Climate Change At Prince William Forest Park

The Geological Society of America- Mosaics in Science

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Introduction

- **Position**: Digital Science Interpretation Intern
- **Problem:** the lack of public knowledge regarding climate change
- **Goal**: Educate the public about climate change in the Northern Virginia Region using Digital Media

About Prince William

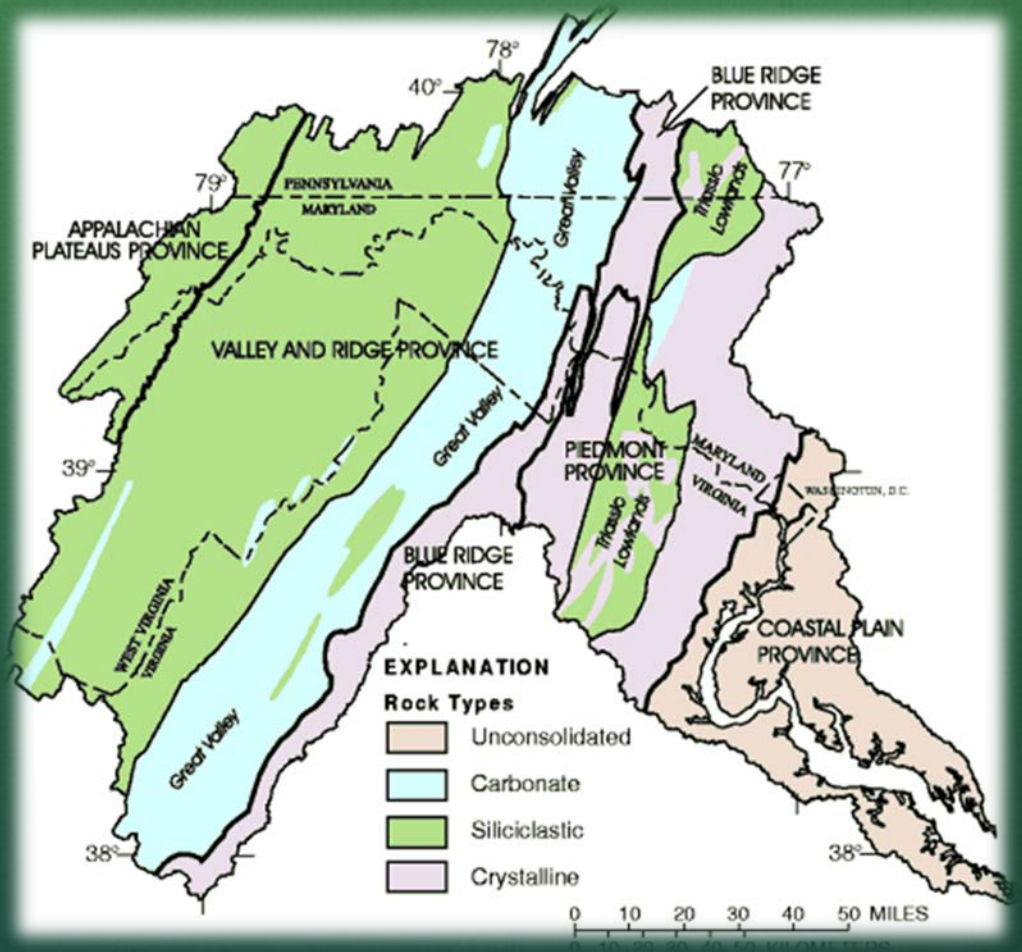
- Developed by the Works Progress Administration (WPA)
- Established as Chopawamsic Recreational Demonstration Area in 1936
- Largest protected area in the Washington, D.C. region
- 19,000 acres
- Protects the Quantico Creek Watershed
- Consists of both Coastal plains and Piedmont forest

About Prince William

- 150 Historic Structures
- The Civilian Conservation Corps (CCC) built facilities, roads, and lakes from 1936-1942
- Used by the U.S. Army's Office of Strategic Services (OSS) from 1942-1945
  - Trained spies and radio operators

Geology

- On the North American Place, west of the Mid-Atlantic Ridge
- Moving west (2.5 cm/year) as the seafloor spreads
- Formed as a series of continental collisions that created vast mountain ranges equivalent to the Himalayas
    - Erosion and glaciers etched away those mountains and piled up layers of sediment



What is Climate Change?

