Note regarding Smith/Bybee channel modification options

A primary factor in needing to modify the channel is its sediment deposition which, over a number of years, has raised the channel bed elevation, reducing the rate at which Smith Lake drains in the summer. Beaver dams have also compromised the drain rate.

Otak produced valuable information about several design options, cost estimates and assumed design life. The major immediate cost of each design option is excavation and disposal. In general, higher costs are proportional to excavation volume and excavation volume affects the rate at which Smith Lake drains. Additional estimated costs associated with conducting maintenance in x-number of years to remove accumulated sediment are significant.

The design options appear to assume a steady sediment presence in the system but sediment transport, sediment origin and rate of sediment accumulation have not been determined. Nutria activity is highly likely a major cause of soil disturbance and subsequent sediment distribution. If nutria management can be increased to where almost no nutria remain in the system, sediment accumulation may drop significantly. The model indicates that tidal flow velocities aren't high enough to keep the channel free of sediment. If sediment loading is minimal, the flow velocity would be less important to keeping the channel open and the assumed design life costs would be reduced.

The *"Time to drain from elev. 11 to 9"* is related to both width and depth of the excavated channel. If, as Jonathan questioned, the drain duration of approximately 14 days is not necessarily critical, the channel may not need to be as deep or as wide or as long as modeled in the design options. Maybe excavating the channel to elevation 8' (as in Alt 3) but with a bottom width of 5-10' would drain Smith Lake to elevation 9' within an acceptable time-frame. If nutria removal significantly reduced the soil disturbance, sediment may not be as much of a concern. Although the model for the selected options indicates the tidal flow velocity is unlikely to move very much sediment, a narrower channel may increase velocity enough to move sediment out of the channel.

In its current, mid- to late-summer configuration, the low-flow channel near Smith Lake is narrow (approx. 2' wide by 1' deep), and for some distance west of beaver dam 5 it is wider (approx. 4-6' wide by 1.5' deep). Both low-flow channel configurations have nearly vertical banks which may indicate that the adjacent bed material is consolidated enough to not slough off and fill in the channel at a flatter slope gradient. This sharply defined channel may indicate that soil disturbance within the system has been reduced to the extent of reducing sediment accumulation. Or it may indicate that recent channel flow velocities were high enough to keep the narrow channel from accumulating sediment.

Studies conducted without the benefit of collecting site data (in this case, sediment analysis) over a long period often require designs that need to accommodate the most extreme conditions, just to play it safe. But there are enough unknowns at this point that it may be cost-effective to investigate a more modest design than those that were modeled; a design based on having no nutria disturbing the soil. Meaning, possibly less sedimentation. Otak could model several more conservative designs. A modest "test option" design might be implemented for several years to see if it addresses the sedimentation and beaver habitat issues; if it doesn't, a follow-up option might be needed.

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