Black's Nook In-Pond Restoration Project

Fresh Pond Advisory Board
19 September 2019

AGENDA

1. Project Team
2. Previous Restoration Projects
3. Black's Nook – Setting Goals
4. Project Timeline
5. Baseline Conditions
6. Your Input

OUR TEAM

WATER QUALITY EXPERT – Ken Wagner, Ph.D., Limnologist, Certified Pond Manager

WILDLIFE SCIENTISTS – NORMANDEAU ASSOCIATES

WETLAND & RESTORATION ECOLOGISTS, GREEN INFRASTRUCTURE, LANDSCAPE ARCHITECTS, CERTIFIED ARBORIST – HATCH

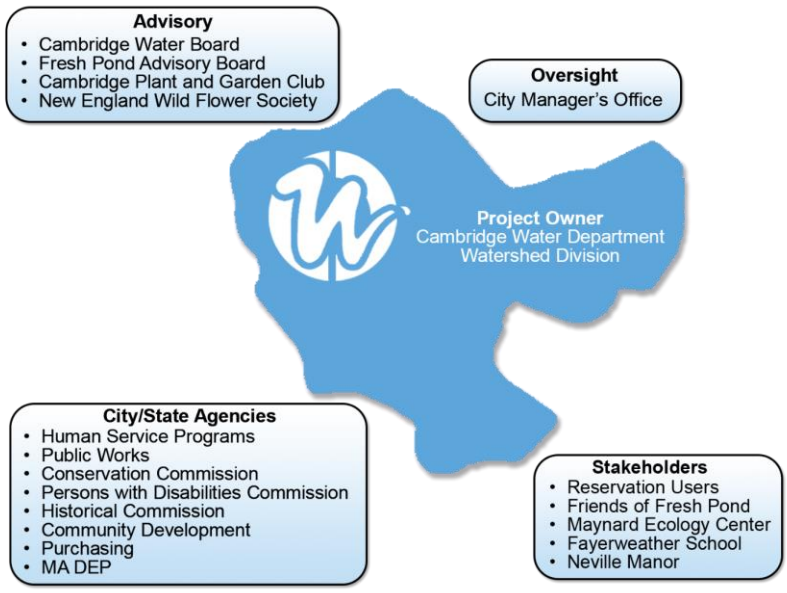
BLACK'S NOOK POND

Stewardship, n.

The responsible overseeing and protection of something considered worth caring for and preserving

DPW staff and Cambridge Plant Club, ca 1940

STAKEHOLDER ENGAGEMENT AND PUBLIC PROCESS



STAKEHOLDER AND FPAB ENGAGEMENT

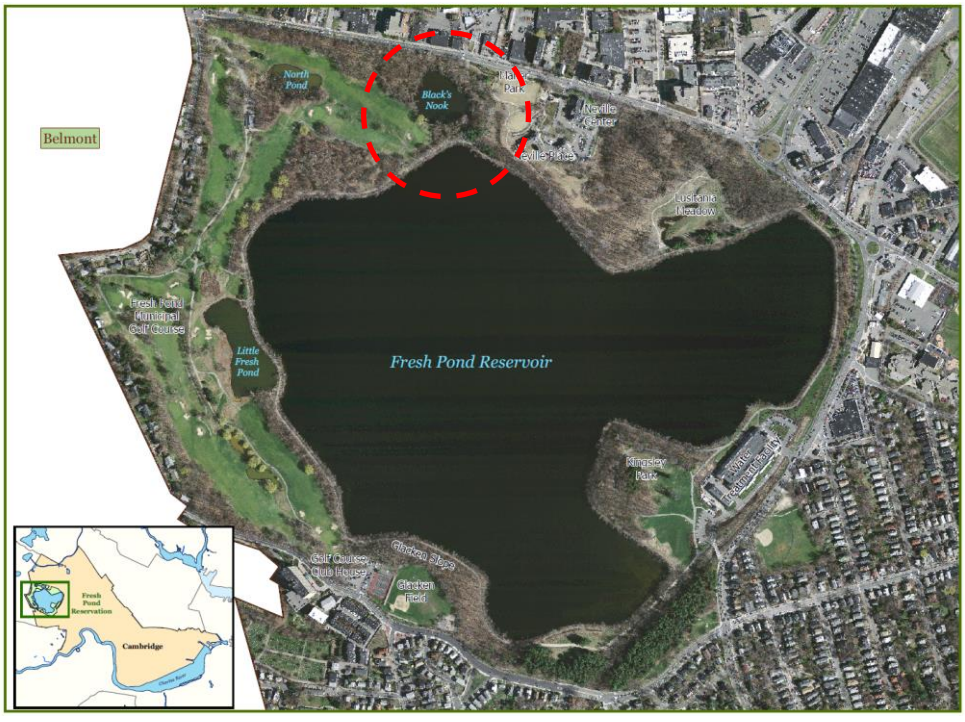
FP Advisory Board:

