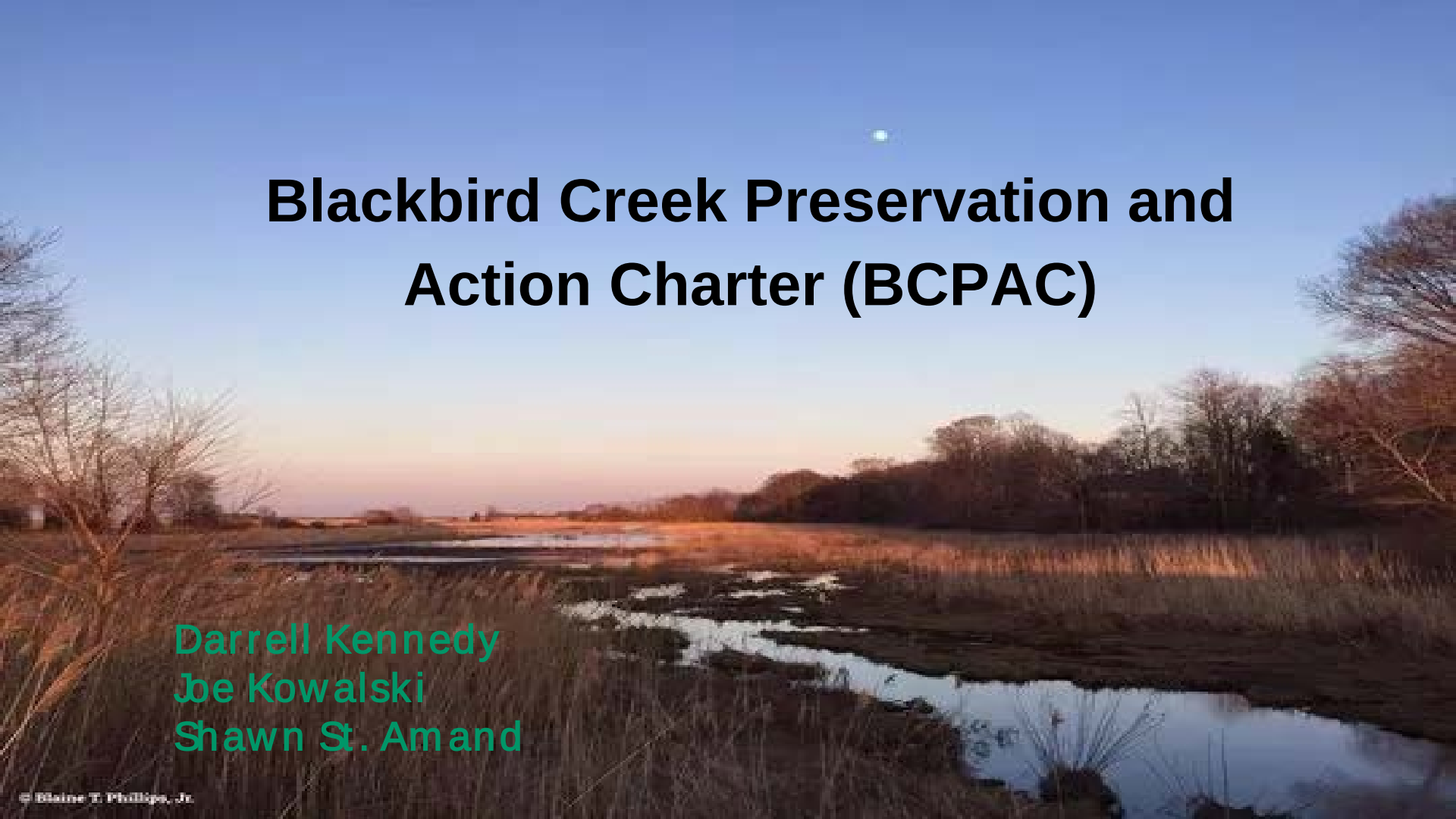
Blackbird Creek Preservation and Action Charter (BCPAC)



Darrell Kennedy
Joe Kowalski
Shawn St. Amand

Outline

- Watershed Overview
- Current Status
  - Issues
  - Policies
- Watershed Improvements
  - Water Quality
  - Ecological Preservation
  - Soil Erosion
- Conclusion
- Questions

Mission Statement

BCPAC's mission is to continue restoration of newly acquired land, increase the area of the natural reserve, reduce pollutant loads, and uphold current water quality standards of the Blackbird Creek Watershed in lower New Castle County, Delaware. This will be for immediate short-term efforts and provide an action plan for the years 2018 – 2023.

