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Loudoun County Planning Commission

Water Quality/Stream Briefing

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Water Quality Monitoring

- The Virginia Department of Environmental Quality (DEQ) has been publishing lists of impaired waters every even year since 1992.
- Virginia Water Quality Assessment 305(b)/303(d) Integrated Report.
- A stream is considered impaired if it does not meet one of five use criteria:
 - Drinking water
 - Primary contact/swimming (bacteria)
 - Fishing
 - Shellfishing
 - Aquatic life (benthic)
- The two most common identified impairments in Loudoun County are primary contact/swimming and aquatic life.

Primary Contact/Swimming

- A stream is designated impaired for the primary contact/swimming use if bacteria levels are high (E.Coli bacteria shall not exceed a monthly geometric mean of 126 CFU/100 ml or if more than 10.5% of samples taken exceed 235 CFU/100 ml - 9VAC25-260-170).
- Sources of E.Coli include animal waste (livestock, wildlife, and pets) and human waste (failed septic systems, straight pipes, sewer system leaks).

Aquatic Life

- Streams are assessed by biological monitoring and are assigned a score based upon the types of benthic macroinvertebrates found according to the Virginia Stream Condition Index (VSCI).
- Benthic macroinvertebrates are good indicators of overall stream health.
- Some are more tolerant of pollution than others:
 - Mayflies = Intolerant
 - Dragonflies = Somewhat Tolerant
 - Black Flies = Tolerant

Life Cycle of the Dragonfly

- The female dragonfly lays her eggs on a plant near the water or drops them in the water.
- Most of a dragonfly's life (up to 4 years) is spent as a nymph in the water. During this time, one of the main food sources for the nymph is mosquito larvae.
- The nymph leaves the water, crawls out of its larval skin, and begins to fly.
- The adult stage only lasts between 2-4 months.

A Dragonfly Emerges



Biological Monitoring

- If biological sampling results in a score of less than 42 out of a possible 100, the stream is considered severely stressed. A stream scoring between 43 and 59 is considered stressed. Both severely stressed and stressed streams are categorized as being impaired for aquatic life (9 VAC 25-260-10 A).
- DEQ has identified sediment, nutrients, and habitat modification as three of the primary sources of stream degradation.



Stream Assessment

- In 2009, Loudoun County contracted with Versar to conduct a Countywide Stream Assessment.
- The study included biological monitoring according to the VSCI at 178 randomly selected locations and habitat monitoring (stream bed, banks, vegetated buffers) at 500 randomly selected locations.
- The study found that, statistically, 78% of Loudoun's streams are stressed or severely stressed and meet the criteria for being impaired for aquatic life.
- Stream habitat was generally found to be suboptimal (criteria are optimal, suboptimal, marginal, and poor).

TMDLs

- Federal and state law requires states to develop Total Maximum Daily Loads (TMDLs) for impaired streams.
- A TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards (use criteria).
- $TMDL = WLA + LA + MOS$
 - WLA – Wasteload Allocation (point sources)
 - LA – Load Allocation (nonpoint sources)
 - MOS – Margin of Safety

TMDLs

- DEQ develops approximately 50 TMDLs each year.
- TMDLs are generally developed within 12 years of a stream being listed as impaired.
- TMDLs are developed based on models that simulate watershed hydrology, point and nonpoint source pollutant loads, and receiving water quality.

Goose Creek Sediment TMDL

- Goose Creek TMDL – 1998 aquatic life impairment – 2004 TMDL – stressor was identified to be sediment.

Pollutant	TMDL (tons/year)	WLA (tons/year)	LA (tons/year)	MOS (tons/year)
Sediment	47,106	1,587	40,808	4,711

- These load allocations are based on reductions in existing sediment loads from the following nonpoint sources:
 - Agriculture (30%),
 - Developed Land (30%)
 - Streambank Erosion (62%)
 - Clear/Select-Cut Timber (92%)

Bull Run Sediment TMDL

- Bull Run TMDL – 1998 aquatic life impairment – 2006 TMDL – stressor was identified to be sediment.

Pollutant	TMDL (tons/year)	WLA (tons/year)	LA (tons/year)	MOS (tons/year)
Sediment	11,994	5,986	4,807	1,194

- These load allocations are based on a 78% reduction in the existing sediment loads from the following nonpoint sources:
 - Agriculture,
 - Developed Land,
 - In-Stream Erosion

TMDLs

- The Virginia Department of Conservation and Recreation (DCR) develops implementation plans for TMDLs as funding permits.
- One implementation plan for a primary contact/swimming (a.k.a. bacteria) impairment on Catoctin Creek has been implemented in Loudoun to date – primarily livestock stream exclusion practices and septic system repair/replacement.
- The County is required to develop a TMDL Action Plan for Goose Creek and Bull Run, in addition to other TMDLs by July 1, 2015 in conjunction with the County MS-4 Stormwater Permit.

Water Quality Data



Water Quality Data

- Drain to a segment of Broad Run that is impaired for aquatic life (VAN-A09R-BRB01A00 & VAN-A09R - BR02A06).
- Segment begins at the confluence with Cabin Branch and continues downstream to the confluence with the Potomac River.
- First listed in 2006. TMDL scheduled for 2018.
- County's 2009 Stream Assessment – “suboptimal” for habitat and “severely stressed” for aquatic life.



Water Quality Practices

- Tree conservation
- Stream and wetland preservation
- Reforestation, particularly in riparian areas
- Installation of enhanced pollutant treatment practices (e.g., enhanced erosion controls, stormwater management ponds with wetland areas, and wet ponds).
- Installation of additional pollutant treatment practices (e.g. larger ponds, rain gardens).
- Stream and wetland enhancement/restoration.

Kincora (394 acres)

- Drains to downstream segment of Broad Run that is impaired for aquatic life.
- \$1,889,000 of bonded environmental improvements have been installed, including:
 - 2,425 linear feet of stream enhancement,
 - 2.5 acres of on-site wetland mitigation,
 - an 8.6-acre wetland mitigation bank,
 - 56 acres of riparian reforestation,
 - 3 acres of reforestation to offset river and stream corridor resource encroachments.
- The project also preserves 69 acres of riparian forest cover and 3 acres of upland forest cover.

Kincora Stream Enhancement



Kincora Wetland Mitigation



Kincora RSCRE Reforestation



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Questions?