- Presentations at Inventory, Analysis, and Assessment/ Alternatives phases
- Site visit(s)
- Goal-setting critical
- City Working Group: Recreation, Public Works/Conservation Commission, CWD

Stakeholders:

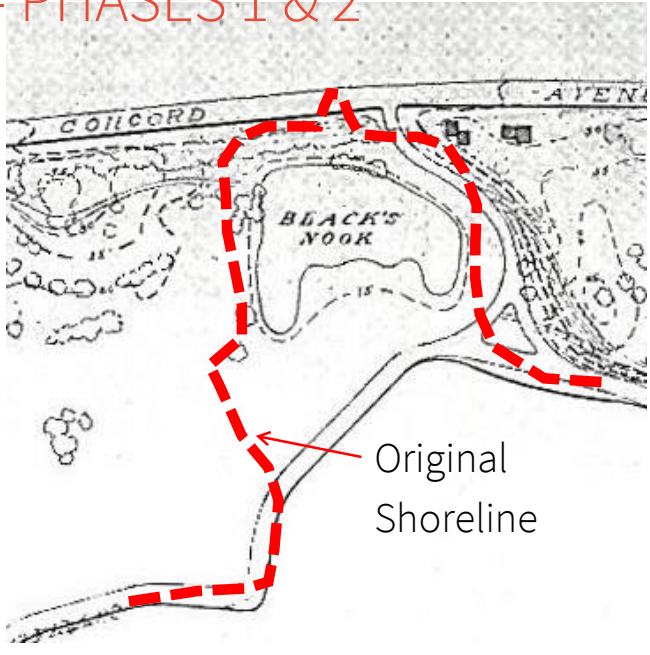
- Cambridge Plant and Garden Club
- Maynard Ecology Center (MEC)
- Fayerweather School teacher and student volunteers
- Friends of Fresh Pond
- Audubon birding group

BLACK'S NOOK PROJECT AREA



PREVIOUS PROJECTS – PHASES 1 & 2

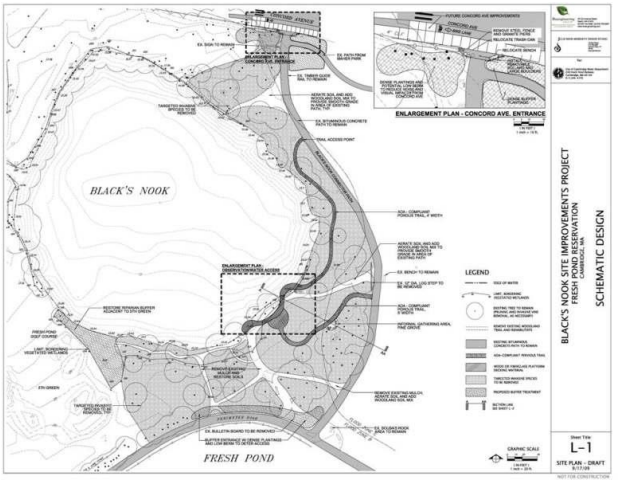
- Inventory and Analysis
- Concept Designs
- Contract Documents
- Permitting
- Construction Oversight
- Vegetation Management Plan
- Phased Implementation



SIGNIFICANCE AT FRESH POND

Black's Nook as Unique Place:

