TENNESSEE WETLANDS CONSERVATION STRATEGY

THIRD EDITION

THE GOVERNOR'S INTERAGENCY WETLANDS COMMITTEE
AND TECHNICAL WORKING GROUP

OCTOBER 1998

Tennessee Environmental Policy Office, Tennessee Department of Environment and Conservation, Authorization No. 327698, 500 copies. This public document was promulgated at a cost of $3.72 per copy. August 1998.

EPA #904-R-98-001

TENNESSEE WETLANDS CONSERVATION STRATEGY

THIRD EDITION

by the

GOVERNOR'S INTERAGENCY WETLANDS COMMITTEE

and its

TECHNICAL WORKING GROUP

OCTOBER 1998

Published by:

Tennessee Department of Environment and Conservation
Environmental Policy Office
21st Floor, L & C Tower
401 Church Street
Nashville, TN 37243-1553
(615) 532-0739
mcatania@mail.state.tn.us

The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under EPA Grant No. X004833-90-3 to the Tennessee Department of Environment and Conservation. It has been subjected to the Agency's peer and administrative review and has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

For additional copies of this document, please contact TDEC Environmental Policy Office at (615) 532-0739. Electronic copies of this document are available at **www.state.tn.us/environment**.

STATE OF TENNESSEE

DON SUNDQUIST
GOVERNOR

October 1, 1998

Dear Fellow Tennesseans:

I am proud to share with you the *Tennessee Wetlands Conservation Strategy: Third Edition.* This document marks a continuation of our commitment to study, understand, protect, and restore Tennessee's wetlands resource.

Much has changed in wetlands protection since the Strategy was first published in 1994. We now know more about the benefits that this precious resource provides to our environment and our economy by cleaning our water, protecting our land from floods, and providing a home for a variety of plants and animals. We are better able to cooperate to address continuing concerns, and to make sound decisions based on reason and technical information.

Most experts agree that we are gaining wetland acreage in Tennessee. We still face many challenges, including the need to better measure and evaluate the status of the wetlands we currently have. We must continue to explore new methodologies for tracking our wetlands to make sure that we are meeting our goal of "no net loss" and to better understand the effectiveness of our current efforts.

I encourage you to become involved in wetlands protection and to learn more about the wetlands in your community.

Sincerely,

Don Sundquist

State Capitol, Nashville, Tennessee 37243-0001
Telephone No. (615) 741-2001

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

The State of Tennessee gratefully acknowledges the contributions and efforts of the following individuals and organizations to the Tennessee Wetlands Conservation Strategy. Governor Don Sundquist has supported two editions of this document since taking office, enabling continued progress in protecting and restoring Tennessee's wetlands resource. The support of former Governor Ned McWherter in initiating the first edition of the Strategy is also gratefully acknowledged.

Commissioner of the Tennessee Department of Environment and Conservation Milton H. Hamilton and Deputy to the Governor for Policy Justin P. Wilson are recognized for continuing important executive level coordination for wetlands protection.

Special recognition is due to the members of the Governor's Interagency Wetlands Committee and its diligent Technical Working Group (See Appendix A). These individuals provided the commitment, cooperation, and hard work needed to develop and implement the Strategy.

The contributions of Dr. Ruth Neff as an original author, editor, and champion of the Strategy are gratefully acknowledged. Also acknowledged are the contributions of Mr. Tom Talley. Mr. Talley provided sound expertise as technical coordinator of the initial planning process, which resulted in a sustained focus on scientifically sound, technically driven policy.

The Strategy and its progress would not have been possible without the generous financial and professional support of the United States Environmental Protection Agency.

Mr. Dodd Galbreath is also gratefully acknowledged for facilitating the Strategy's implementation among state and federal agencies and for communicating Tennessee's Strategy with other states to promote wetlands conservation planning nationwide.

PREFACE

The Tennessee Wetlands Conservation Strategy, first published in February 1994 and revised in January 1996, is a blueprint to guide agency and organizational decisions, research, and actions to better understand and conserve Tennessee's wetlands resources. This is the third edition of the Strategy, developed to provide a progress report on implementation of the Strategy and to identify new goals for the upcoming years.

The development of a Wetlands Strategy in Tennessee began in the fall of 1989, when Governor Ned McWherter appointed an Interagency Wetlands Committee (IWC) to advise him concerning the status of the state's wetlands. Members of the Committee are the leaders of state and federal agencies with program responsibilities related to wetlands, and the leaders of private user groups and organizations. The purpose of the Committee is to exchange information and coordinate the programs of federal, state, and local agencies, conservation organizations and private landowners to manage, conserve or restore wetlands for beneficial uses. The Committee appointed a Technical Working Group (TWG), consisting of professional staff members from each agency or organization, to carry out necessary research and technical analysis. A list of present members of the Committee and of the Working Group appears in Appendix A, Part I.

In December 1989, the IWC recommended that the State develop a comprehensive statewide Wetlands Conservation Plan for Tennessee. Their decision was partially based on guidance from the 1987 National Wetlands Policy Forum, which recommended that all states develop conservation plans. In July 1990, EPA awarded a $102,910 Wetland Program Development Grant to the State to initiate the planning process.

