Day 2: Rising Watershed and Bay Water Temperatures: Ecological Implications and Management Responses

Watershed Subgroup

Session 2: Rural Waters and Habitats

Matt Ehrhart
Stroud Water Research Center

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The Chesapeake's Rural Landscape is highly variable in terms of:

- **Physiographic province**
- **Forest composition and coverage**
- **Types of agricultural operations and density**
- **Connectivity to rural communities**

Credit: Patrick Drohan, Penn State

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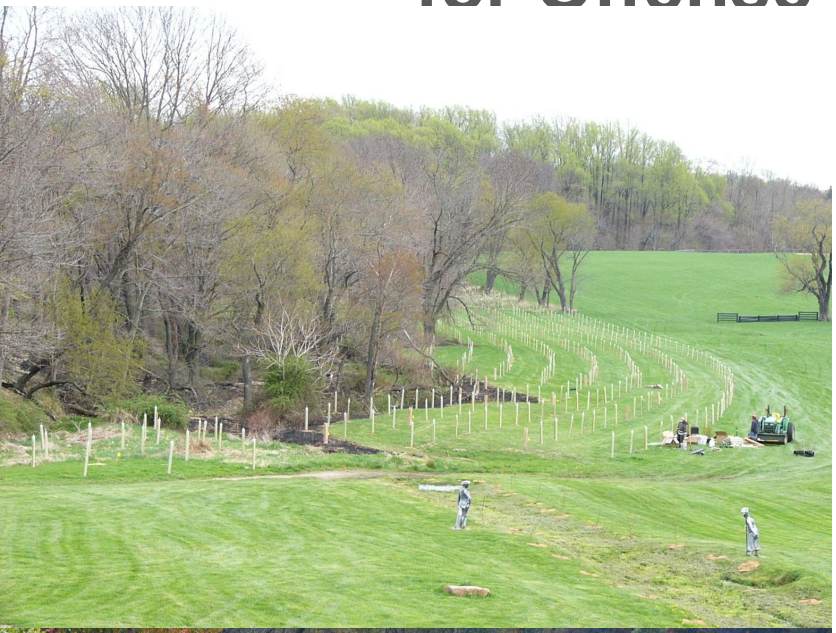
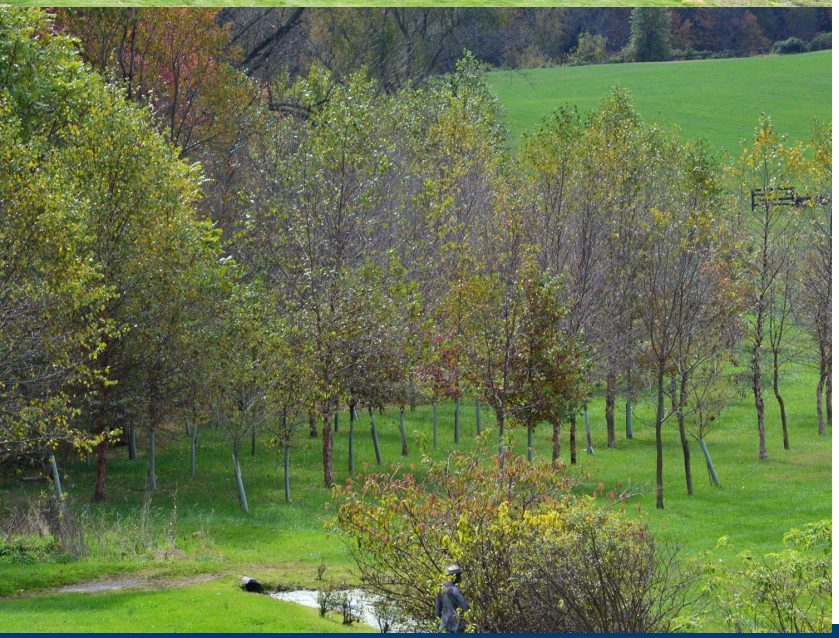
The Rural Landscape Provides an Opportunity for Offense as Well as Defense