- Passive recreation – birding, no dogs
- Permanent fence
- Diverse habitats
- Outdoor classroom
- Historical relevance
- FP Golf Course abutter

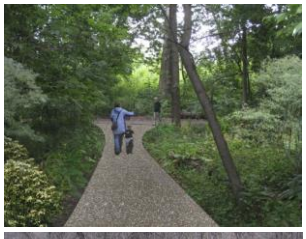


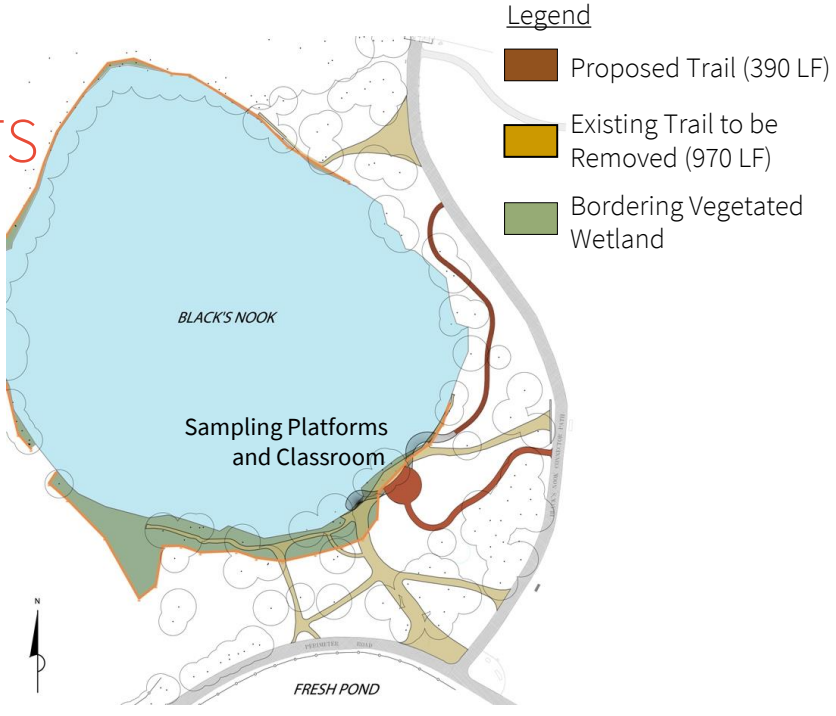
PROJECT GOALS – BLACK'S NOOK PHASE 1

- Provide sense of wonder and discovery
- Maintain area as a resource / study area for children
- Provide for universal accessibility
- Respect active golf course users and passive Black's Nook users
- Preserve sense of wildness, untamed nature
- Minimize user conflicts with off leash dogs
- Unify and blend improvements with existing elements
- Maintain woodland retreat identity
- Evaluate entrance from Concord Street for appropriateness (scale, character, buffer)

