

# Benefits of Using Wood Structures for Restoring Streams and Reconnecting Floodplains

Joe Berg, CERP, PWS, CSE  
jberg@Biohabitats.com

Doug Streaker, PE  
dstreaker@Biohabitats.com

Laura Kelm  
laura@greenvestus.com



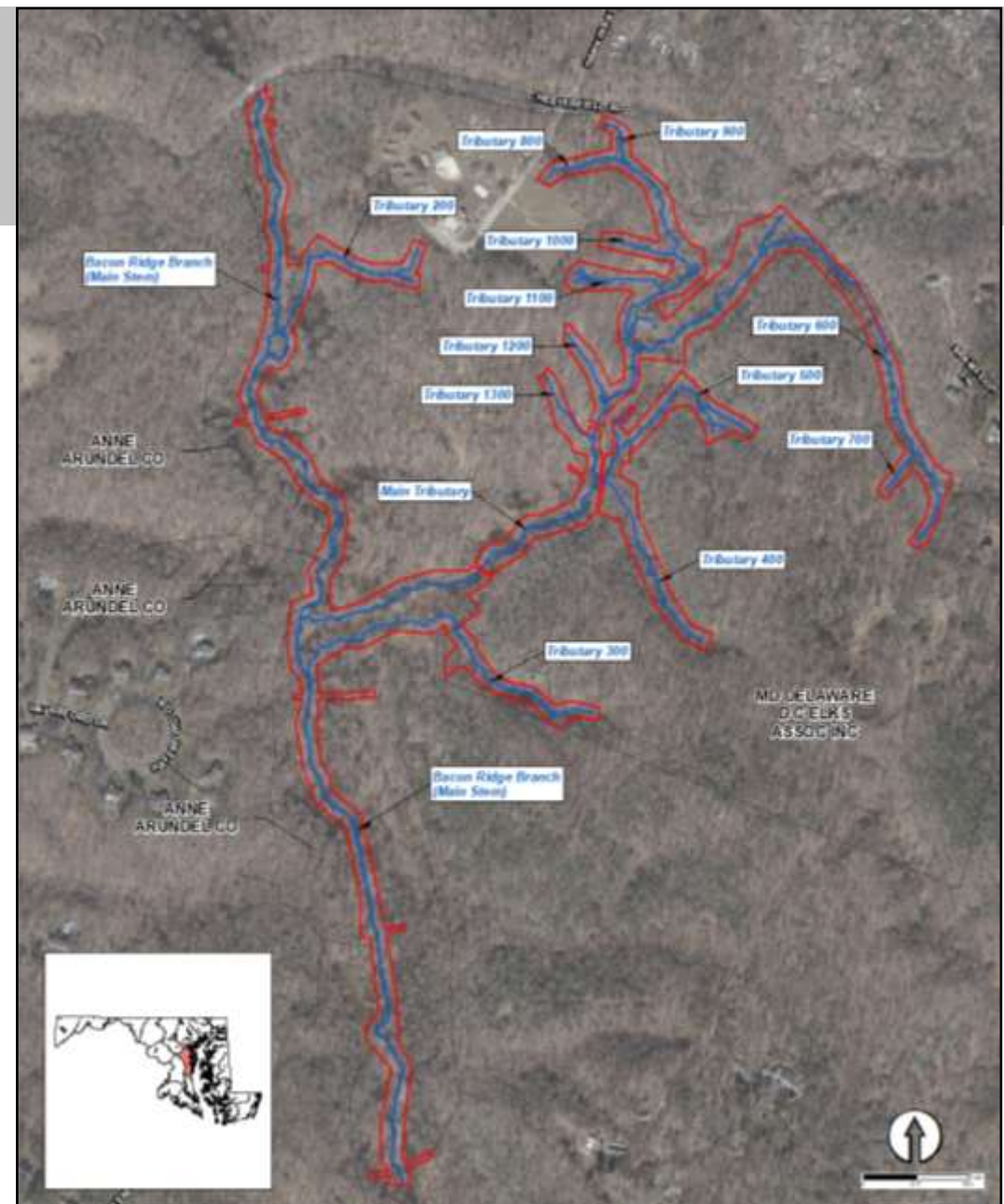
Biohabitats





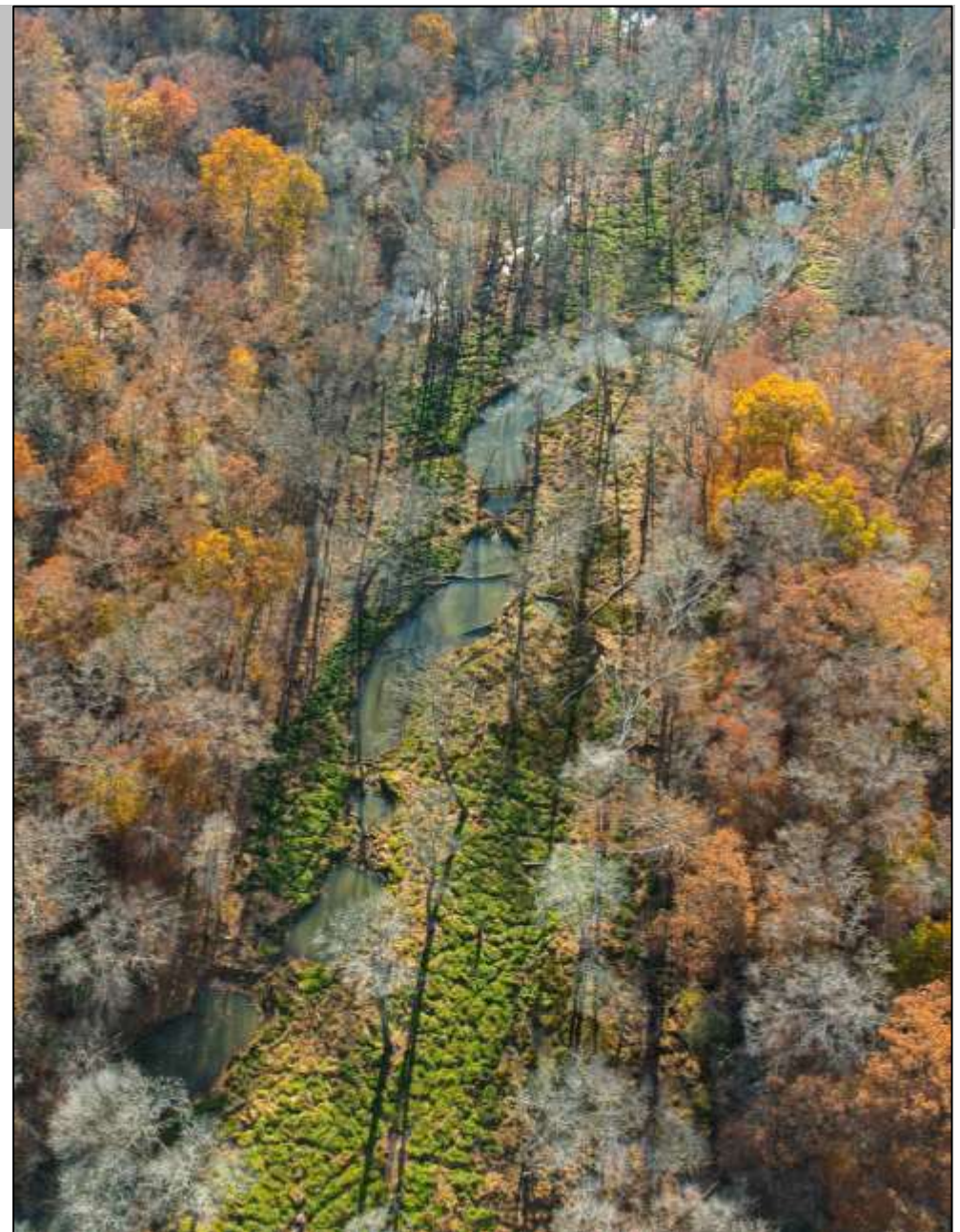
# Background: Bacon Ridge Branch (Elks Camp Barrett)

- Atlantic Coastal Plain
- Anne Arundel County, MD
- MS4 Stream Restoration
- Drainage Area
  - Main Stem 4,495 acres
  - Main Tributary 631 acres
- Land Uses
  - Current: Primarily forested, 10% impervious
  - Historic: ag (hog farming, row crops, pasture)
  - Camp undeveloped for over 100 years
- Channel degradation caused by:
  - Increased runoff from development
  - History of deforestation, soil loss, and poor livestock management practices



