



The Development and Application of a Temperature Assessment Methodology for Coldwater Streams in Maryland

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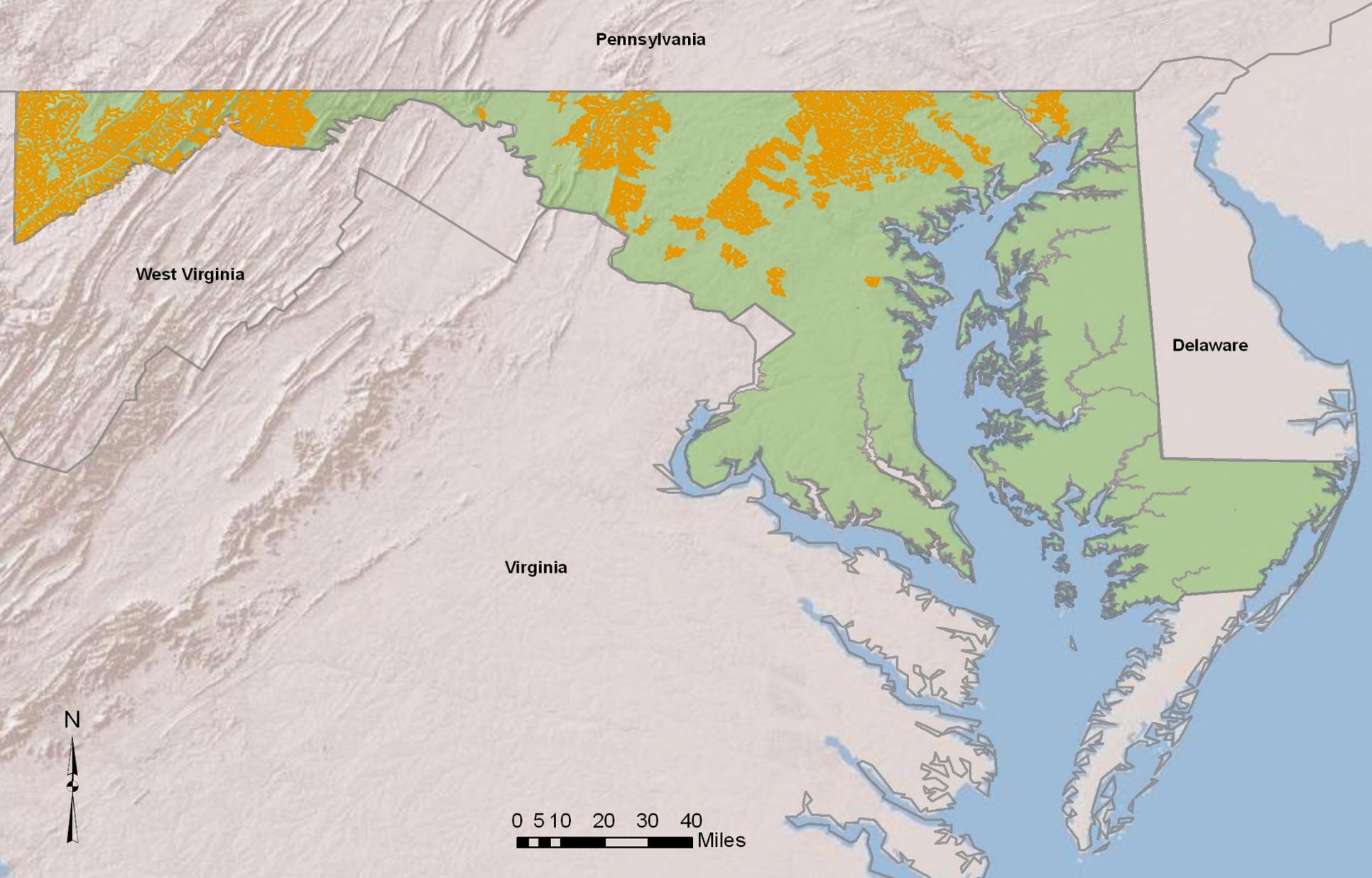


Photo courtesy of Jonathan Nycz, Albion College



Photo courtesy of Michael Kashiwagi, MD DNR

Coldwater Streams in Maryland





What does MD use to Assess and Protect Coldwater Streams?

