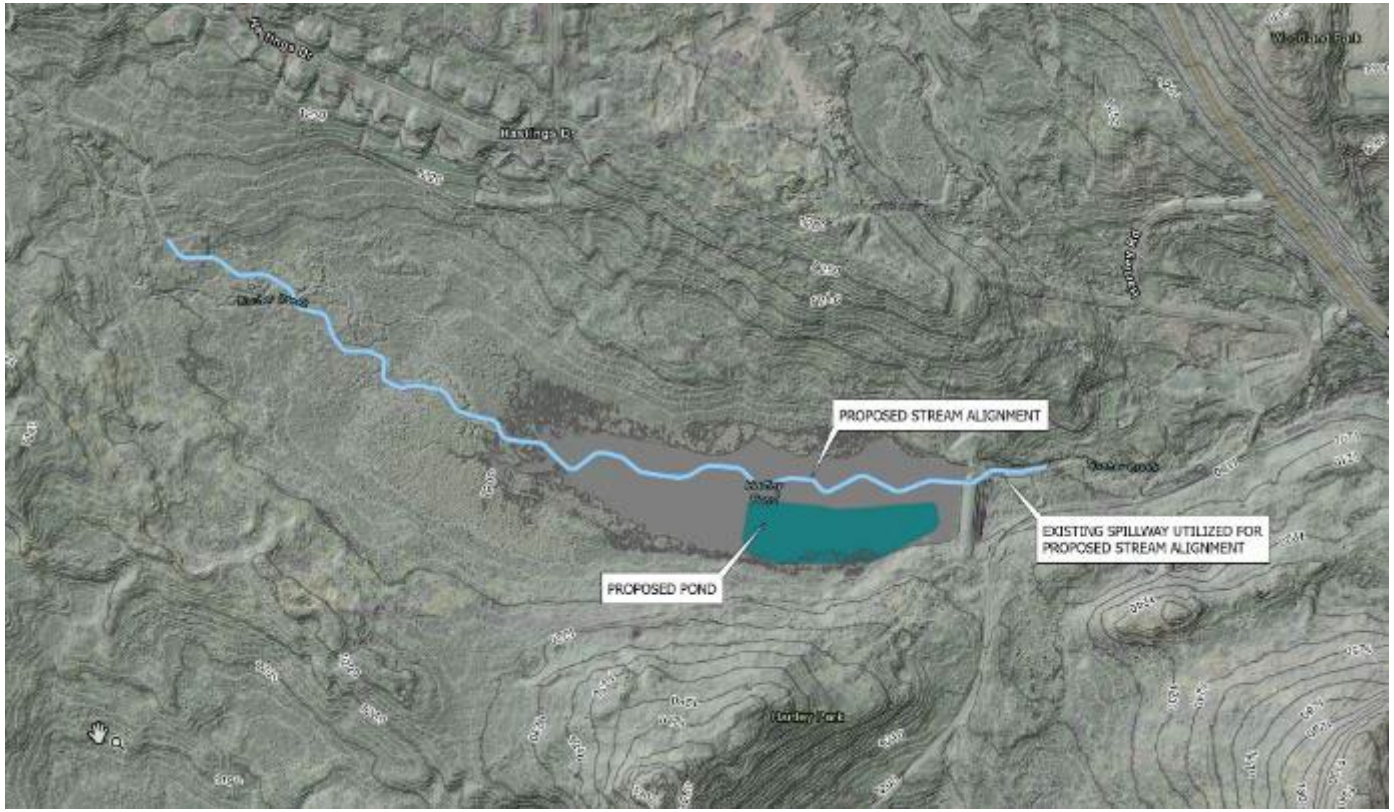
- The latest (preliminary) FEMA flood zone (A/AE) is the teal-colored area
- The Stream Route Around Alternative estimated flood zone is the pink-colored area

Note: Flood extents are approximations based on feasibility analysis, elevation source may differ from FEMA due to availability and there may be other differences in model details; therefore, minor differences in floodplain extents are possible. This a planning level analysis only.



