Coldwater Resources Supporting Trout Populations in Frederick County

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Potomac Valley Fly Fishers
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Coldwater Resources

- Streams that have year round cold water temperatures
- Support coldwater biological community
  - Reproducing trout population
  - Obligate coldwater benthic taxa
- Indicators of high-quality unimpacted watersheds

Stream Temperature

- Water temperature <20°C (68°F)
- Summer critical thermal period
- Importance of groundwater inputs (thermal refuge)
- Temperature conditions determine biological distribution
- Stream temperature monitoring
  - Continuous data loggers
  - 90% of temperature observations <20°C for June - August

What is a Trout?

- Members of the family Salmonidae, including salmon, trout, chars, whitefish, and grayling
- Three species of trout occur in Maryland: brook, brown, and rainbow trout
- Brook trout are the only "native" species of trout in Maryland. Brown and rainbow trout are introduced species

Brown Trout

Rainbow Trout

Brook Trout

Population Types

- ***Stocked*** trout populations are those that require supplemental stocking in order for the population to persist (e.g., "Put and Grow") and/or for intentional harvest (e.g., "Put and Take")
- ***Wild*** trout populations are self sustaining populations that are maintained by natural reproduction and support multiple year classes. There are two types of wild trout populations;

  Introduced – source stock was introduced from outside of Maryland (e.g., brown and rainbow trout)

  Native – the species was naturally part of Maryland (e.g., brook trout)

Stocking hatchery trout

Wild trout spawning

Multiple year classes of wild trout

Wild Trout Life History

- Brook trout & brown trout spawn in the fall – mid-October to mid-November; rainbow trout spawn late winter - early spring, as early as mid-February
- Spawning areas are in cobble/gravel (marble to pea size) with upwelling flows and/or in shallow riffle areas with constant flow
- Constant flow keeps eggs oxygenated and clean of sediment - trout eggs are highly susceptible to mortality from sedimentation
- Spawning periods, egg incubation, and fry life stages are extremely sensitive and critical periods

Brook trout establishing a redd in a gravel area with adequate flow

Wild Trout Life History

- Eggs are deposited and fertilized in a redd (nest) built by the female, then buried 1”- 2” deep in gravel
- Eggs develop in the redd for a period of several months and hatching typically occurs during early spring (brook and brown trout) or late spring (rainbow trout)
- Fry emerge from the redd with a yolk sac used to sustain them until they transition to a diet of zooplankton
- The yolk sac is eventually absorbed as the fry transition to the free swimming fingerling life stage

The Maryland Department of the Environment Use III (non-tidal coldwater) stream closure period (October 1 - April 30) was established to protect these critical life stages: COMAR 26.17.04.11

Developing eggs

Fry with yolk sac

Fingerling stage

Wild Trout Life History

	Brook Trout	Brown Trout	Rainbow Trout
Life Span	Up to 8 years, but typically 4-5 years	Up to 10 years	Typically 5-7 years
Size	Up to 14”, but typically 4”-10”	Up to 25”, larger fish typically in larger rivers	Up to 25”, larger fish typically in larger rivers
Diet	Primarily insects in all life stages	Primarily insects as young trout; insects, fish and small mammals as adult trout	Primarily insects, but large adult trout may prey on other fish

Physical Habitat Requirements

- Clean substrate that includes cobble and gravel areas with flow – supports insect life (trout food) and needed spawning areas for egg incubation
- Streambed complexity – a mix of riffles, runs, and shallow and deep pools (provides habitat for different seasonal and life stage needs)
- Physical structure – boulders, falls, undercut banks, root wads, and in-stream woody debris (provides habitat for different seasonal and life stage needs)

Water Quality Requirements

- Coldwater temperature conditions (<20°C)
- High dissolved oxygen levels (>8 parts per million)
- Low turbidity - related to low sediment loading and nutrient levels
- pH ranging from 5.5 to 8.5 (pH of 7 is neutral);

Social Benefits

- Important angling resource - provides recreational opportunity around the state. 70% of Maryland trout anglers fish for wild trout at least some of the time.
- Locations where wild trout occur are typically more natural, wild areas, which adds value to these areas and angling.
- Presence of wild trout fosters a connection to the past and how environmental conditions used to be. This encourages and promotes conservation.
- Provides a self sustaining resource. No stocking needed = maximize resource and return to economy.