- Use III(III-P) - TOY restriction for waterway projects (Oct 1 – Apr 30)
- DO Criteria
- Ambient Water Quality Criteria for Temp: 20°C (68°F)
 - No description of how to assess criteria
 - Not assessed in the Integrated Report [aka 303(d) List] = No TMDLs = No restoration
- rich temperature dataset (DNR MBSS)



Evaluation of Temperature Criteria



- When should criteria apply?
Critical Period?
 - Intent of 20°C?
 - MBSS temp data June 1-Sept 1
 - Limitations
 - Hot September
 - Brook trout are fall spawners
- No truly pristine areas
- Located on the fringe of brook trout range



Evaluation of Temperature Criteria & Application for Assessment

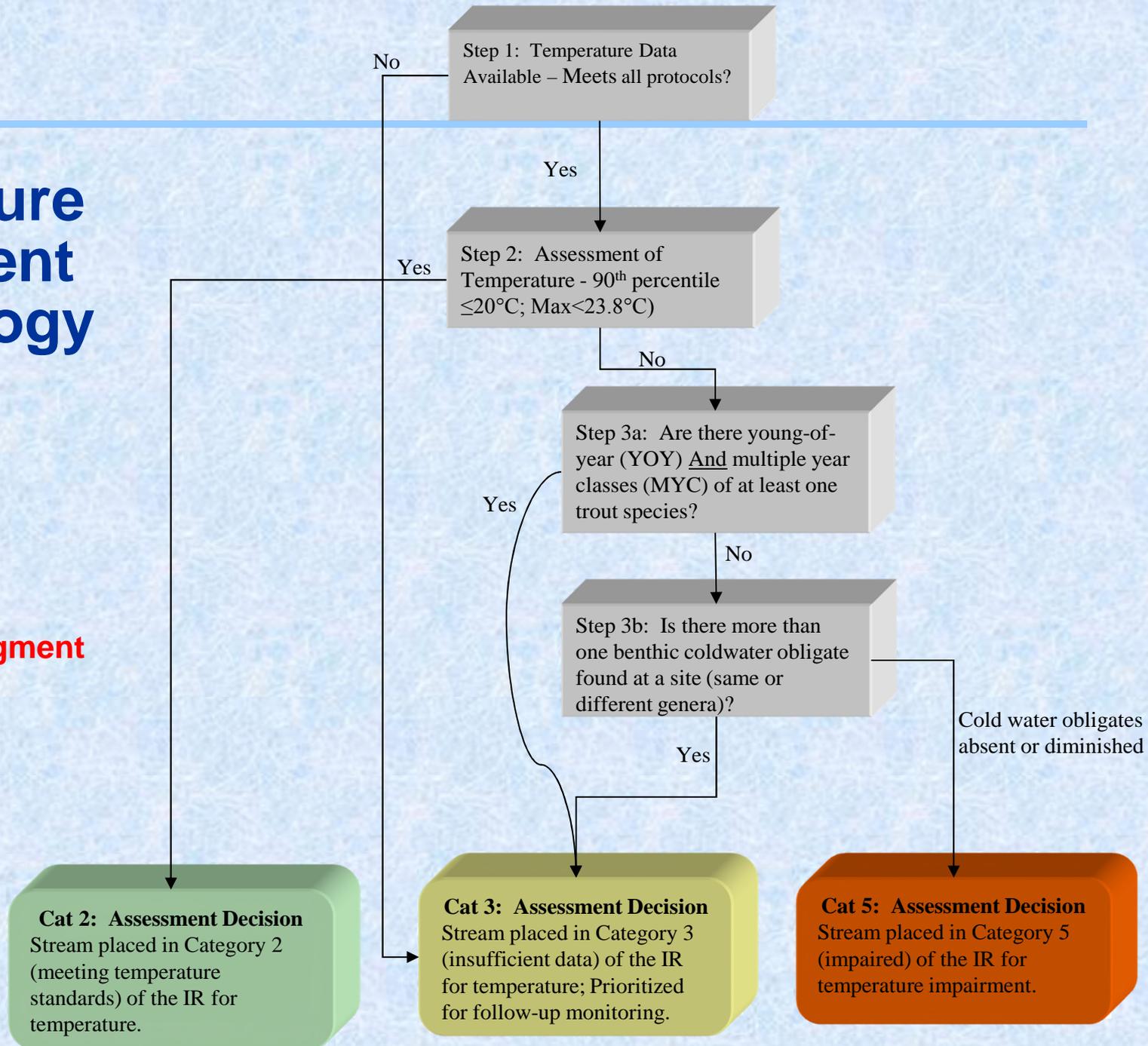
- Use empirical data to validate criteria
 - Establish Reference stream: ≥ 25 brook trout with YOY present and analyze temperatures
- 10% of readings were $> 20^{\circ}\text{C}$
- Short Duration Impacts?
 - Acute threshold: Not to exceed 23.8°C