Dam Removal

- Remove Hartley dam and restore a natural channel through the old pond basin
- For this analysis, the restored channel was designed using the floodplain profile immediately upstream of the current pond, and is 1,740-ft in length



Dam Removal – Downstream Analysis Results

- The latest (preliminary) FEMA Flood Zone (A/AE) is the teal-colored area
- The Dam Removal Alternative is the pink-colored area

Note: Flood extents are approximations based on feasibility analysis, elevation source may differ from FEMA due to availability and there may be other differences in model details; therefore, minor differences in floodplain extents are possible. This a planning level analysis only.

Hartley Pond, Feasibility Study

What we know:

- Pond warms water
- The dam blocks fish passage
- Class I hazard dam
- Poor fish community in pond
- Potentially mitigates storm peak flows, probably not snowmelt peaks
- Quality Brook Trout fishery downstream of pond
- Now have quantified hydrology and hydraulics of dam

What we don't know:

- Community attachment to pond
- Regulatory process exactly
- Service life of dam
- Climate effects influencing peak flows

Photo Courtesy of Tim Beaster, South St. Louis SWCD

Alternatives

Alternatives analysis done at various levels of detail:

- No Action
- Rock arch rapid (not modeled)
- Alternatives simulated with greater detail:
  - Stream Route Around
    - Route Stream to the north and through existing spillway
    - Excavate existing pond to desired depth
  - Dam Removal
    - Remove dam
    - Construct new stream through pond area
    - Excavate one or two off channel ponds

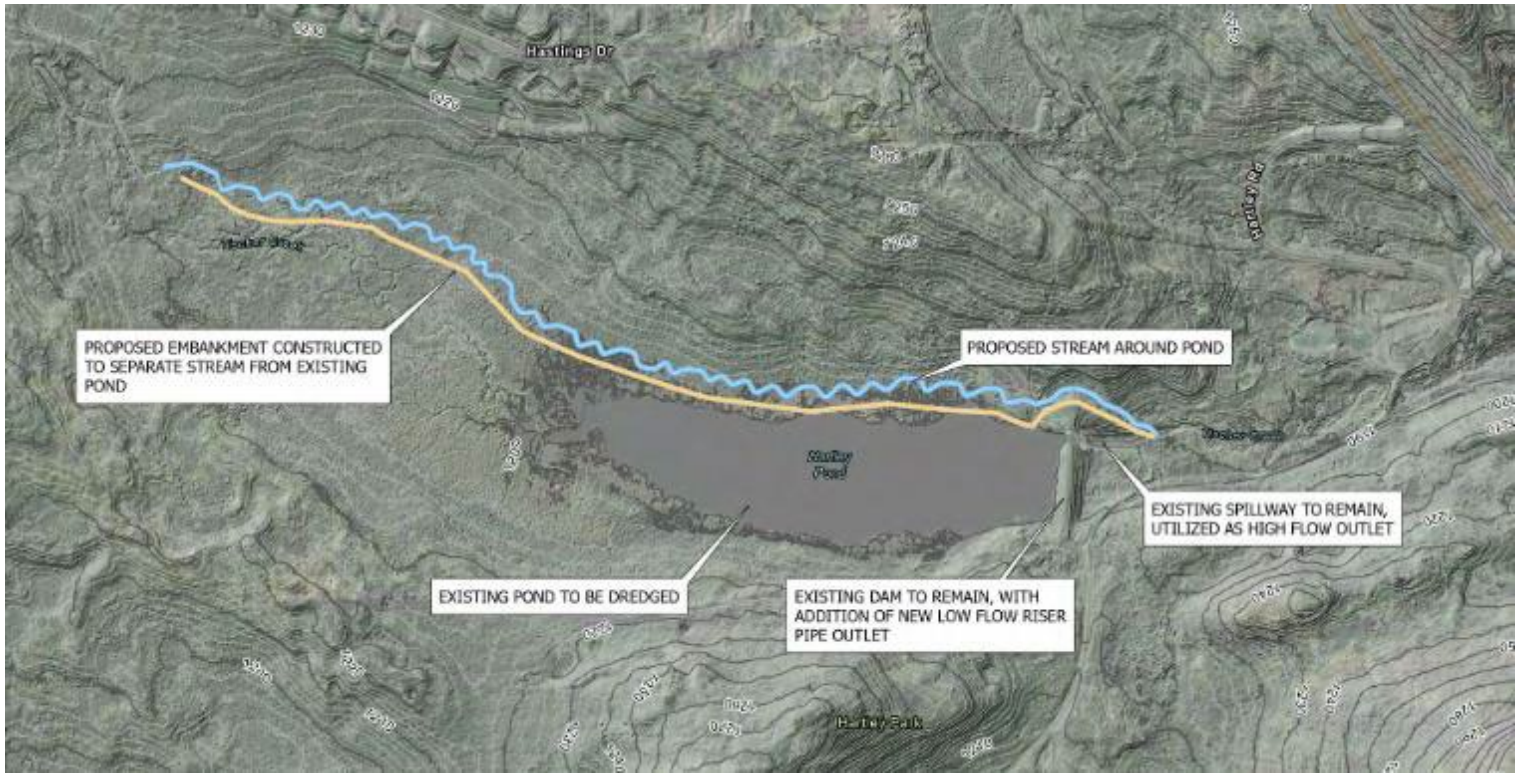
Photo Courtesy of Kelly O'Brien Beaster,