# Stream Restoration Project

- Total Length 17,970 LF
  - Perennial, intermittent, and ephemeral channels
- Main channels not centered in floodplain
  - Design focused on channel profile, not planform or cross section
- Goal to have a “lighter touch”
- 61 Log Jams in Channels
- LWD throughout FP





# Stream Restoration Using Wood Structures

## Elevating Stream Water Surface using Engineered Wood Structures

Use engineered wood structures and soil plugs to raise the stream water surface

# of trees and soil volume depends on channel width/depth

Trunks = bank tie in and structure as well as log sills

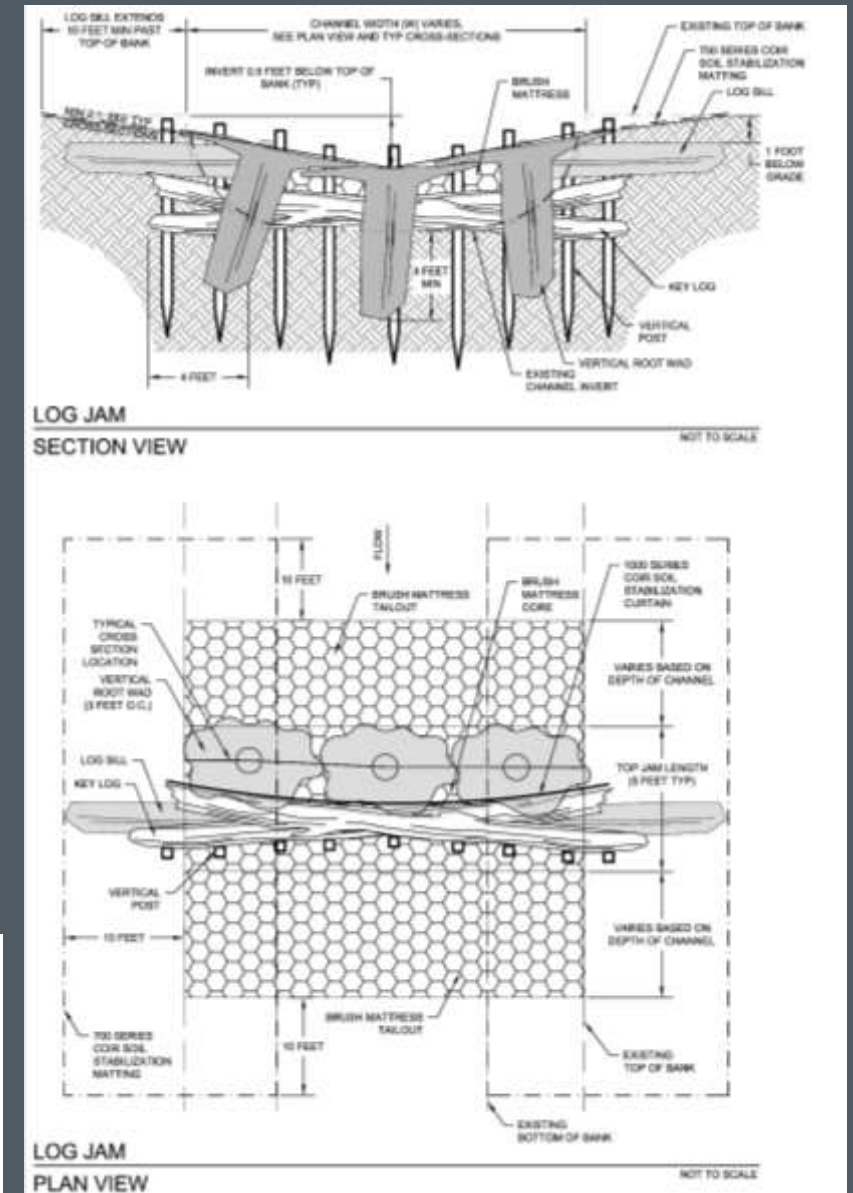
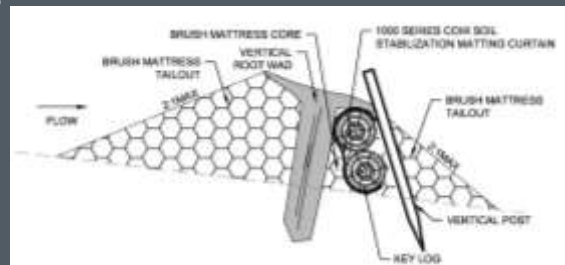
No wasted material, contributes to floodplain roughness, habitat enhancements (turtles, skinks, snakes...)

