Lake Accotink Sustainability Plan
Summary of Potential Alternatives

Presentation to the

Environmental Quality Advisory Group

May 11, 2016

Lake Accotink Park

Lake Sustainability Issues

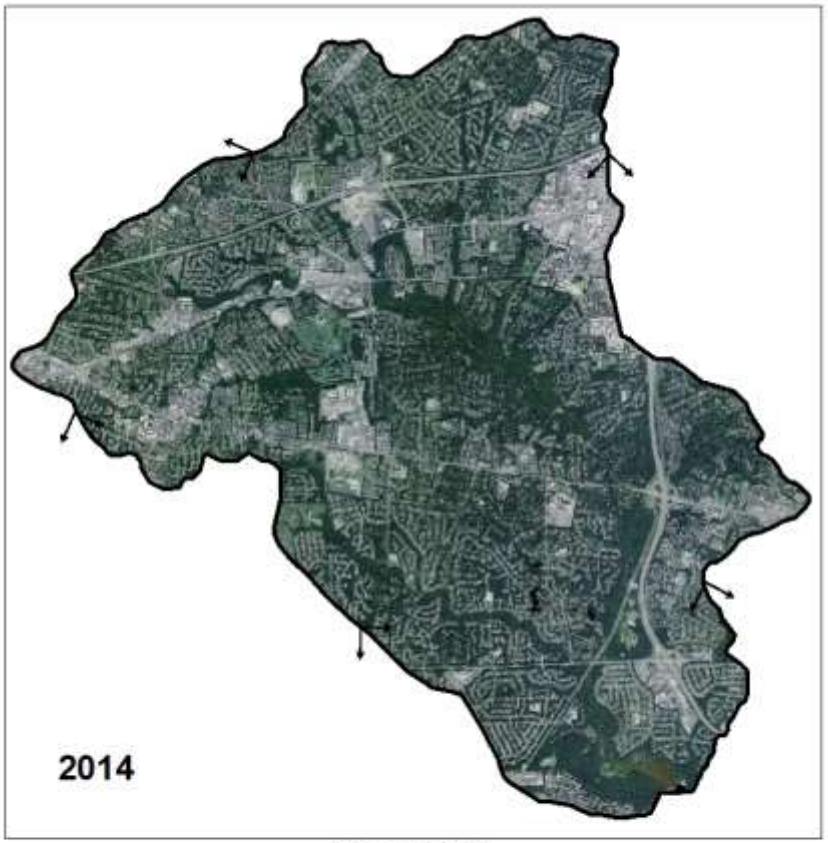
- *Acquired by FCPA 1967 through Federal Lands to Parks program*
- *Current concrete spillway and dam constructed in 1940 for Ft. Belvoir (then, Camp A.A. Humphreys)*
- *Original "Springfield Dam" built in 1918 (removed 1922)*

Lake Sustainability Issues

Lake Accotink Park
WSSI #22647.01
Original Scale: 1" = 1 mile

Aerial Source: Fairfax County GIS

Wetland Studies and Solutions, Inc.
a DAVEY company



Lake Accotink Park
WSSI #22647.01
Original Scale: 1" = 1 mile

Aerial Source: NAIP

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Lake Sustainability Issues

Lake Accotink
Watershed, Subwatersheds, & Major Streams
WSSI #22647.01
Original Scale: 1" = 1 mile

Aerial Source: NAIP. Summer 2014.

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Lake Accotink Drainage Area
31 mi²

