National Park Service
U.S. Department of the Interior

The role of geology and topography in determining locations of the Civil War Defenses of Washington

This is a web-accessible version of a presentation prepared for:

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Civil War Washington Teacher Fellows
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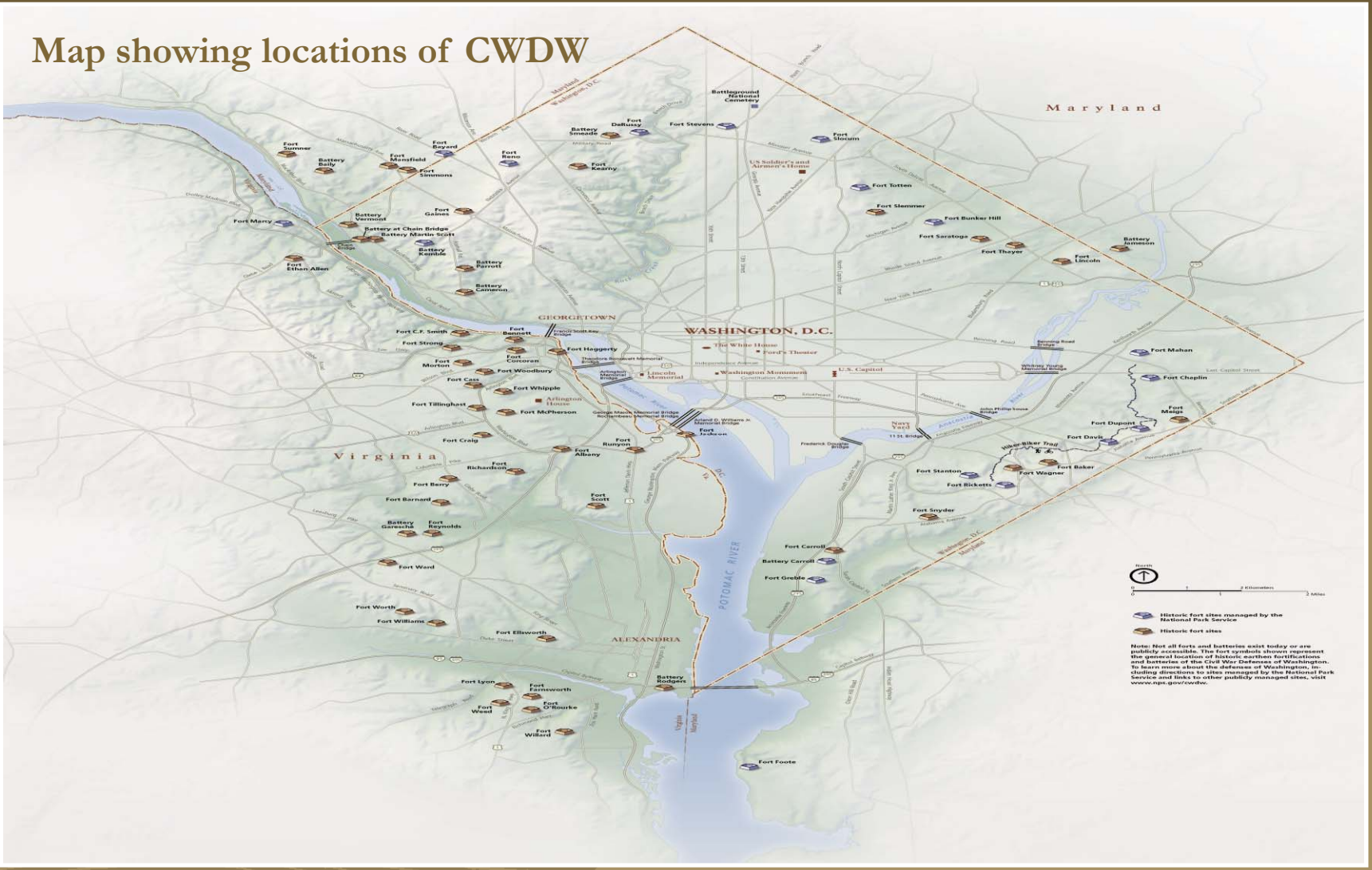
Map showing locations of CWDW



The Civil War Defenses of Washington (CWDW) were built to protect the city from attack during the Civil War.

Introduction

- The Civil War Defenses of Washington were constructed on strategic locations that protected the Potomac, guarded the surrounding countryside, and secured transportation routes.

  At completion, there were:
  - 37 mile circle of fortifications
  - 68 forts
  - 93 batteries for guns and 20 miles of rifle pits, and
  - 32 miles of military roads

- Geology and topography played a role in the locations where the defenses were built.

Introduction (continued)

- The defenses successfully deterred Confederate attack on the capital.
  - The only attack occurred in July 1864 at Fort Stevens.
    - The Confederate assault led by Gen. Jubal Early was defeated by the Union.
    - President Lincoln came under direct enemy fire while viewing the combat.