Try not to damage rootwad during installation!

Treetops & limbs build wood and earth 'plug' matrix—just like a beaver (except we don't work 24/7/365)!

Detail has evolved since this project

- Work in progress!





# Pre-Construction





# Pre/Post Construction Comparison





February 2018



October 2019





Peak attenuation + Increased time of concentration + Groundwater restoration + Enhanced wetland hydrology + Increased area and volume of aquatic resource = **Functional Uplift**



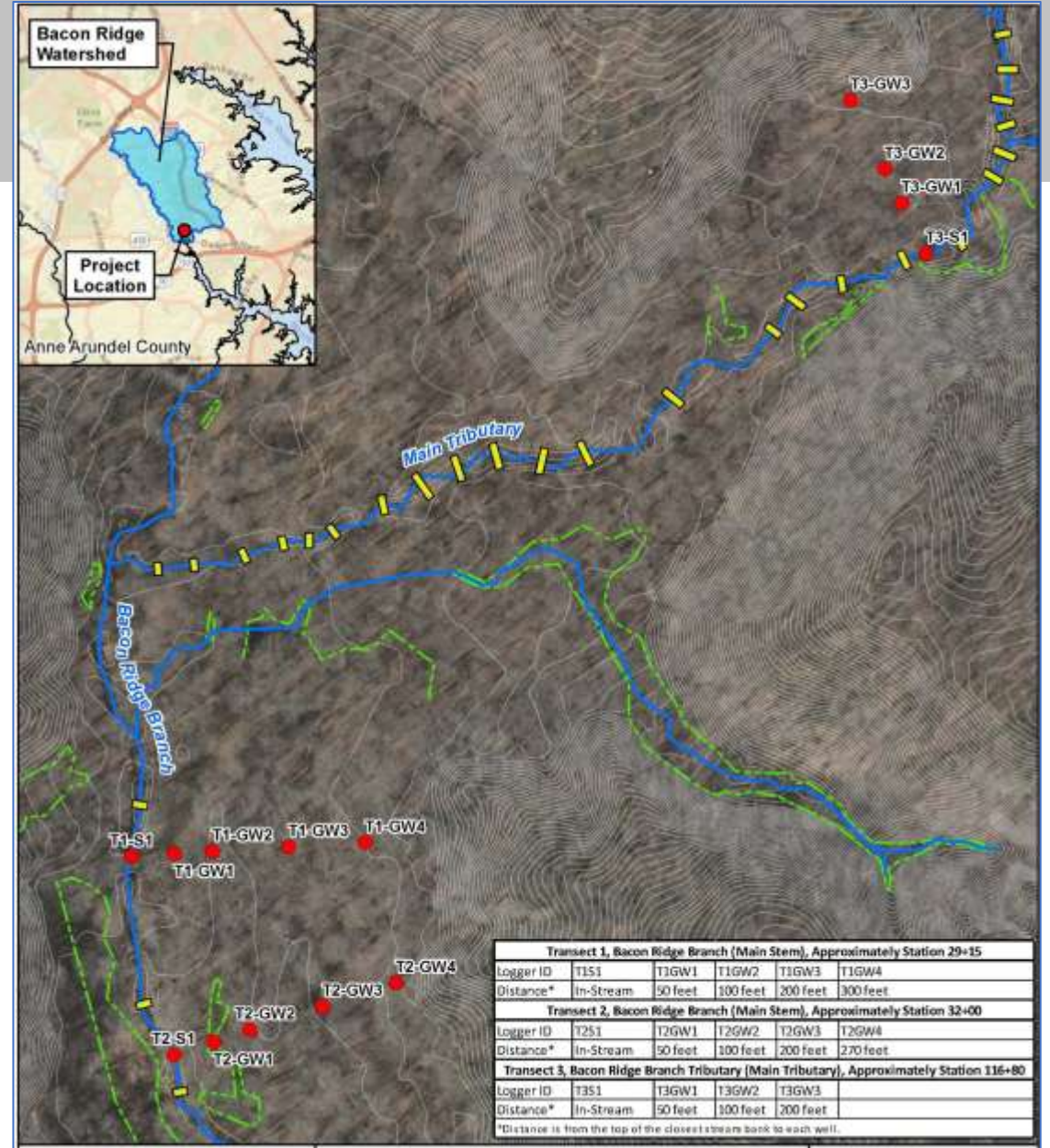
February 2018



October 2019



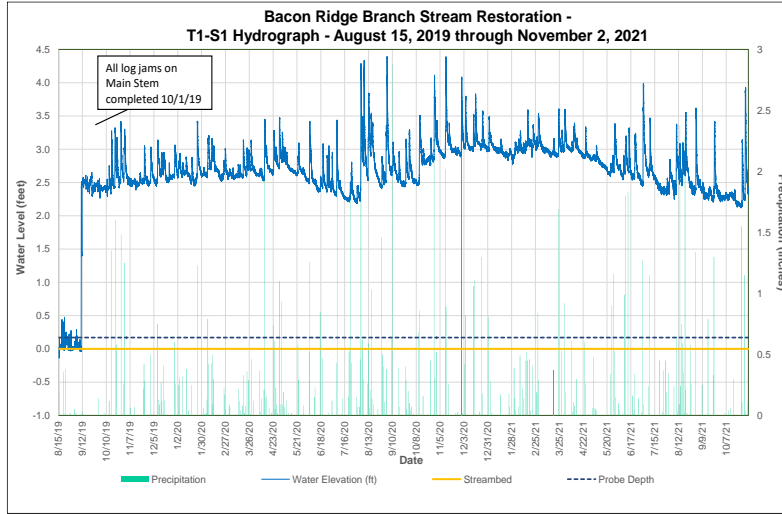
