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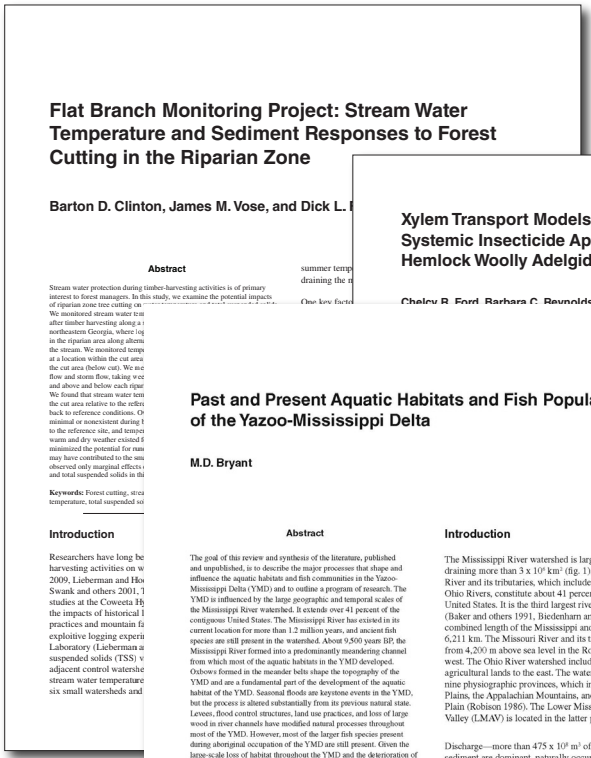


Flat Branch Monitoring Project: Stream Water Temperature and Sediment Responses to Forest Cutting in the Riparian Zone

Barton D. Clinton, James M. Vose, and Dick L. [illegible]

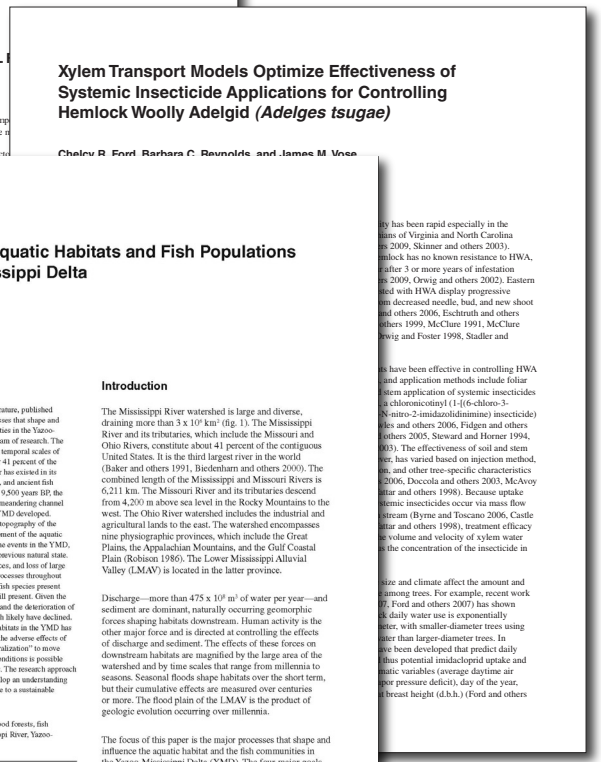
Abstract

Stream water protection during timber-harvesting activities is of primary interest to forest managers. In this study, we examine the potential impacts of riparian zone tree cutting on [illegible]. We monitored stream water temperature after timber harvesting along a [illegible] northeastern Georgia, where logging in the riparian area along alternate sides of the stream. We monitored temperature at a location within the cut area (below cut). We also monitored flow and storm flow, taking weekly grab samples above and below each riparian zone. We found that stream water temperatures in the cut area relative to the reference site, and temperatures back to reference conditions. Other minimal or nonexistent during the growing season. Stream warm and dry weather existed for [illegible] minimized the potential for [illegible] may have contributed to the small [illegible] observed only marginal effects on [illegible] and total suspended solids in the