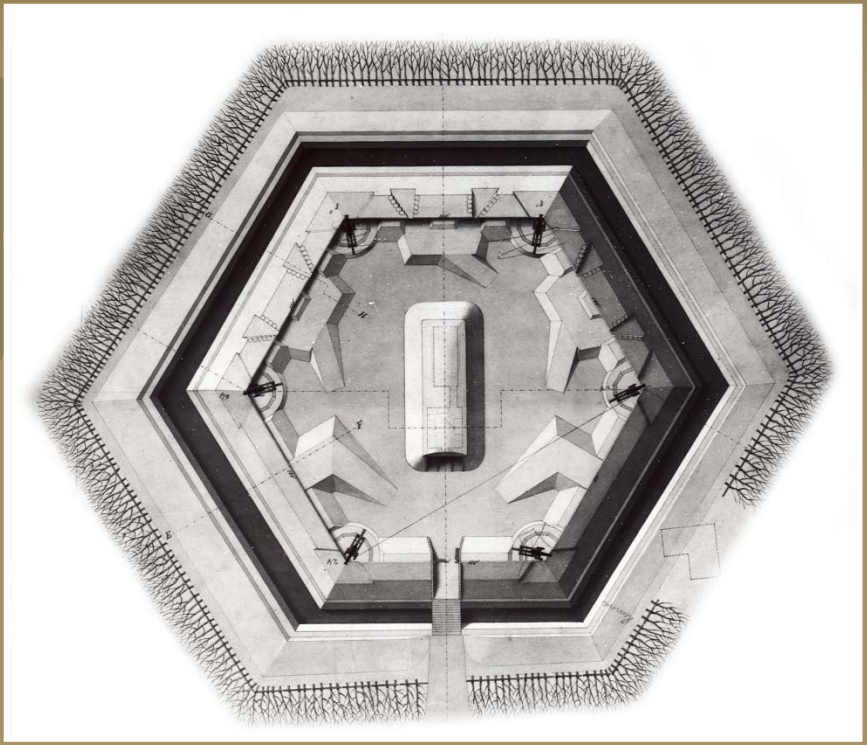
What led to the development of the fortifications?

1. One May 24th 1861 the Union Army crossed the Potomac onto Confederate Virginia and commandeered parts of Northern Virginia.
2. Some fortifications were built immediately because Ft. Washington was the only protection the Capital had leading into the War.
3. After the loss at Bull Run in Manassas, Virginia officials became more apprehensive about Confederate attack and started building more forts around the entire city.
4. By the end of 1863, 68 forts and 93 batteries had been developed in or around the capital.
5. The city went from one of the most vulnerable capitals in the world to one of the most heavily fortified.

Fort Stevens, Aug 1865,
Library of Congress Digital Collection

Forts varied in size and complexity

The CCC reconstructed part of Fort Steven's parapet in 1937-38



Plan of Fort Dupont

Where were the forts built?

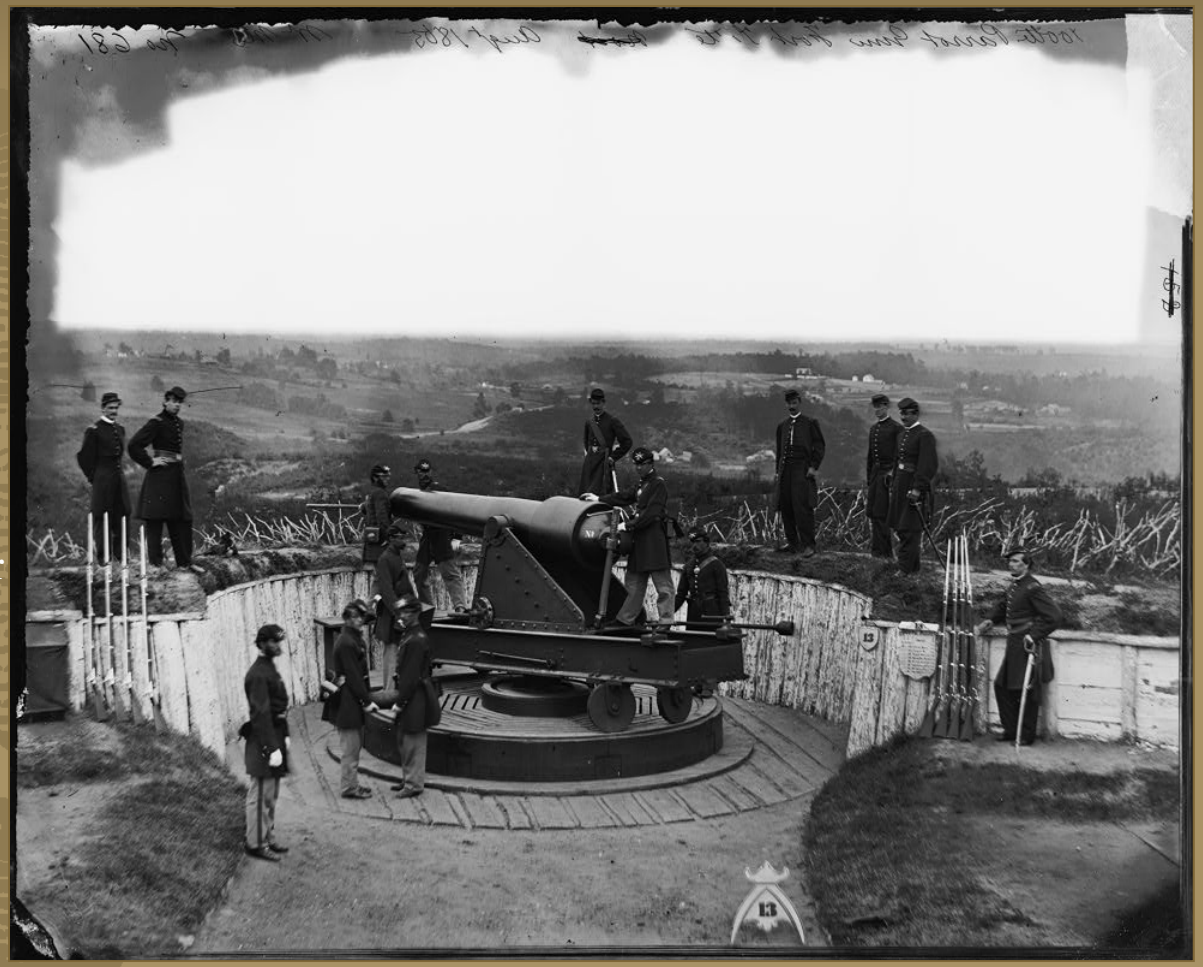
The Forts were built on high elevations throughout the city.

