For more information on CTE's programs and services:

Research and Education Programs
James B. Martin, P.E.
Associate Director
(919) 515-8620 or jbm@unity.ncsu.edu

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Information Services Director
(919) 515-8581 or lwidmer@unity.ncsu.edu

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Kathryn P. McDermott
Technology Transfer Director
(919) 515-8034 or kpm@unity.ncsu.edu

Please visit our web site:
http://www.itre.ncsu.edu/cte
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Message from the Director

It seems like just yesterday I participated in a special planning meeting to discuss the formation of a new center with an environmental theme. In reality, a decade has passed since the Intermodal Surface Transportation Efficiency Act of 1991 provided for the establishment of the Center for Transportation and the Environment at North Carolina State University. At that time — and still today — CTE is the only university transportation center in the country conducting research, education, technology transfer, and information services programs that seek to mitigate the impacts of surface transportation development on the environment.

So, how have we done? This annual report, in part, attempts to answer that question. Between pages 20 and 21 you will find a colorful poster insert that chronicles CTE’s contributions to the transportation and environmental community from 1991 through 2000. I hope you will display this poster in your offices, break rooms, and hallway bulletin boards to remind students and practitioners of the opportunities available to them through the Center’s programs and services. While we still have a lot of work ahead of us, we hope you will find that CTE’s activities have enhanced your daily efforts to effectively integrate environmental concerns in transportation planning and project development.

Consider the poster and the contents of this report, which covers the period 1999-2000, as our tribute to you. CTE did not accomplish this work alone. Our partnership with key agencies and organizations aligned to our mission, along with your participation in our many sponsored activities, is the secret to our success. We decided early in our development that our mission would be best achieved if we positioned ourselves as a resource to the government, academic, and non-profit entities already dedicated to addressing the environmental concerns of the transportation profession. Essentially, we asked, “What can we do for you?” and we mobilized the necessary professional and technological expertise to respond.

In this report we are proud to acknowledge our many partners, who continue to guide us and inspire us in our common quest for improved mobility and a healthy environment.

I would like to mention here a few with whom we regularly collaborate:

**US Department of Transportation.** As a USDOT university transportation center of excellence, CTE’s connection with the Department is clear. The Research and Special Programs Administration, through the Federal Highway Administration and Federal Transit Administration, in particular, FHWA and FTA have used CTE’s teleconference series as a venue for increasing awareness of new proposed rulemaking and other research and policy issues. In addition, FHWA has awarded a contract to CTE’s Information Services program to develop a Web-searchable database of FHWA environmental research. FHWA has also dedicated funding to CTE’s M-ability Challenge Initiative to launch a new Web site that will showcase the people, partnerships, and projects that are improving the way environmental issues are addressed in surface transportation development.

**North Carolina Department of Transportation.** CTE exists because of North Carolina DOT. From the time CTE was established, NCDOT has provided the full match requirement for the Center’s federal grant. NCDOT’s transportation secretary chairs CTE’s advisory board. And the Department participates in all of CTE’s programs, but NCDOT’s new research partnership with the Center is perhaps the most innovative (see page 9). NCDOT is also the major supporter of CTE’s Graduate Research Fellowship and Summer Scholars programs. Each year, NCDOT decision makers, managers, and field staff introduce the environmental aspects of their profession to the undergraduate and graduate students who participate in these programs.

**Transportation Research Board.** TRB’s executive director serves on CTE’s advisory board. In addition, CTE’s technology transfer and information services programs help support the numerous activities of TRB’s environmental committees — from co-sponsoring events, to hosting committee Web sites, to producing video and Web presentations of meeting sessions. Furthermore, CTE’s Information Services coordinates closely with TRB’s Transportation Research Information Services (TRIS) to provide records of research in progress from EnvRIP, CTE’s Web-searchable database of environmental research in progress, for inclusion in TRIS databases.

**American Association of State Highway and Transportation Officials.** The chair of AASHTO’s Standing Committee on the Environment serves on CTE’s advisory board, and CTE has hosted the committee’s midyear meeting and engaged the participation of AAASHTO’s committee chairs, acting presidents, and executive director in the national teleconference series broadcasts.

**US Environmental Protection Agency.** If not for EPA’s Air Pollution Distance Learning Network (APDLN), CTE’s national teleconference series may not have emerged. In 1994 EPA allowed CTE to broadcast its first teleconference over the APDLN network, and while other downlink sites now receive CTE’s programs as well, this relationship continues today. EPA is also a regular participant of the teleconference panel discussions. Recently, EPA’s Transportation and Air Quality Office dedicated funding to CTE’s Mobility Challenge Initiative, and the TRAQ office is working with CTE to produce a teleconference on community-based clean air and transportation partnerships for the 2000-01 programming season.

**Institute for Transportation Research and Education, NC State University.** ITRE is home base to CTE’s operations. Established by the NC General Assembly in 1974 as a systemwide university transportation center, ITRE draws on the immense resources of the 16-campus University of North Carolina system and Duke University to pursue its research, education, and technical assistance initiatives. CTE and its clients benefit immensely from the rich pool of students, faculty, and technological resources that ITRE and the university community provide.

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The Transportation Equity Act for the 21st Century reauthorized the Center for Transportation and the Environment. While the annual federal grant was reduced slightly, the match requirement was increased from 80-20 to 50-50. CTE’s longtime partner, North Carolina DOT, provides the complete match requirement, as it has done since the Center’s establishment.

CTE’s 1999-00 budget totaled $1,372,000. These funds were dedicated to CTE’s programs accordingly:

- Research (46%)
- Technology Transfer & Information Services (32%)
- Education (18%)
- Administrative Services (4%)
- Administrative Services (8%)

Staff

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Director

James B. Martin, M.C.E., P.E.
Associate Director

Kathryn P. McDermott, M.A.
Program Director, Technology Transfer

Lisa J. Welner, M.S.L.S.
Program Director, Information Services

Lisa F. Rockwell, M.S.L.S.
Information Specialist

Jacqueline Berry-Haseeb
Administrative Assistant

Thomas D. Larson, Ph.D., P.E.
Program Consultant
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CTE is housed within the Institute for Transportation Research and Education on NC State University's Centennial Campus in Raleigh, NC. As one of more than 60 centers, institutes, and laboratories administered by the university, CTE reports directly to the Vice Chancellor for Research, Outreach, and Extension.

CTE Director John Fisher organized two committees to guide development of the Center’s programs and services. While these committees do not dictate Center policies or programs, they do provide a valuable resource by helping the Center to identify and address environmental issues of national concern to transportation professionals.

1999-00 Advisory Committee
The CTE Advisory Committee meets annually and is composed of representatives from government, academia, private, and non-profit sectors. The committee serves as a sounding board to CTE’s management team, who seeks the committee’s feedback on recent accomplishments and ideas for new activities. The committee members also help foster partnerships between the Center and key agencies and organizations vital to its mission.

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North Carolina DOT
Raleigh, NC

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Surface Transportation Policy Project
Washington, DC

Thomas D. Larson, Ph.D.
President
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Lemont, PA

Russ Lea, Ph.D.
Associate Vice Chancellor for Research
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The CTE Technical Committee meets at the discretion of the CTE director to assist with the development of the Center’s education program activities. To date, its activities have centered on the Graduate Fellowship and Summer Scholars programs; however, beginning in 2000-01, CTE will begin an initiative to expand its education program to meet the technical training needs of transportation and environmental professionals. It is anticipated that the membership of this committee (and its activities) will expand accordingly.

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Senior Scientist
National Exposure & Assessment Laboratory
US Environmental Protection Agency
Research Triangle Park, NC

Len A. Sanderson, P.E.
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M. Pat Strong, P.E.
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Following its reauthorization in TEA-21, CTE revitalized its research program. The Center’s new federal grant required a significant increase (from 80-20 to 50-50) in the match commitment. North Carolina DOT, CTE’s longtime partner, immediately stepped up to the plate. NCDOT provided the full match requirement and invited CTE to merge its research effort with the Department’s environmental research program, producing a more robust CTE/ NCDOT joint environmental research initiative.

Through this unique partnership, NCDOT manages the proposal solicitation process and administers all projects through its existing research program within the Department’s Research and Development Unit, which is part of the Statewide Planning Branch of the Planning and Environment Office. CTE’s director serves on the technical advisory committee and the individual research project committees. CTE’s education, technology transfer, and information services programs supply the R&D Unit with increased student involvement and more advanced communication and information technology resources.

This research partnership is designed to heighten awareness of CTE/ NCDOT environmental research project activities and to broaden distribution of project results. Furthermore, CTE’s involvement generates more opportunities for discussion of the Department’s environmental research activities and project results with its sister resource agencies, various stakeholder groups, and other state DOTs.

New Projects

In July 1999, NCDOT announced the first wave of projects to be designated as CTE/ NCDOT joint environmental research projects. While several of these projects were awarded prior to July 1999, they are considered “new” projects within the newly constructed CTE/ NCDOT research partnership. Wetlands and water quality issues remain a predominant research focus, although additional environmental topics important to NCDOT are addressed as well. Complete project descriptions are provided on CTE’s Web site at http://www.itre.ncsu.edu/cte/cterip.html.