Keywords: Forest cutting, stream temperature, total suspended solids

Introduction

Researchers have long been [illegible] harvesting activities on water [illegible] 2009, Lieberman and Hornbeck 1925, Swank and others 2001, Troxler 1970), studies at the Coweeta Hydrologic Laboratory in the impacts of historical land [illegible] practices and mountain farming, exploitive logging experiments at the Fernow Experimental Forest in the Laboratory (Lieberman and Hornbeck 1925), suspended solids (TSS) were [illegible] adjacent control watersheds (Douglass and Swank 1975), and stream water temperatures [illegible] six small watersheds and [illegible]



Xylem Transport Models Optimize Effectiveness of Systemic Insecticide Applications for Controlling Hemlock Woolly Adelgid *(Adelges tsugae)*

Chelcy R. Ford, Barbara C. Reynolds, and James M. Vose

[illegible] ty has been rapid especially in the [illegible] ians of Virginia and North Carolina [illegible] es 2009, Skinner and others 2003), [illegible] mlock has no known resistance to HWA, [illegible] after 3 or more years of infestation [illegible] ts 2009, Orwig and others 2002). Eastern [illegible] ted with HWA display progressive [illegible] om decreased needle, bud, and new shoot [illegible] nd others 2006, Eschtruth and others [illegible] others 1999, McClure 1991, McClure [illegible] rwig and Foster 1998, Stadler and [illegible]

[illegible] has been effective in controlling HWA [illegible] and application methods include foliar [illegible] ystem application of systemic insecticides [illegible] a chloronicotinyl (1-[(6-chloro-3-[illegible] N-nitro-2-imidazolidinimine) insecticide) [illegible] les and others 2006, Fidgen and others [illegible] others 2005, Steward and Horner 1994, [illegible] 003). The effectiveness of soil and stem [illegible] er, has varied based on injection method, [illegible] n, and other tree-specific characteristics [illegible] 2006, Doccola and others 2003, McAvoy [illegible] attar and others 1998). Because uptake [illegible] temic insecticides occur via mass flow [illegible] stream (Byrne and Toscano 2006, Castle [illegible] attar and others 1998), treatment efficacy [illegible] e volume and velocity of xylem water [illegible] s the concentration of the insecticide in [illegible]

[illegible] size and climate affect the amount and [illegible] among trees. For example, recent work [illegible] 7, Ford and others 2007) has shown [illegible] k daily water use is exponentially [illegible] eter, with smaller-diameter trees using [illegible] ater than larger-diameter trees. In [illegible] ve been developed that predict daily [illegible] thus potential imidacloprid uptake and [illegible] natic variables (average daytime air [illegible] por pressure deficit), day of the year, [illegible] t breast height (d.b.h.) (Ford and others [illegible]

Past and Present Aquatic Habitats and Fish Populations of the Yazoo-Mississippi Delta

M.D. Bryant

Abstract

The goal of this review and synthesis of the literature, published and unpublished, is to describe the major processes that shape and influence the aquatic habitats and fish communities in the Yazoo-Mississippi Delta (YMD) and to outline a program of research. The YMD is influenced by the large geographic and temporal scales of the Mississippi River watershed. It extends over 41 percent of the contiguous United States. The Mississippi River has existed in its current location for more than 1.2 million years, and ancient fish species are still present in the watershed. About 9,500 years BP, the Mississippi River formed into a predominantly meandering channel from which most of the aquatic habitats in the YMD developed. Oxbows formed in the meander belts shape the topography of the YMD and are a fundamental part of the development of the aquatic habitat of the YMD. Seasonal floods are keystone events in the YMD, but the process is altered substantially from its previous natural state. Levees, flood control structures, land use practices, and loss of large wood in river channels have modified natural processes throughout most of the YMD. However, most of the larger fish species present during aboriginal occupation of the YMD are still present. Given the large-scale loss of habitat throughout the YMD and the deterioration of water quality, the abundance and diversity of fish likely have declined. In the past few years, management of aquatic habitats in the YMD has centered on mitigating and preventing some of the adverse effects of anthropogenic disturbance. A program of "naturalization" to move aquatic ecosystem processes closer to natural conditions is possible within the context of socioeconomic constraints. The research approach proposed in this paper provides a model to develop an understanding of the fish and aquatic habitat that can contribute to a sustainable restoration program.

Keywords: Aquatic habitat, bottomland hardwood forests, fish diversity, floodplain processes, floods, Mississippi River, Yazoo-Mississippi Alluvial Floodplain, Yazoo River.