Fort Reno is located at an elevation of 420 ft.

Fort Dupont is located at an elevation of 303 ft.

These high points made it easier to communicate between the forts as well as to defend them.

Many times the forts protected the vulnerable ravines below them.



Fort Totten, Aug 1865?, Library of Congress Digital Collection

Evolution of Washington DC's landscape

~65 Mya*

Dinosaurs roam DC in a swampy coastal environment

Dinosaurs go extinct

~2.6-65 Mya

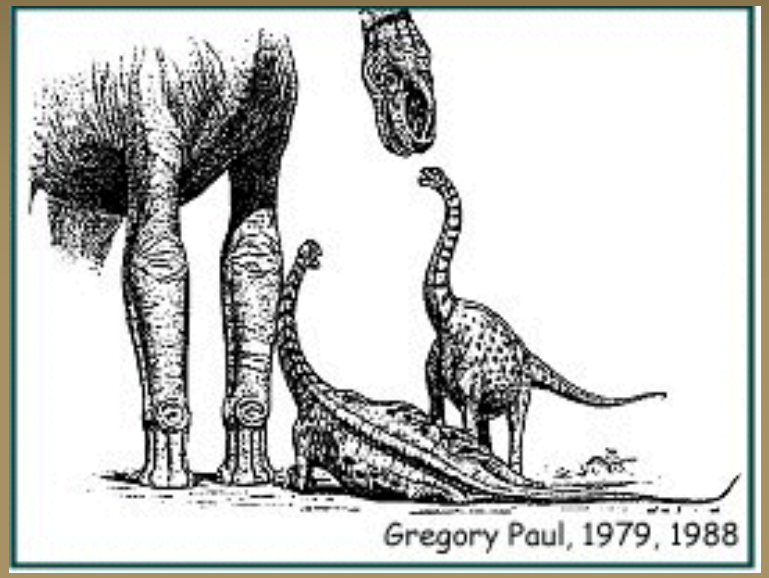
DC is periodically covered by the Atlantic as ocean levels fluctuate

Frequent changes in climate cause glaciations and rising and falling ocean levels

~modern-2.6 Mya

The modern DC landscape is formed by rivers eroding and migrating across the landscape