Tennessee was one of the first two states in the nation to attempt development of a State Wetlands Conservation Plan (WCP). As work on the state plan progressed, it became quickly apparent that data needed to formulate quantified objectives were not available. Concurrently, the state of the science of wetlands qualification, including classification, characterization, and functional value assessment was undergoing a major transition.

The TWG concluded that it was not possible to produce a comprehensive State Wetlands Conservation Plan as originally conceived, but that it was possible to develop a comprehensive conservation *strategy* to guide statewide wetlands policy and technology development.

At about the same time, the World Wildlife Fund (WWF) convened an

advisory panel, including Tennessee and 16 other states, to formulate State Wetlands Conservation Plan Guidelines. WWF's advisory panel also agreed that a Strategy rather than a comprehensive plan was the most viable option.

The TWG decided to prepare a Wetlands Conservation Strategy following the 1992 WWF strategy guide. A strategy defines a process that can be used to adopt a statewide goal and define objectives; to review the current status of the state's wetlands resources, and the programs affecting them; and to develop an action plan to meet the State's objectives.

The TWG developed the state strategy through an interactive and iterative process. Members of the group worked intensively to capture the group's knowledge and advice, and to draft a Strategy that the State can use to guide policy decisions.

On August 24, 1993, the Clinton administration issued a wetlands policy document entitled "Protecting America's Wetlands: A Fair, Flexible and Effective Approach." The policy paper proposed a series of improvements to the federal wetlands regulatory programs, and other programs. The proposed actions were intended to simplify regulatory programs, improve interagency coordination, and decrease uncertainty for landowners and the regulated community. The 1993 proposal confirms the previously adopted "no overall net loss" policy, and the policy "to increase both the quantity and quality of the nation's wetland resource" as a long-term goal.

After finding the Strategy to be consistent with the President's policy, the final document was approved by the IWC. On February 22, 1994, Governor Ned McWherter endorsed the Strategy as an official instrument of state wetland policy.

Governor Don Sundquist recognizes the value of the consensus approach taken by the IWC, as well as the importance of executive level sponsorship of the Strategy. His leadership in supporting two additional editions of the Strategy has enabled the IWC and the TWG to continue to work toward fulfilling its objectives.

The generous financial support of the Environmental Protection Agency in developing the Tennessee Wetlands Conservation Strategy has been a critical component of its success. Since 1989, the State has received $2,209,227 in grants from EPA for the development and implementation of the Strategy.

Implementation of the Strategy is predominantly on schedule, and we have advanced our wetlands knowledge base through targeted research and advances in geographical information system data collection. The focused, action-oriented structure of the Strategy has enabled it to be a working plan, rather than just a policy document. Its broad based support, and cooperative tone have helped to diminish negative perceptions of wetland conservation. It has also encouraged numerous state program actions and has increased federal and state coordination. (See Appendix I for detailed information concerning implementation accomplishments).

Tennessee's Strategy has attracted the attention of states across the nation. Staff from Tennessee have presented the Strategy to other states as a planning model. Since its adoption, eighteen presentations have been made

at state regional and national conferences sponsored by private and public interests. Persons from 41 different states have requested a copy of the Strategy and information related to "lessons learned" in the Tennessee planning experience (See Appendix G for summary of "lessons"). An article was also published in the Wetlands Newsletter regarding Tennessee's approach to wetlands planning.

Overall, the atmosphere for wetlands conservation in Tennessee has been very positive since initiation of the Strategy. Acquisition of targeted wetlands by the Tennessee Wildlife Resources Agency has continued. Increased cooperation among other wetlands interests to purchase and protect unique wetlands has also occurred. In 1995, local organizations, state agencies and national conservation groups banded together to purchase a largely pristine, 4000 acre tract of bottomland hardwood and cypress-tupelo swamp wetlands on the Wolf River in Fayette County. In 1997 Governor Sundquist named the Ghost River section of the Wolf River a State Natural Area.

Important advances also continue to be made through the efforts of the West Tennessee Tributaries Steering Committee. Their restoration demonstration project seeks to restore over 21 miles of river meanders along a previously channelized river. EPA wetland grants received through the Strategy will result in implementation of a restoration demonstration project at Stokes Creek in 1999. The West Tennessee Tributaries Steering Committee originally proposed this project.

Federal and state sanctioned mitigation banking, with a strong emphasis on wetland restoration as opposed to creation, continues to grow. Renewed emphasis on greenways and wildlife corridors also offer new opportunities for wetland conservation in rapidly urbanizing areas.

Challenges in wetland conservation still exist. As our communities continue to grow, more local governments are faced with tough planning decisions and the need to balance resource protection with economic development. Regulatory decisions concerning wetlands protection have resulted in several high profile court cases. Exotic species such as purple loosestrife threaten the ecological integrity of Tennessee wetlands. In addition, the increased fragmentation of natural areas and floodplains disturb the delicate balance required for wetlands function. There also continues to be a lack of conclusive data on the success of restoration projects and the acreage of wetlands restored since the plan was first implemented.