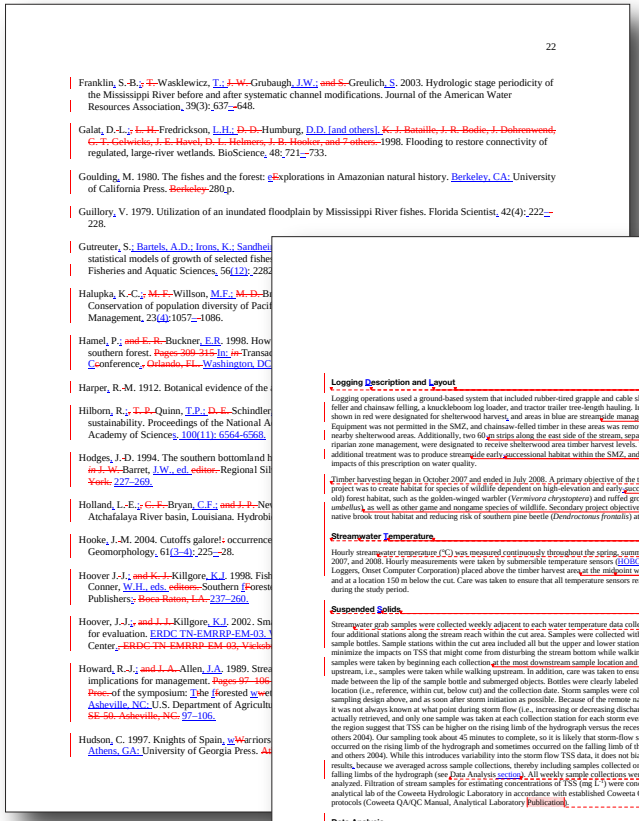
Introduction

The Mississippi River watershed is large and diverse, draining more than 3 x 10^6 km^2 (fig. 1). The Mississippi River and its tributaries, which include the Missouri and Ohio Rivers, constitute about 41 percent of the contiguous United States. It is the third largest river in the world (Baker and others 1991, Biedenharn and others 2000). The combined length of the Mississippi and Missouri Rivers is 6,211 km. The Missouri River and its tributaries descend from 4,200 m above sea level in the Rocky Mountains to the west. The Ohio River watershed includes the industrial and agricultural lands to the east. The watershed encompasses nine physiographic provinces, which include the Great Plains, the Appalachian Mountains, and the Gulf Coastal Plain (Robison 1986). The Lower Mississippi Alluvial Valley (LMAV) is located in the latter province.

Discharge—more than 475 x 10^9 m^3 of water per year—and sediment are dominant, naturally occurring geomorphic forces shaping habitats downstream. Human activity is the other major force and is directed at controlling the effects of discharge and sediment. The effects of these forces on downstream habitats are magnified by the large area of the watershed and by time scales that range from millennia to seasons. Seasonal floods shape habitats over the short term, but their cumulative effects are measured over centuries or more. The flood plain of the LMAV is the product of geologic evolution occurring over millennia.

The focus of this paper is the major processes that shape and influence the aquatic habitat and the fish communities in the Yazoo-Mississippi Delta (YMD). The four major goals of the paper are: (1) to provide a qualitative description of how major aquatic habitats and fish populations in the YMD evolved from geological and climatic conditions of the past; (2) to describe these processes before major anthropogenic alterations in the YMD; (3) to synthesize information on the hydrologic processes, existing landscape and aquatic habitats, and fish species communities in the YMD; and 4)

[1]Welty, Eudora. The collected stories of Eudora Welty. 1980. Harcourt Brace Jouovich.



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Franklin, S.-B.; T. Waskiewicz, T.; J. W. Grubaugh, J.W.; and S. Greulich, S. 2003. Hydrologic stage periodicity of the Mississippi River before and after systematic channel modifications. Journal of the American Water Resources Association, 39(3): 637–648.

Galat, D.-L.; L. H. Fredrickson, L.H.; D. D. Humburg, D.D. [and others], K. J. Bataille, J. R. Bodie, J. Dohrenwend, C. T. Gelwicks, J. E. Havel, D. J. Helmers, J. B. Hooker, and 7 others. 1998. Flooding to restore connectivity of regulated, large-river wetlands. BioScience, 48: 721–733.

