

Notes for the December 10, 2003 MIF presentation.

Strasburg Town Hall 10:00 AM – 11:30 AM

USGS Presentation: Jennifer Krstolic, Don Hayes

Slide 1) Map of the NF basin:

Gage locations = red triangles,

Hydraulic sites = black squares,

North Fork River management sections are highlighted to designate the gage they are associated with (ie. the thick blue line in the headwater area is associated with Cootes Store Gage)

The River is broken down into three management sections because the basin is large, flows are typically much less in magnitude in the headwater reaches than in the lower reaches, and habitat conditions differ in each section. Modeling results will be reported for the river section associated with Cootes Store, Mt. Jackson, and Strasburg gages. The Cootes Store section begins in the headwaters and continues to just below Smith Creek. The Mt. Jackson section begins at Smith Creek, and continues on past stony creek. Strasburg section encompasses the 7-Bends area up to the confluence with the South Fork Shenandoah River. This will allow the habitat results to be examined in relation to the flows at each gaging station.

Slide 2) Flow exceedence for the gage at Strasburg, Va.

A flow exceedence curve shows the percent of time a flow has occurred historically (past 50 years). When we say that 860 cfs is in the 25 % exceedence value, that means that 25 percent of the time flows are equal to or greater than 860 cfs.

The normal range of flow is shown in the blue box—25 % to 75% is what should be typical of the river. The 95 % depicts low flows, but flows that occur 5% of the time.

(the 75 % exceedence value = 136 cfs, the 95 % exceedence value = 90 cfs)

Slide 3) This flow exceedence has July and August flow exceedence curves in blue, and September and October flow exceedence curves in orange. These two extra curves show how flows during the summer and fall months differ from flows for the entire year. Notice that the September-October curve is even less than the July-August curve. What is striking about this is that during September and October there is little agriculture, and much less evapotranspiration. Much less water is typically withdrawn in September and October than in July and August. There is less water in the stream, without major withdrawals.

Slide 4) A ‘blown-up’ view of Slide 3 to emphasize the low flow conditions.

The 25% exceedence value for September and October is 240 cfs,

75% exceedence value for September and October is 109 cfs, and

95% exceedence value for September and October is 77 cfs at the Strasburg gage.

These charts are included so that a general understanding of the flow regime in the lower portion of the river is understood. The following slides show a blue box on them that represents the typical range for September and October. Relating habitat results to historic data trends will provide information needed to make management decisions.

Slide 5) Riffle Guild Habitat Suitability Curves

This slide serves as a reminder of what we are modeling. We are modeling the potential habitat suitability of the river at various flows. We have examined four fish guilds and canoeing criteria to date. This slide represents the criteria that riffle-dwelling fish ‘prefer’. Depths, Velocities, and substrate (Channel Index) each receive a rating in the model. Each model cell, transect, and river reach has a suitability rating that is compiled for the management section.

Slide 6) Pool Cover Guild Habitat Suitability Curves

Again, the Depth, Velocity, and Substrate criteria are shown.

Slide 7) Weighted Usable Area for the Lower North Fork Shenandoah River Reach (Strasburg)

This slide is the first of three slides that show habitat results tied to a gaging station. Flows shown on the bottom axis (X-axis) are in CFS with a few converted to million gallons per day (MGD).

The left hand axis (Y-axis) is weighted usable area, or habitat units.

Four guilds are represented here; canoeing is on a slightly different scale, and will be presented in a few slides. Riffle guild habitat curve in red, Fast generalist guild curve in green, pool-run curve in purple, pool cover curve in blue.

By examining the pool cover curve (blue) it appears to be relatively stable. It does not increase or decrease with any steepness, but rather gradually changes. It may appear strange that at higher flows such as 600 – 1200 cfs the habitat decreases. Remember that these curves represent the combined suitability of Depth, Velocity, and Substrate. At higher flows it is quite possible that the velocities are unsuitable for pool cover fish, thus reducing the overall suitability rating.

It is interesting to note the range of flow for September and October, in relation to the habitat curves. The maximum amount of habitat is not necessarily within the normal range of flows for October and September.

Slide 8) The middle North Fork Shenandoah River Management Section

The modeling results for the section of river tied to Mt. Jackson gage. The range of flows shown on the X-axis is lower than the Strasburg graph. The normal range of flows for September and October at the Mt. Jackson gage is 25 % = 134 cfs, 75% = 43 cfs, and 95% = 24 cfs.

Slide 9) The upper North Fork Shenandoah River Management Section

The modeling results for the section of river tied to Cootes Store gage. The range of flows shown on the X-axis is lower than the Mt. Jackson graph. The normal range of flows for September and October at the Cootes Store gage is 25 % = 36 cfs, 75% = 3.4 cfs, and 95% = 1.3 cfs.

Slide 10) Canoeing results for the lower North Fork Shenandoah River Management Section

The curve on this chart looks much larger than the other guild curves. What needs to be considered is that for canoeing the criteria of Depth, Velocity, and Substrate were considered. The depth suitability varied quite a bit, but the velocity and substrate ratings were almost always 100% suitable at most flows. The two factors being 100% suitable weights the curve. It is more important to examine the pattern of the curve than the magnitude.

The first question most people would have is, 'how deep is it?'. The canoeing modeling runs for one riffle sites and one run sites were examined to get an idea of how depth varies with flow.

These are very preliminary and general numbers that follow.

Riffle sites at 100 cfs:

Average depth ranged from 0.8 to 1.0 feet. The maximum depth ranged from 1.3 to 1.8 ft.

Riffle sites at 300 cfs:

Average depth ranged from 1.0 to 1.7 feet. The maximum depth ranged from 1.3 to 2.3 ft.

Run sites at 100 cfs:

Average depth ranged from 0.9 to 2.8 feet. The maximum depth ranged from 3.2 to 5.5 ft.

Run sites at 300 cfs:

Average depth ranged from 1.4 to 3.2 feet. The maximum depth ranged from 2.3 to 6.2 ft.

Slide 11) Riffle picture with habitat suitability curves superimposed.

Remember that it takes data, knowledge, and a lot of discussion to come up with sound management recommendations. The model results provide information about how the river probably behaves at each flow, and how much habitat is available to each fish guild at various flows. It is up to the MIF technical advisory committee to examine the data, and use the knowledge they have of the system to make policy recommendations.