It is clear, after four years of plan implementation, that cooperation can effectively focus a broad array of resources and expertise on a mutually agreed set of objectives and actions. The end result however, must be actual conservation and restoration of wetlands in Tennessee. Data on the actual wetlands acreage in Tennessee is difficult to collect. Several experts agree that wetlands losses in Tennessee have stabilized, and that wetlands acreage may actually be increasing. Continued implementation and active data collection on the status and trends of Tennessee's wetlands over the next two years will hopefully

reveal the progress of this Strategy and associated conservation efforts.

CHAPTER 1
TENNESSEE WETLAND RESOURCES: DESCRIPTION, STATUS, AND TRENDS

How are Wetlands Defined?

Wetlands are transition zones controlled by landscape and hydrology, and they typically contain attributes of both aquatic and upland environments. Some, such as deep swamps, bogs and marshes are typically recognized as wetlands by the prominence of water and distinct wetland plants. Others, such as bottomland hardwood forests which lack permanent standing water, and submerged aquatic beds which appear to be completely aquatic, are less recognizable. Because of this variation, it is easy to become confused when trying to determine if an area is a wetland or not.

Wetlands are defined and delineated for various legal, scientific and economic purposes, including regulation, assessment, ecosystem and landscape management, and human use. Within the framework of regulatory programs, wetlands definition and delineation is usually interpreted conservatively; whereas, in a landscape management context, such as wetlands habitat assessment, a broader interpretation is needed.

Wetland definition for specialized purposes such as acquisition and inventory may include river channels, open waters such as lakes and reservoirs, sand bars, mud flats, levees, islands and floodplain terraces that do not fit the classic character of vegetated wetlands, or regulatory program definition. An overview and discussion of the several Federal wetlands definitions appears in APPENDIX B. Due to the dynamic nature of this process, the State will continue to defer to federal guidance with respect to the delineation of jurisdictional wetlands.

How Many Wetlands are There in Tennessee?

Wetlands inventories have been made during the past one hundred years or more. The earliest surveys were made by the federal agricultural and land management agencies to determine drainage needs. As interest in wildlife conservation grew, inventories were made to determine the quantity of habitat available for select water dependent species, especially waterfowl. No complete wetlands inventory has ever been specifically conducted in Tennessee, and no national wetlands inventory has accurately quantified the wetlands of Tennessee.

In 1993, six references and/or datasets were used to determine the acreage of wetlands in Tennessee. None of them can be directly compared to another, because of two fundamental issues: (1) differences in defining, identifying, and delineating the resource base being inventoried; and (2) differences in the accuracy of the methods employed in the inventory.

Data from the six inventories have been rectified to a common base in an attempt to make them more comparable. This data is displayed in TABLE 1. However, it should be noted that the interpretations of wetlands types made in TABLE 1 are based on the best professional judgment of the TWG staff, and not the authors of the referenced publications.

An indirect estimate of the state's "wetlands capability base," areas that are capable of supporting wetlands, can be made based on the occurrence of hydric soils. USDA Natural Resource Conservation Service (1991) soil survey data maintained by the Iowa State University Statistical Laboratory were summarized for Tennessee. The analysis indicated hydric soils acreage of approximately 1.55 million acres.

An additional 1.24 million acres are considered by the TWG to be potentially hydric, and as such, portions may support vegetation that can be detected as wetlands by remote sensing methods typically used in wetlands inventories. Portions of the potentially hydric soils may in fact be hydric, and, if vegetated, may be jurisdictional wetlands. The remainder of these potentially hydric soils generally would not meet hydric soil criteria and may lack sufficient hydrology to meet the wetlands definition.

Based on this data, it is projected that Tennessee has approximately 2 million acres of wetlands capability base. However, many of these acres have previously been converted to non-wetlands uses and are no longer considered wetlands.

An analysis of soils occurrence in individual counties from the USDA (1991) soil survey database shows that 80% of the hydric soils occur in the western grand division of the state. Sixteen percent occur in the central division, and only 4% in the eastern division. FIGURE 1 indicates the estimated location of wetlands in Tennessee.[1]

Dahl (1990) used data from the National Wetlands Inventory and other sources to determine the status and trends of wetlands nationally. His data for Tennessee was derived from an analysis performed for the Southeast by Hefner and Brown (1984). Thirty-three square mile sample plots (equaling 0.3% of the state's total area) were used to statistically determine that Tennessee contained 787,000 acres (+/- 16%) of wetlands in the mid 1980's. Dahl then added this acreage to USDA agricultural drainage statistics (Pavelis, 1987) to determine that 1,937,000 acres probably existed in the 1780's. Shaw