Air Quality

Emissions Reduction Through Better Traffic Management

Investigators: Christopher Frey and Nagui Rouphail, North Carolina State University, Department of Civil Engineering

Performance Period: April 1, 1999 - June 30, 2001

Total Budget: $259,557
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Investigator: Ron Hughes, UNC-Chapel Hill, Highway Safety Research Center
Performance Period: July 1, 1997 - December 31, 1999
Total Budget: $77,727

Wildlife Management

Low Light Impediments to Fish Migration with Particular Emphasis on River Herring
Investigator: Mary Moser, University of North Carolina at Wilmington, Center for Marine Science Research
Performance Period: July 1, 1997 - November 30, 1999
Total Budget: $179,844

Wetlands and Water Quality

Erosional Scour in Coastal Sounds of Northeastern North Carolina
Investigator: Stanley Riggs, East Carolina University, Department of Geology
Performance Period: July 1, 1997 - June 30, 1999
Total Budget: $118,178

Completed Projects

Of the newly designated CTE/NCDOT environmental research projects, two were completed during 1999-00, and the final reports were posted on CTE’s Web site. A brief summary of the project results are provided below.

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To view or download the final report, go to http://www.itre.ncsu.edu/cte/rip_visualization.html#hughes.

To order a print copy of the final report, please submit your request to Jackie Berry-Haseeb at (919) 515-8893 or jberry-h@unity.ncsu.edu.
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Low Light Impediments to Fish Migration with Particular Emphasis on River Herring

Investigator: Mary Moser, University of North Carolina at Wilmington, Center for Marine Science Research

Pipes and box culverts are economical alternatives to bridge construction over small water bodies; however, low light levels inside these structures may prevent adult river herring from passing through them on the way to historical spawning areas upstream. The effects of pipes and culverts on herring migration behavior were investigated using gillnet sampling, acoustic observations, and experimental field manipulations. Light measurements indicated that lighting was lowest in corrugated metal pipes of <6' (1.8 m) diameter and was greatest at bridges that were at least 1 m (3.3 ft) off the water surface.

No river herring were captured during gillnet sampling at pipe and box culvert sampling sites in 1998; yet these fish were captured at bridge control sites. The absence of herring indicates that pipes and culverts may have contributed to the reduction of herring from the uppermost reaches of these streams; however, poor water quality may also be responsible. River herring on both the upstream and downstream ends of a box culvert were sampled in 1999 with the gillnets. Observations indicated that some of the fish were able to negotiate this very long culvert and that they needed minimal lighting to do so. Moreover, a higher percentage of fish migrated through this structure at night than during the day. This suggests that low light levels may indeed influence herring migration behavior in the vicinity of culverts during the day, but that some herring migrate at night and are therefore less impacted by the low lighting in culverts.

During experimental field manipulations, river herring chose to migrate through areas with ambient lighting, as opposed to experimentally darkened areas where light levels were reduced to less than 1% of ambient. However, there was no significant avoidance with lighting levels as low as 1% of ambient (based on continuous light measurements at the middle of the experimental structure). Therefore, use of structures that allow at least 1.4% of ambient light to their mid-point may reduce impacts of road crossings to herring migration.

To view or download the final report, go to http:// www.itre.ncsu.edu/cte/rip_wildlife.html#moser.

Ongoing Projects

CTE provided funding during 1999-00 to one unique research project that has been ongoing for more than four years. Because of this project’s importance to NC DOT, the principal investigator will submit future proposals for additional work phases directly to NC DOT through its existing proposal solicitation process. It is anticipated that this project will continue to be funded until its completion through the new CTE/ NC DOT joint environmental research program. A brief summary of the project and work completed to date is provided below.

Ecological Assessment of the Restored Wetlands of the Tulula Mitigation Bank (Phase III)

Investigators: Kevin K. Moorhead, Irene M. Rossell, C. Reed Rossell, Jr., and James W. Petranka, University of North Carolina at Asheville, Environmental Studies Program

Performance Period: May 1, 1999 - July 1, 2000

Total Budget: $75,883

The North Carolina Department of Transportation purchased a site in Graham County, NC, that will be used to mitigate wetland losses associated with highway projects in western North Carolina. A portion of this site contains degraded wetlands that will be restored for mitigation credit. The proposed restoration of Tulula Mitigation Bank wetlands includes realignment of more than 3,000 linear meters of Tulula Creek, removal of 4 ha of spoil, and revegetation of 15 ha of riverine swamp forest. For the past four years, the project team has worked closely with NC DOT to survey the ecological conditions across this site and implement small-scale restoration activities. The team has collected data on hydrology, soils, plant communities, and animal populations. During this phase of the project, the team is evaluating the effectiveness of the proposed large-scale site restoration to provide a comprehensive ecological assessment of the mitigation bank. This mitigation bank is the first of its kind in western North Carolina, and the first large-scale wetland restoration project in the Blue Ridge province.

This research is providing important information on the ecology of floodplain forests and mountain bogs, both of which are disappearing from North Carolina at an alarming rate. Since current restoration techniques are not always applicable to mountain systems, this research also is providing much-needed information on the restoration of wetlands, as well as on the design, implementation, and assessment of mitigation banks in this area. Wetland restoration projects rarely include an evalu-
Low Light Impediments to Fish Migration with Particular Emphasis on River Herring

Investigator: Mary Moser, University of North Carolina at Wilmington, Center for Marine Science Research

Pipes and box culverts are economical alternatives to bridge construction over small water bodies; however, low light levels inside these structures may prevent adult river herring from passing through them on the way to historical spawning areas upstream. The effects of pipes and culverts on herring migration behavior were investigated using gillnet sampling, acoustic observations, and experimental field manipulations. Light measurements indicated that lighting was lowest in corrugated metal pipes of 48" (1.2 m) diameter and was greatest at bridges that were at least 1 m (3.3 ft) off the water surface.

No river herring were captured during gillnet sampling at pipe and box culvert sampling sites in 1998, yet these fish were captured at bridge control sites. The absence of herring indicates that pipes and culverts may have contributed to the extirpation of herring from the uppermost reaches of these streams; however, poor water quality may also be responsible. River herring on both the upstream and downstream ends of a box culvert were sampled in 1999 with the gillnets. Observations indicated that some of the fish were able to negotiate this very long culvert and that they needed minimal lighting to do so. Moreover, a higher percentage of fish migrated through this structure at night than during the day. This suggests that low light levels may indeed influence herring migration behavior in the vicinity of culverts during the day, but that some herring migrate at night and are therefore less impacted by the low lighting in culverts.

During experimental field manipulations, river herring chose to migrate through areas with ambient lighting, as opposed to experimentally darkened areas where light levels were reduced to less than 1% of ambient. However, there was no significant avoidance with lighting levels as low as 14% of ambient (based on continuous light measurements at the middle of the experimental structure). Therefore, use of structures that allow at least 1.4% of ambient light to their mid-point may reduce impacts of road crossings to herring migration.

To view or download the final report, go to http://www.itre.ncsu.edu/cte/rip_wildlife.html#moser.

To view the Web presentation, go to http://carey078.itre.ncsu.edu/fishmigration.html. To order a copy of the videotape or a print copy of the final report, please submit your request to Jackie Berry-Haseeb at (919) 515-8893 or jberry-h@unity.ncsu.edu.

Ongoing Projects

CTE provided funding during 1999-00 to one unique research project that has been ongoing for more than four years. Because of this project’s importance to NCDOT, the principal investigator will submit future proposals for additional work phases directly to NCDOT through its existing proposal solicitation process. It is anticipated that this project will continue to be funded until its completion through the new CTE/ NCDOT joint environmental research program. A brief summary of the project and work completed to date is provided below.

Ecological Assessment of the Restored Wetlands of the Tulula Mitigation Bank (Phase III)

Investigators: Kevin K. Moorhead, Irene M. Rossell, C. Reed Rossell, Jr., and James W. Petranka, University of North Carolina at Asheville, Environmental Studies Program

Performance Period: May 1, 1999 - July 1, 2000
Total Budget: $75,883

The North Carolina Department of Transportation purchased a site in Graham County, NC, that will be used to mitigate wetland losses associated with highway projects in western North Carolina. A portion of this site contains degraded wetlands that will be restored for mitigation credit. The proposed restoration of Tulula Mitigation Bank wetlands includes realignment of more than 3,000 linear meters of Tulula Creek, removal of 4 ha of spoil, and revegetation of 15 ha of riparian floodplain forest. For the past four years, the project team has worked closely with NCDOT to survey the ecological conditions across this site and implement small-scale restoration activities. The team has collected data on hydrology, soils, plant communities, and animal populations. During this phase of the project, the team is evaluating the effectiveness of the proposed large-scale site restoration to provide a comprehensive ecological assessment of the mitigation bank. This mitigation bank is the first of its kind in western North Carolina, and the first large-scale wetland restoration project in the Blue Ridge province.

This research is providing important information on the ecology of floodplain forests and mountain bogs, both of which are disappearing from North Carolina at an alarming rate. Since current restoration techniques are not always applicable to mountain systems, this research also is providing much-needed information on the restoration of wetlands, as well as on the design, implementation, and assessment of mitigation banks in this area. Wetland restoration projects rarely include an evalu-
tion of functional performance. Long-term monitoring of this site will contribute information on the development of functional characteristics after establishing wetland structure.

The results of this work are being made available through published articles in peer-reviewed journals and through presentations to both the scientific community and the general public. Undergraduate education at UNCA is being enhanced through employment opportunities, class presentations by the principal investigators, and field research at the site. In addition, the project team anticipates that the Tulula Mitigation Bank wetlands will become a permanent research and demonstration area for UNCA and other interested parties.

The project team has established its own Web site on the Tulula Mitigation Bank wetlands project at http://www.unca.edu/tulula.

In several cases, CTE/NCDOT principal investigators have opted to publish their final research results in peer-reviewed journals, versus traditional final project reports. Accordingly, CTE provides bibliographic information on these articles on the Web, along with a list of additional related publications and presentations. Print copies of the final reports of CTE/NCDOT-sponsored research are available free of charge through CTE. Please submit your requests to Jackie Berry-Haseeb at (919) 515-8893 or jberry-h@unity.ncsu.edu.