Stream Length
60.5 miles

Impervious Cover
30%

Lake Sustainability Issues

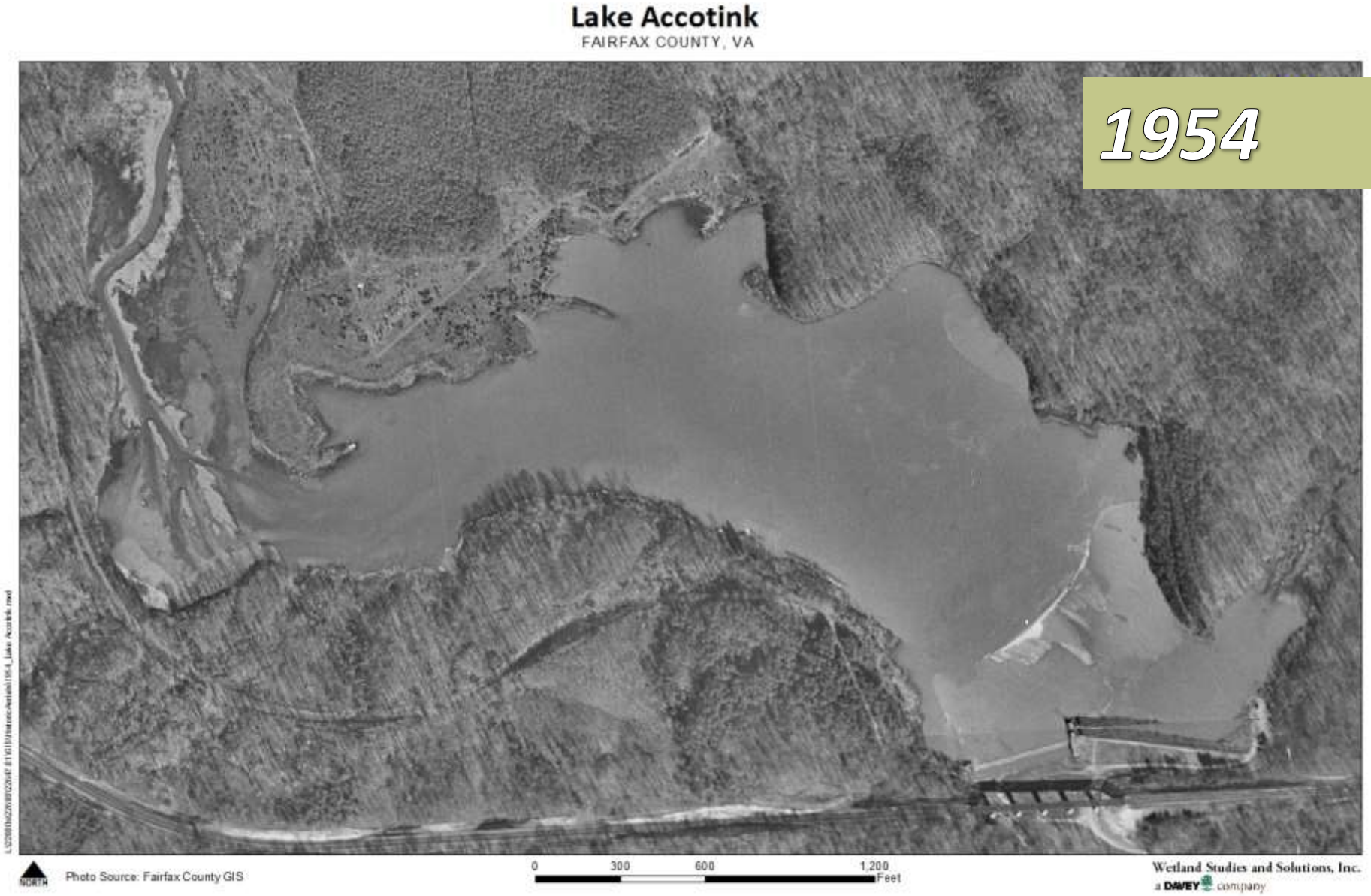
Lake Sustainability Issues

Continuing problem of sedimentation and associated loss of lake function:

- Since 2011, **90,895 c**y have been deposited, mostly in the upper region.
- Sedimentation rate = **22,750 cy/yr**.
- Based on the source (primarily streambank erosion), this will continue until the streams have stabilized – could be decades!