High points and ridges left behind become ideal locations for the CWDW



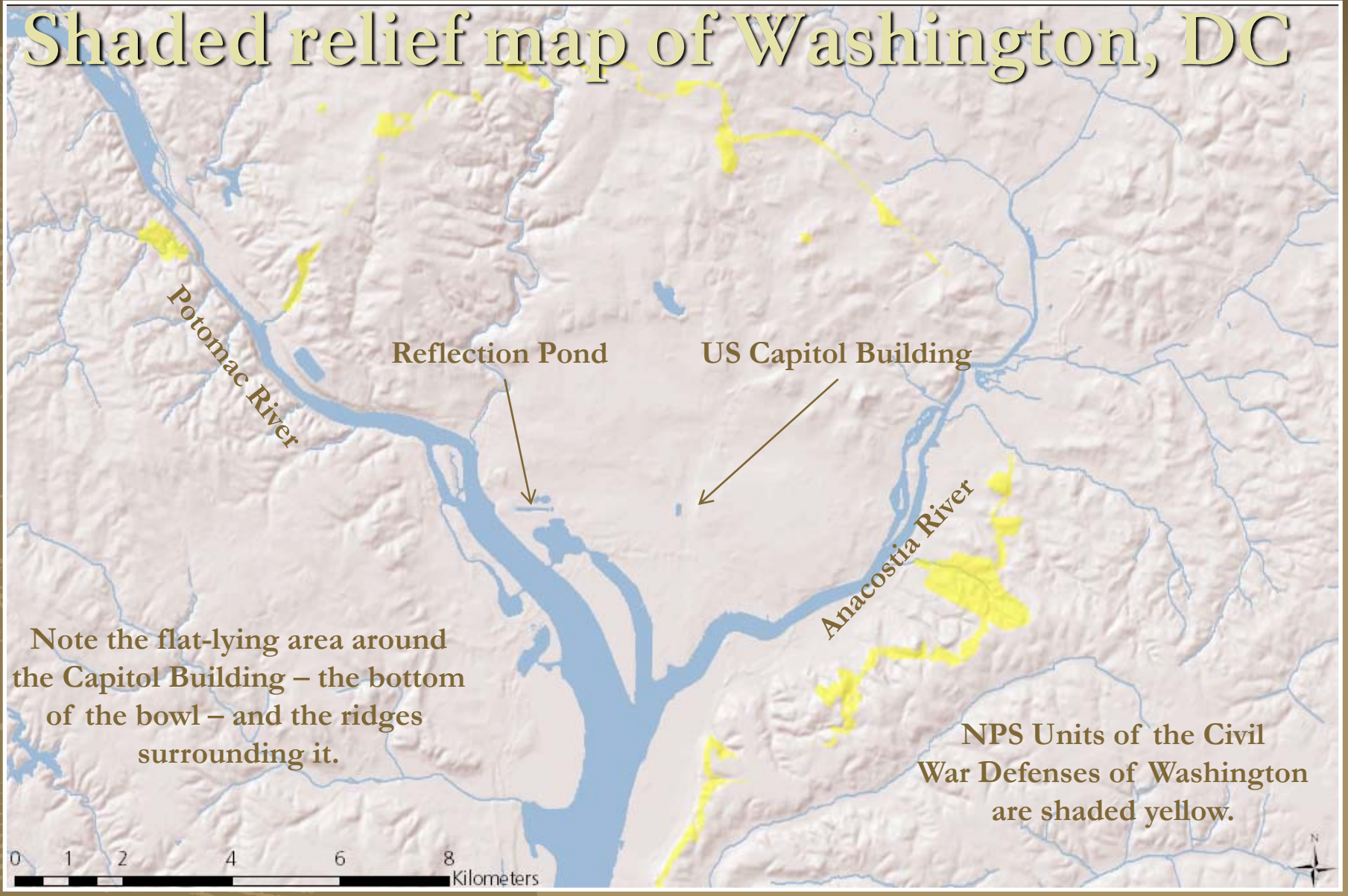
Astrodon johnstoni, Maryland's State Dinosaur, 30 ft high by 50-60 ft long, MD Geological Survey

*Mya = million years ago

Geology's influence on the modern landscape

- Downtown Washington, D.C. is situated in the low point of a topographic 'bowl' left behind as rivers carved through sediment.
- The high points of the bowl circle the city and were strategically important in the defense of the city during the Civil War.
- Many of the Civil War Defenses of Washington were built on these points.