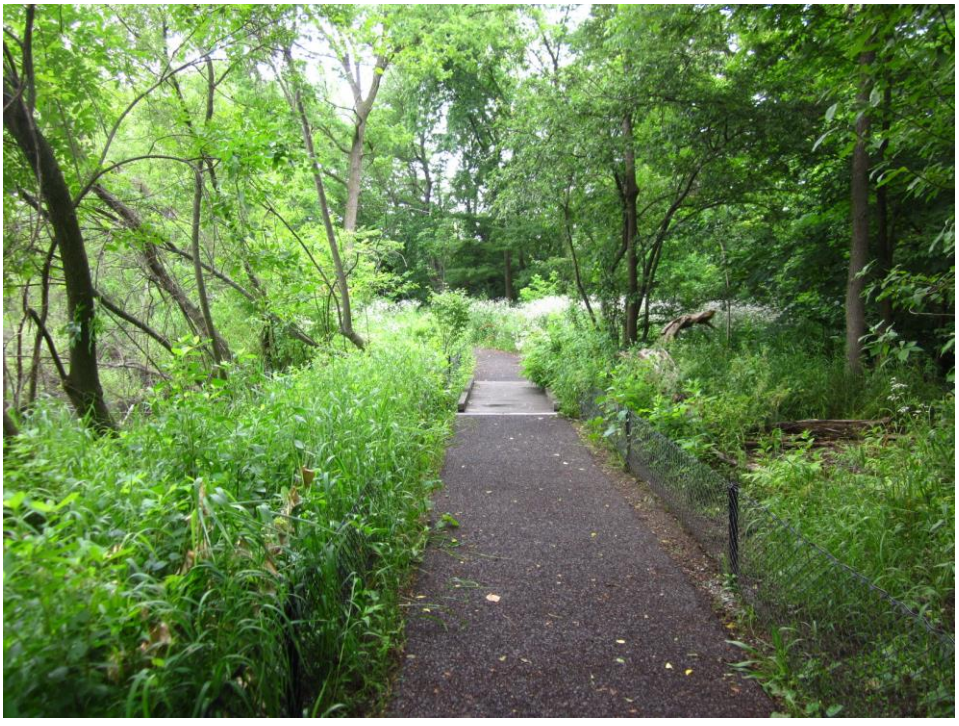
EXISTING SHORELINE CONDITIONS

CIRCULATION IMPROVEMENTS



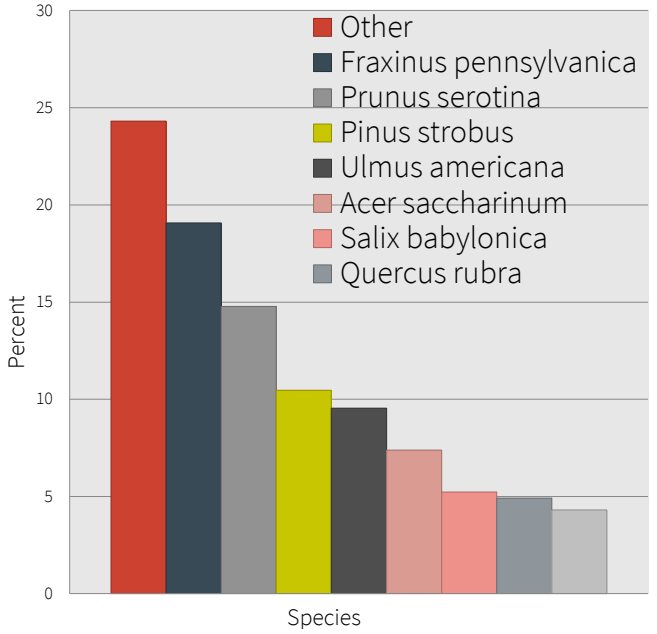


FLEXIBLE POROUS PATH (ADA-COMPLIANT)



SAMPLING PLATFORMS AND OUTDOOR CLASSROOM

EXISTING TREE INVENTORY (>6" dia.)



Other includes:
-Acer platanoides
-Acer rubrum
-Acer pseudoplatanus
-Betula papyrifera
-Crataegus sp.
-Fagus sp.
-Juglans nigra
-Malus sp.
-Morus sp.
-Platanus occidentalis
-Populus deltoides
-Populus tremuloides
-Quercus palustris
-Quercus prinus
-Rhamnus cathartica
-Robinia pseudoacacia

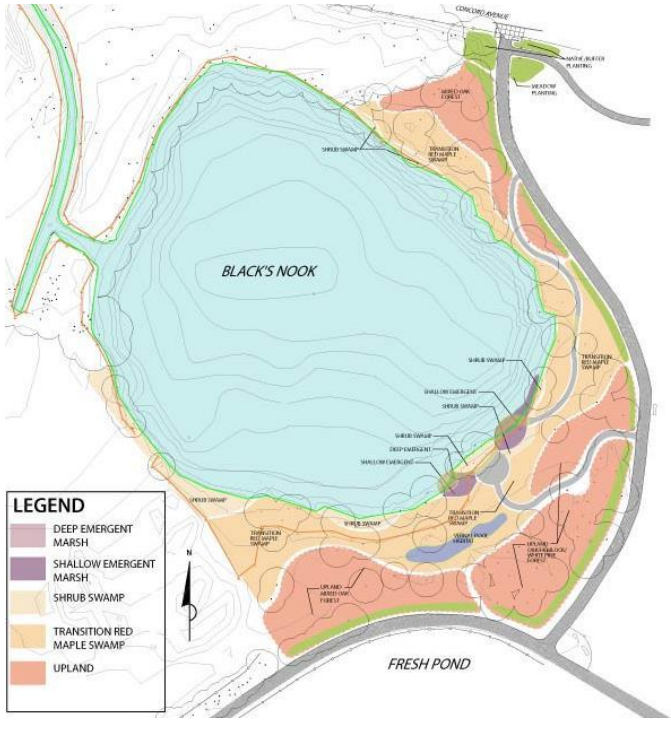
INVASIVE SPECIES ASSESSMENT AND REMOVALS