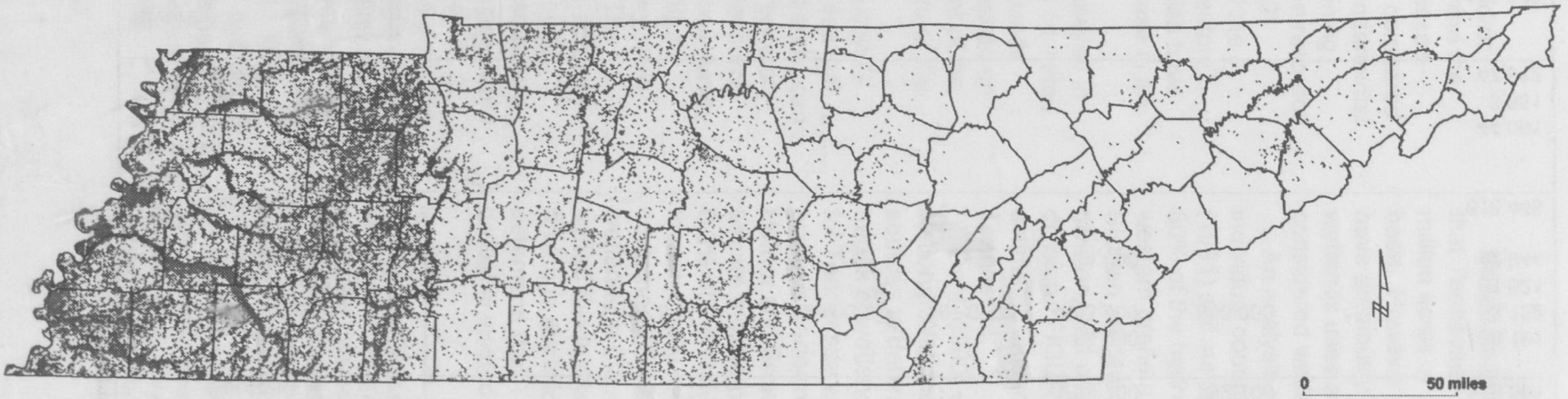
[1] Wetland locations depicted on FIGURE 1 were derived from classification techniques performed on Landsat TM satellite imagery and correlated with aerial videography, and NWI map data. Wetland classes have been identified in the detailed vegetation cover of Tennessee as part of the Gap Analysis program. Wetland classes identified include: Mixed Bottomland Hardwood Forest, Bald Cypress / Water Tupelo Forest, Montane Mixed Forested Wetland, Wetland Scrub/Shrub, Floating Aquatic Vegetation, and Dead Forested Wetland.

TABLE 1
ACRES OF WETLANDS AND WETLAND INDICATORS FOUND BY VARIOUS SURVEYS

WETLAND TYPE	SCS SOILS DATA	DAHL 1780'S	SHAW & FREDINE 1956	DAHL 1980'S	NRI 1982	NRI 1987	TWP 1988	TWRA GIS 170 QUADS
Palustrine							639,177	
• Forested					737,000	730,400		522,467
• Scrub-Shrub					8,500	8,500		25,516
• Emergent					53,800	53,800		27,518
Subtotal					799,700	792,700		575,501
• Open Water					64,000			38,191
• Unconsol, Bottom		1,937,000	828,000	787,000	863,000	856,000		3,132
• Unconsol, Shore								1,621
Subtotal					64,000			42,944
Total Palustrine								618,445
Lacustrine								
• Limnetic								44,061
• Littoral								3,851
Subtotal								47,912
Riverine								
• Lower Perennial								117,025
• Upper Perennial								96
• Intermittent								19
Subtotal								117,140
GRAND TOTAL								**783,497**
Soils								
• Hydric	1,546,254							
• Potential Hydric	1,236,946							
Subtotal	2,783,200							

Figure 1

TENNESSEE WETLANDS



LEGEND

Wetlands

SOURCE: SOIL DATA PROVIDED BY TWRA AND NRCS.

Generated by the TWRA Geographic Information System (tj), 08/98.

and Fredine (1956) inventoried areas of high waterfowl habitat concentration in their early 1950's national survey. They inventoried all of the state west of Kentucky Lake, the reservoirs of the east Tennessee ridge and valley province, and some of the perched wetlands on the Eastern Highland Rim. They estimated that Tennessee has 828,000 acres of waterfowl habitat (assumed to be vegetated wetlands).

It is noteworthy that Shaw and Fredine (1956) described 447,600 acres of the total as "high quality" habitat, ranking the state sixth in quantity of high quality habitat. It was surpassed only by Minnesota, Arkansas, Louisiana, Texas and North Dakota.

The USDA conducts a National Resource Inventory (NRI) every five years, and previously used the Shaw and Fredine wetland classification system. In 1992 NRCS began to utilize the National Wetlands Inventory (NWI) as a wetlands support map. Through the use of remote sensing, randomly selected sample points across the state were identified as a wetland or non-wetland by the use of NWI as a wetlands support map, as well as soils data, aerial photographs, personal knowledge of the site, and other available data. These sampling points were labeled based on the Cowardin classification system for identifying wetlands. If the NWI map was not supported by other available information such as hydric soil determination or land cover type, the data collector was instructed to assign the "corrected" Cowardin label to the sample point. There was a nominal amount of ground truthing performed during the 1992 and 1997 NRI data collection processes.