Efforts to Date

Efforts to Date



Efforts to Date

Lake Accotink

FAIRFAX COUNTY, VA

NORTH

Photo Source: USGS

0 300 600 1,200 Feet

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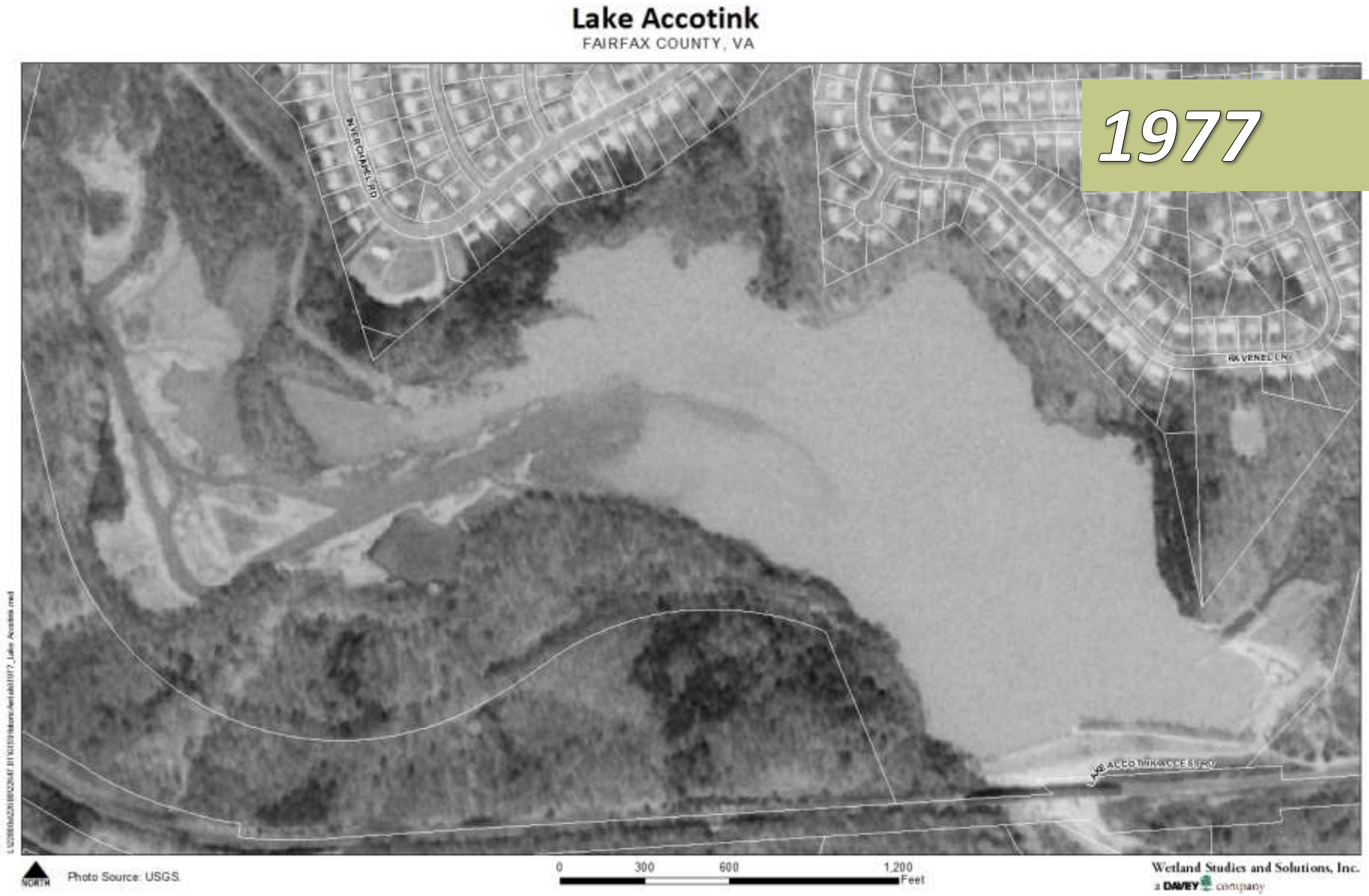
Efforts to Date