List of Final Research Reports on CTE’s Web Site

During 1999-00, CTE improved access to its research information by not only posting descriptions of new project awards on its Web site, but also posting PDF versions of final project reports from previously funded research. The following reports are now available for view or download:

- Assessment and Management of Roadside Wildlife on I-40 in North Carolina (1999)
  http://www.itre.ncsu.edu/cte/rip_wildlife.html#bolen

  http://www.itre.ncsu.edu/cte/rip_wetlands.html#crqualls

  http://www.itre.ncsu.edu/cte/rip_visualization.html#hughes

  http://www.itre.ncsu.edu/cte/rip_wetlands.html#shearmalcom

- Economic Analyses of and Institutional Mechanisms for Wetlands Mitigation and Banking in North Carolina (1998)
  http://www.itre.ncsu.edu/cte/rip_wetlands.html#cob States

- Environmental Compliance Costs: Where the Rubber Meets the Road (1997)
  http://www.itre.ncsu.edu/cte/rip_economics.html#vksmith

- Impacts of Fines on Asphalt Mix Design (1996)
  http://www.itre.ncsu.edu/cte/rip_hwyconstruct.html#khosla

- Low Light as a Possible Impediment to River Herring Migration (1999)
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- Plant Communities of Some Southern Appalachian Bog-Forest Complexes (1998)
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- Probabilistic Evaluation of Mobile Source Air Pollution (1997)
  Volume 1: Probabilistic Modeling of Exhaust Emissions from Light Duty Gasoline Vehicles
  http://www.itre.ncsu.edu/cte/rip_airqlty.html#freyranjithan

- Using Socioeconomic Information to Assess Impacts of Surface Transportation in North Carolina Coastal Communities (1999/1996)
  Technical Report 1: Social, Cultural, and Economic Dependency on Fishery Resources in North Carolina Coastal Communities
  Technical Report 2: Community Studies
  Technical Report 3: Survey Results
  Technical Report 4: Monitoring Social Impacts of Surface Transportation Infrastructure Improvements
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- **Assessment of Highway Impacts on Ecological Function in Palustrine Forested Wetlands in the Upper Coastal Plain of North Carolina (1997)**
  http://www.itre.ncsu.edu/cte/rip_wetlands.html#crqualls

- **Developing Guidelines for the Use of Visualization in Project Design and Public Review (1999)**
  http://www.itre.ncsu.edu/cte/rip_visualization.html#hughes

- **Development of Guidelines for the Restoration of Forested Wetlands in North Carolina (1997)**
  http://www.itre.ncsu.edu/cte/rip_wetlands.html#shearmalcom

- **Economic Analyses of and Institutional Mechanisms for Wetlands Mitigation and Banking in North Carolina (1998)**
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At the turn of the century, CTE’s education program has reached a milestone. Nineteen exceptional graduate students, selected as CTE Graduate Research Fellows from 1994 through 1999, are now blazing new trails in their chosen fields of study. Twenty exceptional undergraduate and graduate students, selected as CTE Summer Scholars in 1997 and 1998, are either continuing or completing their chosen fields of study, and looking for job prospects.

Whether or not these students eventually select careers in transportation and the environment, their awareness of the dynamic relationship between mobility and the natural and human environment has been enhanced significantly as a result of their CTE experience, as well as their sensitivity to the profound challenges that await the next generation of professionals. While that, in itself, is worthy of mention, CTE encourages its graduate fellows and summer scholars to seriously consider careers in transportation and the environment. Accordingly, the Center will soon launch an alumni database to track more efficiently the first jobs and subsequent career choices of its students. An interview with one of CTE’s former graduate fellows (see page 20) and indicates how this experiential program has influenced one student’s career choice.

CTE will continue to promote the success stories of its former fellows and summer scholars through its Web site and various print publications, such as this annual report. Moreover, in the years ahead, CTE plans to expand its educational program to serve not only students, but also practicing professionals, who require on-demand training and professional development tools that keep them up to speed on proven practices and techniques for improving mobility and protecting the environment.

Graduate Research Fellowship Program

CTE’s GRF Program provides $15,000 annual research stipends to graduate students of diverse academic disciplines within UNC system schools and Duke University, who demonstrate a strong research interest in the relationship between surface transportation development and the environment.

During 1999-00, four exceptional graduate students initiated research projects related to their GRF awards. While these students and their projects were first introduced in the previous annual report, CTE invited the students to describe their recent accomplishments as CTE graduate research fellows:

Francis B. Biasi, Duke University
(Ph.D. Candidate, Landscape Ecology)

I focused my CTE fellowship research on the development and use of eco-blocks for conservation planning and assessment. This included researching the relevant literature on the effects of roads on wildlife and plant communities. I also developed and tested a general methodology for creating an eco-block datalayer. I drafted a
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Ryan S. King, Duke University
(Ph.D. Candidate, Community Ecology)

Since 1996, I have been actively conducting research on the effects of highway construction and operation on biota of wetlands of the coastal plain of North Carolina. My CTE fellowship allowed me to continue this research on tidal wetlands near Jacksonville, N.C., where a bypass of Highway 17 is under construction. Here, one wetland is being bisected by the four-lane highway, while two other relatively unimpacted wetlands are being monitored as control sites. The unique aspect of this study is that I have been able to collect data for two years prior to construction in addition to the almost two years during construction. Collaborating with other Duke researchers studying hydrology and water quality at these same sites, I have been monitoring aquatic macroinvertebrate and fish assemblages for the purpose of estimating the magnitude and spatial extent that construction has altered ecological integrity of this wetland ecosystem. Currently, I am in the latter stages of sample processing and data analysis. Preliminary results show a clear, but not overly dramatic, effect of construction on the wetland biota, particularly upstream of the crossing where a temporary causeway has restricted flow and isolated this area from downstream segments. Ultimately, the information produced from this study will be used to identify robust indicators of disturbance that will help managers cost-effectively assess wetland condition for the purpose of highway-related mitigation. Recommendations on construction practices that may alleviate impacts will also be considered. Recent publications related to this work include the following:


Jeffrey A. Masten, University of North Carolina at Chapel Hill
(Master’s Candidate, Urban and Regional Planning)

The objectives of my CTE fellowship research were to define how departments of transportation (DOT) can be more active mitigation bankers, to analyze policy and internal limitations to an effective DOT mitigation banking strategy, and to prescribe policy variables to be applied by mitigation banking stakeholders. Wetlands mitigation banking at the North Carolina Department of Transportation was used as the case study for this research. I have recently summarized my research and findings in a paper submitted to the Transportation Research Board for consideration for publication. The paper details the results of literature reviews of federal and state mitigation regulation and policy, personal interviews with federal and state stakeholders in the mitigation banking field, the development of a conceptual model used to analyze inter-agency interactions, and, finally, policy recommendations to support the conclusion that wetlands mitigation banking is a viable mitigation strategy at NCDOT. The results of the NCDOT case study show that the agency can be a more active mitigation banker. It has the physical assets and the institutional will to make the appropriate changes in its transportation project planning and internal operations to be a wetlands mitigation banking steward. Options include a more aggressive policy approach to solving internal streamlining issues and the development of a stronger trusting relationship with the Corps of Engineers. The analysis of NCDOT’s relationship with USACE has national implications. State DOTs need the support of the Federal Highway Administration in conflict resolution and as mitigation bank guarantors. As a final point, state agencies can support the communication between DOTs and regulatory agencies and act as non-conflicted proponents of statewide mitigation banking and environmental policy.

Angela Moreland, North Carolina State University
(Master’s Candidate, Forestry)

Through my CTE fellowship I was able to plan, write, and submit a proposal to NCDOT for a long-term project involving ecological evaluations of the effects of bridging activities on stream and riparian zones. Although the project was not approved for this fiscal cycle, I have gained the skills needed to submit accurate, in-depth proposal literature, project timelines, and budgets for large institutions and research operations. Having CTE as a resource partner has proven to be one of the most valuable benefits of being a CTE Fellow. The fellowship afforded me the opportunity to work with the NCSU Water Quality Group during the spring and summer of 2000 in order to develop sound ecological monitoring and restoration techniques. This allianc has produced a new thesis project for me that will begin in the fall of 2000. On a few occasions I assisted the Center with its teleconferences, which allowed me to meet important research and government officials dealing with the transportation/environmental concerns of today. Funding from CTE also allowed me to attend various transportation and environmental events, exposing me to new innovations as well as providing a great networking experience. All in all, many of the opportunities I have been offered through CTE have no dollar value, but they are great career building experiences that I could not have taken advantage of otherwise.

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The Student of the Year awards program is administered by the U.S. Department of Transportation Research and Special Programs Administration. RSPA asks each of its more than 30 university transportation centers to recognize the outstanding achievements of its students by electing a “student of the year.” Students are selected based on demonstrated technical merit and research, academic performance, professionalism, and leadership. Awarded students travel to the TRB Annual Meeting in Washington, D.C., where they are recognized during a formal ceremony.

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Summer Scholars Program

The CTE Summer Scholars Program introduces college students of diverse academic disciplines to the environmental aspects of surface transportation development. Students are selected competitively for this two-week program through a nationwide application process. CTE Summer Scholars visit project field sites where innovative mitigation efforts are underway; receive hands-on experience with technological tools, such as GIS and GPS, that are improving the environmental analysis of transportation projects; and meet with decision makers who are shaping the transportation and environmental policies of the next century.

