

## FOREST OPERATIONS - 2008

### Overview

The Virginia Tech Forest Operations team works in four major research areas related to forest management activities:

- 1) Evaluating operations with regard to safety, productivity, planning, and logistics,
- 2) Creating tools to improve the efficiency and profitability of forest operations,
- 3) Analyzing forest business issues such as supply chain management/biomass utilization, and
- 4) Evaluating the environmental impacts of forest operations.

The Forest Operations team gained a new faculty member in 2008, Dr. Chad Bolding, a Forest Engineer. Dr. Bolding, who most recently worked as a faculty member at Clemson University, received a Ph.D. in Forest Engineering and an M.F. in Silviculture from Oregon State University. Dr. Bolding also has M.S. and B.S. degrees in Forestry from Auburn University.



Since Dr. Bolding's arrival in August 2008, the Forest Operations team (Chad Bolding, Mike Aust, and Scott Barrett) have worked collaboratively to refine the Forest Operations curriculum as well as begin new research and extension projects. In 2008, we completed 6 major research projects with associated graduate students and began 9 new projects with 10 new graduate students.

## Completed Projects in 2008

1. **Matt Carroll** completed his M.S. level research that evaluated the water quality effects of four forest harvesting stream crossings (fords, pole crossings, culverts, portable bridges). Overall, Matt found that the portable bridges generally resulted in better water quality and that the stream crossing approach is actually more important to water quality than the actual type of crossing selected. This research was supported by NCASI. Matt is currently employed as an Operations Forester with The Nature Conservancy.
2. **Paul Gellerstedt** completed an M.F. degree program by evaluating the long term influence of skidder and helicopter harvesting on swamp tupelo regeneration. His research concluded that the skidder harvest favored tupelo regeneration and stand volumes while the helicopter harvested areas had greater species diversity. Overall, the similarity between the two types of harvests is increasing as the stands age. Paul's research was funded by NCASI. Paul is a Regional Forester with the North Carolina Forest Service.
3. **Bill Lakel** completed his Ph.D. with a research project that examined the effect of different stream side management zones widths and harvests (25 feet, 50 feet, 50 feet with thinning, 100 feet) on water quality. Overall, Bill found minimal effects of streamside management zone widths on water quality, but findings generally supported use of the existing 50 feet SMZ. Dr. Lakel's research also found that small areas of high erosion rates that by-pass the SMZ are more detrimental to water quality. This research was funded by MeadWestvaco, the USDA Forest Service, and NCASI. Bill is the Water Quality Program Director with the Virginia Department of Forestry.
4. **Erica Fritz Wadl** (co-chaired by Dr. John Seiler of the Forest Biology Section) completed her M.S. with an evaluation of the effects of SMZ widths on carbon dynamics and stream benthic populations as a sub-study of the work begun by Dr. Lakel. Erica concluded that carbon dynamics are generally related to SMZ stand size and found minimal influence of SMZ width on carbon fluxes. Erica's research supported Dr. Lakel's findings that a 50 feet SMZ width seems adequate for typical forest operations. This project was funded by Virginia Tech and NCASI. Erica is employed as a Water Quality Permit Biologist with TVA.
5. **Brandon Martin** completed his M.S. research in early 2009 focusing on an online GIS based wood supply management system. Brandon is currently employed by the VT Conservation Management Institute in Fort Pickett. This project was funded by the Sloan Foundation Forest Industries Center.
6. **Matt Moldenhauer**, a Clemson University M.F.R. student, completed his project on parcelization and its effects on forest operations. Matt found that SC tract sizes are becoming smaller and that loggers are modifying their operations accordingly. This project was funded by Clemson University.

## On-going Projects for 2008/2009

1. **Joe Secoges**, a finishing M.S. student, also worked on a subproject of the aforementioned SMZ width study. Joe is evaluating the effect of SMZ width on surface and subsurface movement of N and P fertilizers. This project is funded by NCASI.
2. **Sally Dymond**, a finishing M.S. student, is using the Distributed Hydrology, Vegetation, and Soil Model (DHVSM) to evaluate the effects of forest road standards and road density on water quality. She is validating the model for use in the Appalachian regions by using existing data from the USFS Hydrology Lab at Coweeta, North Carolina. This project is funded by the USFS.
3. **Brian Keightley** is an MNR student located at the campus in Northern Virginia. Brian is conducting a literature review on the nutrient and biomass removals associated with biomass/biofuel harvests in bottomland hardwoods.
4. **Scott Barrett**, already a faculty member and SHARP logger program coordinator, has begun a Ph.D. program that will focus on the operational and environmental aspects of biomass/biofuel harvesting.
5. **Charlie Wade** (M.S. student) and **Clay Sawyers** (VT employee and M.F. student) are working on a new research project at the Reynolds Homestead that evaluates the sediment transport associated with five different methods of closing bladed and overland skid trails. Treatments to be evaluated in conjunction with standard water bars are a control, seeded, seeded and mulched, hardwood slash, and pine slash. This project is jointly funded by the Virginia Department of Forestry, NCASI, and Plum Creek.
6. **Will Ford**, a first semester M.F. student, is conducting a literature review on the impacts of harvesting on subsequent regeneration in Appalachian Hardwood stands. This project is partially funded by the Appalachian Hardwood Forest Research Alliance.
7. **Joseph Conrad**, a new M.S. student, is conducting a study of the potential impact of a wood-to-energy market on the U.S. South's wood supply chain. Joe will survey important industry players throughout the 13 southeastern states to further our knowledge on the benefits and challenges of biomass utilization. This project is jointly funded by Virginia Tech and the USFS.
8. **Tripp Dowling**, a new M.S. student, is focusing his project on forest products transportation. He is investigating the differences in our trucking industry versus over-the-road hauling including issues such as truck scheduling. He is also conducting a pilot study on the new Blue Ox truck scheduling software. This project is partially funded by Virginia Tech.
9. **Scott McKee** is our newest graduate student. Scott will be working on the carbon/biomass component on the helicopter and skidder project in the Alabama swamp formerly used by Paul Gellerstedt. This project is sponsored by NCASI.