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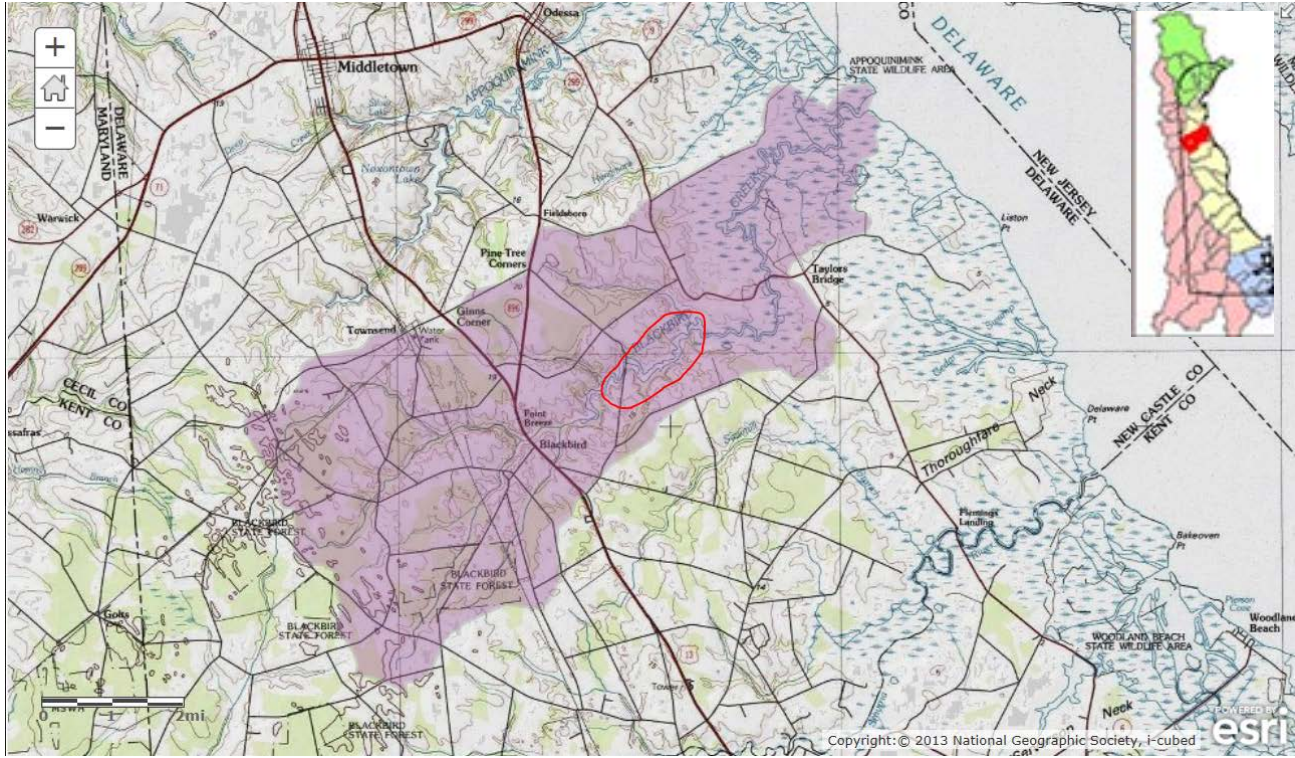