In 1997 and 1998, a total of 20 students participated in the program. The Summer Scholars Program was not conducted in 1999 while CTE transitioned from its ISTEA grant period to its TEA-21 work plan. However, the program will resume in July 2000 when a select group of undergraduate students from across the country will travel with CTE to Pittsburgh, PA, to participate in the first Transportation and the Environment for the 21st Century national conference, co-sponsored by CTE in cooperation with several environmental committees of the Transportation Research Board.

Interview with Former CTE Graduate Research Fellow Marie W. Venner

Q. You were one of the first recipients of CTE’s graduate research fellowship award in 1995. What attracted you to the program?

I was working with the Department of Natural Resources in Georgia at the time, primarily conducting training around the state in wetlands and water quality. I had worked with Georgia DOT in the development of an erosion and sedimentation control class for DNRC law enforcement. When I decided to return to graduate school in North Carolina and focus on land use and transportation, CTE looked like a great match with my background and future interests.

Q. Did being a CTE graduate fellow provide you with any unique opportunities?

Definitely. As much as CTE did for me while I was in graduate school, I didn’t completely realize the unique opportunities it afforded me until afterwards. Initially I thought the CTE Graduate Research Fellow Program was just a wonderful scholarship and research opportunity. However, I learned the most through the state DOT environmental managers whom I met at AASHTO, TRB, and Connections meetings. Without CTE, I never would have been able to attend or participate in those events. Also through CTE, I was able to begin an affiliation with AASHTO’s Environmental Technical Assistance Program, for which I now serve as a wetlands and water quality specialist, increasingly covering threatened and endangered species issues as well. This has afforded me an extra reason to stay up to speed on the regulations, continue writing, and stay in touch with what individual DOTs are doing related to natural resources.

Q. What are you doing now professionally?

I am now managing the Natural Resources Unit at the Colorado Department of Transportation, which includes wetlands, water quality, threatened and endangered species, wildlife, and landscape specialists. I continue to serve as AASHTO’s wetlands and water quality specialist as well, which complements my other work. On the side, I’m serving on the Littleton Planning Commission.

Q. To what extent did your CTE fellowship help prepare you for your current position?

To a great extent! I can’t thank CTE enough. CTE helped me to enter into a national dialogue of what was going on in the natural resources field related to transportation development, first as a listener and now as both a contributing and a receiving member. That opportunity was invaluable and contributes to my current position on a continual basis.

Q. What do you find most intriguing about a career related to transportation and the environment?

It’s on the edge, between development, often the largest construction agency in the state with increasing project implementation pressures, and state and federal environmental regulations and public interest considerations. There are continual opportunities for innovation and improvement. The complexity of the regulations and issues we encounter and the need to continually improve predictability in project timelines and coordination among agencies is a continual challenge and a lot of fun, for the most part. I have to say, the other environmental program managers I’ve met are an inspiration, at FHWA and especially at state DOTs. Many are approaching their third decade of service, continually turning over projects in new ways, and coming up with new ideas. Perhaps impressively, they are using the pressures in this business, they retain their enthusiasm and commitment. I’ve benefited greatly from the knowledge and stories they’ve shared with me along the way.

Q. What role do you hope to play in the evolving relationship between transportation and the environment?

I hope to make a difference in improving environmental compliance, facilitating our evolving role at DOTs toward environmental stewardship and enhancement, and streamlining internal and external processes and coordination. I hope to be a part of growing information-sharing community among state DOTs as we work toward improving our environmental processes and on-the-ground results.

Q. What should the industry do to attract more students?

It seems a lot of people, including myself, are attracted to environmental fields. When we come to transportation, we have to learn that side. It seems since there are a lot more engineers in state DOTs than environmental staff, and since the environment comprises a smaller portion of the overall work, the reverse does not happen as often. From my vantage point, a big question is how to get education in environmental issues and regulations to the engineers. How do we increase awareness so that our chances of cooperation earlier and better are greater, and so we understand and are committed to a joint vision of both implementing transportation improvements in the most efficient way possible and fulfilling our environmental stewardship responsibilities as a public agency?

Q. What would you advise students considering a career in this area?

If problems intrigue you, you’re creative, you like working in an interdisciplinary field, and you don’t mind controversy, this could be the field for you!

Q. Any final thoughts?

Thank you again to CTE for facilitating my being in the right place at the right time, and providing so many learning opportunities and an introduction to this community. Graduating debt free was fantastic! I hope that I have continued contact with CTE in the future and to have a chance to give back some of what I’ve been given.

Marie W. Venner manages the Natural Resources Unit for the Colorado Department of Transportation. She was a CTE Graduate Research Fellow from 1995-1997. Marie received her B.A. in international affairs and environmental conservation from the University of Colorado at Boulder and her M.A. in regional planning from the University of North Carolina at Chapel Hill.
Summer Scholars Program

The CTE Summer Scholars Program introduces college students of diverse academic disciplines to the environmental aspects of surface transportation development. Students are selected competitively for this two-week program through a nationwide application process. CTE Summer Scholars visit project field sites where innovative mitigation efforts are underway, receive hands-on experience with technological tools, such as GIS and GPS, that are improving the environmental analysis of transportation projects, and meet with decision makers who are shaping the transportation and environmental policies of the next century.

In 1997 and 1998, a total of 20 students participated in the program. The Summer Scholars Program was not conducted in 1999 while CTE transitioned from its ISTEA grant period to its TEA-21 work plan. However, the program will resume in July 2000 when a select group of undergraduate students from across the country will travel with CTE to Pittsburgh, PA, to participate in the first Transportation and the Environment for the 21st Century national conference, co-sponsored by CTE in cooperation with several environmental committees of the Transportation Research Board.

Interview with Former CTE Graduate Research Fellow Marie W. Venner

Q. You were one of the first recipients of CTE’s graduate research fellowship award in 1995. What attracted you to the program?

I was working with the Department of Natural Resources in Georgia at the time, primarily conducting training around the state in wetlands and water quality. I had worked with Georgia DOT in the development of an erosion and sedimentation control class for DNR law enforcement. When I decided to return to graduate school in North Carolina and focus on land use and transportation, CTE looked like a great match with my background and future interests.

Q. Did being a CTE graduate fellow provide you with any unique opportunities?

Definitely. As much as CTE did for me while I was in graduate school, I didn’t completely realize the unique opportunities it afforded me until afterwards. Initially I thought the CTE Graduate Research Fellow Program was just a wonderful scholarship and research opportunity. However, I learned the most through the state DOT environmental managers with whom I met at AASHTO, TRB, and Connections meetings. Without CTE, I never would have been able to attend or participate in those events. Also through CTE, I was able to begin an affiliation with AASHTO’s Environmental Technical Assistance Program, for which I now serve as a wetlands and water quality specialist, increasingly covering threatened and endangered species issues as well. This has afforded me an extra reason to stay up to speed on the regulations, continue writing, and stay in touch with what individual DOTs are doing related to natural resources.

Q. What are you doing now professionally?

I am now managing the Natural Resources Unit at the Colorado Department of Transportation, which includes wetlands, water quality, threatened and endangered species, wildlife, and landscape specialists. I continue to serve as AASHTO’s wetlands and water quality specialist as well, which complements my other work. On the side, I’m serving on the Littleton Planning Commission.

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Communication is the cornerstone of CTE's technology transfer program. New research, policies, and best practices that have the greatest potential for successful implementation emerge from purposeful communication that engages a broad range of relevant perspectives. Balancing the public's demand for improved mobility and a protected environment is a profoundly complex task that can be executed more efficiently if enhanced communication and coordination among transportation and environmental professionals is achieved.

Since its inception, CTE's technology transfer program has strived to develop opportunities that facilitate transportation and environmental professionals' ability to discuss current technical and policy issues of national concern. Through satellite, the Web, and traditional face-to-face interactions, CTE uses the most appropriate mix of media and technologies to cultivate enhanced communication and collaboration.

A core service of CTE's technology transfer program is the national teleconference series. For six years CTE's teleconferences have offered transportation and environmental professionals a unique opportunity to discuss the most pressing issues of the day. These "virtual" symposia, which are broadcast live via satellite from N.C. State University's television studios, bring together technical and policy experts from throughout the country to explore environmental concerns related to surface transportation development with a national audience of governmental, academic, non-profit, and private sector representatives. The series has become an important resource particularly to TRB committees and federal agencies seeking to expand their outreach activities related to new research results, proposed regulations, policies, and best practices. The series is also an effective platform for agencies and organizations desiring to showcase successful partnerships and innovations.

An average of 200 downlink sites in the U.S., Canada, and Puerto Rico preregister to receive CTE's broadcasts, including more than 120 sites comprising the US Environmental Protection Agency's Air Pollution Distance Learning Network (APDIN). CTE began simulcasting its broadcasts over the Web in 1998 to increase access to the teleconferences for students and practitioners. CTE also moderates the library CTEWEBICAST to support the technical and information needs of its webcast participants. The webcasts are archived on CTE's Web site for replay, and the programs are also available on videotape. To date, more than 3,500 videotapes have been distributed internationally, and nearly 10,000 hits have been recorded on CTE's webcast archive.

This year, in its continual effort to increase awareness of the teleconferences, CTE began promoting its broadcasts through the Environmental News Network and Chronicle of Higher Education. ENN is a portal for global environmental information and services, and maintains a calendar of events for its affiliate members.
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National Teleconference Series
www.itre.ncsu.edu/cte/cte-teleconference.html

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"Your efforts were very well organized. Thank you again for inviting me. I found the whole experience very rewarding."