The NRI in past years was performed by sampling numerous points across the state reported with a 95% confidence interval. The 1982 and 1987 inventories indicated 863,700, and 856,700 acres respectively of palustrine wetlands. In 1994, adjustments were made in the 1982 NRI data to better conform to the 1979 Cowardin wetland classification system and to make certain corrections. These adjustments resulted in revised estimates of 664,000 acres of palustrine wetlands on non-federal lands. The 1992 NRI estimated 668,100 acres of palustrine wetlands on non-federal lands. The confidence intervals of the data indicate no statistical difference between the samples, meaning that we cannot assume an *increase* of acreage from 1987 to 1992, but may be able to assume *no net loss* of acreage.

In 1988, the former Tennessee Department of Conservation formulated a "State Wetlands Plan" as an addendum to the State Recreation Planning Report, in compliance with the Federal Emergency Wetlands Resource Act. Aerial photography and satellite imagery were used to determine that the state's vegetated wetlands comprised 639,177 acres (571,000 ac. or 89% in the western grand division and 68,177 ac. or 11% in the remainder of the state).

Tennessee Wildlife Resources Agency is currently digitizing National Wetlands Inventory (NWI) maps into their Geographic Information System (GIS). Digitization provides for a relatively accurate determination of the acreage of wetlands digitized. To date approximately 60% of the state's total area in NWI quadrangles have been digitized. Maps have been prioritized

for digitization based on areas of known wetlands concentration.

Out of 170 digitized maps analyzed in 1993, one hundred forty occurred in West Tennessee. The remaining 30 were in areas of high wetlands concentration in the central and eastern grand divisions. Analysis indicated that there were 783,497 acres of wetlands on 170 digitized quadrangles; 618,445 of these acres are palustrine wetlands. Based on distribution of hydric soils, it appears that 80% to 85% of the state's wetlands may have been digitized. Extrapolation of this data indicated approximately 773,000 to 825,000 acres of palustrine wetlands statewide.

No one knows the exact acreage of Tennessee's wetlands. In 1993, TWRA's digitized NWI maps concluded that a minimum of 618,445 acres of palustrine wetlands existed. Hefner and Brown (1984) concluded a statistically derived maximum of 912,920 acres of palustrine wetlands. An average of Hefner and Brown (1984), SCS 1987 NRI, and TWRA's GIS projected data indicated approximately 814,000 acres of palustrine wetlands in the state.

A more accurate estimate of Tennessee's total wetlands acreage will be possible as digitization of the NWI and hydric soils data for the entire state is completed and imported into the GIS system (See FIGURES 2 and 3 for the status of these projects). Soil survey quadrangles are being digitized by a USEPA grant with substantial progress. Other soil surveys have been digitized as new soil surveys are completed.

The results of a statistical analysis conducted with GIS with resulting maps and overlays have been reported along with field investigation of soils, plant species and prevalence indices for the same seven quadrangles identified in Table 2 (See APPENDIX C for a complete list of Technical Reports supporting the Strategy). Based on these and other studies, opportunities for NWI and soils correlation combined with the use of informative soil survey meta-data files has greatly increased the state's interest in soils digitization.

The evaluation of "physiographic province" resource characteristics is being used by Tennessee to identify "ecoregions." This data layer provides information on wetland systems based on geomorphological positioning, climate and other factors (See FIGURE 4). It is recommended that in the future, inventory and field data should be organized and reported at least according to the US Geologic Survey (USGS) hydrologic units (See FIGURE 5), and by wetlands type.

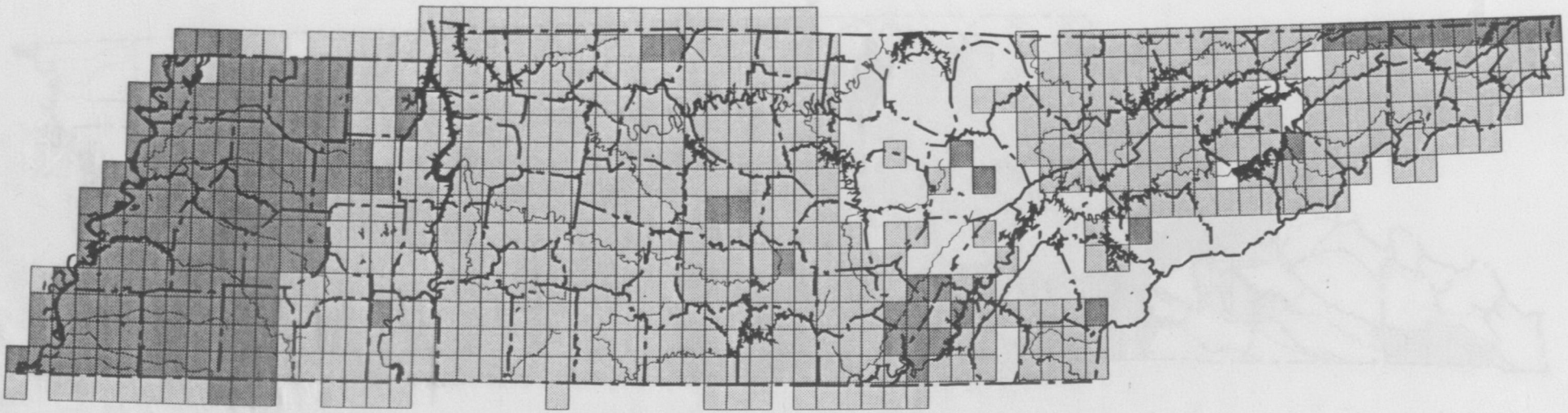
What Are the Basic Types of Wetlands?