Shaded relief map of Washington, DC



The modern landscape

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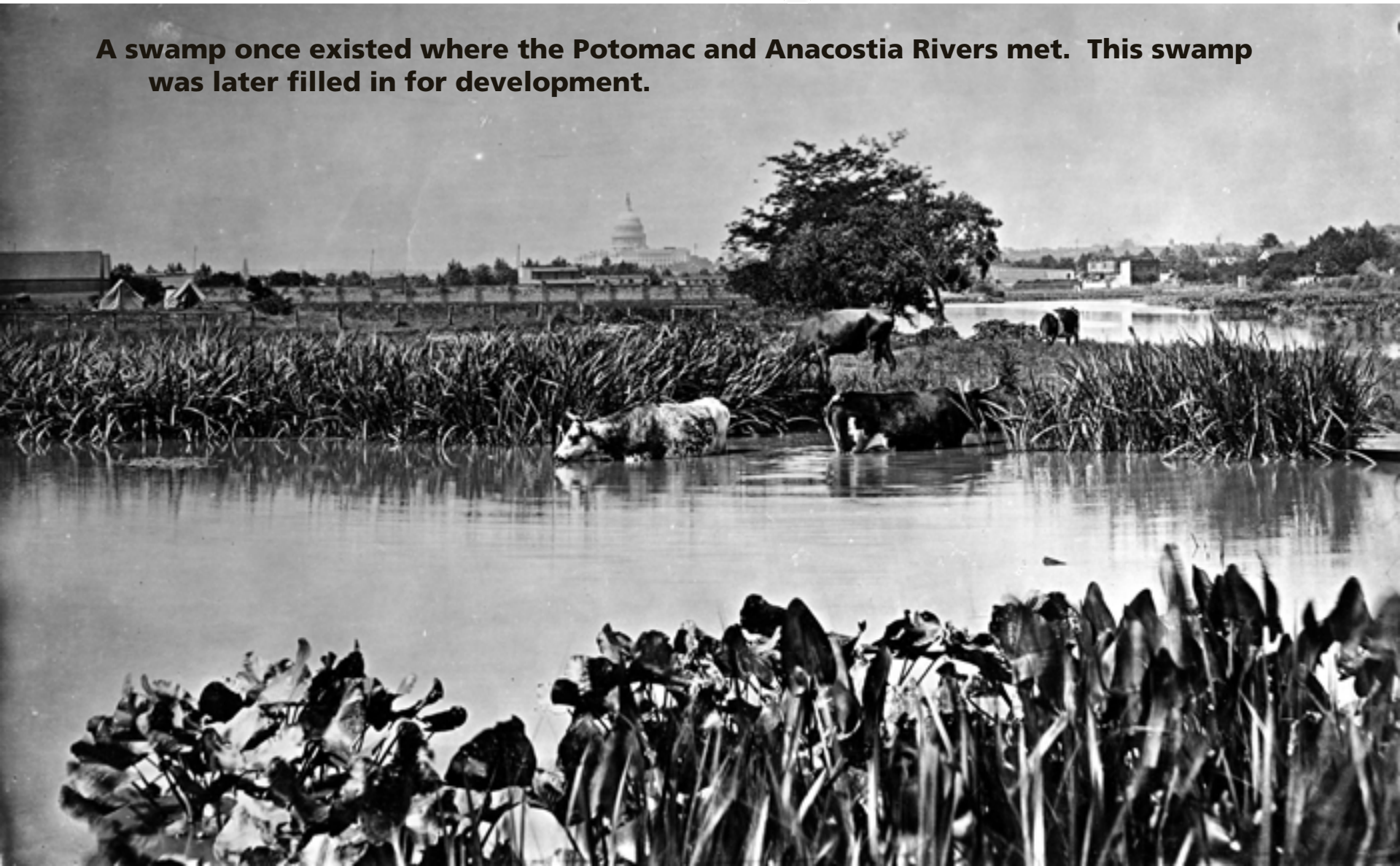
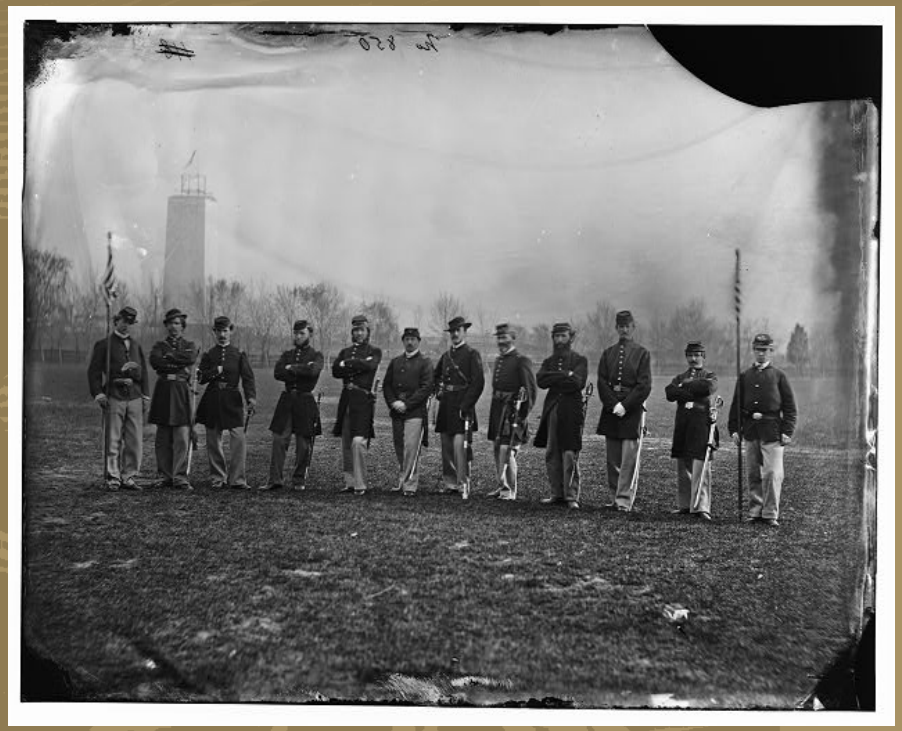
USGS Photographic Library



A swamp once existed where the Potomac and Anacostia Rivers met. This swamp was later filled in for development.

