

# BMPs: How Forests Provide Clean Water



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STATE OF MICHIGAN



DEPARTMENT OF ENVIRONMENTAL QUALITY

# Michigan's Water Resources

- Clean Water is one of Michigan's greatest natural assets
- Michigan is bordered by 4 out of 5 of the Great Lakes
- Michigan's land mass includes 11,000 lakes and over 36,000 miles of rivers and streams
- Over 6.5 million acres of wetland



# Michigan's Water Resources



- Public Trust resources
- Protection of these resources is provided for in Michigan's Constitution
  - *"in the interest of the health, safety and general welfare of the people. The legislature shall provide for the protection of the air water and other natural resources of the state from pollution, impairment and destruction."*





# Rivers and Streams Have Economic, Social and Environmental Benefits



Habitat

Discharges

Irrigation

Drainage

Energy

Transportation

Industrial cooling

Drinking Water

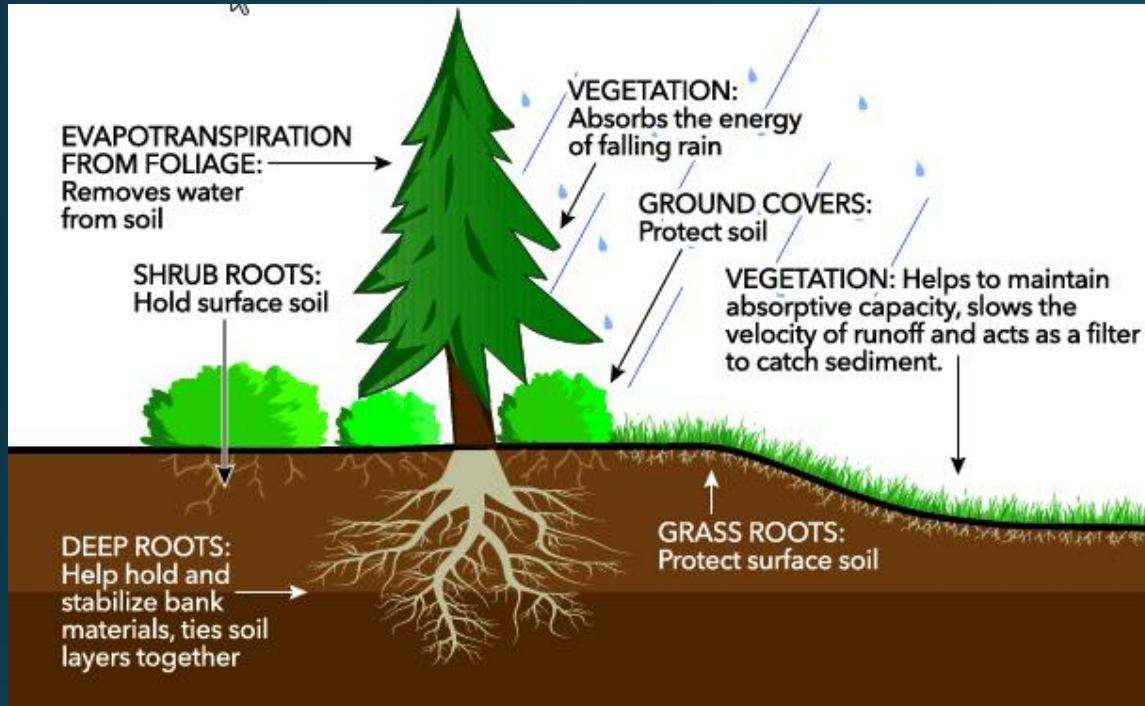
Recreation

# How do Forests Provide Clean Water?

- Forests are the most effective land cover for maintenance of water quality
- Trees serve as natural sponges, collecting and filtering rainfall and releasing it slowly into rivers and streams.
  - ✓ A single, large tree can capture and filter up to 36,500 gallons of water per year
- Forests regulate timing and magnitude of streamflow
- Regulate water temperatures by providing shade



# How do Forests Provide Clean Water?



- Permanent vegetation slows water velocity
- Undisturbed soils and litter layer limit erosion of sediment
- Soil and vegetation filter pollutants
- Complex root network keeps soil from washing away and filters water as it soaks downward
- Recharge the water table by allowing the water to enter the ground



# Forest Wetlands

- An important component of water quality protection
- Wetlands act as a holding areas for surface runoff, which can then be slowly released into a watershed.
- Vegetation absorbs nutrients such as nitrogen and phosphorus
- Accumulation of natural sediments
- Recharges the groundwater