Chris Servheen, US Fish and Wildlife Service (CTE teleconference panelist)
During 1999-00, CTE's technology transfer program produced four live satellite broadcasts with Web simulcasts. A total of 1,827 videotapes of these programs, and programs from previous years, were distributed. Individuals representing more than 30 agencies and organizations served as panelists, either at N.C. State University’s television studios in Raleigh, N.C., or at George Washington University Television in Washington, DC. More than 1,800 individuals were reported to have participated in the live broadcasts at the pre-registered downlink sites; however, this represents only a fraction of the total participation for the 1999-00 season, which CTE estimates to be in excess of 5,000 students, practitioners, and policy makers. In addition, 985 individuals connected to the live Internet simulcasts, with a total of 132 watching the webcasts continuously from start to finish.

Following is a summary of the people and issues featured in CTE’s 1999-00 national broadcasts:

**Implementing the Environmental Streamlining Provisions of the Transportation Equity Act for the 21st Century. Broadcast August 10, 1999.**

This program examined the federal strategy for implementing the environmental streamlining provisions of the Transportation Equity Act for the 21st Century (TEA-21). The US Department of Transportation and its partner agencies introduced the new provisions and discussed the various initiatives underway to guide the implementation process. Case studies of regional and state approaches to implementation were also featured, as well as stakeholder response to the various initiatives.

**Moderator:**
Charles H. Thompson, Transportation Secretary, State of Wisconsin; Chair, Standing Committee on the Environment, American Association of State Highway and Transportation Officials

**Panel (Raleigh, NC):**
- Gloria Jeff, Deputy Administrator, Federal Highway Administration, US Department of Transportation
- Abbe Marner, Environmental Scientist, Federal Transit Administration, USDOT
- Michael McCabe, Regional Administrator, USEPA - Region 3
- Brad Mallory, Transportation Secretary, State of Pennsylvania
- Hal Kasouf, Highway Program Area Manager, Parsons Brinckerhoff

**Discussants (Washington, DC):**
- Anne Miller, Deputy Director, Office of Federal Activities, US Environmental Protection Agency
- Ray Klimetz, Executive Director, Surface Transportation Policy Project
- John Fowler, Executive Director, Advisory Council on Historic Preservation
- John Studt, Chief, Regulatory Branch, US Army Corps of Engineers Headquarters
- Don Peterson, Transportation Environmental Coordinator, Fish & Wildlife Service, US Department of the Interior

**Best Practices in Wetland Mitigation and Stream Restoration.**

Broadcast October 5, 1999.

This program presented case studies which have been successful in meeting restoration and mitigation objectives, while remaining compatible with highway project needs and constraints, and discussed different approaches to the design and construction of mitigation projects. Several case studies from the Pacific Northwest, Northeast, and Southeast were featured. Representatives from the private and public sectors shared their stories about the challenges and successes related to the wetland and stream mitigation efforts undertaken in these regions.

**Moderator:**
Dr. Paul Garrett, Senior Ecologist, FHWA Headquarters, US Department of Transportation

**Panel:**
- Charles B. Adams, Director, Office of Environmental Design, Maryland State Highway Administration
- V. Charles Bruson, Ph.D., Asst. Branch Mgr., Environmental Planning, North Carolina DOT
- Gary S. Davis, Biology Program Manager, Washington State DOT
- Albert Garlo, Senior Scientist, Normandeau Associates
- Russell LaFayette, Natl. Riparian/ Wetlands Coordinator, USDA Forest Service
- Robbin B. Sotir, President, Robbin B. Sotir & Associates, Inc.

* Nearly 20% of all pre-registered downlink sites report back to CTE after each broadcast. Of these, less than half indicated the organizational affiliation of the program participants, although CTE estimates the distribution of affiliations to mirror the percentages above.
The Chronicle of Higher Education recently created a calendar of academic webcasts and chats for the university community. CTE continues to promote the teleconferences through USDOT and other transportation-specific calendars (e.g., http://www.fhwa.dot.gov/training.html).

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Who Watched CTE Teleconferences in 1999-00?

<table>
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<tr>
<th>Category</th>
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<td>Other</td>
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Produced in cooperation with the TRB Public Involvement in Transportation Committee, this program focused on the role of community impact assessment (CIA) techniques in the transportation planning and project development process. CIA is defined as “a process to evaluate the effects of a transportation action on a community and its quality of life” which is integral to meeting the contemporary objectives of the National Environmental Policy Act (NEPA). A panel discussion featured federal, state, and local experts and informative presentations from a number of “case study” communities.

Panel:
- Eugene Cleckley, Director, FHWA Southern Resource Center
- Thomas F. Barry, Jr., Secretary, Florida Department of Transportation
- David S. Boyd, AICP, Planning & Information Services Director, East-West Gateway Coordinating Council
- Dennis R. Pescitelli, Deputy Director, Planning and Programming, Illinois DOT
- Sue Schwartz, AICP, Community Planner, Housing and Community Development, City of Greensboro, NC
- Larry Jackson, Sr., Managing Editor, The Portland Observer

Moderator:
Marcy Schwartz, Chair, TRB Committee on Public Involvement in Transportation (A1D04), and Vice President, Transportation Technologies, CH2M Hill


The Mobility Challenge Initiative

The Mobility Challenge: Moving Beyond Conflict project is a national education initiative targeted to students, professionals, policy makers, and the general public. The project will chronicle the dynamic and evolving relationship between surface transportation development and the environment, and showcase the people, projects, policies, and practices influencing this relationship into the 21st century.

The goal of the Mobility Challenge is to demonstrate how transportation and environmental communities are coming together to balance the public’s demand for improved mobility without degrading the natural and human environment. Accordingly, the project will spotlight creative partnerships and technological advancements that represent the best combinations of engineering excellence and environmental stewardship.

During 1999-00, CTE continued its efforts to increase awareness of the project and meet with representatives of agencies and organizations who may be potential project advisors, advocates, and sponsors. This year CTE successfully secured $50,000 in seed funding for the project from The U.S. Department of Transportation (Federal Highway Administration) and the U.S. Environmental Protection Agency (Office of Transportation and Air Quality). CTE plans to solicit additional monies from foundations and the corporate sector.

The first product generated will be the Mobility Challenge Web site, which will feature a timeline of milestones covering the past 250 years of our nation’s history, exemplary project case studies, and profiles of the people who are positively shaping the transportation/environmental relationship. The Web site is expected to be launched in the spring of 2002. Additional Mobility Challenge products will include an HD TV public television documentary, CD-ROM and book, and teacher’s guide for K-12. Stay tuned!

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Produced in cooperation with the US Department of Transportation, this program described the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) proposed rules for statewide and metropolitan planning, National Environmental Policy Act (NEPA) implementation, and intelligent transportation systems (ITS). FHWA and FTA planned an extensive outreach process to ensure that all interested stakeholders were made aware of the proposed rules. This teleconference was a key element of the outreach process, and the panelists’ responses to the questions posed by the national audience were included in the federal docket.

Moderator:
Sarah Siwek, President, Sarah J. Siwek & Associates

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Support to the CTE/NCDOT Environmental Research Program

CTE’s technology transfer program works closely with NCDOT’s Research and Development Unit, and Project Development and Environmental Branch, to ensure that CTE/NCDOT environmental projects receive high visibility, and that research findings are discussed and shared widely with transportation and environmental professionals.

Establishing an Identity

During 1999-00, CTE established a distinct identity for the joint CTE/NCDOT research program, producing updated report covers, letterhead, and other materials illustrating the new partnership. In addition to producing and distributing final technical reports, CTE also posted descriptions of the projects on its Web site, including biographical sketches of the principal investigators. Final reports submitted to CTE/NCDOT in 1999-00 were scanned and posted on the Web in PDF format. (Final reports from previous CTE-funded research were posted on the Web as well.) Moreover, profiles of ongoing CTE/NCDOT research projects are being featured regularly in the Center’s quarterly newsletter, CTE News & Notes.

Fostering a Dialogue About Research Results

In addition to establishing an identity for the CTE/NCDOT environmental research program, CTE was invited to co-host two of the Department’s monthly inter-agency permit review meetings. CTE’s role was to introduce the meeting attendees (who included representatives from NCDOT headquarters and division offices, NC Department of Environmental and Natural Resources, NC Wildlife Resources Commission, US Fish and Wildlife Service, and US Army Corps of Engineers) to CTE’s new research partnership with NCDOT and to feature several high profile projects.

On November 18, 1999, participants of NCDOT’s inter-agency permit review meeting were invited to NCSU Centennial Campus to watch a pre-taped video presentation of Dr. Mary Moser’s preliminary research results for the CTE/NCDOT project titled, Low Light Impediments to Fish Migration with Particular Emphasis on River Herring. Dr. Moser, who had recently accepted a new job in Washington State, participated in the forum remotely by phone. CTE produced Dr. Moser’s video presentation and also videotaped her subsequent discussion of the research results with the meeting participants. CTE produced a Web presentation of the forum (http://carey078.itre.ncsu.edu/fishmigration.html) and distributes the videotape upon request.

On December 9, 1999, NCDOT’s inter-agency permit review group again convened on NCSU’s Centennial Campus. After the group conducted its normal business meeting, CTE introduced them to three environmental research projects focused on wetlands mitigation in North Carolina. The project principal investigators provided brief presentations and answered questions from the meeting participants.

Both of these events highlight NCDOT’s commitment to make its division staff and sister resource agencies more aware of the research being sponsored by the Department in conjunction with CTE, and equally important, to engage them in a dialogue about the implications of environmental research results on future transportation planning and project development activities.