Forest Buffers

Inter-seeded cover crop

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Best Management Practices: Heaters and Coolers

Category	BMP types	Available research	Strength of BMP temp effect			Lag Time to Change Temp?	Can Impact be Enhanced or Mitigated?
			Baseflow	Runoff	G/W		
Known Heaters	Wet ponds, created wetlands, dry ED ponds, farm ponds, CAFO lagoon	Strong	+++	++	?	None	Limited ability to mitigate, unless deeper than 10 ft
Suspected Heaters	Sand filters, MTDs,	Weak	++	+	-	None	Limited ability to mitigate
Shaders/ Interceptors	Upland and stream corridor forestry practices. Ag and urban forest buffers	Strong	- -	?	?	10 to 15 yrs	Enhanced by practices that accelerate tree canopy
Shade Removers	Land clearing, some channel restoration practices, open channels ag ditches	Weak	++	+	?	None, unless the site is reforested	Can be mitigated in headwater streams (e.g., forest buffer)
Known Coolers	Bioretention, porous pavement, infiltration, w/o underdrains	Strong	-	-	-	Weeks	Limited ability to enhance w/ urban soils
Suspected Coolers	LID practices w/ under-drains, floodplain habitat restoration	Weak	-	-	-	Hours	Need more data about GW & hyporheic exchange
Uncertain/ Unknown	Stream and floodplain restoration, Ag practices, Wetlands restoration	Weak	??	??	??	??	N/A
Thermally Neutral	Street cleaning, ag & urban NMPs, IDDE	Weak	?	?	?	??	No evident mechanism to change temps

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Little Chiques Creek Headwaters