Economic Benefits

2016 Maryland Non-Tidal Angler Survey

Participation: 44% of freshwater anglers in Maryland fish for trout (53,000 anglers)
Effort: 27% of trips were for trout (689,000 trips)
Trip Expenditures: $81 mean; $30 median; Total - ***$56,000,000 annually***

Stocked Trout

Participation: 39%; 47,000 anglers

Effort: 13% of trips; 345,000 trips

Trip Expenditures: $79 mean; $30 median; Total = $27,000,000

Brown Trout

Participation: 17%; 20,000 anglers

Effort: 5% of trips; 139,000 trips

Trip Expenditures: $113 mean; $65 median; Total = $16,000,000

Brook Trout

Participation: 18%; 22,000 anglers

Effort: 3% of trips; 74,000 trips

Trip Expenditures: $131 mean; $84 median; Total = $10,000,000

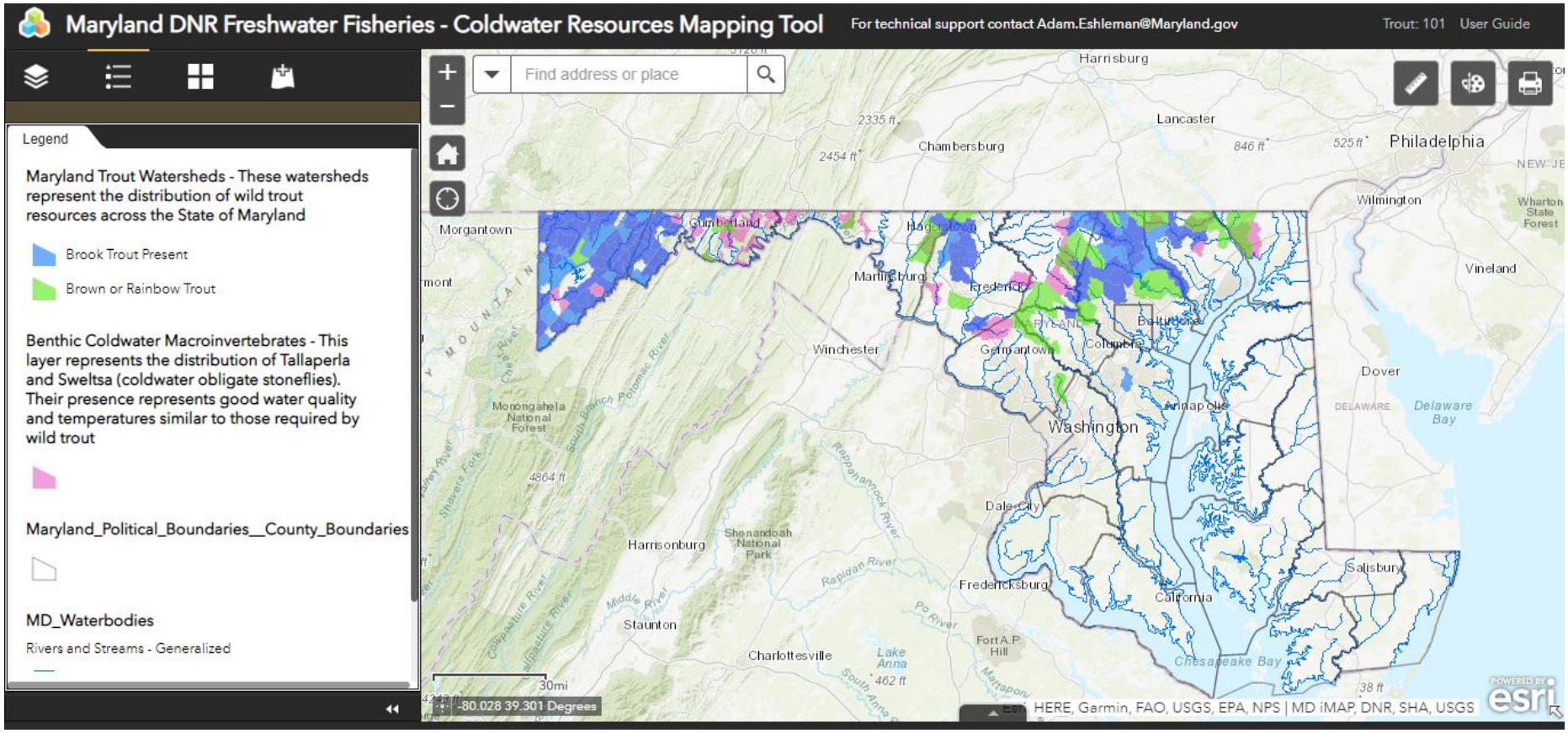
(Knoche, 2017)