Increasing Meeting Efficiency Through Technology

During 1999-00, CTE’s technology transfer program was approached by NCDOT to examine how the Center’s expertise in communications technologies could be used to relieve the extensive travel and cost burdens experienced by the inter-agency permit team, who must travel to Raleigh twice monthly from various locations throughout the state. In March 2000, CTE facilitated a meeting between NCDOT and NCSU to introduce the Department to various distance learning and videoconferencing resources, which could replace traditional face-to-face meetings without compromising the quality and productivity of the participants’ interactions. CTE is currently working on a draft prospectus for the Department, outlining various desktop- and classroom-based videoconferencing options available to them with recommendations for implementation.

Participation in Local, Regional, and National Events

CTE actively seeks opportunities to co-sponsor and/ or participate in events that address the Center’s mission. During 1999-00, CTE’s technology transfer program committed its financial, professional, and technological resources to the following events:

NCSU Instructional Technologies Expo (Local Exhibit), September 22, 1999

In September 1999, CTE participated in NCSU’s annual Instructional Technologies Expo, which showcases distance learning and instructional technologies innovations emerging from the NCSU community. CTE provided a demonstration of the unique combination of university-based technologies and partnerships that make possible the Web simulcasts of its national teleconference series broadcasts.

Second Annual TRB Transportation Education Forum (National Workshop), January 9, 2000

Organized and hosted by TRB’s Transportation Education and Technology Transfer committees, this forum showcased new technologies utilized to enhance the continuing education and professional development of transportation professionals. CTE was invited to present and discuss the satellite- and Web-based technologies supporting its national teleconference series.

“These research findings will be very beneficial to us as we move forward to balance roadbuilding with environmental sensitivity.”

Dr. Charles Bruton, Assistant Branch Manager, Natural Systems Unit, NCDOT Project Development and Environmental Analysis Branch.
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Fostering a Dialogue About Research Results

In addition to establishing an identity for the CTE/NCDOT environmental research program, CTE was invited to co-host two of the Department's monthly inter-agency permit review meetings. CTE's role was to introduce the meeting attendees (who included representatives from NCDOT headquarters and division offices, NC Department of Environment and Natural Resources, NC Wildlife Resources Commission, US Fish and Wildlife Service, and US Army Corps of Engineers) to CTE's new research partnership with NCDOT and to feature several high profile projects.

On November 18, 1999, participants of NCDOT's inter-agency permit review meeting were invited to NCSU Centennial Campus to watch a pre-taped video presentation of Dr. Mary Moser's preliminary research results for the CTE/NCDOT project titled, Low Light Impediments to Fish Migration with Particular Emphasis on River Herring. Dr. Moser, who had recently accepted a new job in Washington, State, participated in the forum remotely by phone. CTE produced Dr. Moser's video presentation and also videotaped her subsequent discussion of the research results with the meeting participants. CTE produced a Web presentation of the forum (http://carey078.itre.ncsu.edu/fishmigration.html) and distributes the videotape upon request.

On December 9, 1999, NCDOT's inter-agency permit review group again convened on NCSU's Centennial Campus. After the group conducted its normal business meeting, CTE introduced them to three environmental research projects focused on wetlands mitigation in North Carolina. The project principal investigators provided brief presentations and answered questions from the meeting participants.

Both of these events highlighted NCDOT's commitment to make its division staff and sister resource agencies more aware of the research being sponsored by the Department in conjunction with CTE, and equally important, to engage them in a dialogue about the implications of environmental research results on future transportation planning and project development activities.

Increasing Meeting Efficiency Through Technology

During 1999-00, CTE's technology transfer program was approached by NCDOT to examine how the Center's expertise in communications technologies could be used to relieve the extensive travel and cost burdens experienced by the inter-agency permit team, who must travel to Raleigh twice monthly from various locations throughout the state. In March 2000, CTE facilitated a meeting between NCDOT and NCSU to introduce the Department to various distance learning and videoconferencing resources, which could replace traditional face-to-face meetings without compromising the quality and productivity of the participants' interactions. CTE is currently working on a draft prospectus for the Department, outlining various desktop- and classroom-based videoconferencing options available to them with recommendations for implementation.

Participation in Local, Regional, and National Events

CTE actively seeks opportunities to co-sponsor and/or participate in events that address the Center's mission. During 1999-00, CTE's technology transfer program committed its financial, professional, and technological resources to the following events:

NCSU Instructional Technologies Expo (Local Exhibit), September 22, 1999

In September 1999, CTE participated in NCSU's annual Instructional Technologies Expo, which showcases distance learning and instructional technologies innovations emerging from the NCSU community. CTE provided a demonstration of the unique combination of university-based technologies and partnerships that make possible the Web simulcasts of its national teleconference series broadcasts.

Second Annual TRB Transportation Education Forum (National Workshop), January 9, 2000

Organized and hosted by TRB's Transportation Education and Technology Transfer committees, this forum showcased new technologies utilized to enhance the continuing education and professional development of transportation professionals. CTE was invited to present and discuss the satellite- and Web-based technologies supporting its national teleconference series.
In the Aftermath of Hurricane Floyd: Recovery in the Coastal Plain (Regional Conference), May 24-26, 2000

In 1999 Hurricane Floyd and its floods devastated eastern North Carolina. This conference, organized and hosted by East Carolina University in Greenville, N.C., brought together nearly 300 governmental, academic, non-profit, and private sector representatives to participate in roundtable discussions on such topics as extended recovery response, floodplain management, distribution of risks and benefits, sustainable recovery, and domains of responsibility. The outcome of these sessions was a set of policy recommendations that will continue the dialogue on how North Carolina can become more resilient in the wake of extreme natural disasters. CTE's director served on the conference planning committee. CTE provided financial support for this event, conducted registration, produced the print publications (e.g., registration flyer, final program, posters), assisted with local publicity, and provided on-site support. In addition, CTE identified an NCDOT representative to discuss transportation issues at the floodplain management roundtable discussion.

Stormwater Management Initiative 2000 (Statewide Workshop), June 23-24, 2000

This was the fourth of several stakeholder meetings conducted in response to the NC Environmental Management Commission’s directive to local governments, environmental groups, developers, and others to frame a consolidated and comprehensive approach to stormwater management. Results of the stakeholder process are to be presented to the Commission in October 2000. The meetings, held at various locations throughout the state, are sponsored by the N.C. Department of Environment and Natural Resources. CTE hosted the Raleigh stakeholder meeting at the Jane S. McKimmon Center on NCSU’s Centennial Campus.

Transportation and the Environment for the 21st Century (National Conference)

This event marks the first gathering of more than a dozen TRB environmental committees to explore a broad range of environmental issues related to surface transportation development. CTE was invited to be a co-sponsor of this first-of-its-kind national event, scheduled for July 24-26, 2000, in Pittsburgh, PA. CTE’s director has been invited to serve on the conference planning committee.

Special Projects

In July 1999, CTE was approached by the chair of the TRB Waste Management in Transportation Committee to assist the committee with exploring how to use Web streaming technologies to broaden dissemination of technical information presented at the committee’s 1999 midyear meeting in Denver, CO. The committee videotaped two presentations and requested CTE’s help with converting the video to Web-based presentations. CTE undertook this effort as a special technology transfer project. It represented the first attempt by a TRB environmental committee to utilize Web streaming as a means of sharing valuable technical information generated from its midyear meetings with a larger audience of transportation and environmental professionals. CTE produced the Web presentations, which are located at http://carey078.itre.ncsu.edu/trbsummermtg.html and also linked from the committee’s CTE-hosted Web site at http://trencsu.edu/A1007/a1007.htm. In addition, CTE’s technology transfer director and the A1007 committee chair presented a poster presentation on this initiative at the TRB Annual Meeting in Washington, DC, on January 11, 2000, as part of a poster session sponsored by the TRB Environmental Analysis in Transportation Committee.

CTE will continue to lend its support to TRB and other organizations that wish to use Web streaming and other communications technologies either to increase awareness about their transportation and environmental initiatives or to initiate a dialogue about those initiatives with a larger audience. For example, TRB’s Public Involvement in Transportation Committee recently contacted CTE’s technology transfer program about adding a video Web component to its 2001 annual meeting demonstration session.

Distribution of Technology Transfer Materials

CTE’s technology transfer program responds to requests for videotapes of the national teleconferences, CTE/NCDOT final research reports, and CTE-produced publications, such as the annual report and quarterly newsletter (CTE News & Notes). While all of these materials are available in electronic format on the Web, hard copy versions remain in demand. During 1999-00, the following materials were distributed upon request. The pie charts below illustrate the number and types of materials distributed as well as the professional affiliations of the individuals requesting those materials. During 1999-00, a total of 1,078 technology transfer program materials were distributed in response to 400 individual requests.

- Videotapes (729)
- Research Reports (279)
- Other (e.g., referrals, teleconference handouts, etc.) (171)

- Federal Agencies (121)
- States Agencies (318)
- International Groups* (309)
- Local Agencies/ MPOs (619)
- Environmental Advocacy Groups (171)
- Universities (279)
- Private Firms (159)

*International requests came primarily from international and government agencies.
in China, Yugoslavia, Russia, Pakistan, Japan, Canada, and Australia.

Distributions of Technology Transfer Materials: 1999-00

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Information Services

To support the mission of providing timely and accurate information for good decision making, CTE Information Services (CTE-IS) set four ambitious goals in the strategic plan: (1) lead the development of online resources, (2) deliver value-added information, (3) track, document, and collect information resources, and (4) support information literacy and information technology literacy. As the following narrative illustrates, CTE-IS has met the challenges set by these four goals and succeeded during a year of exciting developments and change.

For CTE-IS this year represented a renewed commitment to client services and a standard of excellence. It was also a time to explore new opportunities in contract work, primary research, and other special projects.