The Signal Corps



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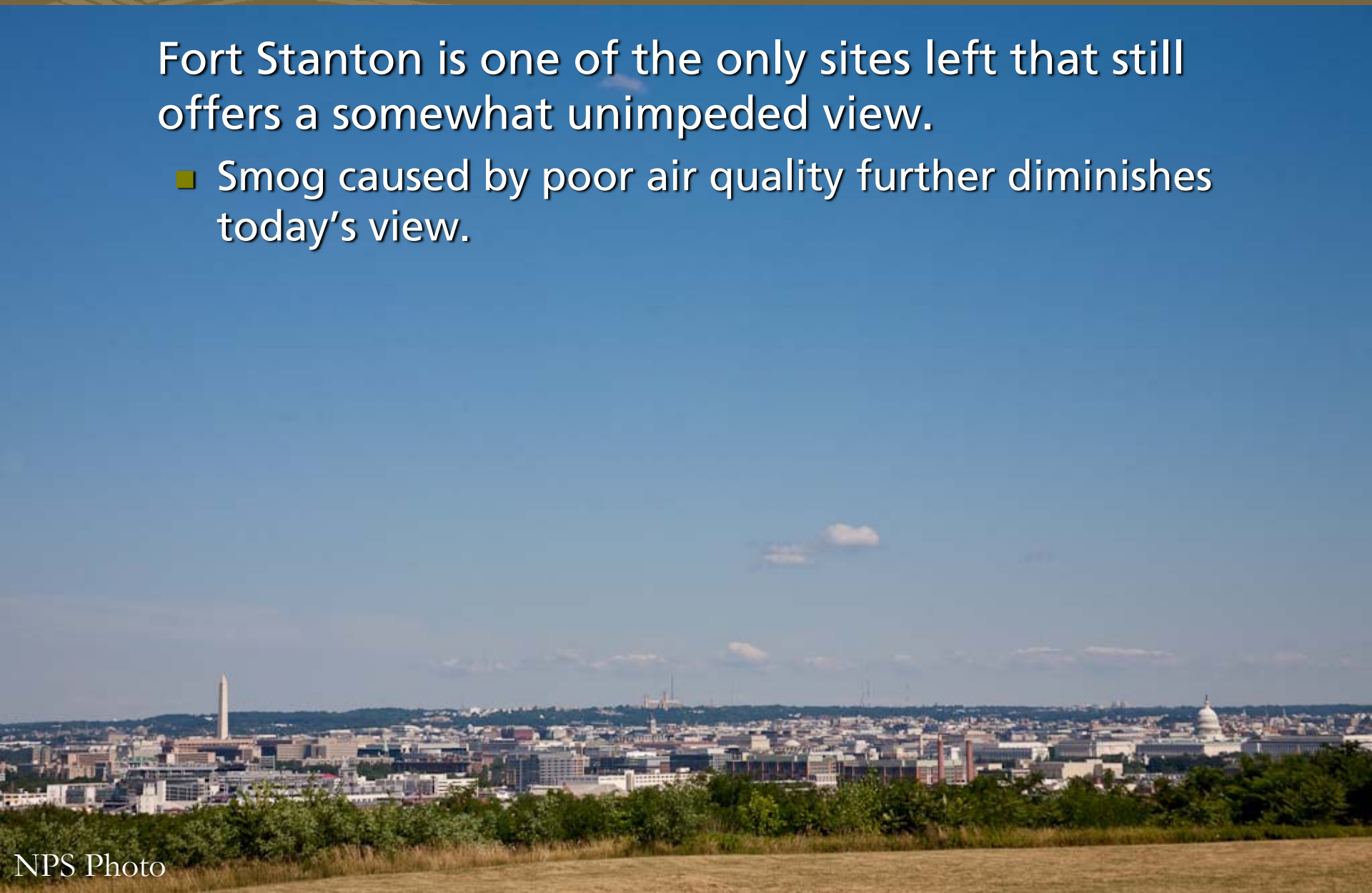
- The Signal Corps used flags to communicate between the forts.
- The hillsides surrounding Washington during the Civil War were stripped of trees to provide unimpeded views.
- This created lines of fire and eliminated enemy cover.

Fort Stanton is one of the only sites left that still offers a somewhat unimpeded view.

- Smog caused by poor air quality further diminishes today's view.



NPS Photo

- The vegetation visible on the opposite bluff (and on all the surrounding bluffs) was absent during the Civil War.