- A disturbance in the Earth's established weather patterns over a long period of time
- Main contributor: greenhouse gases
- 3 major factors cause climate change in Northern Virginia
  - Waste
  - Electricity
  - Transportation

Waste

- 850 tons of trash a day
- 250 million tons of trash in 2011
- Only 34.7% of that was recycled

Electricity

- Generates the greatest amount of greenhouse gases in the U.S.
- Since 1990, Greenhouse gas emissions have increased by 18% as the demand for electricity has increased
- 2011- most of Virginia's Energy production came from coal followed closely by natural gas and nuclear power
- Residential and Commercial sector consumes the most electricity at 35%

Transportation

- 27% of total U.S. greenhouse gases
  - Majority of emissions from passenger vehicles
- Amount of annual emissions: 5.1 metric tons of Carbon Dioxide

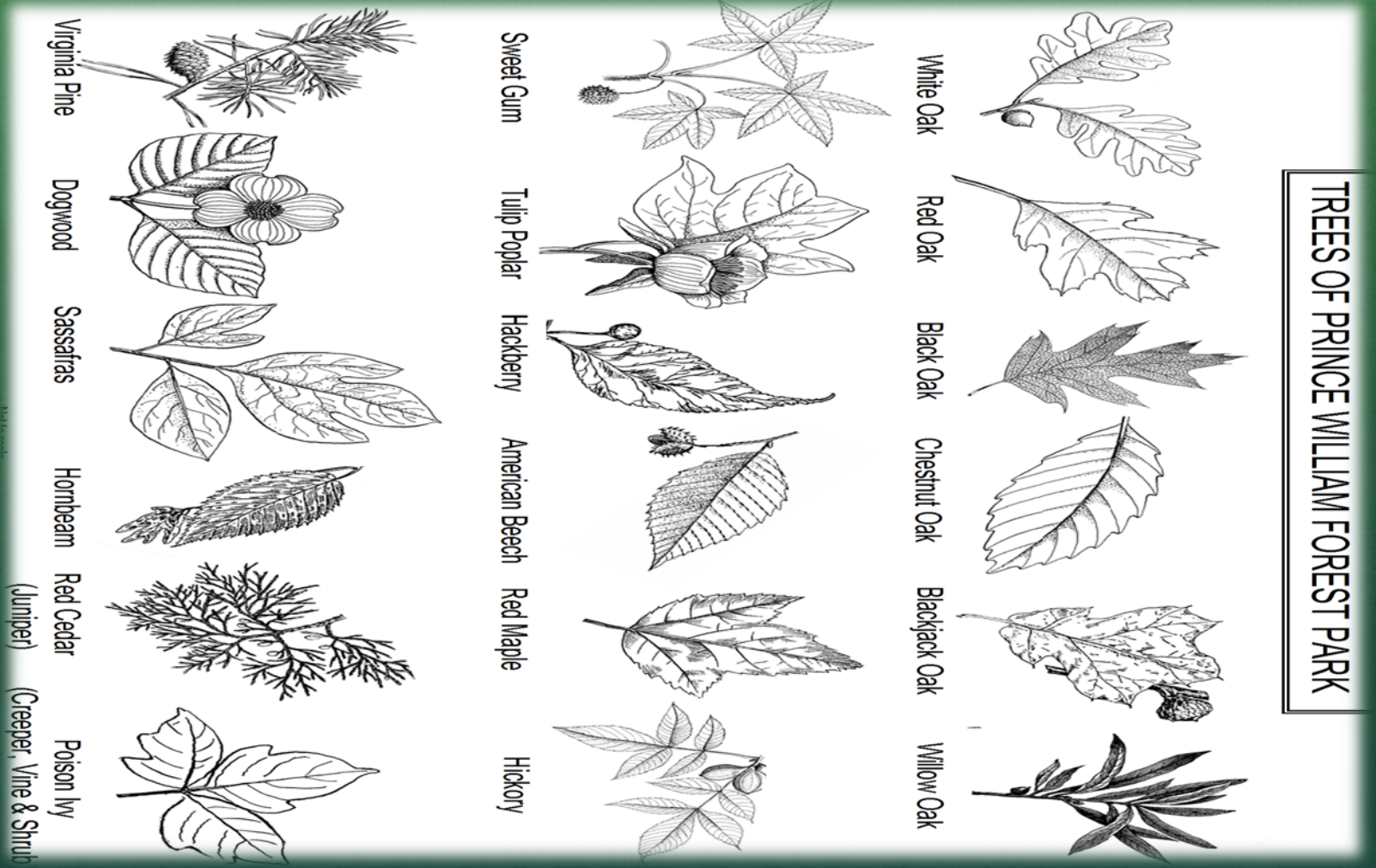
Climate Change and Hydrology

- More rain, tropical storms, rise in streams
- More erosion, scouring streams
  - Bad for species such as the freshwater sponge
  - More churning of the streams
    - Rise in E. Coli levels as a result
- May lead to decline in macro invertebrates.
  - Ex. Mayflies may start to decline
- More wetlands occurring potentially increasing the amount of mosquitos