RESTORATION STRATEGIES

Build on Existing Natural Communities:

- Restore riparian and wetland zone by community type
  - Natural soil chemistry characteristics
  - Improve site conditions for natives
- Sculpt pond edge and littoral zone
- Straight native species

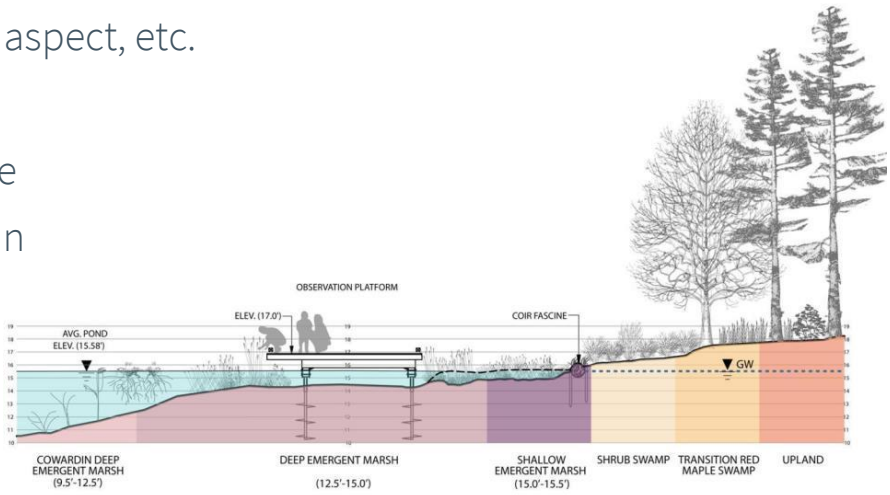
RESTORATION PLANTING CONCEPT



RESTORING NATIVE COMMUNITIES

- Species diversity, dominance and composition
- Soils, hydrology, aspect, etc.
- Habitat goals
- Visitor experience
- Management plan

Black's Nook Pond Restoration
Planting Section



SHALLOW MARSH PLANTINGS

SCRUB/ SHRUB WETLAND BUFFER PLANTING

VERNAL POOL HABITAT CREATION

BLACK'S NOOK IN - POND RESTORATION SCENARIO

"It is possible that some of the old ponds and swamps (at Fresh Pond), which it has hitherto been your intention to fill up, may well be preserved as agreeable landscape features…"

- April 1894 letter to Cambridge Water Board, from Charles Eliot (Olmsted Brothers)

"Lakes seem, on the scale of years or human life spans, permanent features of the landscape, but they are geologically transitory, usually born of catastrophe and mature and die quietly and imperceptibly" .

- Hutchinson, 1957

ASSESSMENT APPROACH

Preliminary Goal Setting:

1. Fresh Pond Reservation Master Plan Vision
   - Preserve water quality, natural green spaces, wildlife habitat and refuge from hectic urban life
2. Black's Nook Pond – Water Quality Goals
   - Slow cultural eutrophication;
   - Keeps Black's Nook an open water body; and
   - Address Category 5 impaired water body status on the State's 303(d) list.
3. Black's Nook Pond – Ecological, Cultural & Educational Goals
   - Stakeholder and City input – additional opportunities?