Goulding, M. 1980. The fishes and the forest: eExplorations in Amazonian natural history. Berkeley, CA: University of California Press. Berkeley 280.p.

Guillory, V. 1979. Utilization of an inundated floodplain by Mississippi River fishes. Florida Scientist, 42(4): 222–228.

Gutreuter, S.; Bartels, A.D.; Irons, K.; Sandhei[illegible] statistical models of growth of selected fishes[illegible] Fisheries and Aquatic Sciences, 56(12): 2282[illegible]

Halupka, K.-C.; M. F. Willson, M.F.; M. D. B[illegible] Conservation of population diversity of Pacif[illegible] Management, 23(4): 1057–1086.

Hamel, P.; and E. R. Buckner, E.R. 1998. How[illegible] southern forest. Pages 239–315. In: in Transac[illegible] Conference, Orlando, FL. Washington, DC:[illegible]

Harper, R.-M. 1912. Botanical evidence of the [illegible]

Hilborn, R.; T. P. Quinn, T.P.; D. E. Schindler[illegible] sustainability. Proceedings of the National A[illegible] Academy of Sciences, 100(11): 6564–6568.

Hodges, J.-D. 1994. The southern bottomland h[illegible] in J. W. Barret, J.W., ed. editor. Regional Sil[illegible] York: 227–269.

Holland, L.-E.; C. F. Bryan, C.F.; and J. P. Ne[illegible] Atchafalaya River basin, Louisiana. Hydrobi[illegible]

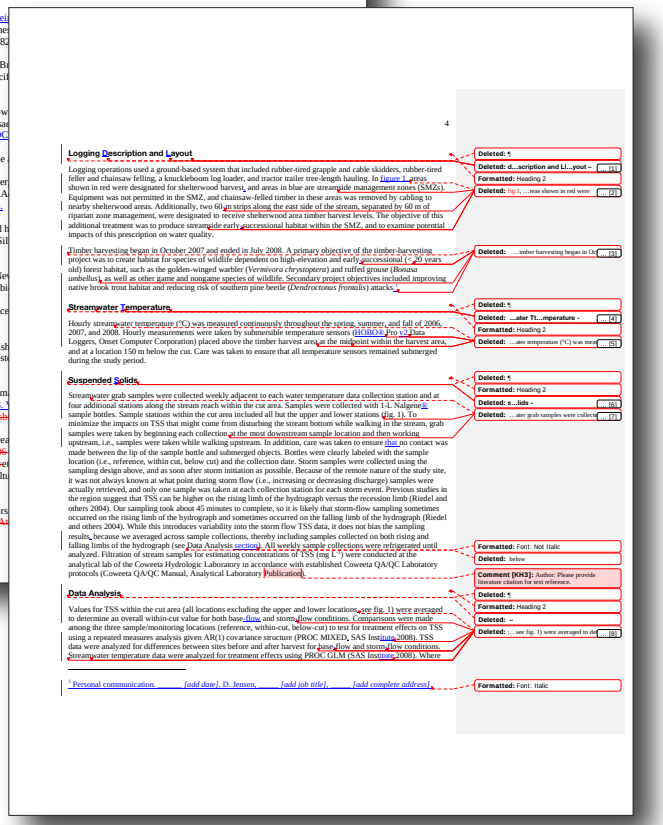
Hooke, J.-M. 2004. Cutoffs galore!: occurrence[illegible] Geomorphology, 61(3–4): 225–28.

Hoover J.-J.; and K. J. Killgore, K.J. 1998. Fish[illegible] Conner, W.H., eds. editors. Southern Forest[illegible] Publishers: Boca Raton, LA. 237–260.

Hoover, J.-J.; and J. J. Killgore, K.J. 2002. Sm[illegible] for evaluation. ERDC TN-EMRRP-EM-03. V[illegible] Center, ERDC TN-EMRRP-EM-03, Vicksb[illegible] SE 50. Asheville, NC: 97–106.

Howard, R.-J.; and J. A. Allen, J.A. 1989. Strea[illegible] implications for management. Pages 97–106. Proc. of the symposium: The Forested w[illegible] Asheville, NC: U.S. Department of Agricultu[illegible] SE 50. Asheville, NC: 97–106.