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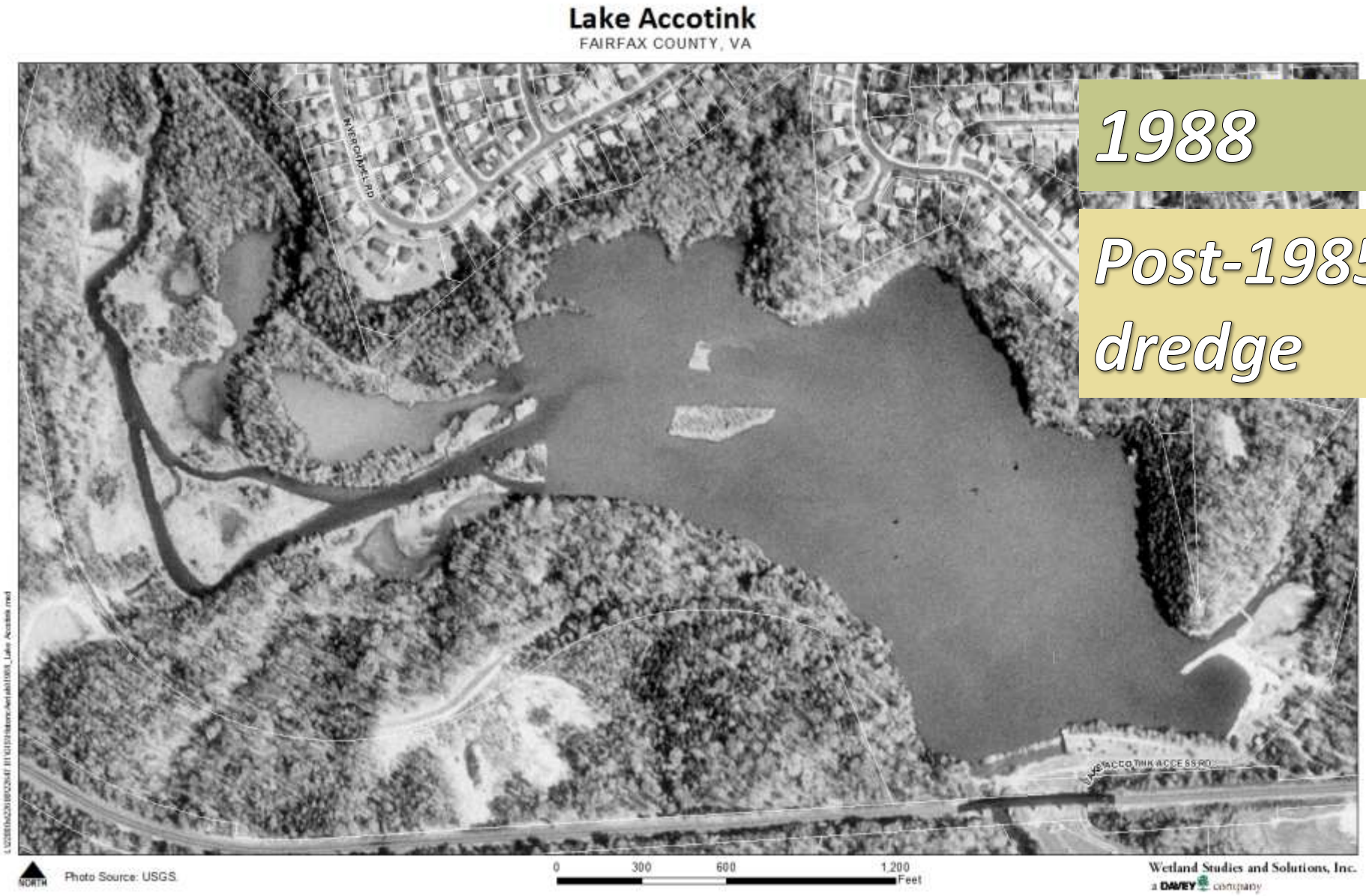