Coldwater Benthic Organisms

1. Identify coldwater streams that currently do not support trout populations
2. Maryland Biological Stream Survey
   - Temperature data
   - Benthic macroinvertebrate data
3. Coldwater benthic obligate taxa
   1. *Tallaperla*
   2. *Sweltsa*

Status in Maryland

Maryland DNR – Coldwater Resources Mapping Tool

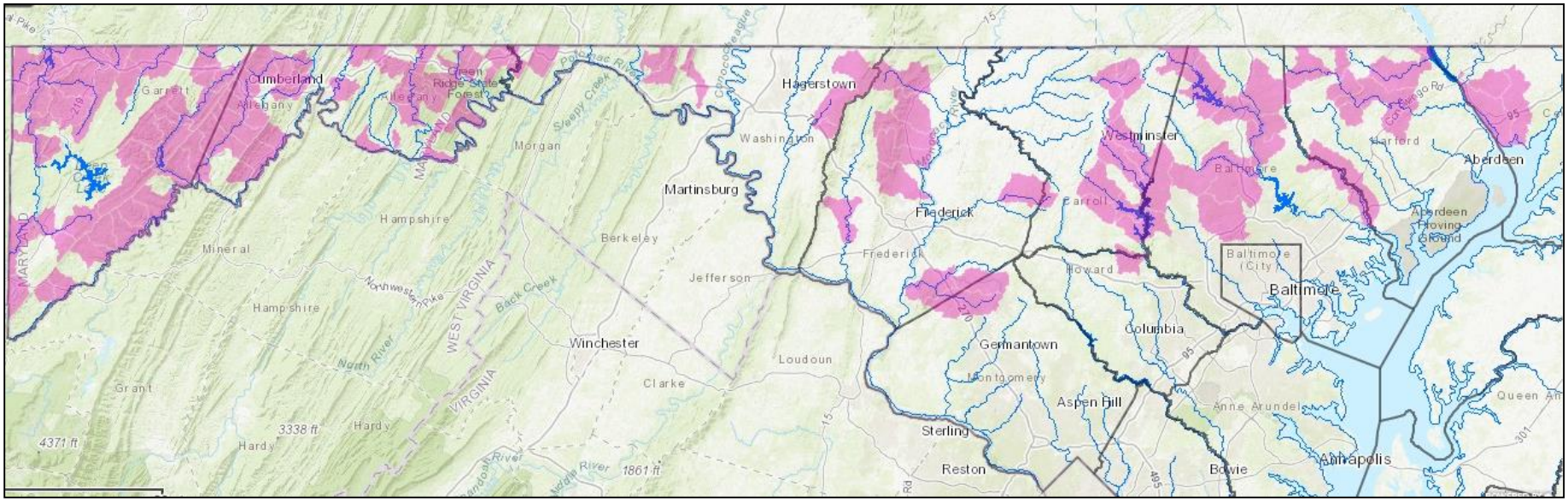


Status in Maryland

- Wild trout populations occur in 11 of Maryland's 24 counties
- 132 watersheds support wild trout: brown trout (97), brook trout (93), and rainbow trout (12) (some watersheds > 1 species present)