Hudson, C. 1997. Knights of Spain, wWarriors [illegible] Athens, GA: University of Georgia Press. Au[illegible]



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Logging Description and Layout

Logging operations used a ground-based system that included rubber-tired grapple and cable skidders, rubber-tired feller and chainsaw felling, a knuckleboom log loader, and tractor trailer tree-length hauling. In figure 1, areas shown in red were designated for shelterwood harvest, and areas in blue are streamside management zones (SMZs). Equipment was not permitted in the SMZ, and chainsaw-felled timber in these areas was removed by cabling to nearby shelterwood areas. Additionally, two 60-m strips along the east side of the stream, separated by 60 m of riparian zone management, were designated to receive shelterwood area timber harvest levels. The objective of this additional treatment was to produce streamside early successional habitat within the SMZ, and to examine potential impacts of this prescription on water quality.

Timber harvesting began in October 2007 and ended in July 2008. A primary objective of the timber-harvesting project was to create habitat for species of wildlife dependent on high-elevation and early successional (~20 years old) forest habitat, such as the golden-winged warbler (*Vermivora chrysoptera*) and ruffed grouse (*Bonasa umbellus*), as well as other game and nongame species of wildlife. Secondary project objectives included improving native brook trout habitat and reducing risk of southern pine beetle (*Dendroctonus frontalis*) attacks.[1]

Streamwater Temperature

Hourly streamwater temperature (°C) was measured continuously throughout the spring, summer, and fall of 2006, 2007, and 2008. Hourly measurements were taken by submersible temperature sensors (HOBO® Pro v2 Data Loggers, Onset Computer Corporation) placed above the timber harvest area at the midpoint within the harvest area, and at a location 150 m below the cut. Care was taken to ensure that all temperature sensors remained submerged during the study period.

Suspended Solids

Streamwater grab samples were collected weekly adjacent to each water temperature data collection station and at four additional stations along the stream reach within the cut area. Samples were collected with 1-L Nalgene® sample bottles. Sample stations within the cut area included all but the upper and lower stations (fig. 1). To minimize the impacts on TSS that might come from disturbing the stream bottom while walking in the stream, grab samples were taken by beginning each collection at the most downstream sample location and then working upstream, i.e., samples were taken while walking upstream. In addition, care was taken to ensure that no contact was made between the lip of the sample bottle and submerged objects. Bottles were clearly labeled with the sample location (i.e., reference, within cut, below cut) and the collection date. Storm samples were collected using the sampling design above, and as soon after storm initiation as possible. Because of the remote nature of the study site, it was not always known at what point during storm flow (i.e., increasing or decreasing discharge) samples were actually retrieved, and only one sample was taken at each collection station for each storm event. Previous studies in the region suggest that TSS can be higher on the rising limb of the hydrograph versus the recession limb (Riedel and others 2004). Our sampling took about 45 minutes to complete, so it is likely that storm-flow sampling sometimes occurred on the rising limb of the hydrograph and sometimes occurred on the falling limb of the hydrograph (Riedel and others 2004). While this introduces variability into the storm flow TSS data, it does not bias the sampling results, because we averaged across sample collections, thereby including samples collected on both rising and falling limbs of the hydrograph (see Data Analysis section). All weekly sample collections were refrigerated until analyzed. Filtration of stream samples for estimating concentrations of TSS (mg L^{-1}) were conducted at the analytical lab of the Coweeta Hydrologic Laboratory in accordance with established Coweeta QA/QC Laboratory protocols (Coweeta QA/QC Manual, Analytical Laboratory Publication).

Data Analysis

Values for TSS within the cut area (all locations excluding the upper and lower locations, see fig. 1) were averaged to determine an overall within-cut value for both base-flow and storm-flow conditions. Comparisons were made among the three sample/monitoring locations (reference, within-cut, below-cut) to test for treatment effects on TSS using a repeated measures analysis given AR(1) covariance structure (PROC MIXED, SAS Institute 2008). TSS data were analyzed for differences between sites before and after harvest for base-flow and storm-flow conditions. Streamwater temperature data were analyzed for treatment effects using PROC GLM (SAS Institute 2008). Where

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