Freshwater Sponge

S.O.S

Trees of Prince William



Climate Change and Plants

- Change in temperature and humidity
  - Major shift of species composition of forests
  - Species that are found farther south will creep up
  - At Prince William, species such as the Red Maple and Sweet Gum will increase while other species such as Black Cherry, American Beech, and other oaks will decline.
- Trees have been blooming earlier in the year

Climate Change and Invasive Species

- As the climate of the region changes, it'll be more susceptible to invasive species
- Have been expanding and have seen a lot more growth
  - Spreading more rapidly than normal
  - Longer growing season
    - Reproduce more, spread faster

Climate Change and living Resources

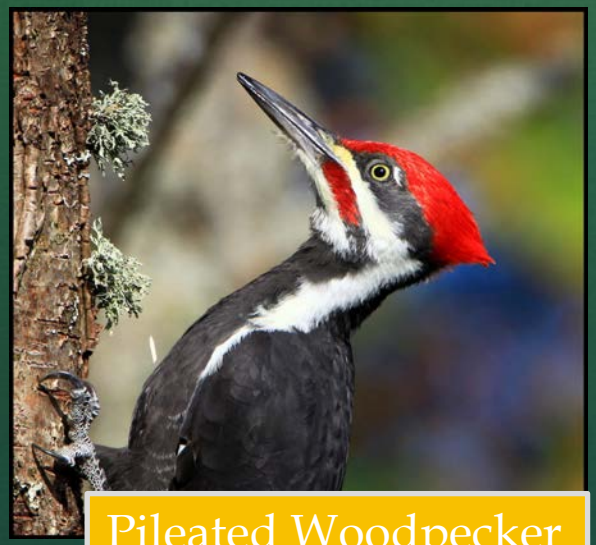
- PRWI home to hundreds of birds including: Acadian flycatcher, Hooded Warbler, Northern Pare-ula, Ovenbird, Pileated Woodpecker, Red-eyed Vireo, Scarlet Tanager, Whip-poor-will, Wood thrush, Yellow-billed cookoo, etc.
  - However, due to the change in the climate it's possible that some of the birds will have to relocate.
  - Risk of changing migration patterns. The timing of the migration process is crucial for birds because a slight delay could result in them missing the chance to breed, get caught in the cold, or be met with a lack of food. This will result in a population decline since birds won't be able to reproduce or will die due to lack of food and low temperatures.
- Bears don't seem to be hibernating as a result of the warmer winter season.