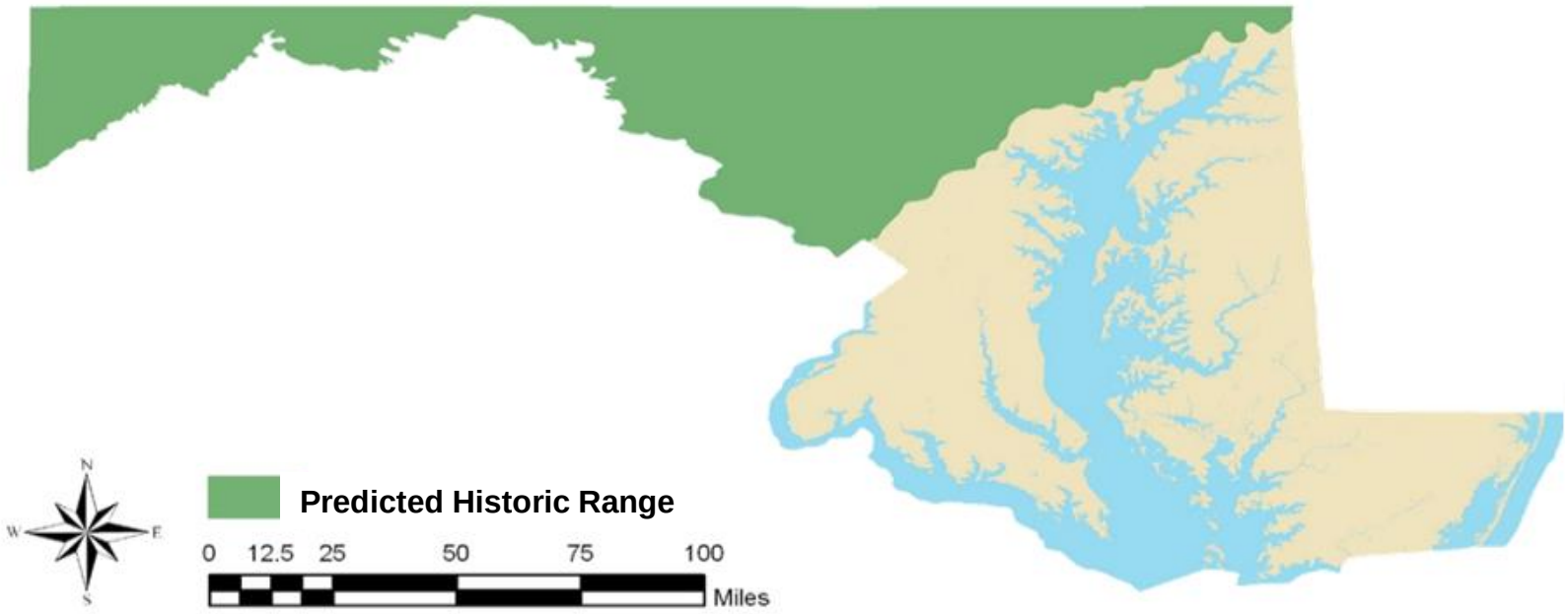
Status in Maryland

- Coldwater benthic obligates occur in 9 of Maryland's 24 counties
- 124 watersheds support coldwater benthic obligates (*Tallaperla, Sweltsa*)



Population Trends

- Because of the stringent habitat requirements for wild trout they are under threat from disturbances to the landscape.
- The change in native brook trout distributions in Maryland starkly illustrates the challenge of maintaining and protecting wild trout populations…