# GW Monitoring Wells



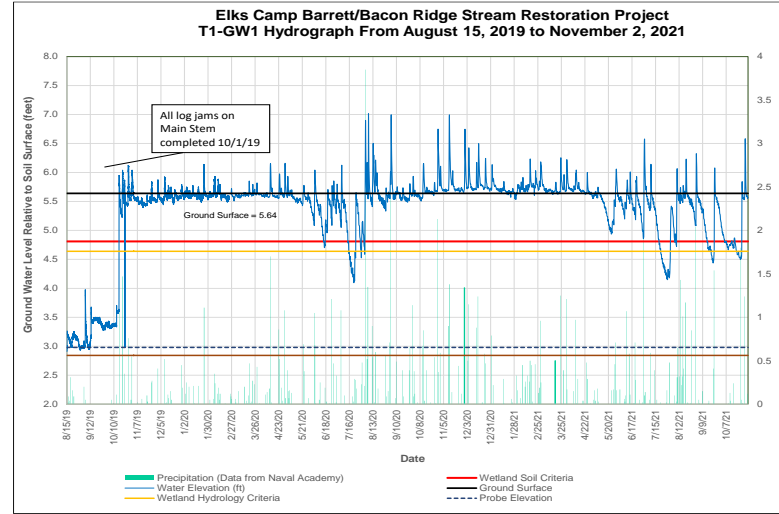


# Elks Camp Barrett Hydrographs: Transect 1

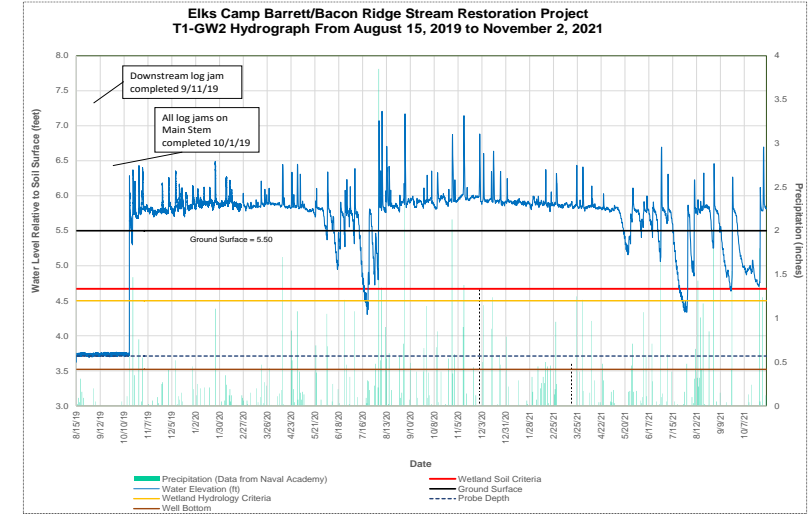
Mainstem Channel



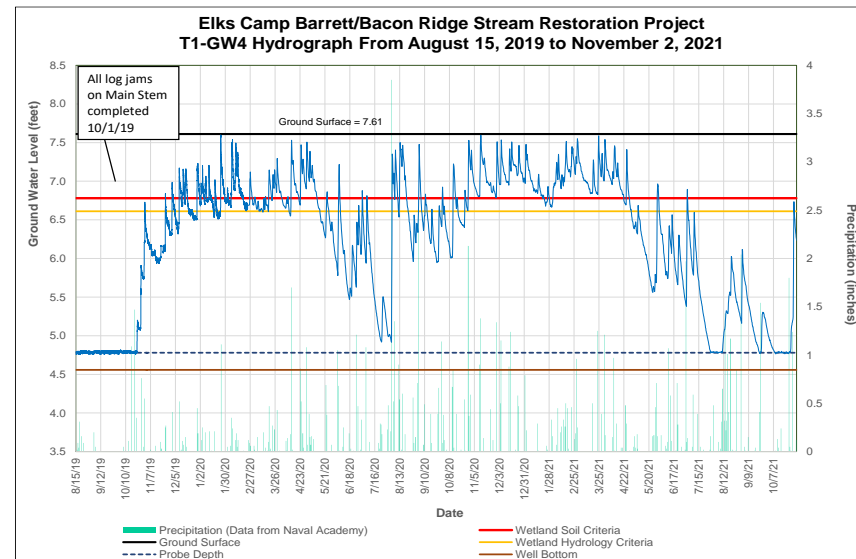
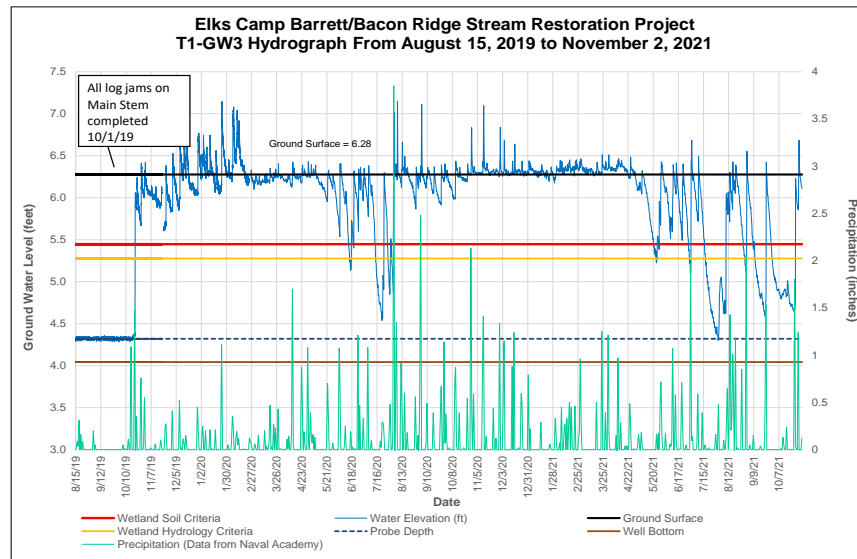
GW1: 50' from Stream



GW2: 100' from Stream



GW3: 200' from Stream



GW4: 300' from Stream



# Ecological Uplift

## Species Observed After Construction

- Great blue heron
- Mallard and wood duck
- Red-tailed hawk
- Wild turkey
- Bald eagle
- Spring peeper
- Wood frog
- American toad
- Eastern ratsnake
- Snapping turtle
- Box turtle
- Copperhead snake
- Beaver
- White-tailed deer
- Fox
- Raccoon
- Fish throughout project area



White-breasted Nuthatch



Yellow Perch Egg Mass

## Forest Interior Dwelling Species ("FIDS") Observed

- Barred owl
- Red-shouldered hawk
- Northern parula
- Wood thrush
- Pileated woodpecker



Maintenance Crew



Wood Thrush



# Main Tributary Beaver Dam



Backwater from Dam, December 2021



Overbank Flows, April 2022



# Beaver Benefits: Stage Zero System



June 2021 Video by Jack Turner



# Transitioning to Tidal Waters

## Low Tech Solution

Using Live Willow Wattles to  
Compliment Engineered Wood Structures



















# Questions?

Joe Berg, CERP, PWS, CSE  
Jberg@biohabitats.com



Biohabitats