Birds

Yellow Billed Cuckoo

Oven Bird

Northern Parula



Pileated Woodpecker

Hooded Warbler

Birds

Whip Poor Will

Wood Thrush

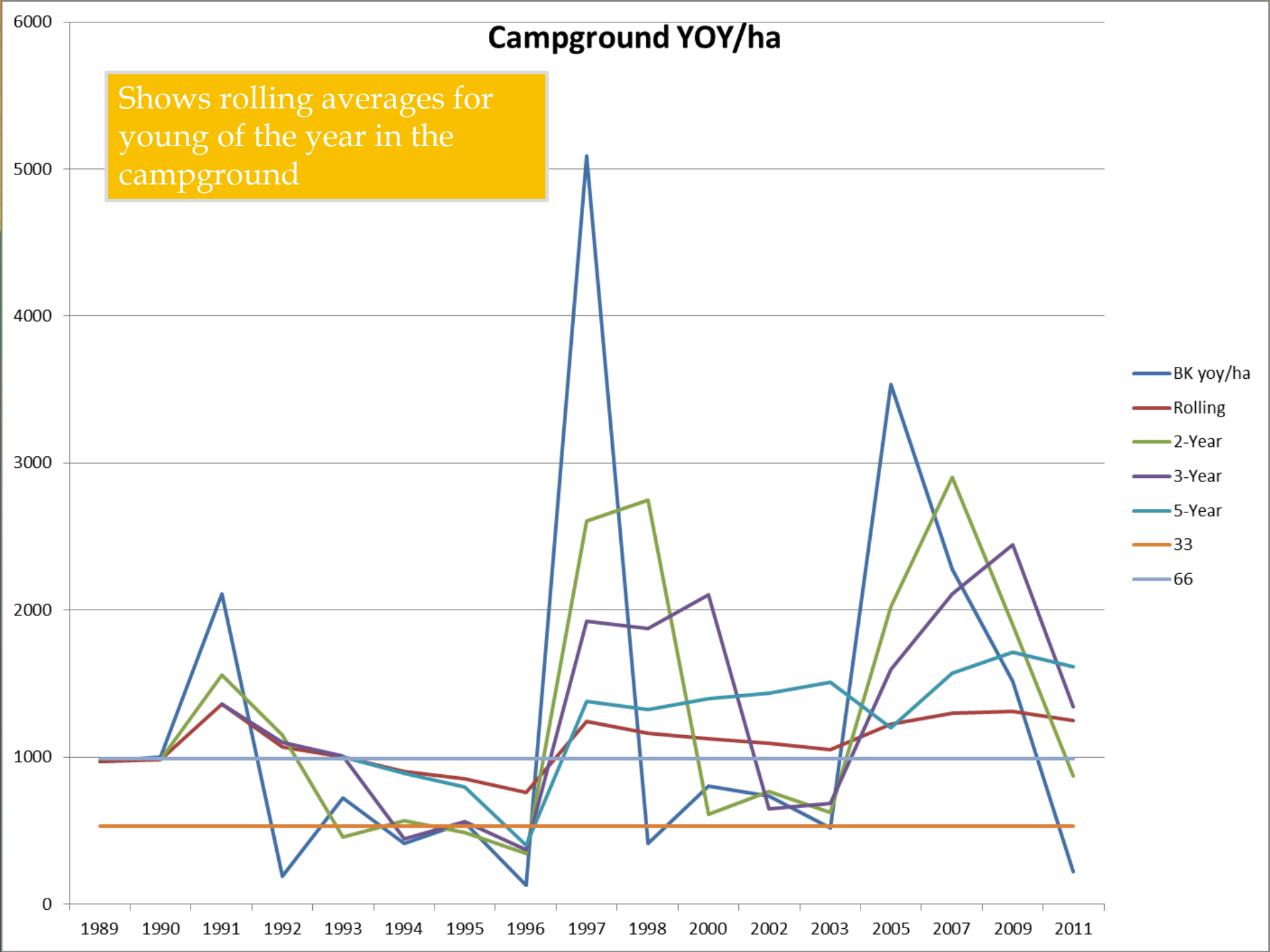
Red-Eyed Vireo

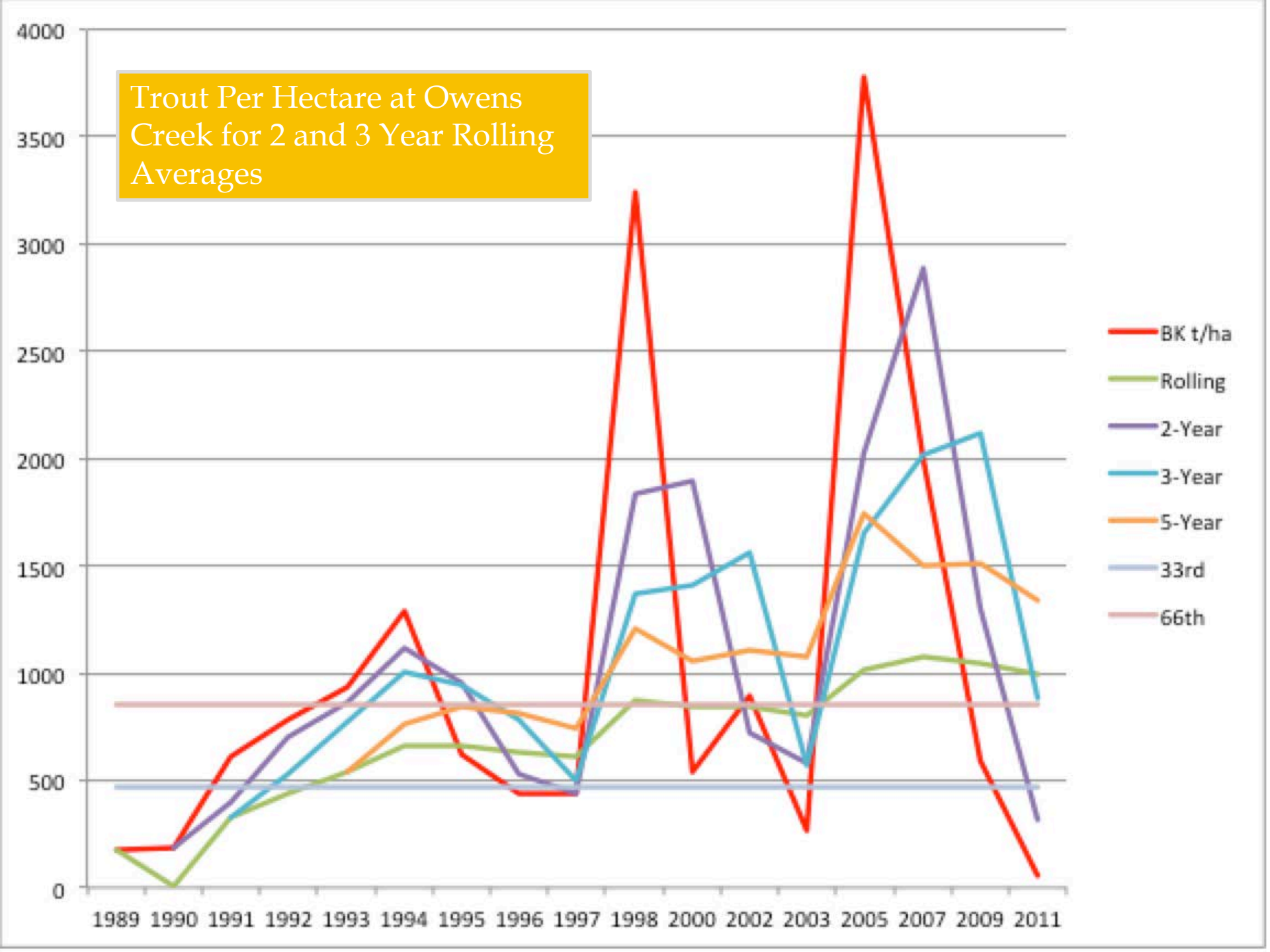
Scarlet Tanager

Acadian Flycatcher

Catoctin Brook Trout

- Believed trout decline due to extreme environmental conditions
- Possible reasons:
  - Larger rain events- wash away trout eggs
  - Higher stream temperatures due to hot, dry summers and a reduction in the riparian canopy
- Adult Brook trout populations have declined to record lows at the Owens creek Campground Station in 2011 and showed little change in 2012. Brook trout reproduction has been very low between 2010 and 2012.


Campground YOY/ha
Shows rolling averages for young of the year in the campground
6000
5000
4000
3000
2000
1000
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
2000
2002
2003
2005
2007
2009
2011
BK yoy/ha
Rolling
2-Year
3-Year
5-Year
33
66


Trout Per Hectare at Owens Creek for 2 and 3 Year Rolling Averages
4000
3500
3000
2500
2000
1500
1000
500
0
1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 2000 2002 2003 2005 2007 2009 2011
BK t/ha
Rolling
2-Year
3-Year
5-Year
33rd
66th

The Solution?

Prince William Parks Environmental Management Statement

"As the steward of the Nation's most valued public lands, the National Park Service has a special obligation to be a leader in protecting the environment and complying with our nation's environmental laws. Prince William Forest Park *is committed to compliance, continuous improvement, and implementing a sound environmental management program and demonstrating environmental leadership in the preservation and conservation of the park's cultural and natural features. Our environmental management system is putting a focus on improving park staff's practices to support environmental excellence, resulting in real reductions in environmental impacts."*

–Prince William's Environmental Management Statement

Visitors Center/ Interp

- "Trash Free Parks" and "Going Green" programs
  - Focus on reducing waste, electricity, and transportation use
- Encourage a no idle zone
- Switch to an online reservation system in the hopes of reducing paper waster
- Encouraging volunteers and visitors to use reusable water bottles

Stephanie Pooler- Park Ranger

Maintenance

- Using "Green" Products
- Recycling construction debris and using environmental building materials
- Replacing paper towels with hand driers
- Composting
- Eliminating old, inefficient water heaters with energy efficient natural gas water heaters
- Plant over 200 trees
- Installed 10 rain barrels
- Using hybrid and electric vehicles