The Wetlands Strategy adopts a new method for classifying the various types of wetlands in Tennessee, grouping those similar in function. The approach, referred to as the hydrogeomorphic (HGM) classification system (Brinson 1993), is evolving nationally with input from scientists representing various disciplines. Several institutions and agencies in Tennessee are participating in the development of the models for assessing function of wetlands in various HGM categories.

The HGM classification system is based on three parameters: geomorphic setting, water source, and hydrodynamics. Because it is these three parameters that essentially determine a wetland's structure, the HGM system facilitates the development

Figure 2

STATUS OF NATIONAL WETLANDS INVENTORY DIGITIZATION



LEGEND

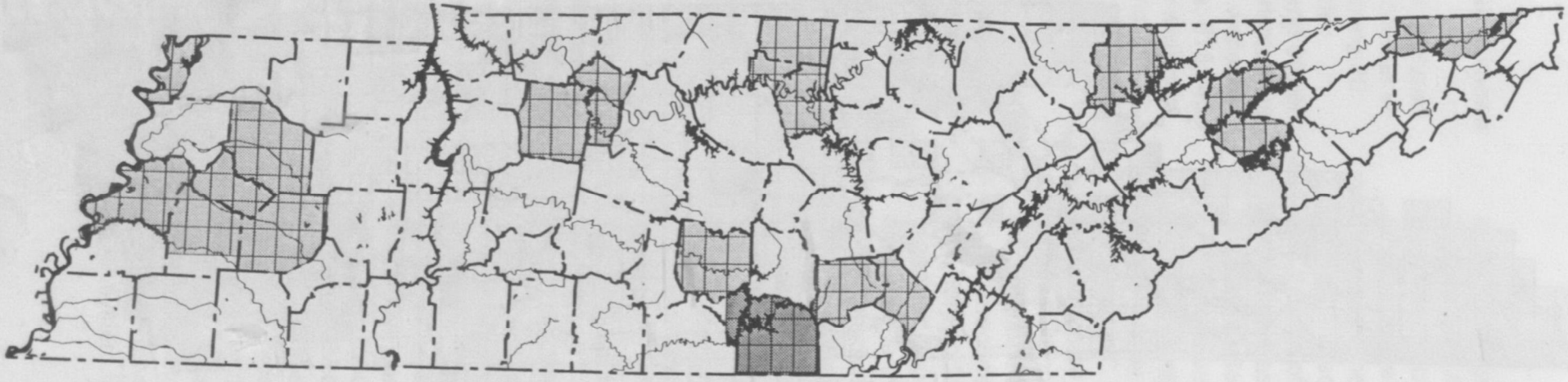
- NWI Digitization Completed Prior to 10/11/93
- NWI Digitization Completed Between 10/11/93 and 08/20/98
- County Boundaries
- Major Rivers and Reservoirs

TENNESSEE WILDLIFE RESOURCES AGENCY

Generated by the TWRA Geographic Information System (tj), 08/98.

Figure 3

STATUS OF SOIL SURVEY DIGITIZATION



LEGEND

- Soil Digitization Draft
- Soil Digitization Completed
- County Boundaries
- Major Rivers and Reservoirs

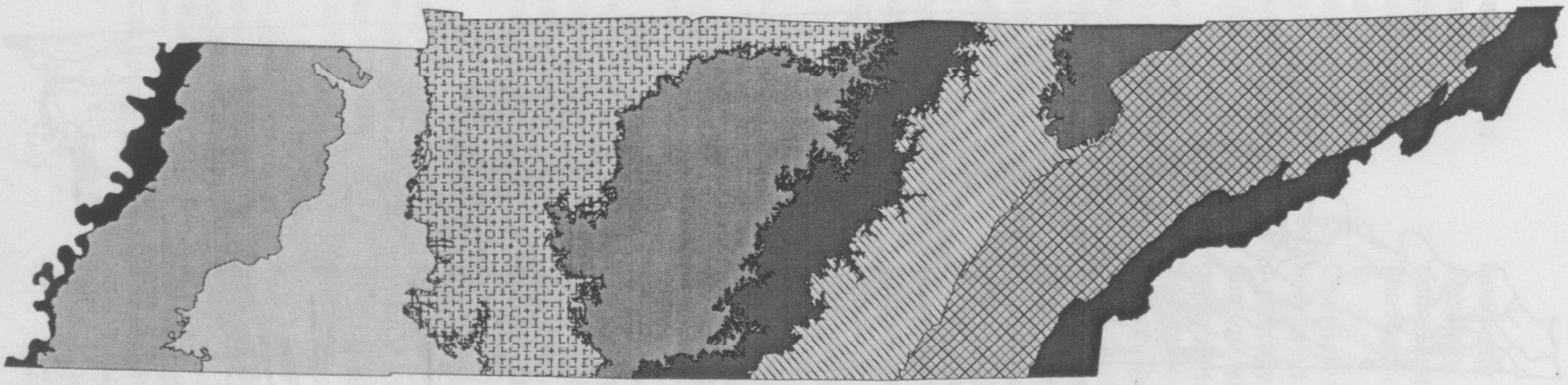
SOURCE: SOIL DATA PROVIDED BY TWRA AND NRCS.