No Action

- Strengths
  - Potential to Mitigate storm peak flows, probably not snowmelt peaks
  - Recreational and educational benefits
- Weaknesses
  - Pond water quality is poor
  - Blocks fish passage
  - Traps sediment, stream stability problem
  - Pond will eventually convert to an emergent wetland
  - Temperature effects
  - Changes natural flow pattern
  - Ongoing maintenance costs
  - Dam safety concerns
- Unknowns
  - Pond water quality long term

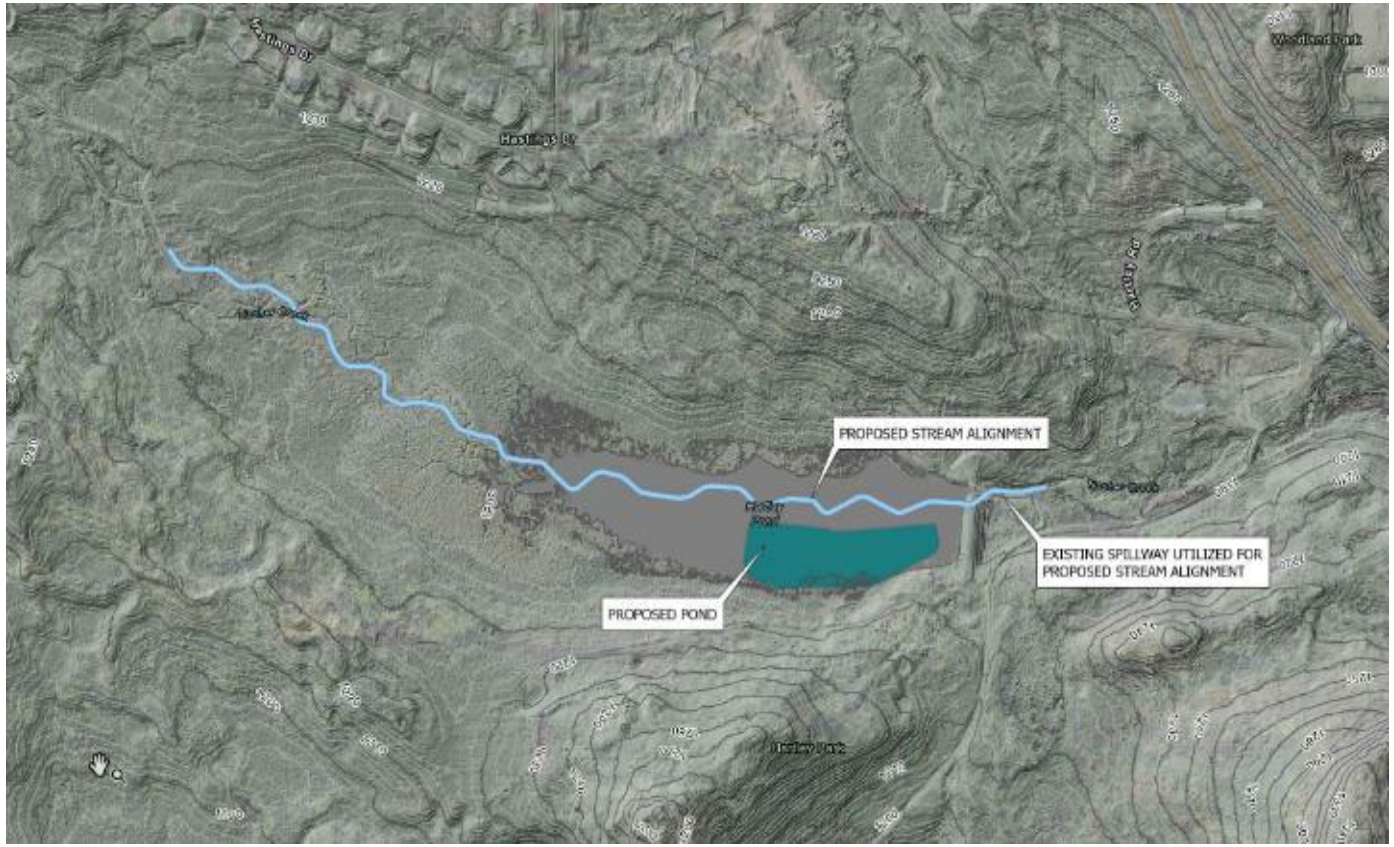
Stream Route Around Strengths and Weaknesses

- Strengths
  - Will have stream around pond and mitigate temperature issues
  - Allow for fish passage
  - Retain pond area
  - Keep current dam, modified
  - Potential to mitigate storm flows for downstream effects
  - Recreational and educational benefits
- Weaknesses
  - Maintain Class I dam
  - Design is more complicated due to dam issues
- Unknowns
  - Pond water quality long term, will increase retention time
  - Stream/pond connection



Dam Removal Strengths and Weaknesses

- Strengths
  - Remove Class I dam
  - Remove warming effects of pond
  - Construct stream in valley where it used to be
  - Smaller pond dug into water table
  - More straight forward design
  - No dam maintenance
  - Recreational and educational benefits
- Weaknesses
  - Changes to current pond that some in the community use and appreciate
  - Storm flow mitigation effects downstream may not be realized without dam
  - May require EIS for removal of the Pond



Alternatives Analysis Report and Recommendations

- Report Findings and Approach
  - Report on the above related issues and findings
  - Modeling results
  - Schematics of each alternative
  - Establish baseline for final design work of selected alternative
- City Process
  - Public input
  - Final recommendation, pending input
  - Review findings and report
- MNDNR process and Review
  - Permitting
  - Flood mapping

Photo Courtesy of Tim Beaster, South St. Louis SWCD

Public Input Process

City of Duluth Public input process to follow Feasibility Study

- Natural Resources Commission
- Parks and Recreation Commission
- Planning Commission
- Hartley Park Stewardship Committee and Hartley Board of Directors
- Duluth City Council

Project will be required to go through local, state, and federal permitting process

Thank You!
Questions?

Hartley Pond Feasibility Study

October 9, 2023