NPS Photo

Using GIS to inform history

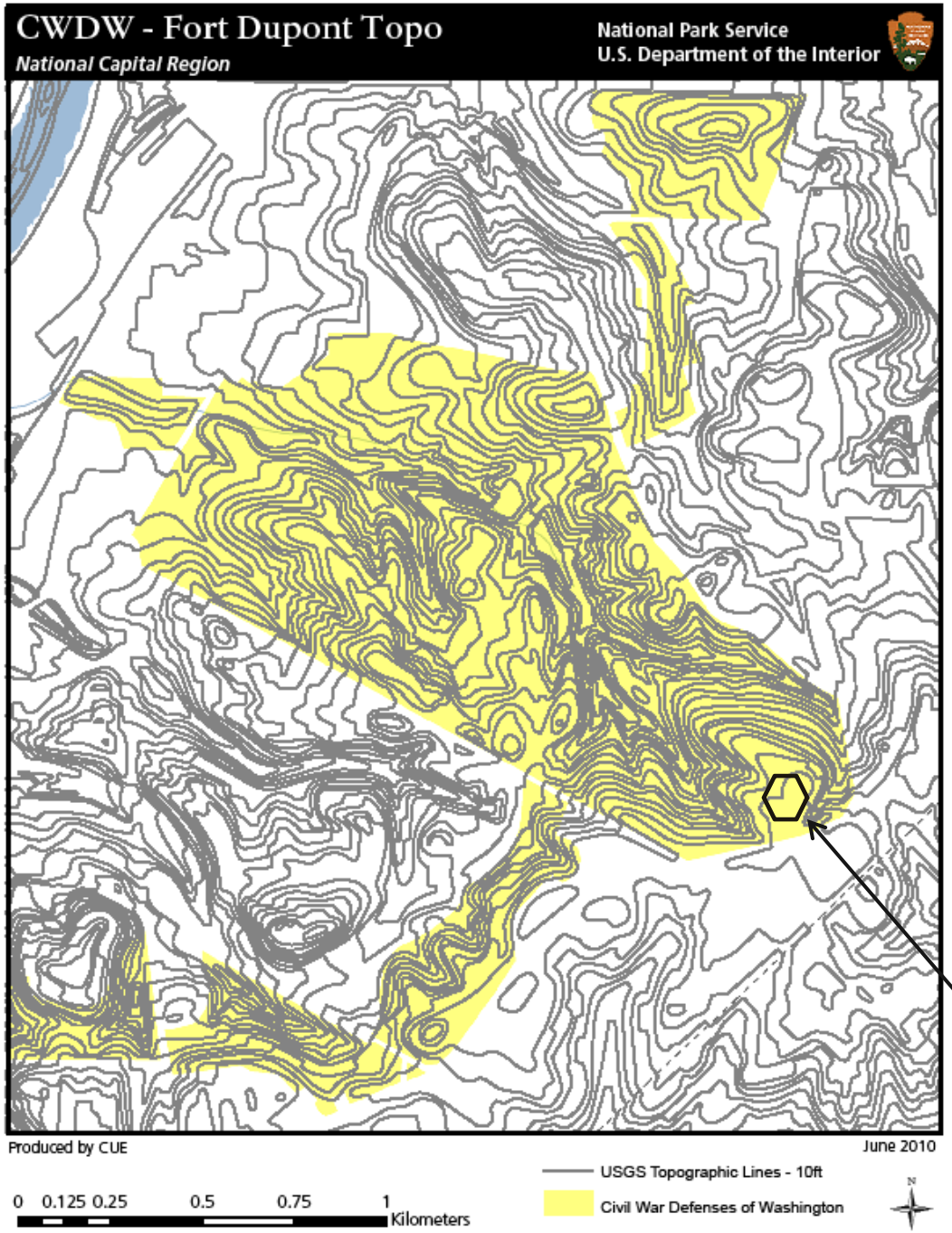
- GIS: Geographic Information System
  - Data are geographically linked to a location.
- Data are stored as GIS layers.
  - Each layer contains different information.
    - Examples:
      - Population data for towns, cities, counties
      - Types of landcover
      - Infrastructure
  - Multiple layers can then be ‘stacked’ on top of each other. This is useful to:
    - Create maps
    - Look for trends in data