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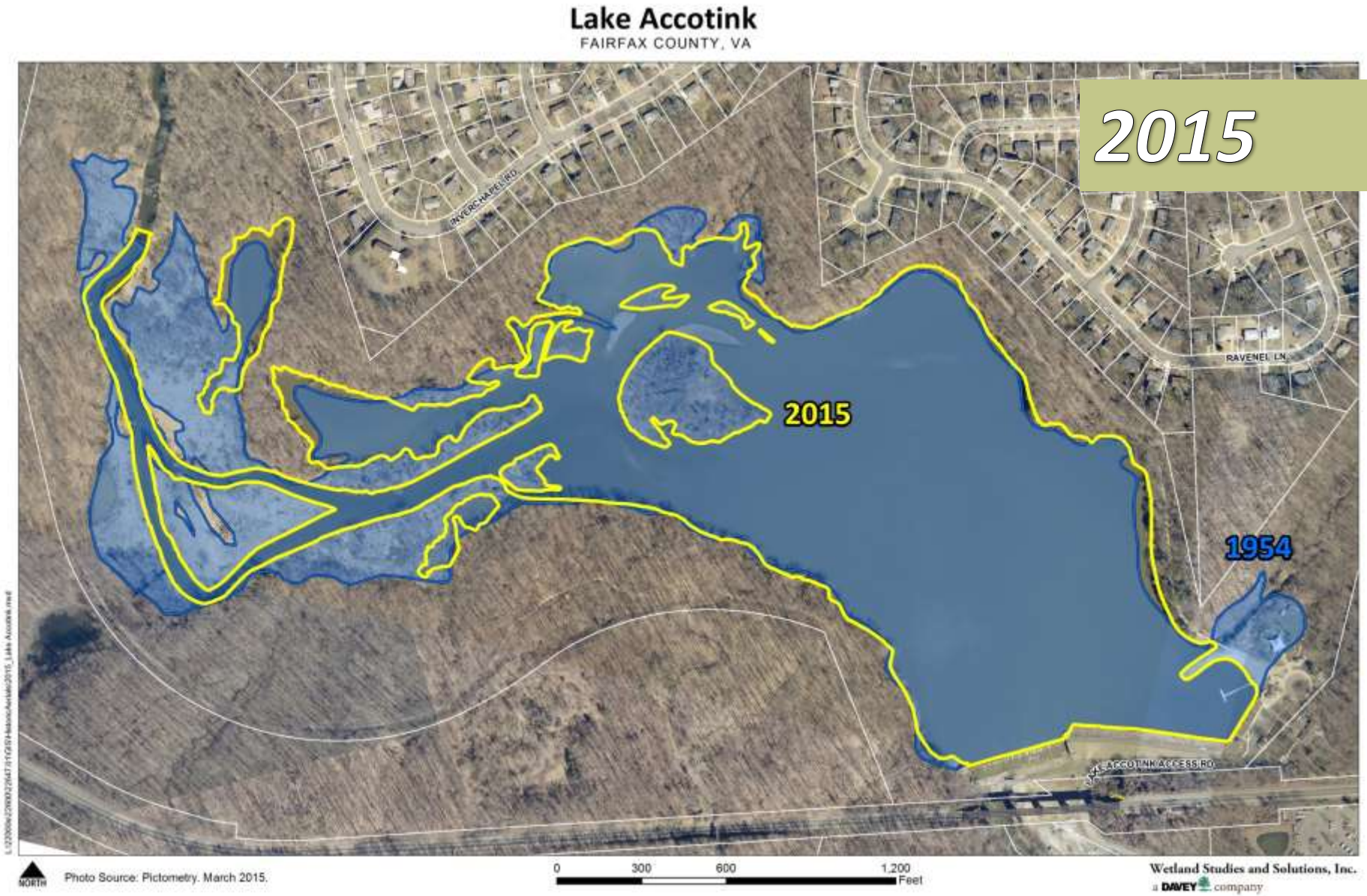