Temperature Assessment Methodology

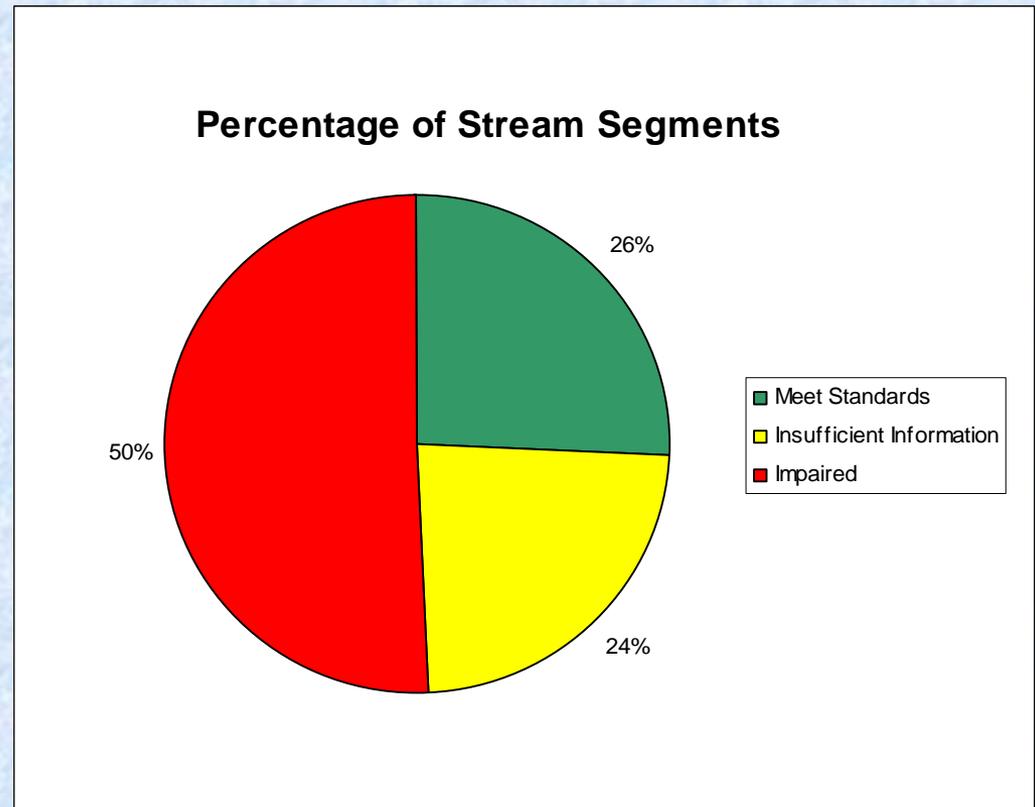
Scale= Stream Segment





Summary of Assessment Draft 2014 Integrated Report

- **Meet Coldwater ALU: 35 stream segments**
- **Insufficient Information: 32 stream segments**
- **Impaired Streams: 69 stream segments**
- **Newly impaired stream miles: 64**