# Forest Management

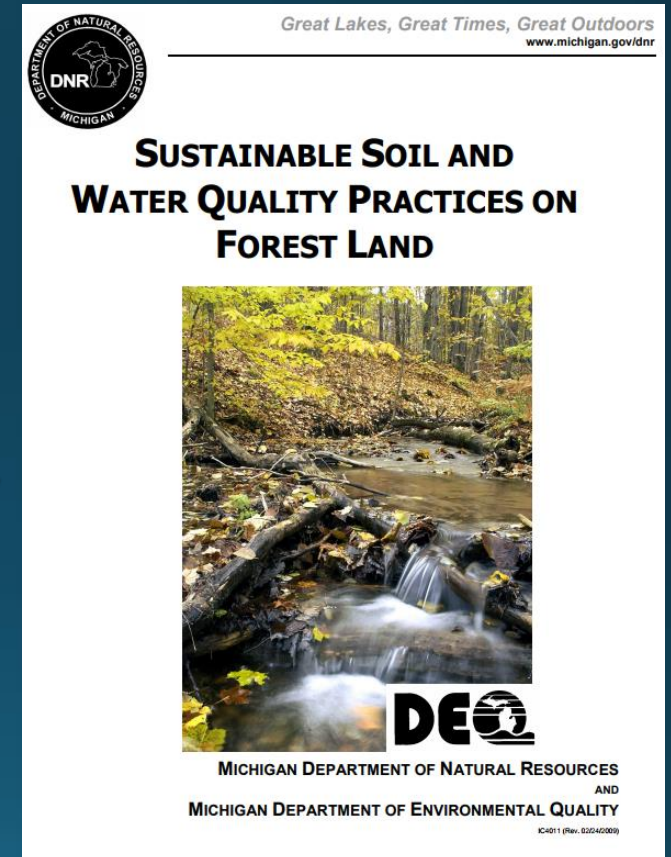
- 20 million acres of forested land is another of Michigan's greatest natural assets
- Management practices on forest lands will determine if forests remain healthy and productive.
- Healthy, stable and productive forests = highest quality of surface and ground water.
- Sustainable management of Michigan's forests protects the health of Michigan's waters.





# Forest Practices that Protect WQ

- Water and soil protection practices can prevent erosion, sedimentation and soil compaction and maintain healthy forests and watersheds.
- Manual “Sustainable Soil and Water Quality Practices on Forest Land” also known as Michigan’s Forestry BMP Manual
- BMPs shown in this presentation are all detailed this manual (and many more!)



# Forestry BMPs

- BMP = Best Management Practice
- Techniques to conserve and protect our waters from being polluted by surface water runoff, as well as protect site productivity





# Basic Principles of BMPs

1. Reduce the amount of sediment and other pollutants available to runoff and enter water ways
2. Reduce the amount of water running off a sight that can carry sediment
3. Slow the water down
4. Spread the water out
5. Filter the water

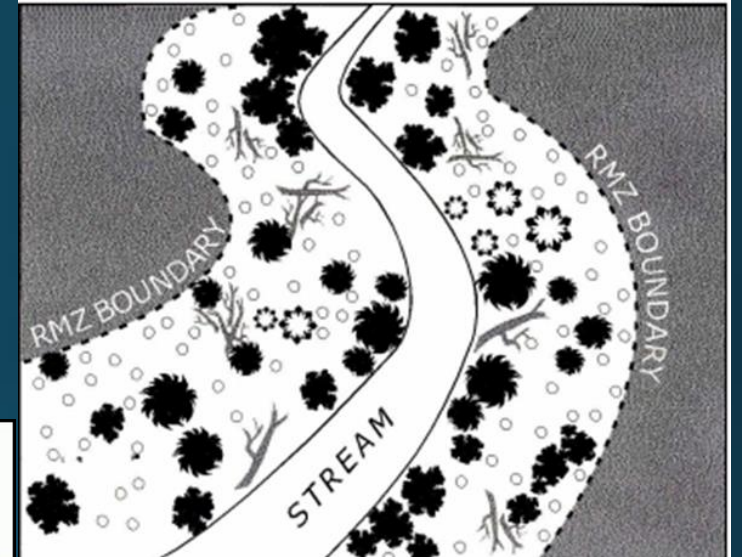
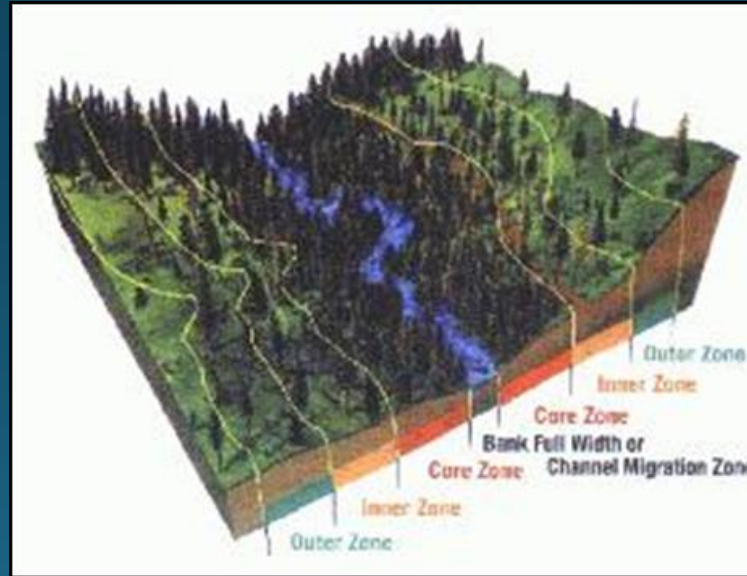