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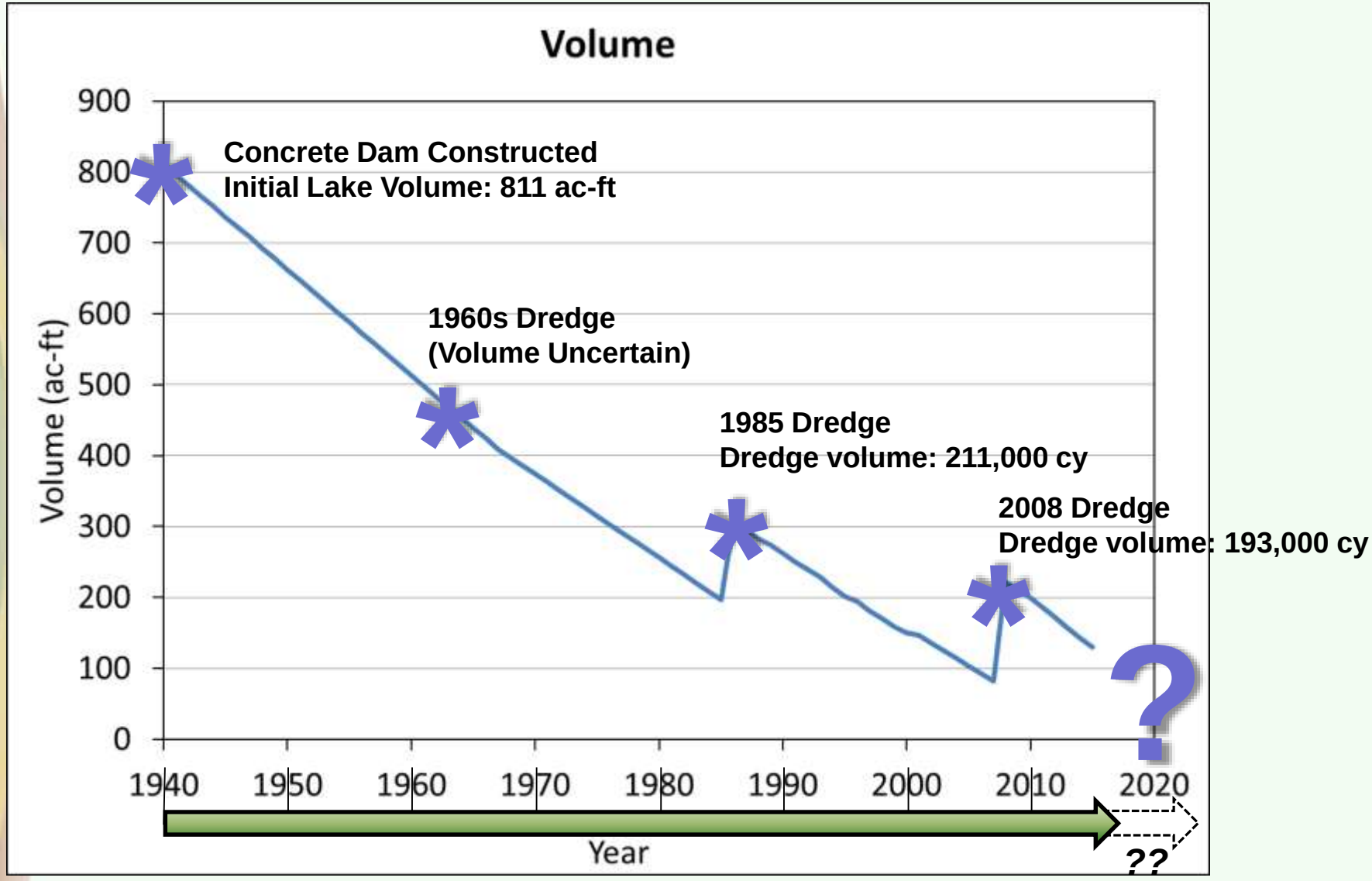
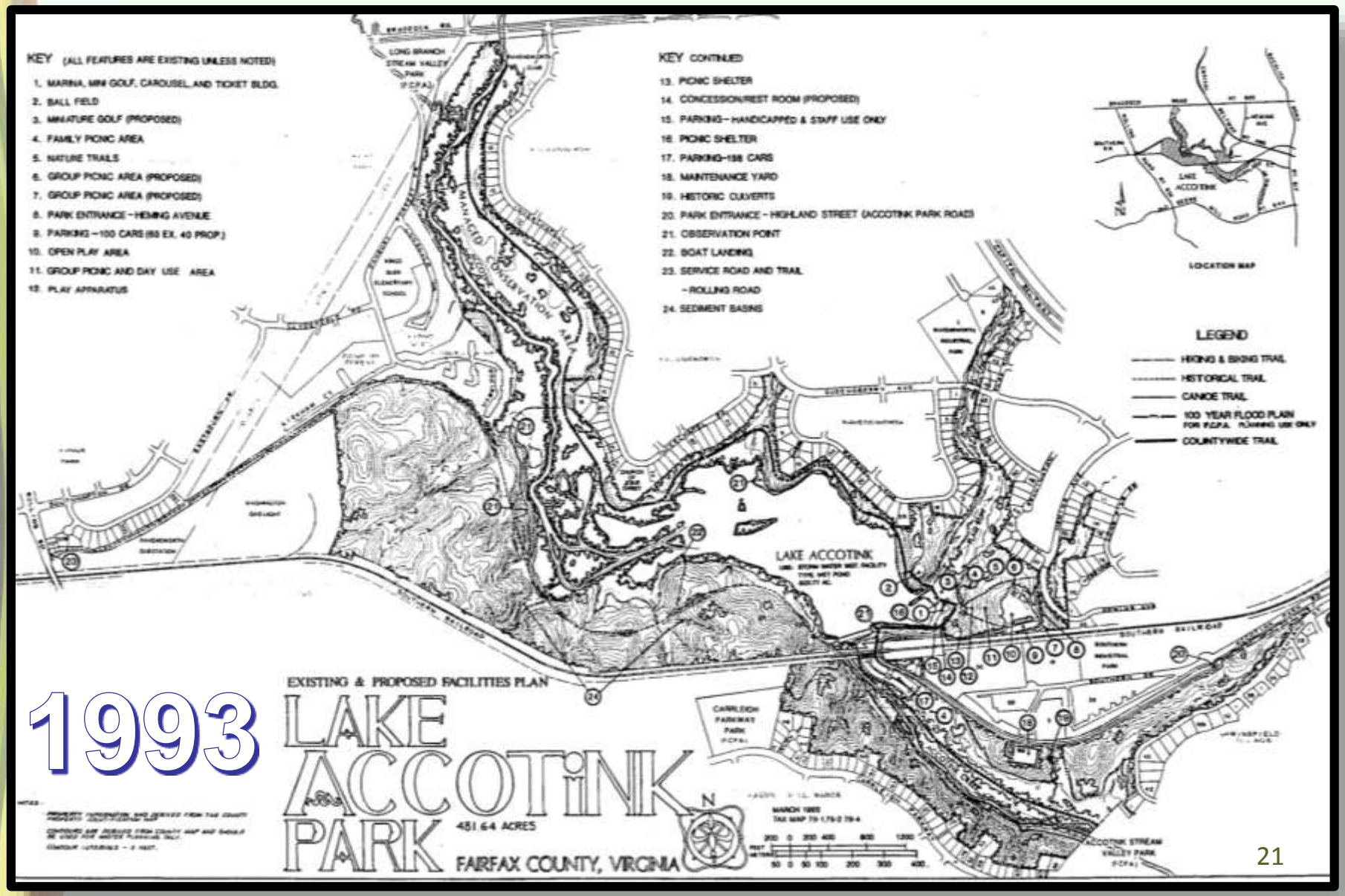