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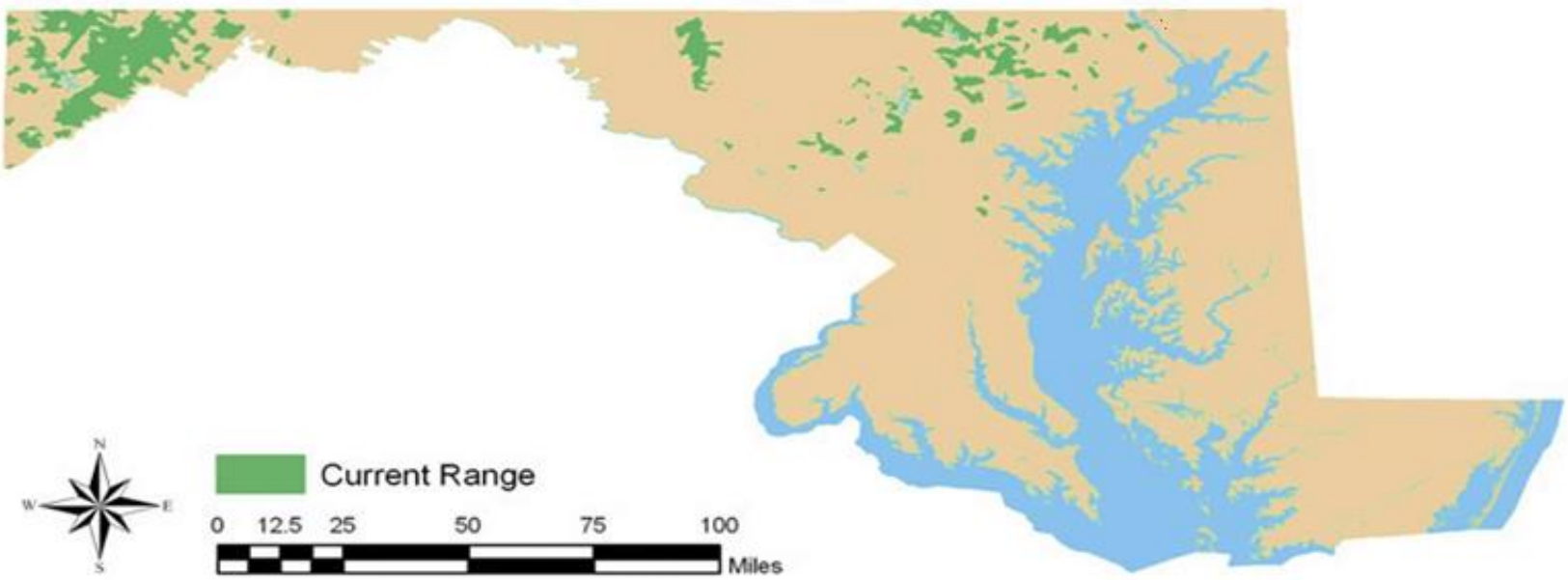
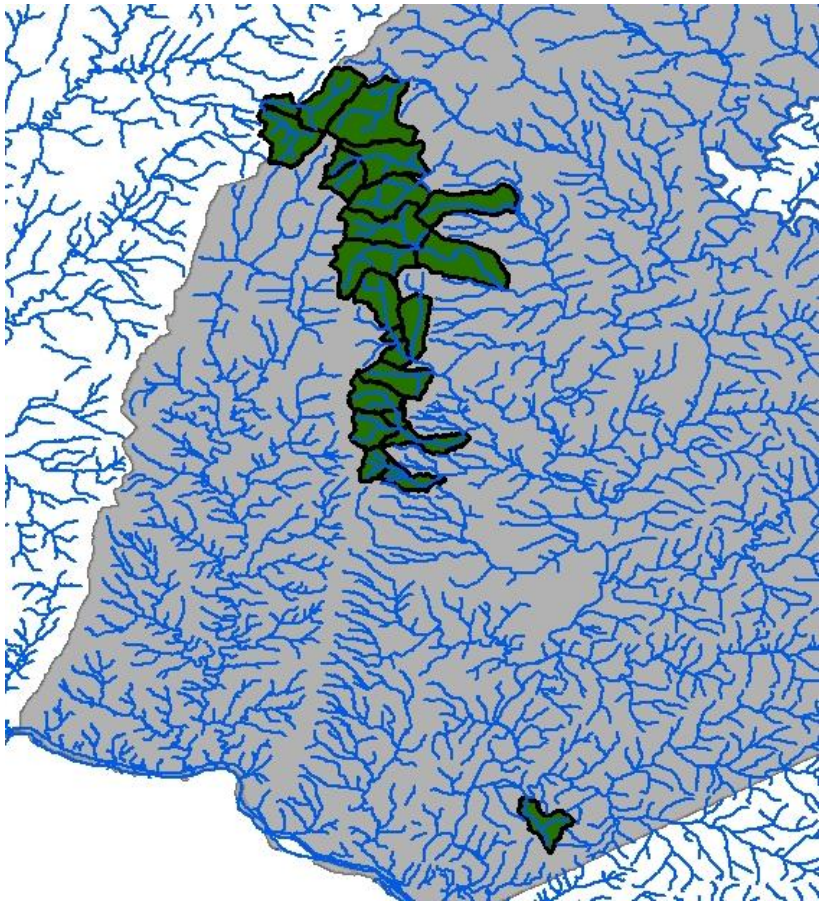