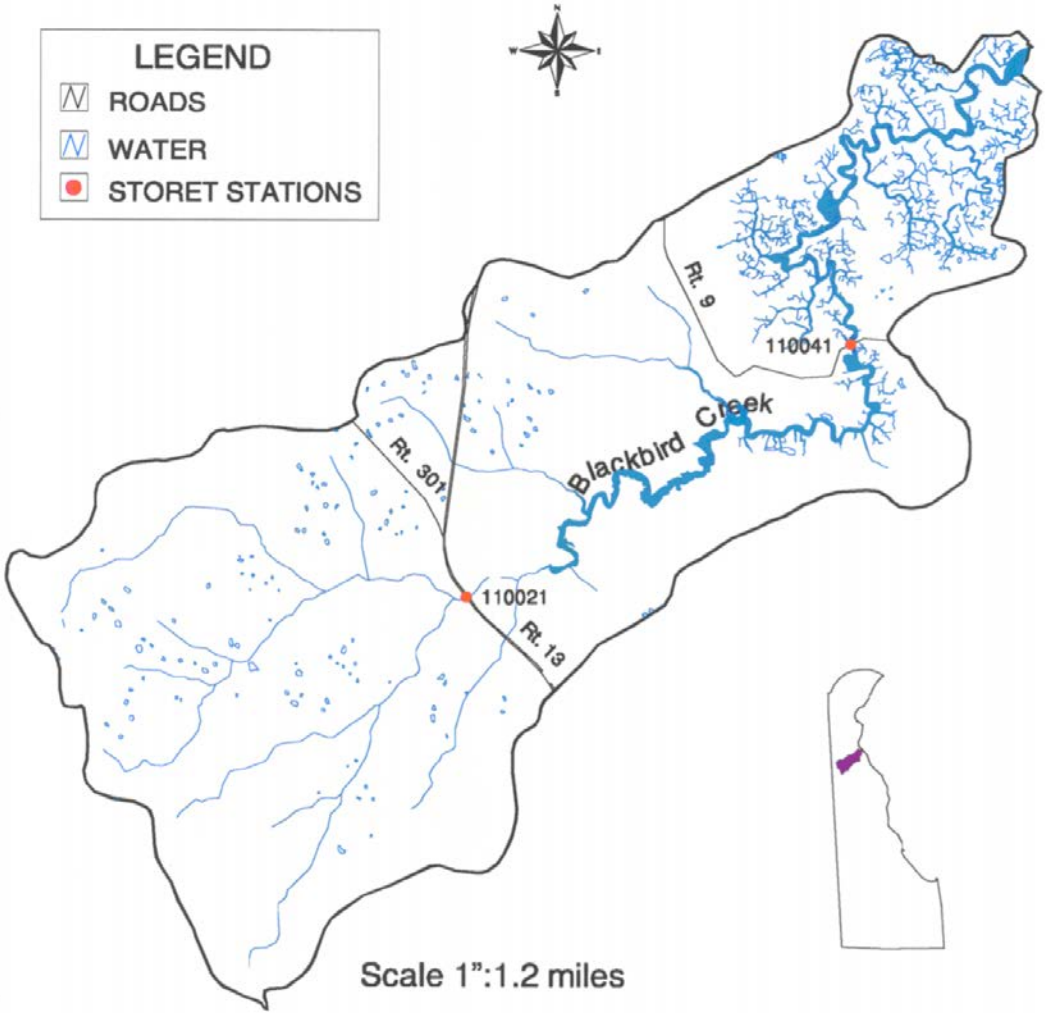
Watershed Overview