BMPs should be considered and implemented before, during, and after timber harvest activities



# Riparian Management Zones

- Also called RMZs or Buffer Strips
- Occurs on both sides of streams and around other bodies of open water – such as wetlands, ponds or lakes
- Extra precaution is used in these areas during timber harvesting activities
- Typical RMZ extends to 100 feet from the water body – further in higher sloped areas



# Riparian Management Zones

- RMZs protect water quality by:
  - Providing an area of vegetation to interrupt water flow and filter out sediment, nutrients, and other pollutants
  - Providing shade to streams, reducing thermal pollution
  - Contributing to the aquatic food chain
  - Providing recruitment of Large Woody Structure into the stream





# Forest Roads

- Nationwide, it is estimated that over 90% of sediment entering forested streams comes from forest roads
- Good planning, design, construction and maintenance of forest roads will significantly reduce the amount of sediment entering a stream.
- Goal: Reduce the volume and velocity of water and sediment occurring on roads during and after a rain event by providing for proper drainage of water runoff





# Forest Roads

- Planning and Placement
  - Minimize erosion by knowing the locations of soil types
  - Avoid springs, seeps, wetlands, and poorly drained areas if possible
  - Avoid RMZs unless crossing a stream – keep crossings to a minimum
  - Cross a stream at a 90 degree angle, choosing a gentle slope if possible
- First priority: Keep the road surface as free of water as possible
- Roads designed to best standards:
  - More efficient, less costly, easier to maintain, minimum impact on water quality



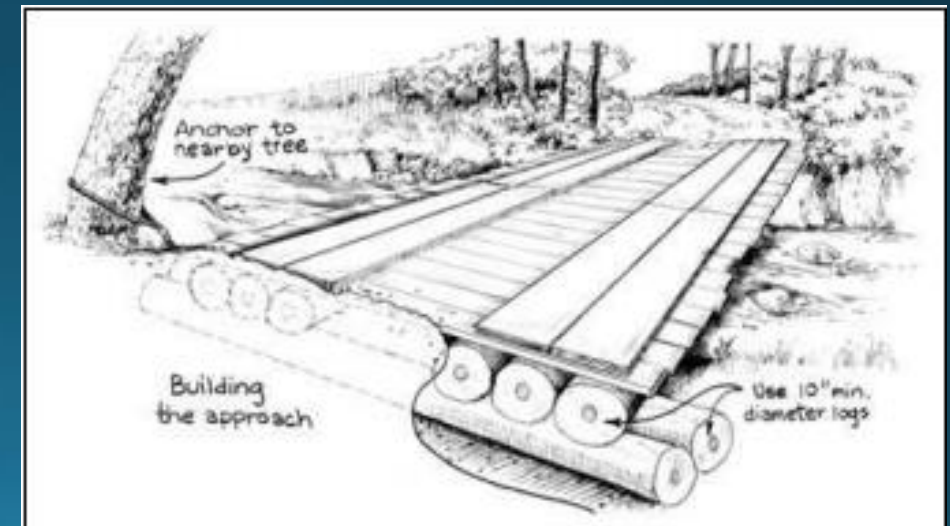
# Stream Crossings

- Require a DEQ permit
- DEQ has expedited Minor Project and General Permit categories
  - Clear span bridges
  - Culverts that meet criteria of MESBOAC method
- Best method – Cross a stream using a portable bridge that creates the least disturbance to the stream



# Portable Bridges

- Also called temporary bridges
- Preferred method for stream crossings
- In place for less than 2 years
- Studies show that portable bridges resulted in 98% less sediment entering the stream, compared to installing a culvert.
- Key advantages:
  - Reusable
  - Minimize erosion and stream siltation
  - Provide unimpeded fish passage
  - No impacts to stream bottom





# Culverts

- Most common type of stream crossing
- Proper sizing, orientation, and installation based on the stream's physical characteristics
  - Provides fish passage
  - Minimizes the risk of erosion, scouring, pooling and washout during significant storm events
  - Maximizes longevity of the culvert
- Use the MESBOAC Method for sizing and placement of culverts



# Culverts - MESBOAC

- Match the culvert width to the bankfull channel width
- Extend the culvert through the side slope of the road
- Set slope of culvert the same as stream slope
- Bury the culvert  $\frac{1}{6}$ <sup>th</sup> of the diameter up to 2 feet
- Offset multiple culverts
- Align the culvert with the stream channel
- Consider headcut





# Stewardship

The careful and responsible management of something entrusted to one's care

- 65% of Michigan's forest land is privately held
- Use of BMPs is voluntary
- Forest products industry in Michigan does a great job of promoting these BMPs
- Thank you!!!
- Everyone using these BMPs for doing their part to help protect Michigan's valuable water resources



# QUESTIONS? COMMENTS?

Contact:

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