Lake Accotink Master Plan Revision



Efforts to Date

Previous Diagnostic and Dredging Studies

- ***Diagnostic and Feasibility Study for the Restoration of Lake Accotink***
  (NUSAC Incorporated, 1982)

- ***F.X. Browne Sedimentation Studies 1983-1988***
  (Associated with 1985 Dredge Event)

- ***Lake Accotink – Sediment Management Program Study***
  (HDR Engineering, Inc., January 2002)

Lake Accotink Master Plan Revision

September 2014

Board of Supervisors voted to:

Approve one-time funding in the amount of $179,000 to support a master site analysis and area-use recommendation study for Lake Accotink Park. This study is necessary planning work that will assist in the development and enhancement of this vital County facility. Staff will continue to look for additional funding sources to support this planning effort and required design elements, including grant funding.

2016 Lake Sustainability Study

Regulatory Impacts

New TMDL recommendations

Additional Study

2016 Lake Sustainability Study

Continued Dredging

ALTERNATIVE

A

Location

- Within main body of the lake, primarily in the upper end.

Goal

- To restore average depth to 5-8 ft for recreational boating. Remove approximately 200,000 cy.

Maintenance Dredging

- Approx. 15-20 year cycle.

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2016 Lake Sustainability Study

Continued Dredging

ALTERNATIVE

A

Considerations

- Requires action every 15 years.
- The lake is maintained as a recreational resource.
- Retains current baseline for sediment reduction for water quality downstream.
- Dredging does not significantly enhance water quality of the lake.
- Recreational use of the lake is impacted for long periods of time during dredge (~2 years).
- An offsite disposal area would be required.
- Expensive

2016 Lake Sustainability Study

Upstream Forebay

ALTERNATIVE

B

Location

- Just upstream of the main pool

Configuration

- Surface Area – 13.3 ac
- Depth – 8 ft
- Volume – 94 ac-ft
- Sized for 15% of Tv

Maintenance Dredging

- Average Trap Efficiency ~ 20% (can be increased with larger volume).
- Requires “temporary” on-site disposal area to be viable.

2016 Lake Sustainability Study

Upstream Forebay

ALTERNATIVE

B

Considerations

- Reduce sediment influx to main lake.
- Yearly or biennial maintenance dredging would be required.
- Yearly or biennial maintenance dredging would not impact main lake.
- Increased duration between larger dredging events.
- The lake is maintained as a recreational resource.
- Alternative would require an initial full dredge of the lake.
- Wetland impacts (~ 5 ac).
- Will still require dredging of the main lake, although at greater intervals.
- Maintenance dredging requires area on-site to prepare sediment to be transported off site.

2016 Lake Sustainability Study

In-Lake Forebay

ALTERNATIVE

C

Location

- Around “island” – essentially the 2008 dredge footprint.

Configuration

- Surface Area – 13.3 ac
- Depth – 8 ft
- Volume – 94 ac-ft
- Sized for 15% of Tv

Maintenance Dredging

- Average Trap Efficiency ~ 20%. Can be increased with larger volume.
- Requires “temporary” on-site disposal area to be viable.