PROJECT TIMELINE

Fall/Winter 2019 – Establish Baseline Conditions:

1. Aquatic Vegetation & Benthic Communities
2. Fish Survey
3. Bathymetry and Sediment Characterization
4. Watershed & Groundwater Assessment
5. Water Quality Sampling (Fall and Spring)
6. Plankton & Algae Survey
7. FPAB Meeting – summary of fall data collection/findings (November 2019)

PROJECT TIMELINE

Spring/Summer 2020:

1. Herptile Study
2. Nesting Bird and Bat Study
3. Water Quality Sampling (contd.)
4. Wetland Delineation, if necessary
5. Assessment & Develop Alternatives
6. FPAB Meeting – Summary of Findings and Draft Alternatives (June 2020)
7. FPAB Meeting – Preferred Alternative and next steps (September 2020)

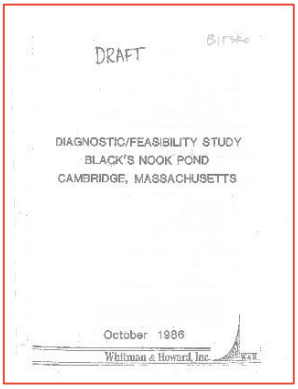
	4	5
Method	Dredging	Drawdown
How does it Work?	Sediment is physically removed, also removing accumulated nutrients and organic material	Lowering water level will dry sediments and allow sediments to oxidize and compact.
Potential Benefits	Reduced internal nutrient supply, increases water depth, can reduce sediment oxygen demand	May alter nutrient availability. Opportunity for shoreline cleanup.
Potential Drawbacks	Expensive if disposal site not nearby. Temporary turbidity, removes macroinvertebrates, temporarily interferes with recreation. Might reduce ponds' natural capacity for denitrification and thus allow more soluble nitrogen to make its way to coastal embayments.	Possible impacts on contiguous wetlands, may change habitat for amphibians. Ponds with water level controls may be managed for herring. Temporary loss of waterfowl habitat. Potential to create highly unappealing aesthetic conditions for neighbors.
Data gaps to make decision	Quality of sediments (affects disposal options and costs), detailed bathymetry to estimate volumes and costs.	Water level control needed, therefore not feasible for most ponds
Costs (Relative)	$15,000 - $50,000/acre *	<$100/acre if structures adequate*
Permitting issues	Requires permit for dredging and disposal Conservation Commission approval needed.	Permit required, complexity depends on impacts on wetland and other ponds. Conservation Commission approval needed.
Longevity	Moderate to long	Moderate to long
Ponds that might be appropriate for this alternative	Lovers, Stillwater, Emery	Cranberry

BASELINE CONDITIONS – OVERVIEW OF APPROACH

Field Survey and Metrics:

1. Review all existing information – reports, studies and observances
2. Use standard industry protocols for collecting, monitoring, surveying and recording data
3. Influence In-Pond Restoration Alternatives based on established goals and metrics

Engelmann's Umbrella Sedge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DIAGNOSTIC/FEASIBILITY STUDY
BLACK'S NOOK POND
CAMBRIDGE, MASSACHUSETTS

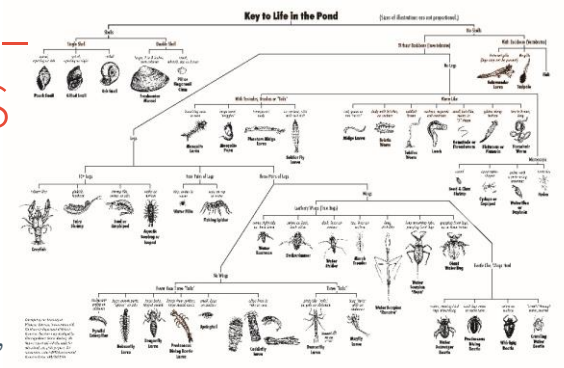
October 1986
Whitman & Howard, Inc.