Chuck Ayres- Roads and Trails Supervisor

Headquarters

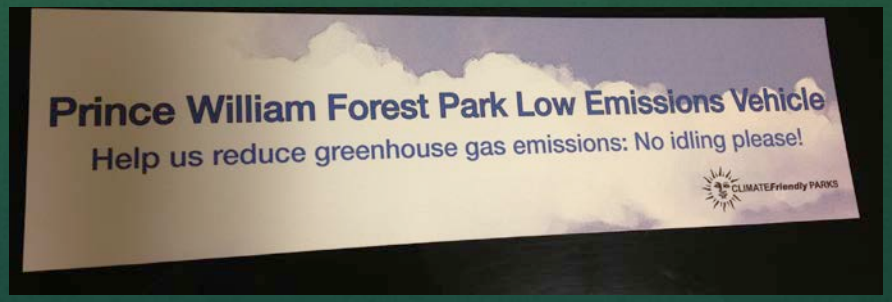
- Electronics
  - Make sure system is energy efficient
  - Check to see how it was manufactures
  - Recycle all equipment

Chris Alford- IT Specialist

Resource Management

- Maintain and collect climate change data
- Recycling and composting
- Building a green screen to help insulate the building and keep the building cool during the summer time
- Bumper stickers for park vehicles to educate the public

Paul Petersen- Resource Management Supervisor

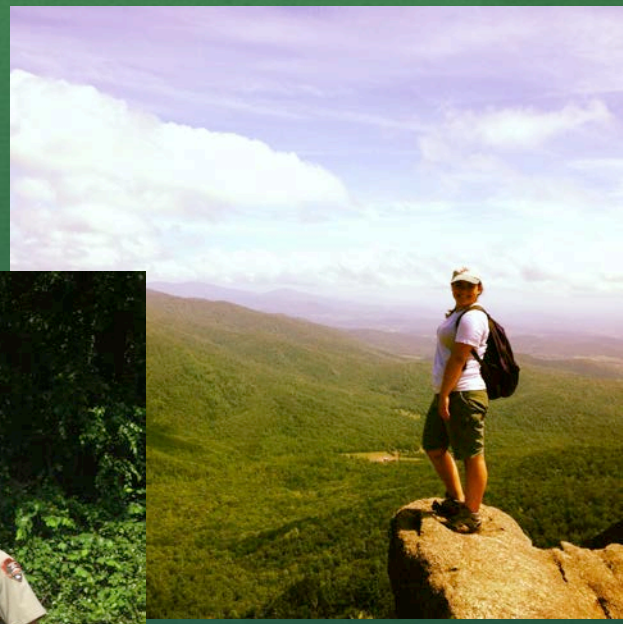


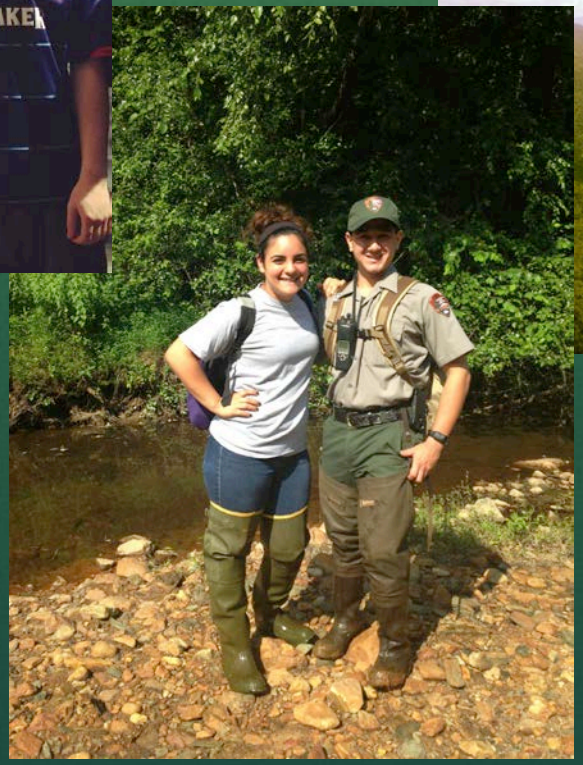
Acknowledgements

- Geological Society of America
- National Park Service
- Laura Cohen, Paul Petersen, Stephanie Pooler, Eric Kelley, Scott Shea, Chuck Ayers
- Catoctin- Lindsay Donaldson
- National Hispanic Environmental Council (NHEC), Roger Rivera

Questions?

ADIRONDACK MOUNTAIN CLUB
VOLUNTEER TRAILS PROGRAM
QUAKER





NPS
4
LYFE