With a four-year proven track record CTE-IS has established a solid knowledge base and a network of informal, reciprocal partnerships with agencies and libraries. These advantages assure that CTE-IS continues to meet client needs while pursuing and winning contract projects. For example, the past year saw a growing demand for solutions to wildlife issues in transportation. CTE-IS proactively tracks the latest literature and trends in wildlife ecology and posts extensive bibliographies on the CTE Web site, rather than wait for individual requests. These bibliographies are among the most heavily used Web pages on the CTE site, generating several requests per week for documents or more detailed information. By posting the information before clients request it, CTE-IS is able to serve a wider audience more quickly and effectively. Rather than responding to each request with an individualized database search, CTE-IS can generate custom results from its own extensive database of wildlife ecology literature. A task that would have taken hours to complete in the past can be accomplished in minutes. Thus, through the use of Web technology, Information Services’ products are helping a larger audience without increasing the department’s workload. It is this efficiency of scale that allows the department to expand services while maintaining the same staffing level of two full-time information professionals.

Past successes have led to requests to take the department’s services to the next level. In addition to continuing to provide quality database searches and literature reviews, CTE-IS expanded its informal survey work to a more rigorous process with a special survey project on wetland mitigation policies and procedures for North Carolina DOT. Similarly, the success of the department’s database of environmental research in progress, EnvRIP, generated a contract from FHWA’s Environmental Research Program to create a similar product to track and disseminate information about their funded research. Awarded in August 1999, the FHWA contract for $50,000 is CTE’s first.

This overview only hints at the developments in CTE-IS department. Read on for details and examples of what has made the past year exciting and full of promise.

Thanks so much for the link to the document on the web! It will be very useful, as questions about available abstracts are posed several times per year. I’ll keep the link and check it for updates. Thanks again for sending the abstracts at this time, but I forgot to let them sit for a while.

A. Milliken
RideArrangers Div.
Denver Regional Council of Governments
(Written bibliography with reference to transportation control measures)
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Leading the development of online resources

The most visible among CTE-IS accomplishments is the complete redesign and reorganization of the Center’s Web site at http://www.itre.ncsu.edu/cte/. This six-month initiative was led by the director of Information Services and an N.C. State computer science student with professional Web design experience. The new format and images convey the Center’s commitment to environmental solutions for transportation projects. Visually pleasing and logically navigable, the site invites the end-user to explore the content, which includes the full range of services and resources CTE offers plus full text of papers and reports not available in print and selected links to reviewed Web sites. Clearly, CTE emphasizes reliable, quality information but recognizes the importance of presenting it in an accessible format. Furthermore, the redesign was planned with a vision toward new services and resources that CTE may offer in the next few years.

Behind the scenes of the Web site is a new, robust Windows NT Web server, CTE’s investment in technology in the interest of serving clients. With this system and specialized software packages, CTE is able to offer full text of research results and searchable databases such as EnvRIP, Environmental Research in Progress. In anticipation of the increasing importance of the Web as a primary means of disseminating CTE’s products and services, more CTE staff members are mastering Web markup and graphics. The director of Information Services has accepted the additional responsibility of Web server administrator.

The hardware upgrades also accommodate CTE’s increased support of Web sites for TRB Environmental Committees. CTE-IS continues to host the Web sites for A1F02 Environmental Analysis in Transportation and A1F07 Waste Management in Transportation while adding a third committee, A1F05 Historic and Archeological Preservation in Transportation.

An additional feature on the Web site is a new two-minute movie interpreting CTE’s mission and vision. This multimedia presentation has also been broadcast during teleconference intermissions and other CTE presentations to promote the Center’s message in a high-tech format.

In the immediate future CTE-IS will focus on expanding the depth and breadth of information, especially full text resources, available through the Web site. For example, many newsletters and electronic discussion groups make reference to recent court decisions or regulatory changes without providing the complete text or direct URLs to the information. CTE-IS will explore an efficient means to identify electronic versions of such legal and regulatory documents in order to assure rapid dissemination of complete information. In addition, CTE-IS will continue to expand access to electronic full text of environmental information by recommending selected publications for inclusion in the National Transportation Library’s online collection maintained by the Bureau of Transportation Statistics.

Long-term plans include possible development of an enterprise information portal (EIP) to deliver client-customized information to the desktop. Portals are Web-based interfaces designed to deliver heterogeneous, filtered, and personalized content to clients. Advantages of this method of information delivery include seamless, single search access to heterogeneous sources; content organization suitable for browsing, personalization of the client’s view into the contents; and a mechanism for alerting users about new content that meets their selection criteria. Portals can also incorporate collaborative features that allow teams of users to conference together or manage and share documents. CTE-IS envisions applying the portal concept to core client groups by creating interfaces customized according to the clients’ professional interests and needs. For example, separate content ‘views’ would be created for wetland scientists, wildlife biologists, air quality specialists, and other environmental specialists. CTE-IS tracks trends in information technology to apply the best solutions to clients’ information needs.

Delivering Value-Added Information

Value-added information has been the hallmark of CTE-IS from its inception. Whether responding to a simple ready reference question such as “Can you give me a list of recent publications on stream restoration by David Rosgen?” or designing a complex survey instrument, CTE-IS guarantees quality information.

On demand, custom database searches and literature reviews continue to be the cornerstone of CTE-IS and remain much in demand. As already mentioned, these services have been streamlined by posting selected bibliographies for frequently requested topics on the Web site. CTE-IS staff then encourages clients to review the online bibliographies first before discussing the additional, custom searches they may require. Client reaction to this approach has been uniformly positive.

Another value-added feature that clients truly appreciate is the synthesis of findings that are included with each literature review. The specific nature of many search requests is such that often only a few paragraphs or a single chart from a long report pertains to a client’s question. In these cases, CTE-IS lists the publication in the literature review but also extracts and summarizes the pertinent information. Clients appreciate the savings in time and effort that these summaries represent.

The spontaneous comments from clients assure CTE-IS that it is offering the right services.

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“Several months ago you and your colleagues conducted a search pertaining to waste management in transportation for the A1F07’s Subcommittee for Research. The document you put together was wonderful. Not only was I impressed with your willingness to help out in any way possible, I was even more excited about the final product. We routinely have literature reviews run for us . . . by a variety of folks. Yours was by far the most thorough and organized I have received (for me) to date. I cannot thank you enough for your help and good work.”

Michael Fitch
Virginia Transportation Research Council

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Tracking, Documenting, and Collecting Information

Believing that knowing where to find the information when it is needed is more critical than developing a large collection of print resources, CTE-IS has focused considerable effort on tracking, documenting, and collecting information about research in progress, which is far more elusive than published reports.

EnvRIP, the CTE-sponsored database of environmental research in progress, is now one of CTE's established services. During the second half of 1999, CTE-IS identified 107 new environmental research projects in progress of interest to transportation professionals and updated the status of 124 existing database records. This was accomplished through a diligent phone and email campaign to gather this information from state DOT Research and Development Units, university transportation centers, and other federal and private research organizations. Beginning in late spring of 2000, CTE-IS initiated another round of updates.

The value of the EnvRIP service is apparent from the fact that the director of TRB's Transportation Research Information Services (TRIS) requests EnvRIP records for inclusion in TRB's database of research in progress. In addition, CTE-IS has, on several occasions, generated custom reports for other organizations, such as Montana DOT's Research and Development Program and the Surface Transportation-Environment Cooperative Research Program (STECRP).

In three years CTE-IS has achieved its long-term goal of converting EnvRIP from a biennial print product to a Web-searchable database with frequent updates. The benefits of the Web-searchable database are numerous: global access to critical information about environmental research in progress, results tailored to the clients' interests, and the capability for regularly scheduled updates. As an additional feature, CTE-IS is investigating a system whereby researchers can submit changes and new projects via the Web.

Recent Requests for Literature Reviews and Database Searches

- Data on ridesharing and vehicle occupancy
- Impacts of highway noise on recreation
- Stormwater management practices for karst areas, caves or sinkholes
- Environmental impact of leachates from milled asphalt
- Chemistry and toxicology of road dust and street sweepings
- Use of recycled and waste materials in transportation
- Methods of removing, treating or disposing of contaminated railroad ballast
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At this point, a test version of the database has been loaded on the Web server. CTE-IS is designing the search interface and writing help screens with the intention of announcing and demonstrating the database at the July 2000 National Conference on Transportation and Environment for the 21st Century, a joint meeting of 13 TRB committees. This will also provide a one-on-one training opportunity for clients as well as feedback for CTE-IS on the search interface.

In August 1999 CTE was awarded a one-year, $50,000 contract to design and manage a Web-searchable database of FHWA’s Environmental Research program (ERP) research spanning the last decade. As of December 1999 CTE had completed the first phase of this project on schedule. In collaboration with FHWA, CTE-IS identified the research to be included in the database, verified the accuracy of the data, designed a custom database, and created records authority control for uniform data entry. From the database, CTE-IS generated a specialized report for inclusion in ERP’s Accomplishments Report, which is to be published in 2000. Subsequently, FHWA elected to make major edits to the information initially provided, and CTE-IS has worked closely with FHWA to accommodate these changes.

Phase II of this project, testing of the search engine and design of custom search screens for the Web-accessible version of the ERP database, has begun. However, because the two projects, EnvRIP and ERP, are complementary, any developments or lessons learned with the one can be applied immediately to improve the other. In fact, to further facilitate access to this information, CTE will test integrating the ERP records in the EnvRIP database in addition to offering a separate ERP database. Once again, TRB has expressed interest in obtaining the contents of ERP, and CTE-IS is facilitating conversations between FHWA and TRB toward that end. Both TRB staff and FHWA staff will participate with CTE in presenting all these information sources as a poster session at the previously mentioned TRB midyear meeting.