Confounding Scenarios

Baisman Run



Photo courtesy of MD DNR

- Sentinel Site ~ 6 years of data
- 30-54% readings were above 20°C
- 3/6 years failed the 'not to exceed' threshold
- Persistent brook trout with multiple year classes including YOY!

Confounding Scenarios

Dry Run

- 12% of readings above 20°C
- Thermal Max > 25°C
- 50 brook trout in 75 m, YOY, multiple year classes!
- Coldwater benthos

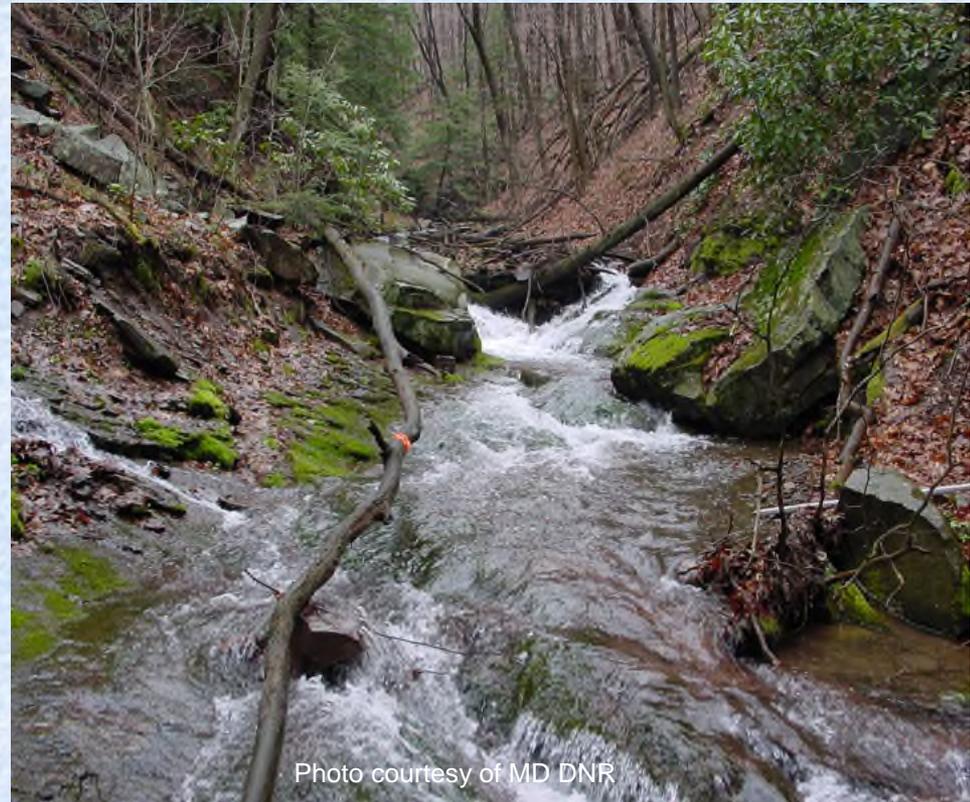


Photo courtesy of MD DNR



Possible Answers & Solutions

Potential Answers

- Thermal refugia – groundwater seeps
- Acclimated fish
- Last 3 years were hottest on record in Maryland

Potential Solutions

- Add more temp loggers to 75 m segment
- Site-specific criteria development
- Other?



Comments or Suggestions?

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