- BCR vs BCW
- 0.6mi^2 vs 31mi^2
- Some data from BCR
- BCR representative of BCW
- Majority of BCW drains through BCR



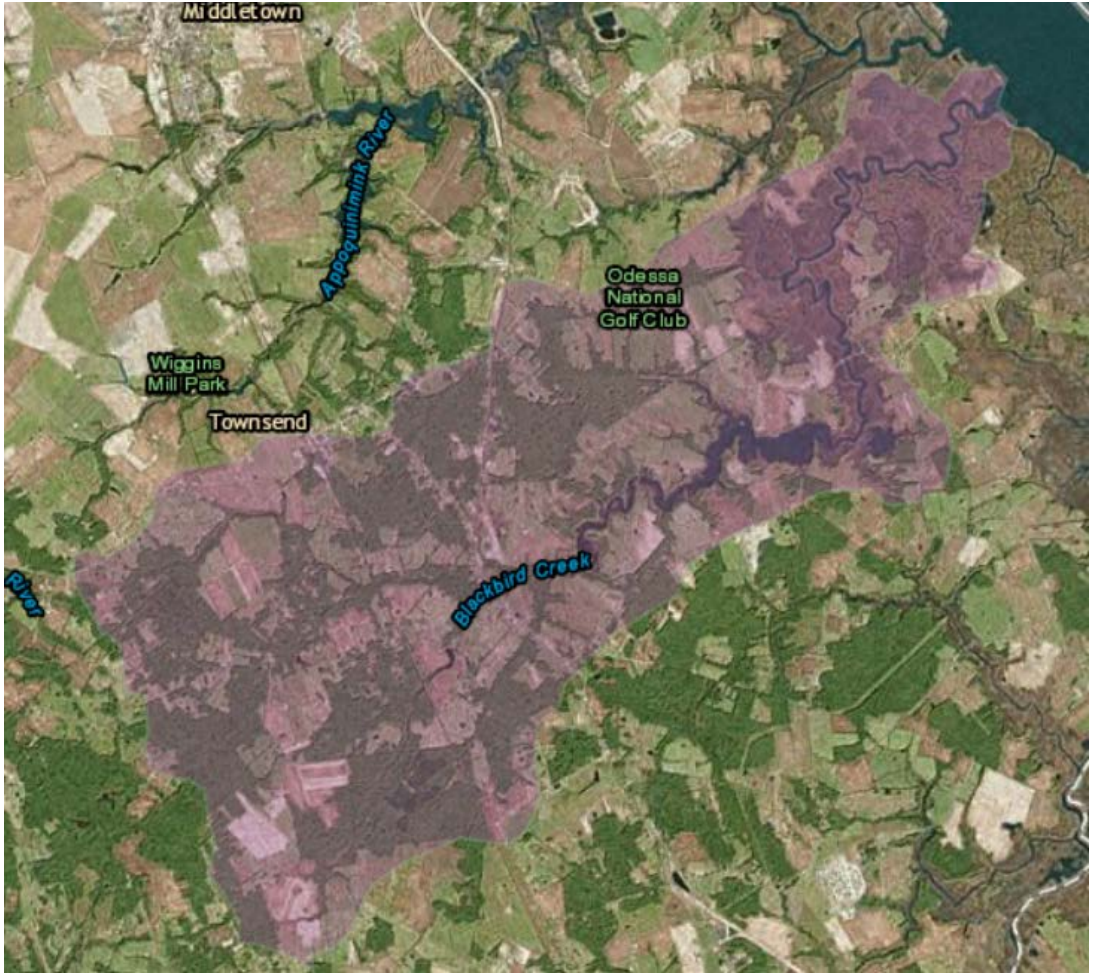
Watershed Overview

- Few Roads
- Small impervious areas
- First/second order streams in west
- Tidal marsh/wetlands in east



Watershed Overview

- Population: 5465
- Land use:
  - 43% Agricultural
  - 35% Forest
  - 17% Wetlands
  - 4% Urban/residential
  - 1% Other



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Current Status

- 2012-2015 Study by Delaware State University

Parameter	Standard	Existing Levels
Dissolved Oxygen	5.5 mg/L average	5.1-6.4 mg/L*
Phosphate	0.2 mg/L	0.51-0.60 mg/L
Nitrate	3.0 mg/L	0.20-0.35 mg/L*
Enterococcus	185 col/100mL	2000 col/100mL highest

TABLE 1 | Mean values for water quality parameters according to seasons and habitats with one standard error in parentheses.

