WHY IS IT SO DIFFICULT TO OBTAIN RELIABLE BMP PERFORMANCE DATA?

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Prepared by:
Jonathan E. Jones, P.E.
Wright Water Engineers, Inc.
On Behalf of
UWRRC International Stormwater BMP Database Project Team

Representative Problems Encountered

• Solids/Debris in Stormflows
• Monitoring Equipment Limitations
• Need for Constant Maintenance
• Lack of Attention to Hydraulics
• Lack of “Reasonableness” Checking
• BMPs Do Not Work in the Field as They Were Designed
• Bypass Flows Not Measured
Representative Problems Encountered

• Animal Problems
• Baseflow Fluctuations
• Assumed Hydrograph (for programming) Does Not Match Actual Hydrograph
• “Triggering” Frequently Based on Concurrent Rainfall and Flow Depth, Creating “Double Trouble”
• Laboratory Problems (PQLs, Error, Wrong Test, Weekend Issues, etc.)
Stream Setbacks

Appropriate stream setbacks can prevent the creation of new watershed problems due to erosion.
Understand Factors Affecting Aquatic Biota

**Energy Source**
- type, amount, and particle size of organic material entering a stream from the riparian zone versus primary production in the stream
- seasonal pattern of available energy

**Water Quality**
- temperature
- turbidity
- dissolved oxygen
- nutrients (primarily nitrogen and phosphorus)
- organic and inorganic chemicals, natural and synthetic
- heavy metals and toxic substances
- pH

**Habitat Quality**
- substrate type
- water depth and current velocity
- spawning, nursery, and hiding places
- diversity (pools, riffles, woody debris)

**Flow Regime**
- water volume
- temporal distribution of floods and low flows

**Biotic Interactions**
- competition
- predation
- disease
- parasitism

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Ecological impact of human-induced alterations

- decreased coarse particulate organic matter
- increased fine particulate organic matter
- increased algal reproduction
- expanded temperature extremes
- increased turbidity
- altered diurnal cycle of dissolved oxygen
- increased nutrients
- increased suspended solids
- decreased stability of substrate & banks due to erosion & sedimentation
- more uniform water depth
- reduced habitat heterogeneity
- decreased channel sinuosity
- reduced habitat area due to shortened channel
- decreased in-stream cover and riparian vegetation
- altered flow extremes
- increased maximum flow velocity
- decreased minimum flow velocity
- reduced diversity of microhabitat velocities
- fewer protected sites
- increased frequency of diseased fish
- altered primary and secondary production
- altered trophic structure
- altered decomposition rates and timing
- disruption of seasonal rhythms
- shifts in species composition and relative abundances
- shifts in invertebrate functional groups
- shifts in trophic guilds
- increased frequency of fish hybridization