Using GIS to inform history at Fort Dupont

Step 1: Identify earthworks

- Figure at left shows one layer
  - Bing satellite imagery

Fort Dupont earthworks



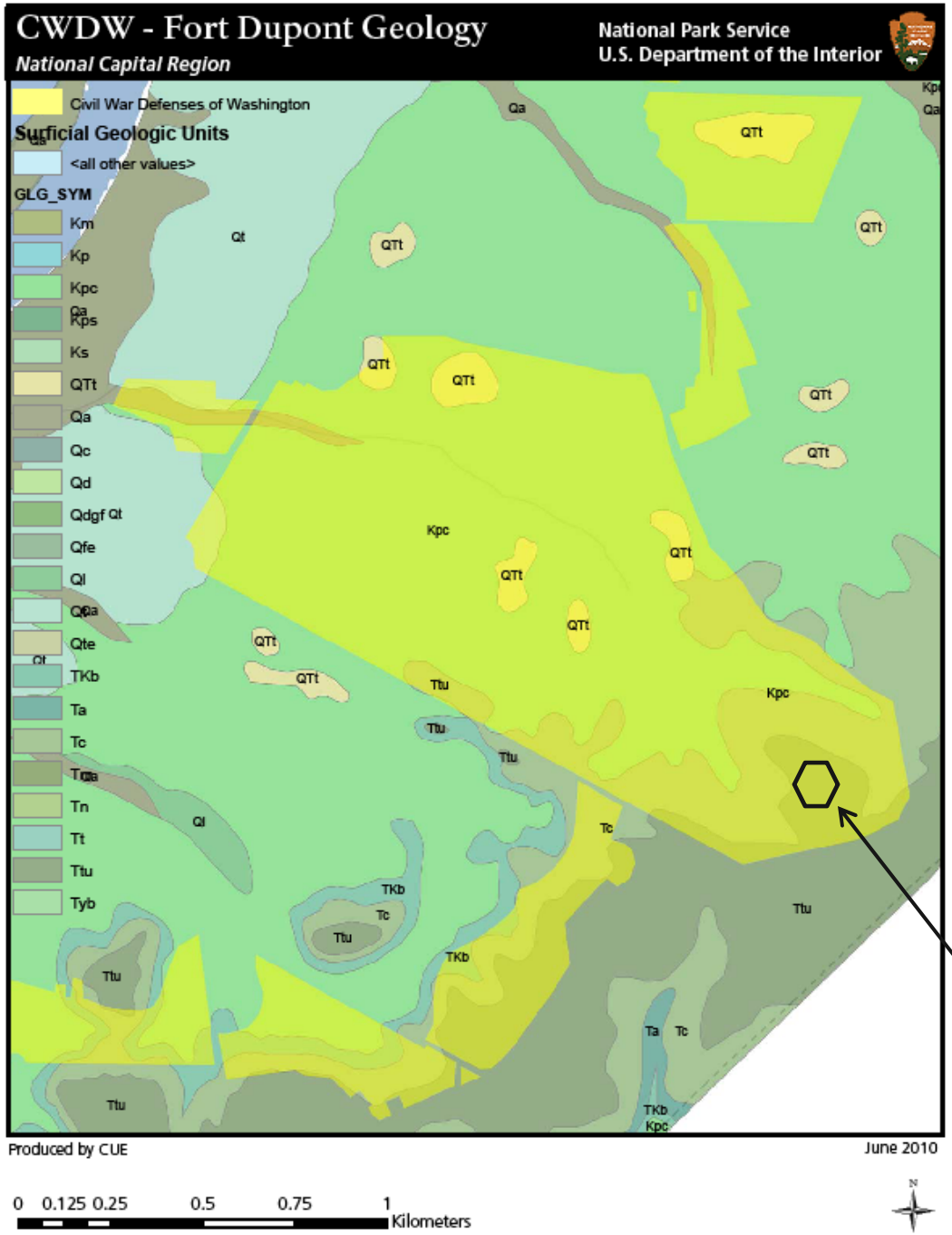
Using GIS to inform history at Fort Dupont

Step 2: Use a topographic layer to determine if site is on a ridge

- Figure at left shows two layers
  - CWDW extent (yellow)
  - USGS topography

Fort Dupont earthworks

Using GIS to inform history at Fort Dupont



Fort Dupont earthworks

Step 3: Determine the underlying geology of the site using a map of surface geology

- Figure at left shows two layers
  - CWDW extent (yellow)
  - USGS surface geology map

Using GIS to inform history at Fort Dupont

Results of GIS exercise

- Earthworks were identified using satellite imagery.
- The topographic map showed that the earthworks were positioned along a ridge line.
- Surface geology map showed that the earthworks were built in the 'highest level upland terrace deposits' geologic unit (Ttu).

Using GIS to inform history at Fort Dupont

Geologic interpretation of GIS exercise

Some key characteristics of Highest Level Upland Terrace Deposits (Ttu):

- Ttu is made of layered mixtures of gravel and sand.
- These rocks were deposited by waterways in the Tertiary Period (~65.5-2.6 Mya).
- The highest bluffs surrounding DC have Ttu underlying the ground surface.
- Many of the forts were likely built in this unit.

- Additional GIS analysis showed that other forts were built in the Potomac Formation (Kp).

- In places where Ttu was eroded away, the high points are often Kp. These points were therefore strategic locations for building defenses.

- Some characteristics of the Potomac Formation (Kp):
  - The Potomac Formation (Kp) is made of clay with minor sand and gravel. Dinosaur fossils have been found in this formation.
  - The Kp rocks were deposited in the Cretaceous (~145.5-65.5 Mya) before Ttu rocks. Therefore Kp lies below Ttu and is slightly lower in elevation.

Conclusions

- The Union defenses surrounding Washington D.C. during the Civil War were constructed in locations that provided the Union with a strategic advantage.
- Geology and topography often played an important role in locating the defenses.
- GIS and related mapping exercises can be used in the classroom as a tool to explore the relationship between geology, topography, and history.

19 of the sites are currently maintained by the NPS as protected green space within the urban landscape of Washington, D.C.

For more information, visit the
Civil War Defenses of Washington
www.nps.gov/cwdw

National Park Service
U.S. Department of the Interior

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