BASELINE CONDITIONS – AQUATIC VEGETATION

Field Survey and Metrics:

1. Floating, Emergent, Submerged Aquatic & Shoreline Vegetation
2. Rowboat, rake, right angle prism, GPS
3. Photographs, collection and pressings (if necessary)
4. Habitat value, Commonwealth status, abundance, & aquatic ecosystem value
5. September/October 2019

BASELINE CONDITIONS – BENTHIC COMMUNITIES



Field Survey and Metrics:

1. Benthos (Aquatic Macroinvertebrate) Collecting
2. Also identify water depth, temperature, Secchi disk reading (clarity)
3. Rowboat, grab sampler (mini hand dredge), kick net, GPS unit
4. Lab sampling, photographs, collection
5. Species list, richness, population density, diversity, relative abundance, & community composition

BASELINE CONDITIONS – FISH SURVEY

Field Survey and Metrics:

1. Shallow pond observance/net capture
2. Electro-capture (deeper) – temporarily immobilizes for study in live well before releasing
3. Richness, diversity, and relative abundance
4. Community composition
5. Incidence of disease or parasitism
6. Size class (reproduction indicator)
7. Water quality relevance

BASELINE CONDITIONS - HERPTILE SURVEY

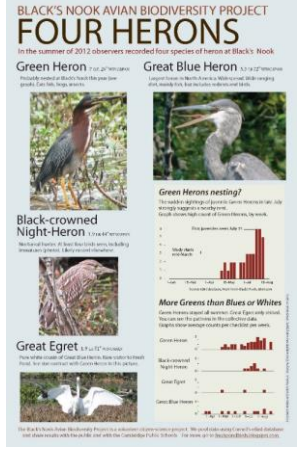
Field Survey and Metrics:

1. Breeding and Basking Study for Reptiles & Amphibians
2. Breeding frogs and toads – recorded calls and surveys
3. Turtles, snakes, salamanders, and newts - disturbing cover observations and surveys
4. Includes North Pond and north shore of Fresh Pond
5. Late April - June 2020

BASELINE CONDITIONS – BREEDING BIRD SURVEY

Field Survey and Metrics:

1. Standardized census methods and Breeding Bird Atlas
2. Post migration period - May 25th
3. Recorded calls, observed behavior, & survey (seen and heard)
4. List of breeding birds, diversity, habitat dependence
5. Late May – June 30, 2020



BASELINE CONDITIONS – ACOUSTIC BAT SURVEY

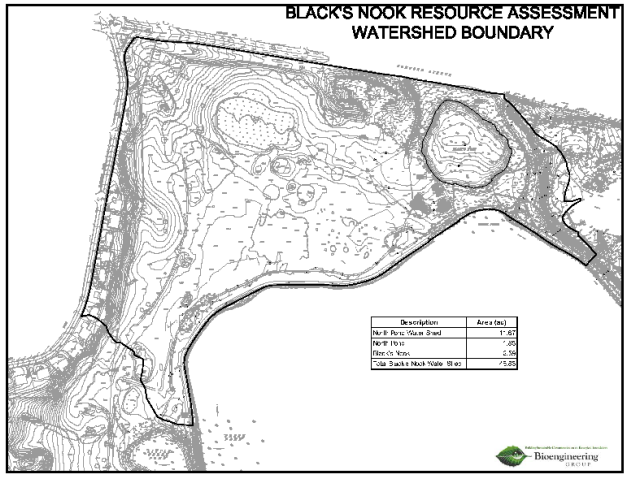
Field Survey and Metrics:

1. Confirms presence of bats and identifies species present
2. Automated high-frequency recording devices (USFWS and N.A. Bat Monitoring Program specifications)
3. Eight (8) consecutive nights
4. Recorded calls, observed species, & weather data
5. Mid May – June 30, 2020

BASELINE CONDITIONS – WATERSHED & GROUNDWATER ASSESSMENT

Field Survey and Metrics:

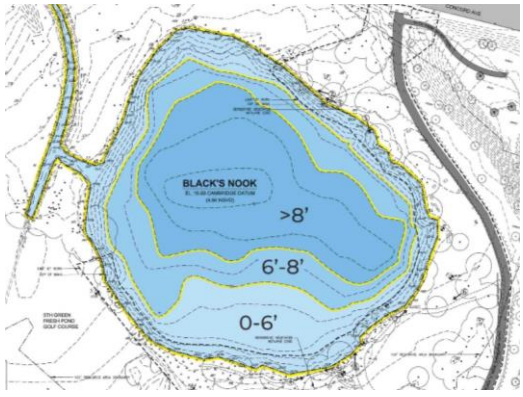
1. Confirm watershed boundaries
2. Estimate runoff inputs and nutrient loading from watershed
3. Locate existing groundwater wells and monitor levels relative to Black's Nook
4. Estimate groundwater inflow and potential nutrient loading from contribution area