2016 Lake Sustainability Study

In-Lake Forebay

ALTERNATIVE

C

Considerations

- Reduce sediment influx to main lake, increasing duration between larger dredging events.
- Lesser impacts to wetland in comparison to Alternative B (mostly open water).
- The lake is maintained as a recreational resource.
- Alternative would require an initial full dredge of the lake.
- Yearly or biennial maintenance dredging would impact main lake
- Will still require dredging of the main lake, although at greater intervals.
- Maintenance dredging requires area on-site to prepare sediment to be transported off site.

2016 Lake Sustainability Study

In-line "Beaver Dams"

ALTERNATIVE D

Location

- Upstream and within Accotink Creek.

Configuration

- Sheet pile "walls" within the channel to encourage sediment deposition. Rough capacity estimate of up to12,000 cy per structure over time (variable).
- Will convert existing forested wetland areas to "beaver swamps" over time.

Maintenance Dredging

- Extension of time for full dredge of the main lake.
- "Beaver ponds" not accessible for dredging.

2016 Lake Sustainability Study

In-line "Beaver Dams"

ALTERNATIVE

D

Considerations

- Sediments are trapped upstream.
- Inexpensive to install.
- Can install more or less as desired within the Accotink main channel throughout the County.
- Reduced erosion in vicinity of the structure.
- The lake is maintained as a recreational resource.
- Alternative would require an initial full dredge of the lake.
- Impacts to existing wetlands.
- Limited capacity of "beaver ponds", not easily dredged.
- One time sediment capture. Limited impact on extending the initial dredge of the lake.

2016 Lake Sustainability Study
Sediment Disposal

- Alternatives A, B, C, and D will all require an initial dredging of the lake as the first phase of the project.
- Alternatives B and C will require annual/biennial maintenance dredging and the ability to process dredge material on-site to be financially viable.
- Alternative D is a one-time option.

Ultimate disposal of dredge material will require trucking to off-site location for any of the dredge options.

2016 Lake Sustainability Study
Sediment Disposal

Where to put it???

- Preliminary analysis of potential locations.
- Will require further study to align with chosen lake alternative.
- Removal of sediment will entail impacts to surrounding communities.

2016 Lake Sustainability Study

Single Channel with Reclaimed Land

ALTERNATIVE

E

Location

- Stream along northern shore, reclaimed remaining footprint (reforest, wetlands, open space).

Configuration

- Stream Creation Length – 3,300 lf.

Maintenance Dredging

- Not necessary.

2016 Lake Sustainability Study
Single Channel with Reclaimed Land

ALTERNATIVE
E

Considerations

- Eliminate sediment deposition and need for dredging.
- No significant excavation.
- Creation of habitat and wetlands.
- Channel creation in “wet” sediments – additional study necessary for best method.
- Will no longer trap sediments/pollutants – regulatory implications? Downstream impacts need further study.
- Potential impacts to downstream water quality -further study required.
- No open water for recreational purposes.

2016 Lake Sustainability Study

Single Channel with Smaller Lake

ALTERNATIVE

F

Location

- Stream along southern shore, smaller “off-line” lake/wetlands along northern shore.

Configuration

- Lake Surface Area – 18.5 ac
- Depth – 8 ft
- Stream Length – 2,500 lf

(90 ft wide (bankfull), 6 ft deep, transports sediment)

Maintenance Dredging

- Not necessary

2016 Lake Sustainability Study

Single Channel with Smaller Lake

ALTERNATIVE

F

Considerations

- Eliminate sediment deposition and need for dredging.
- "Off-line" lake water quality should be greatly enhanced as storm flows bypass.
- Depicted grading "balances" (no offsite disposal).
- Retention of open water for recreational uses.
- Significant earth moving operation with "wet" sediments – additional study necessary.
- Will no longer trap sediments/ pollutants - regulatory implications? Downstream impacts need further study.
- Expensive implementation cost.
- Likely a multi-year project.

2016 Lake Sustainability Study

Community Involvement

Public Meeting/Workshop on May 16th, 7:00 p.m. at Kings Glen Elementary School

2016 Lake Sustainability Study

Next Steps

Recommendations for TMDL to be released at the end of 2016

Continued public outreach to the community throughout the summer regarding park usage

Publishing of draft master plan
Completion of Lake Sustainability Study

Thank you!

for your time