63 km^2

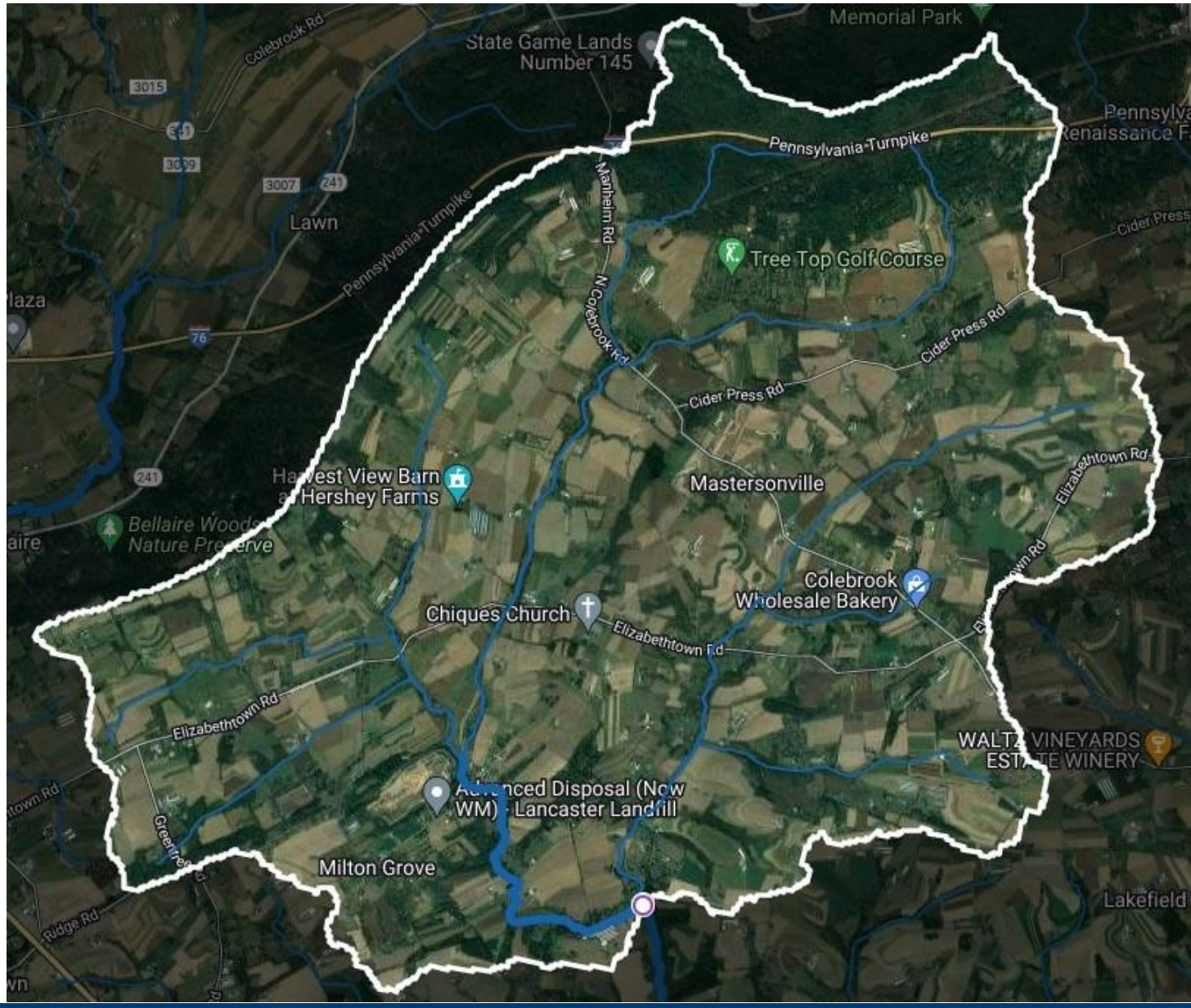
59% ag land use

66 km streams

37 km ag streams

0.56 km^2 buffer

(@ 50’ width)