BASELINE CONDITIONS – BATHYMETRY AND SEDIMENT CHARACTERIZATION

Field Survey and Metrics:

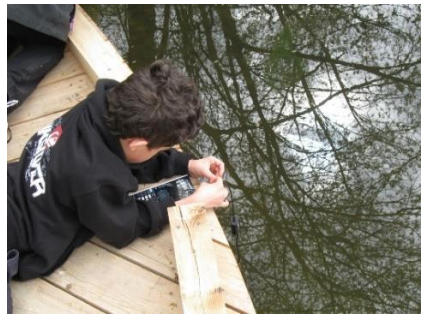
1. Bathymetric Survey –
   - Small boat, electronic instrumentation, hand probes, underwater camera, GPS unit
2. Sediment Characterization -
   - Sediment probes to evaluate depth and nature of sediment
   - Surficial samples (3) for sediment quality
   - Full core samples (5) for dredging feasibility assessment (can do in winter)



BASELINE CONDITIONS – WATER QUALITY

Field Survey and Metics:

1. Temperature, dissolved oxygen, pH, conductivity, turbidity, & chlorophyll-a
2. Total and dissolved phosphorus, Nitrate-N, Ammonium-N, TKN
3. Surface and bottom samplings with field instruments and boat
4. Stormwater sampling - Streams A and B (FPGC)
5. Fall 2019 and Spring 2020



BASELINE CONDITIONS – PLANKTON & ALGAE

Field Survey and Metrics:

1. Qualitative and Quantitative Sampling
2. Collect Algae and characterize Algae community in relation to desired uses
3. Collect surface Phytoplankton and provide a count by taxon (at time of water quality sampling)
4. Collect Zooplankton (for entire water column) and provide a count by taxon
5. September – December 2019

ASSESSMENT APPROACH

Initial Characterization:

1. Understanding the source of nutrients very important to limiting their continued effect on pond eutrophication
2. Value of aquatic plants & benthic community to existing fish and vertebrate community
3. Understanding oxygen cycle critical
4. Define Black's Nook within existing watershed and habitats – bigger picture

ASSESSMENT APPROACH

Modeling Approach (Standard):

- Define existing water quality and habitat conditions
- Identify pollutant(s) responsible for degraded water quality and/or habitat conditions
- Define targets that will support desired use
- Quantify acceptable loads
- Identify contributing point and nonpoint sources of pollution
- Quantify transport and attenuation
- Develop a strategy for source reductions targets

ASSESSMENT APPROACH

Slow Cultural Eutrophication:

1. Determine the source(s) and magnitude of nutrient loading
2. Engage FPGC as long-term partner and steward
3. Enhance runoff quality entering Black' Nook Pond

ASSESSMENT APPROACH

Riparian Buffer:

- FP Golf Course runoff
- Mowing of pond buffer plantings
- Changing maintenance crews
- Geese

Shrub Scrub Wetland Buffer Planting

ASSESSMENT APPROACH

Retains Open Water Body:

1. What new data are critical for assessment?
2. Dredging analysis for different scenarios
3. Alternatives for maintaining open water (e.g. benthic barriers)
4. Habitat goals, in-pond and birds

ADDITIONAL OPPORTUNITIES

Deep Water vs. Wetland:

- Shaped similarly to a kettle hole
- Emergent wetlands
- Invasive aquatics mixed with native aquatics
- Value for hibernating herptiles
- Important food source for long-legged wading birds?

LONG-TERM MANAGEMENT STRATEGY

- Herbicide treatment (relegate to backup plan)
- Mechanical treatment (effective and efficient)
- Benthic barrier (can be removed as needed to support hibernation)
- Protected and Threatened species considerations (e.g. umbrella sedge)
- Habitat and aesthetic considerations

QUESTIONS & INPUT