As a result of National Cooperative Highway Research Project (NCHRP) 20-39(2) for a secure Web-based system for research in progress reporting, the next one to two years will bring major changes to how state DOTs track and report their research in progress. Although CTE-IS was not the successful bidder on this project, the department is following project developments and has already offered to contribute records of environmental research in progress to the new system. As CTE-IS does with all its services, EnvRIP will be re-evaluated regularly to determine if it continues to be viable. At a future time, it is possible that EnvRIP will be incorporated into the NCHRP 20-39(2) product, if it appears this will best serve CTE’s clients.
Tracking, Documenting, and Collecting Information

Resources: EnvRIP and FHWA ERP

Believing that knowing where to find the information when it is needed is more critical than developing a large collection of print resources, CTE-IS has focused considerable effort on tracking, documenting, and collecting information about research in progress, which is far more elusive than published reports.

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The value of the EnvRIP service is apparent from the fact that the director of TRB’s Transportation Research Information Services (TRIS) requests EnvRIP records for inclusion in TRB’s database of published literature. Moreover, the National Cooperative Highway Research Program (NCHRP) 20-39(2) for a secure Web-based system for progress reporting and release of environmental research results in progress is interested in EnvRIP records for use in its database. In addition, FHWA’s Research and Development Program (RD) collaborates closely with TRB on this project. In addition to providing TRB with information from EnvRIP, CTE-IS has, on several occasions, generated custom reports for other organizations, such as Montana DOT’s Research and Development Program and the Surface Transportation-Environment Cooperative Research Program (STECRP).

In just three years CTE-IS has achieved its long-term goal of converting EnvRIP from a biennial print product to a Web-searchable database with frequent updates. The benefits of the Web-searchable database are numerous: global access to critical information about environmental research in progress, search results tailored to the clients’ interests, and the capability for regularly scheduled updates. As an additional feature, CTE-IS is investigating a system whereby researchers can submit changes and new projects via the Web.

At this point, a test version of the database has been loaded on the Web server. CTE-IS is designing the search interface and writing help screens with the intention of announcing and demonstrating the database at the July 2000 National Conference on Transportation and Environment for the 21st Century, a joint meeting of 13 TRB committees. This will also provide a one-on-one training opportunity for clients as well as feedback for CTE-IS on the search interface.

In August 1999 CTE was awarded a one-year, $50,000 contract to design and manage a Web-searchable database of FHWA’s Environmental Research program (ERP) research spanning the last decade. As of December 1999 CTE had completed the first phase of this project on schedule. In collaboration with FHWA, CTE-IS identified the research to be included in the database; verified the accuracy of the data; designed a custom database; and created records authority control for uniform data entry. From the database, CTE-IS generated a special report for inclusion in ERP’s Accomplishments Report, which is to be published in 2000. Subsequently, FHWA elected to make major edits to the information initially provided, and CTE-IS has worked closely with FHWA to accommodate these changes.

Phase II of this project, testing of the search engine and design of custom search screens for the Web-accessible version of the ERP database, has begun. However, because the two projects, EnvRIP and ERP, are complementary, any developments or lessons learned with one can be applied immediately to the other. In fact, to further facilitate access to this information, CTE will test integrating the ERP records in the EnvRIP database in addition to offering a separate ERP database. Once again, TRB has expressed interest in obtaining the contents of ERP, and CTE-IS is facilitating conversations between FHWA and TRB toward that end. Both TRB staff and FHWA staff will participate with CTE in presenting all of these information sources as a poster session at the previously mentioned TRB midyear meeting.

As a result of National Cooperative Highway Research Project (NCHRP) 20-39(2) for a secure Web-based system for research in progress reporting, the next one to two years will bring major changes to how state DOTs track and report their research in progress. Although CTE-IS was not the successful bidder on this project, the department is following project developments and has already offered to contribute records of environmental research in progress to the new system. As CTE-IS does with all its services, EnvRIP will be re-evaluated regularly to determine if it continues to be viable. At a future time, it is possible that EnvRIP will be incorporated into the NCHRP 20-39(2) product, if it appears this will best serve CTE’s clients.

“Thank you SO much for the great information. And I’m very impressed with your format of delivery to customers. Neat hard facts and synthesis.”

J. Davidson
U.S. Army Corps of Engineers
Wilmington District

Information Services Requested

- General Information (42%)
- Database Search (41%)
- Ready Reference (26%)
- Surveys (7%)

Recent Requests for Literature Reviews and Database Searches

- Data on ridesharing and vehicle occupancy
- Impacts of highway noise on recreation
- Stormwater management practices for karst areas, caves or sinkholes
- Environmental impact of lead poses from milled asphalt
- Chemistry and toxicology of road dust and street sweepings
- Use of recycled waste materials in transportation
- Methods of removing, treating or disposing of contaminated railroad ballast

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Supporting Information Literacy and Information Technology Literacy

The fact that most CTE-IS clients are remote from the Center’s location increases the challenges of good communication, information access, and information transfer. Initially, clients preferred that all bibliographies and reports be delivered in print format. With their improved email and Internet access, clients now readily accept electronic delivery. However, there are still some challenges involved with software incompatibility and limited knowledge of some of the Internet protocols. As a solution, CTE-IS is careful in its choice of delivery mechanisms and formats. At the same time CTE-IS endeavors to educate clients in information tools and technology by submitting articles for publication in CTE’s quarterly newsletter, News & Notes, and in the newsletters of selected TRB committees. In addition, each CTE-IS product includes information about the search strategies and databases used to identify the pertinent literature. This is an informal approach to increasing clients’ understanding of information sources and how to use them.

CTE-IS also seeks opportunities to provide more formal training. Each class of CTE Summer Scholars benefits from a database and Web search class with hands-on computer practice. Additionally, during the past year, the director of CTE-IS gave a presentation on sources of environmental information in transportation at the Special Libraries Association Annual Meeting and provided individualized instruction to several CTE graduate fellows and other students.

At the same time that CTE-IS strives to educate clients and encourage their independent use of selected Web sources, the staff must continue to develop new skills and knowledge in the dynamic information profession where change is a constant. With the future possibility of an information portal to replace the CTE Web site and the migration of information from static Web documents to searchable databases, the staff is constantly increasing both subject expertise and technology skills. Development of these skills is essential to maintain the high quality of CTE Information Services.
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Sharp graphics on the Web site, Java scripting, Flash! Movie presentations — these features may be what initially catch the eye, as they are designed to do. But, CTE Information Services is fundamentally about serving people, providing the best and most accurate information to answer their questions and keeping them informed of new developments. It is about building relationships that promote information sharing and learning. Through the synergy of these relationships with individuals and organizations who value and share knowledge, CTE-IS can accomplish more than seems possible with a small, albeit dedicated, staff of two information professionals. CTE-IS will always explore the latest information technology and employ it on behalf of clients, but clearly the focus will remain on people and meeting their information needs.

“I just wanted to say thanks for your assistance on Web navigation. Subsequently, I greatly improved my database search abilities and submitted a worthy proposal. Again, your attention and expertise are appreciated.”

A. Moreland
CTE Graduate Fellow

“Outstanding! Thanks for all your help. Let me know if we can be of any assistance to you in the future.”

Dr. D. Belluck
Chief Toxicologist
Minnesota DOT

Clients Served

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### Summary of CTE Information Services Activities

#### Services:
- Database searches
- Literature reviews
- General reference services
- Surveys
- Tracking environmental research in progress (EnvRIP)
- Database design and maintenance
- Web publishing of searchable databases
- Web site design and management
- Quarterly current awareness searches published on the Web (topics: wetlands mitigation, stream restoration, wildlife fragmentation and mortality, transportation control measures)

#### Partnerships:
- **TRB Environmental Committees:**
  - CTE-IS supports Web sites for the A1F02, A1F05 and A1F07 Committees.
- **TRB Transportation Research and Information Services (TRIS):**
  - CTE-IS contributes records of environmental research in progress to the TRIS database.
- **FHWA:**
  - CTE-IS has a contract to create a Web-searchable database of FHWA environmental research projects.
  - CTE-IS supplies contents and links for FHWA’s transportation control measures Web page.

#### Special Projects:
- **NCDOT Survey of State DOTs’ Wetland Mitigation Practices and Techniques (Selected results and findings are to be presented by NCDOT to the State Legislature)**
- **Literature review of recent research on waste management, transportation of hazardous waste, use of recycled materials, pollution prevention and related topics for the TRB A1F07 Waste Management in Transportation Committee (Conducted in preparation for the 2002 conference, Environmental Research Needs in Transportation)**

#### Staff’s Volunteer Commitments to Professional Organizations:
- **Lois Widmer, Director of Information Services**
  - Chair, TRB B0002 TRIS Committee
  - Director, Environmental Resources Management Division, Special Libraries Assoc. (SLA)
  - Production Editor, Transportation Division Bulletin, SLA
  - Academic Relations Chair, North Carolina Chapter, SLA
  - Contributor, Sources of Information in Transportation, a bibliography published decennially
- **Lisa Rockwell, Information Specialist**
  - Editor, N/C SLA Bulletin, quarterly newsletter of the N/C Chapter of SLA
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A look at where we've been and what we've accomplished over the past decade.

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Please visit our web site: http://www.itre.ncsu.edu/cte

The Center for Transportation and the Environment conducts programs of research, education, technology transfer, and information services, which seek to mitigate the impacts of surface transportation on the environment.

CTE serves as a national resource for addressing critical research and policy issues facing the transportation and environmental profession.

Mission