Frederick County Trout Watersheds

- Owens Creek – Brook, Brown, Rainbow
- Big Hunting Creek – Brook, Brown, Rainbow
- Little Hunting Creek – Brook, Brown, Rainbow
- Fishing Creek – Brook, Rainbow
- Clifford Branch – Brook
- Bear Branch - Brook



Threats to Trout and Habitat

Because of their life history and cold water needs, trout are particularly vulnerable to disturbance…

Examples of Typical Threats:

Urbanization/impervious surfaces
Loss of Riparian Buffer
Warmwater Runoff
Acid Mine Drainage (AMD)
Sediment Loading
Water Withdrawals
Dam Inundation/Fragmentation

Protection of Trout and Habitat

- Special Fisheries Regulations

  2 fish daily creel, trophy trout, catch-and-release, artificial lures only, zero creel, etc.
- Outreach to Decision Makers/Stakeholders
- Annual Statewide Monitoring of Wild Trout Resource Distributions
- Environmental Review

Special Regulation Area

Conducting Environmental Review

Trout population survey on the lower Savage River

Protection of Trout and Habitat

Environmental Review Program

Coordinate all project review activities within the department. Communicates the department's concerns and recommendations to protect Maryland's resources and coordinates with state, federal and local government agencies

Protection of Trout and Habitat

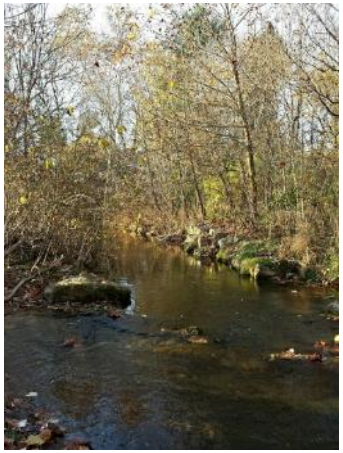
Coldwater Reviews Focus on Habitat Impacts

- Will the proposed activity increase water temperature?
- Will the proposed activity increase fine sediment in the waterbody?
- Will the instream habitat be affected?
  - Pool/riffle ratio
  - Pool/riffle quality (pool depth, embeddedness of riffle substrate)
  - Loss of instream cover
  - Changes in stream flow (increase or decrease)

Restoration

Freshwater Fisheries staff participate in restoration efforts statewide for wild trout. A few examples of these types of projects include:

Acid Mine Drainage (AMD) Remediation
Riparian Buffer Establishment
Physical Habitat Enhancement
Streambank Stabilization
Water Quality Improvement Projects
Fish Passage/Culvert Work



Conservation

Chesapeake Bay Watershed Agreement

- Signed in 2014 – Maryland signature partner
- Establishes goals and outcomes for the restoration of the Bay, its tributaries and the lands that surround them
- 10 Goals and 31 Outcomes
- Brook Trout Outcome as a Vital Habitat Goal
- Outcome = "Restore and Sustain naturally reproducing brook trout populations in the Chesapeake headwater streams with an eight percent increase in occupied habitat by 2025"
- Brook Trout Action Team (BTAT)– DNR's Brook Trout Program is an active participant with the BTAT to achieve the Outcome

Conservation

Sugarloaf Rural District Area

- Frederick County in process of developing plan
- Coldwater resources present in that area
  - Bear Branch – Brook trout, coldwater benthic obligates
  - Bennett Branch tributaries – coldwater benthic obligates
- Public support for proposed plan
  - NGOs, watershed groups, Trout Unlimited

Questions

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