White Clay Creek

8.6 km^2

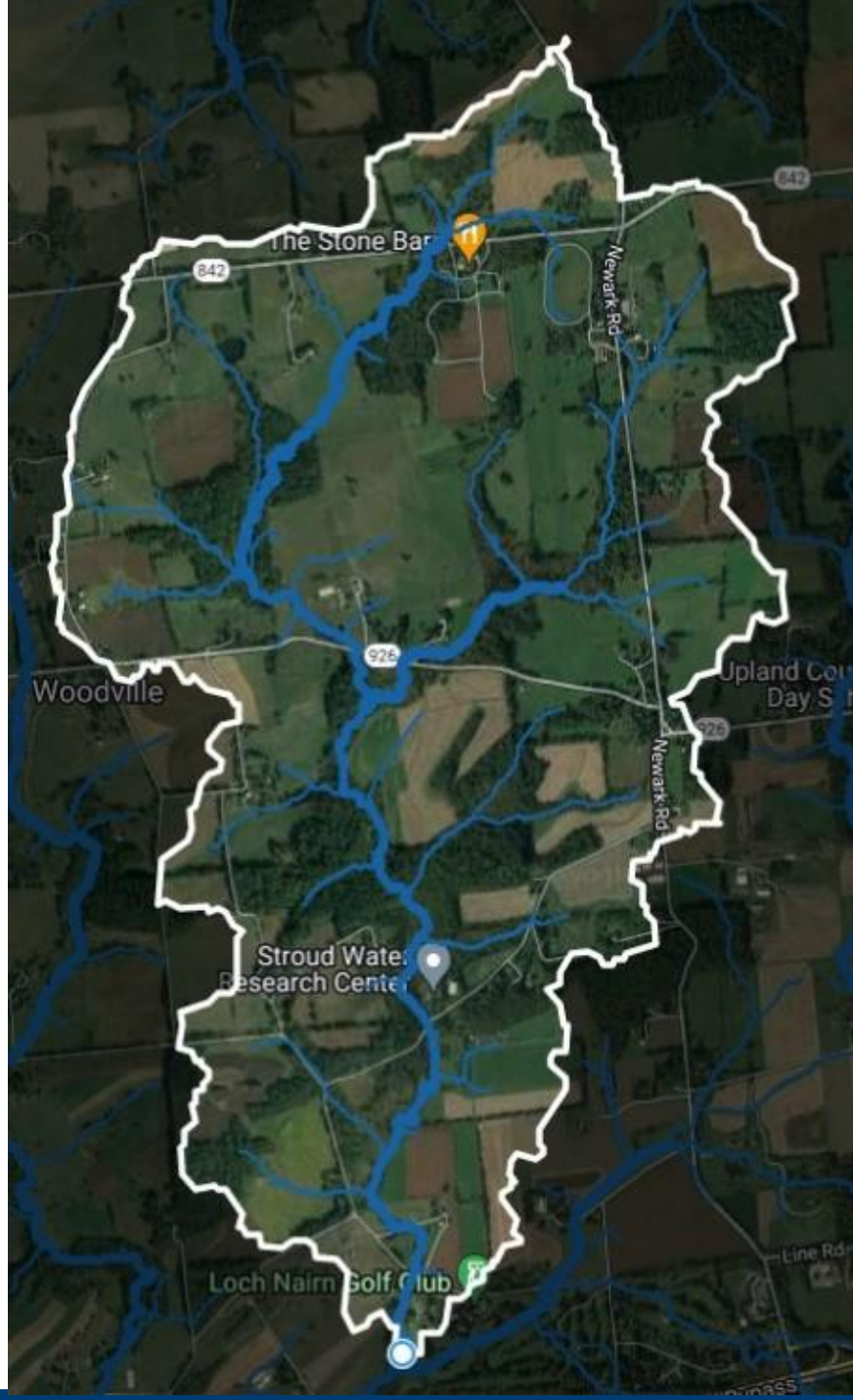
64% ag land use

9 km streams

2.3 km ag streams

0.07 km^2 ag buffer

(@ 100’ width)