TENNESSEE WILDLIFE RESOURCES AGENCY

Generated by the TWRA Geographic Information System (tj), 08/98.

Figure 4

PHYSIOGRAPHIC REGIONS OF TENNESSEE



Legend

- Mississippi Alluvial Plain
- Loess Plain
- Southern Coastal Plain
- Western Highland Rim
- Central Basin
- Eastern Highland Rim
- Cumberland Plateau
- Cumberland Mountains
- Ridge and Valley
- Unaka Mountains

Generated by the TWRA Geographic Information System (tj), 08/98.

Figure 5

HYDROLOGIC UNITS OF TENNESSEE

LEGEND

- 06040002 Hydrologic Unit Number
- Hydrologic Unit Boundaries
- County Boundaries
- Major Rivers and Reservoirs

TENNESSEE WILDLIFE RESOURCES AGENCY

Generated by the TWRA Geographic Information System (tj), 08/98.

of groupings (referred to as classes and subclasses) that will have generally similar characteristics and will perform similar functions. It is a holistic approach that recognizes the continuum of wetlands from wettest to driest and has considerable application in wetland assessment and management. It is not intended to define wetlands for jurisdictional purposes.

Currently seven hydrogeomorphic classes have been identified nationwide. These are riverine, depressional, slope, mineral soil flats, estuarine fringe, and lacustrine fringe. The ten archetypes on wetlands identified in the initial version of the Strategy are further defined into nine archetypes using HGM terminology plus some additional modifiers as follows. Note: the HGM designations are in parentheses and follow the original description.[2]

1. **Deep floodplain basins:** old river channels, oxbows, or sloughs typically dominated by baldcypress or water tupelo and in some cases may be devoid of woody vegetation except near edge; often colonized by submergent or floating-leafed plants (Class: Riverine; Subclass: Low gradient, depressional, permanently flooded)

2. **Floodplain depressions:** shallow sloughs that frequently are ponded well into the growing season; woody species typically include overcup oak and water hickory (Class: Riverine; Subclass: Low gradient, depressional, semi-permanently flooded)

3. **Overflow flats:** seasonally inundated zone of the floodplain that is typically dominated by species such as willow oak, red maple and green ash (Class: Riverine; Subclass: Low gradient, flats, seasonally flooded)

4. **Floodplain ridges:** high portions of the floodplain including ridges and natural levees that are only temporarily flooded; species may include cherrybark oak, water oak, silver maple, boxelder and eastern cottonwood (Class: Riverine; Subclass: Low gradient, ridge, temporarily flooded)

5. **Low fringes:** semipermanently flooded lake fringes typically dominated by herbaceous emergent and shrub vegetation including black willow or buttonbush (Class: Estuarine fringe; Subclass: semipermanently flooded)

6. **Elevated fringes:** higher zones near lake fringes that are seasonally flooded but in which the soils remain saturated for much of the year; typically forested; (Class: Estuarine fringe; Subclass: seasonally flooded)

7. **Flow-through depressions:** meandering drainways characterized by temporary flooding and saturated soils found in upland landscapes in association with intermittent or first order streams (headwater areas);

[2] There are two additional types of wetlands that may be found in Tennessee. They exist on old river terraces and abandoned floodplains. They are **Terrace Flats: saturated**, infrequently flooded flats on terraces; and **Upland flats**: saturated, rarely ponded flat areas on uplands.

originally forested with willow oak, red maple, sweetgum, green ash and associates, but much more commonly in wet meadow habitat dominated by herbaceous species including rushes, sedges, and grasses (Class: Depressional; Subclass: Open, saturated)

8. **Closed depressions:** isolated depressions without outlets in upland landscapes that may pond water well into the growing season and have saturated soils for much of the year; species composition similar to above (Class: Depressional; Subclass: Open, saturated)

9. **Slope seeps:** groundwater discharge areas on or at the base of a slope that results in semi-permanent to permanent saturation; vegetation is highly variable (Class: Slope; Subclass: Saturated)

These are generalized concepts of types of Tennessee wetlands. Some types may need further subdivision, and some individual wetlands will exhibit key characteristics of two or more types.

What Are the Functions and Uses of Tennessee Wetlands?

Historically, wetlands were considered to be wastelands that should be drained as soon as possible, for farming, residential or industrial development. Wetlands were not considered to be valuable resources, and their complex ecological and hydrological functions were, for the most part, unrecognized.

Only recently have wetlands been recognized as valuable natural resources, that if maintained and properly managed, provide important benefits to the public and the environment. For example, wetlands can protect or enhance water supplies, improve water quality, help control flood damage, provide valuable habitat for wildlife, and contribute to the biological diversity and stability of surrounding ecosystems.