	Agriculture Season			Habitat	
	Planting	**Growth**	**Harvesting**	**Non-Agriculture**	**Agriculture**
NH_3 (mg L^{-1})	0.136 (0.0058)	0.110 (0.0050)	0.088 (0.0043)	0.108 (0.0039)	0.113 (0.0052)
NO_3 (mg L^{-1})	0.203 (0.0293)	0.229 (0.0243)	0.353 (0.0330)	0.274 (0.0243)	0.248 (0.0226)
NO_2 (mg L^{-1})	0.012 (0.0020)	0.027 (0.0015)	0.014 (0.0011)	0.019 (0.0016)	0.016 (0.0012)
PO_4^{3-} (mg L^{-1})	0.557 (0.0226)	0.596 (0.0204)	0.510 (0.0173)	0.584 (0.0162)	0.526 (0.0176)
Alkalinity (mg $CaCO_3$ L^{-1})	77.9 (2.13)	84.3 (1.70)	92.0 (1.77)	83.7 (1.50)	86.7 (1.62)
Turbidity (FTU)	63.5 (3.70)	43.4 (1.77)	49.0 (2.94)	48.6 (2.16)	51.4 (2.18)
Temperature (°C)	24.15 (0.189)	26.48(0.108)	19.54 (0.397)	24.01 (0.268)	23.8 (0.327)
Salinity (ppt)	3.545 (0.1115)	5.539 (0.1806)	8.412 (0.197)	5.999 (0.18525)	5.585 (0.2271)
Dissolved Oxygen (mg L^{-1})	6.384 (0.1569)	5.137 (0.0949)	5.850 (0.1997)	5.882 (0.1013)	5.313 (0.1473)
Ph	7.217 (0.1569)	7.217 (0.0253)	7.172 (0.0599)	7.215 (0.032)	7.192 (0.0348)

Current Issues

- Water quality
  - **Phosphate** - most likely from agriculture
  - **Bacteria** - 17% Wetlands, 35% Forest
  - **Erosion** - from overland flow

Current Policies

- Delaware National Estuarine Research Reserve (DNERR) Management Plan - Rv.2013
  - DNERR is a partnership between NOAA and DNREC
  - DNERR protects the Reserve and surrounding areas under the Coastal Zone Management Act
  - This Management Plan is for Blackbird Creek for the years 2013-2018. It has framework for:
    - Public access plan
    - Regulations on facility maintenance and public use areas
    - Resource protection including land acquisition policy

Current Policies

- Ecological Restoration Master Plan - March 2007
  - Prepared by the Independent company, Biohabitat, Inc.
  - Created after DNERR recent purchase of 4 new tracts of land.
  - “Ensure environmental quality is preserved, to minimize detrimental impacts, and to mitigate invasive species”.
  - Provide long term research, educational insight, and promote BMPs for the Reserve's natural resources.

Total Maximum Daily Loads

- DNREC 2006
  - Data from 1994-2003, mostly from 2002-2003
  - HydroQual model
  - 40% reduction in NPS nitrogen and phosphorous, 80% reduction in NPS *enterococcus*

Table 5. Proposed TMDLs For The Blackbird Creek Watershed

Parameter	WLA	LA	TMDL
TN (lb/d)	105.1	70.4	175.5
TP (lb/d)	11.64	8.33	19.97
Enterococcus (#/d)	4.67E+10	1.33E+07	4.67E+10

WLA: Wasteload Allocation

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Watershed Improvements

Watershed Improvements - Water Quality

- Phosphorus
  - Most likely from agriculture
  - Create or restore riparian buffer zones
    - Area around the stream and or creek
    - Plant native species
  - Soil testing to avoid overfertilization
    - Semi-annual: Consider before planting season and after harvesting season.
  - Nutrient timing strategies
    - Only apply fertilizer and pesticides when needed. (winter ban)
- Bacteria
  - Concentrations are typical of a natural environment.
  - Acts as a natural biological barrier from pollutants for the surrounding environment.

Watershed Improvements - Ecological Preservation

- Assess current conditions, treat poorly conditioned areas, and monitor change in environment over time
  - Start with DNREC owned properties and expand out
  - Oversee and Monitor future change in ownerships of real estate property
- Land Restrictions
  - Restricted to no development on agricultural lands 5-10 years from purchase date
  - No new industrial development without consent of DNREC and DNERR
- Habitat restoration
  - Providing funding to the DNREC-Delaware Natural Heritage and Endangered Species Program Bald Eagle
  - Research habitat creating techniques and conduct habitat building projects

Watershed Improvements - Soil Erosion

- Problems:
  - Soil erosion as a result of heavy overland runoff from agricultural fields
  - Over foraging of geese
  - Sea level rise reducing marsh lands
    - Creates high TSS in water
- Solutions:
  - Implement better stormwater management techniques
    - Water bars to dissipate kinetic energy of overland flow before entering stream
    - Plant species that slow shallow concentrated and open channel flow
  - Plant vegetation that geese won't eat & promote geese hunting
  - Make wetlands preservation a high area of focus
    - Sea level rise is inevitable

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