Northkill Creek

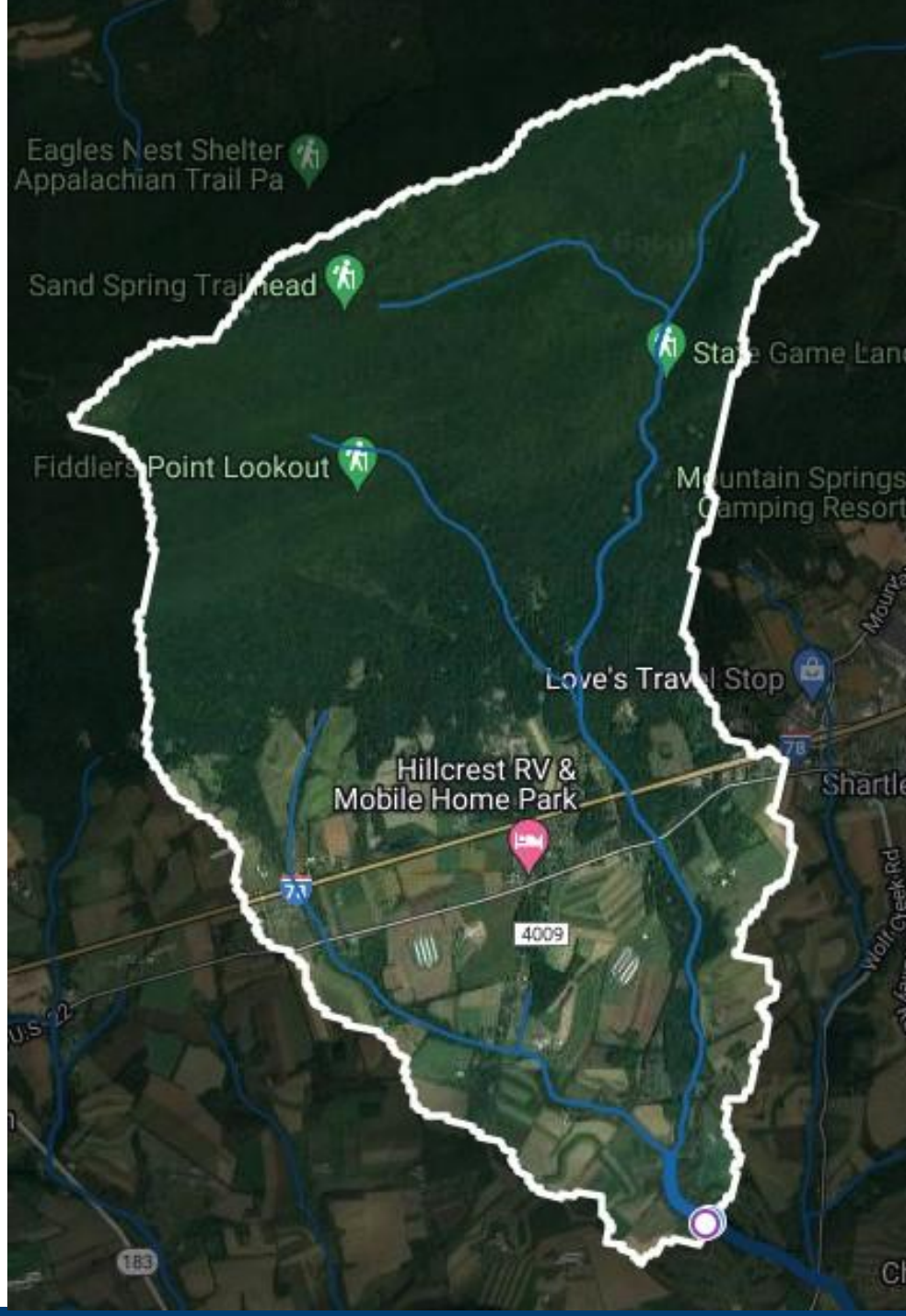
26 km^2

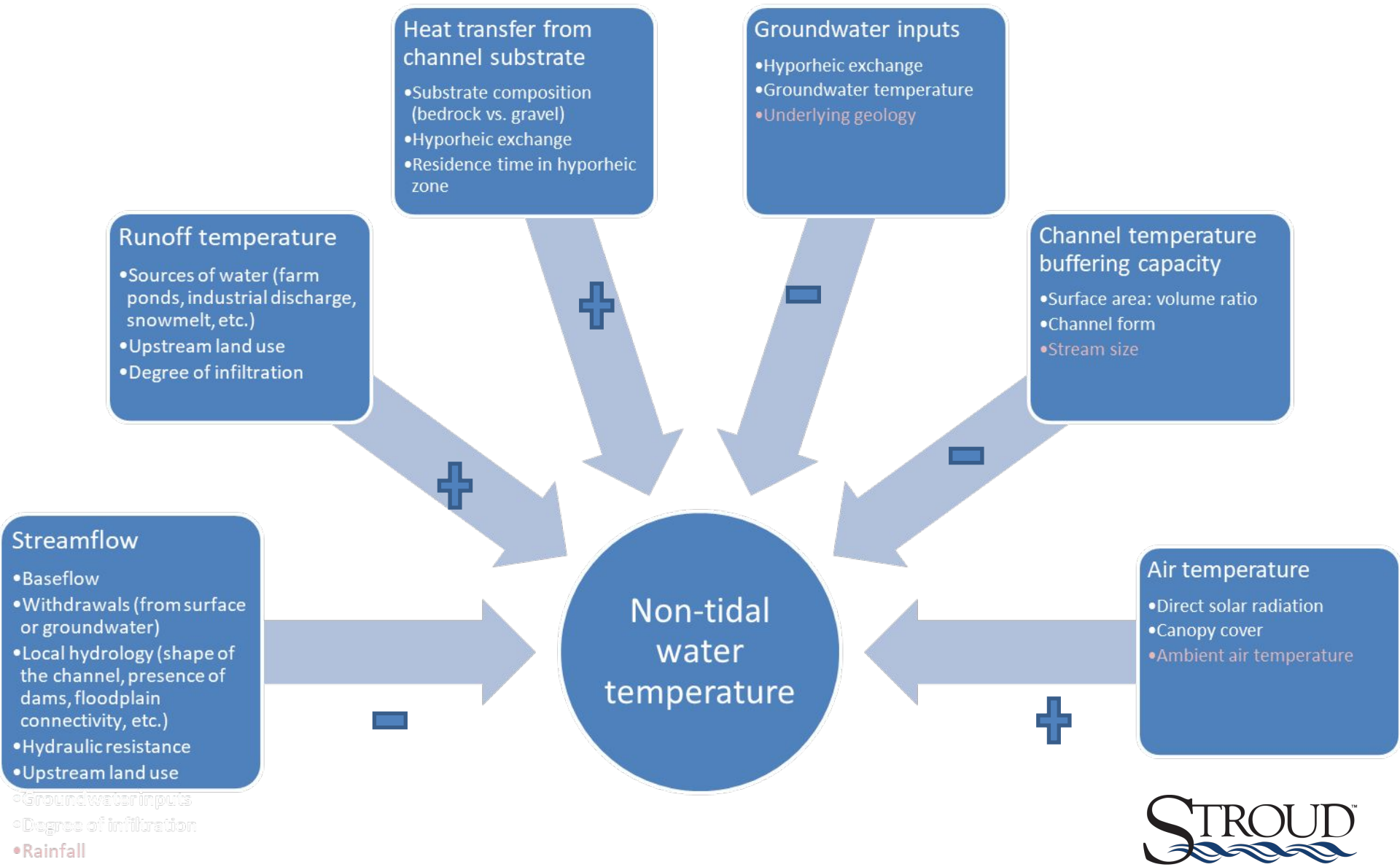
23% ag land use

19 km streams

1.8 km ag streams

0.03 km^2 buffer (@ 50’ width)





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Protect Rural Waters and Habitat: Recommended Management Actions & Practices

R-1. Ensure rivers and streams are well buffered, install “cooler” and “shader” practices, and avoid heater BMPs in rural watersheds.

R-2. Use our improved Bay watershed mapping capability to prioritize which specific headwater stream reaches are the most ideal candidates for riparian buffer plantings to exert the greatest cooling impact in rural watersheds.

R-3. Use our new mapping capabilities to calculate the maximum rural stream mileage that can be reforested and whether its cooling effect could compensate for future stream and watershed warming factors.

R-4. Investigate the potential for dam/pond removal and floodplain restoration projects as a cooling mitigation strategy for rural watersheds.

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Protect Rural Waters and Habitat: Recommended Science Support

R-5. Conduct more small ag watershed research to measure temperature impacts for agricultural land and water management practices. Some priorities for getting more reliable BMP field monitoring data include cropping, tillage and field drainage practices.

R-6. Perform demonstration research projects and measure the cooling impact of scaled-up riparian buffer plantings on stream and groundwater temperatures in rural watersheds.

R-7. Use data to develop management models to determine the best way to target riparian buffer plantings, and whether the cooling effect can compensate for other local warming factors.

R-8. Perform research to define how wetlands and other stream corridor habitats influence hydrologic processes that can enhance cooling in streams and rivers.

Breakout Room Discussion Goals

1. Develop, refine, and prioritize recommendations on how to mitigate the impacts or increase resilience for habitats and fishery resources under changing conditions.

2. Identify our uncertainties and science needs: Where are we less certain and what additional information is needed to improve understanding of rising temperatures, ecological implications, and management options.

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Questions for Breakout Rooms to Help Achieve Goals

1. Do the proposed management actions need to be modified or adapted to address rising water temperatures? Are there entirely new options that should be considered?

2. How do we best implement these management actions? Could current management or policy be adapted to address rising water temperatures or do we need an entirely new approach?

3. What additional science and/or information would you need to better understand the effects of rising stream temperatures and to consider new management or policy actions?

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