Wetlands functions are directly beneficial to people and to the integrity of the environment where they are found. Not every wetland will perform all possible functions, and not all functions are performed equally well in every wetland. The degree to which a wetland performs a function is defined by a complex web of interrelations between the wetland's characteristics and its landscape setting, upstream contributors, downstream receivers, and biotic interactions.

There are five functions associated with Tennessee wetlands:

1. Water Quality Enhancement

Wetlands enhance the physical and chemical condition of water by two methods:

- ***Sediment and /Toxic Substance Retention:*** Reducing the concentration of suspended and bed-load sediment, and attendant toxicant load, through energy dissipation, precipitation, ionization, and/or biotic bonding.

- ***Nutrient Removal/Transformation:*** Reducing the concentration or modifying the form of nitrogen, phosphorus, and potassium ions through oxidation, reduction, assimilation, or other bio-chemical processes.

2. **Flood Impact Mitigation**
Wetlands reduce the volume and physical energy of water below a base condition through two means:

- ***Flood Peak Reduction:*** Wetlands influence regional water-flow regimes by intercepting storm runoff and temporarily storing excess surface waters. Wetlands reduce storm runoff peak flows by storing and slowly releasing runoff over a longer period of time.

- ***Erosion Potential Reduction:*** Wetlands in their natural state are usually vegetated; and this vegetation reduces the velocity of flood waters and wave action, thereby decreasing potential erosion of shorelines and floodplain areas. The root systems of wetland vegetation bind the floodplain and shoreline soils to further resist erosive forces.

3. **Biological Productivity**
Wetlands provide habitat that supports a diverse array of species that depend upon wetlands throughout their lives or at critical times such as breeding and caring for young. Examples include:

- ***Aquatic Species:*** Vertebrate and invertebrate species that complete their life cycles in water.

  Resident: Species that typically spend their entire life in the same type of habitat.

  Transient: Species that typically move in response to changing habitat conditions and/or at different times in their growth and development.

- ***Semiaquatic Species***: Vertebrate and invertebrate species that spend parts of their lives in water.

- ***Wetland Wildlife Species***: Vertebrate species, typically mammals, birds, and reptiles, that spend most or all of their life above the water's surface, but are heavily dependent on aquatic or wetland conditions.

  Resident: Species who live all year within a single home range.

  Migratory: Species whose annual life stage requirements are met by a series of distant ranges.

- ***Vegetation:*** Species of plants that are typically adapted to periodic anaerobic soil conditions.

- ***Food Chain Support:*** Providing primary productivity (organic debris) that supports faunal communities within the wetland and in adjacent and downstream waterbodies.

4. **Ground Water Influence**
Wetlands significantly influence shallow water aquifers within their vicinity by three processes:

- ***Ground Water Recharge***: Retaining water and allowing for its percolation into the underlying aquifer.

- ***Low Flow Augmentation***: Releasing water to adjacent streams or waterbodies during dry periods of

the year and during drought.

- ***Ground Water Discharge Buffering***: Enhancing the quality of groundwater discharge by providing a biochemical treatment system.

5. Direct Human Benefits

In addition to the societal benefits provided by wetlands functions, several direct human benefits can be derived from wetlands. Opportunities for human uses that are compatible with sustained wetland conditions include:

- ***Recreation***: Use for play, amusement, relaxation, and physical and mental refreshment.

- ***Education***: Use for training and developing knowledge, skill, and appreciation for natural resources.

- ***Timber Production***: Provide the potential for profitable production of tree species that thrive in wetlands conditions.

- ***Agricultural Production***: Provide the potential for agricultural resource management compatible with wetland conditions.

What is the Condition of Tennessee Wetlands?

Tennessee's wetlands are varied and dynamic systems. They occur in topographic positions ranging from upland slopes and divides to the floodplains of low-gradient coastal plain streams. They support plant communities that include submerged, floating and emergent plants, shrubs, and trees. Under natural conditions, wetlands may undergo changes in wetness, species composition, and morphology in response to climate, geology, and ecological succession. Wetlands are also subject to a wide variety of direct and indirect human influences.

Human activities have a tremendous impact on Tennessee wetlands. Wetlands are owned and managed by farmers, hunt clubs, timber concerns, developers, state and federal agencies, and other interests. Land uses in wetlands include timber extraction, agricultural production, outdoor recreation, and wildlife habitat. Large areas of wetlands have been converted to non-wetland environments through filling, draining, or diversion of water.

Wetlands are key parts of hydrologic systems that extend across the landscape. Natural processes and human activities that occur outside their boundaries affect them. Changes in rainfall, runoff, or erosion in a drainage basin can alter the quantity and quality of water and sediment delivered to wetlands, changing their physical or biological character. Wetlands in Tennessee can be found in every possible condition from pristine to severely degraded to completely destroyed.

Wetlands are created, maintained, modified, and destroyed by the physical processes that control the distribution and storage of water. These processes include rainfall, infiltration, evaporation, groundwater discharge, erosion, and sedimentation. These hydrologic processes are largely driven by climate and topography, with major influences from geology, soil properties and vegetation. All of these factors are subject to natural change and tend to equilibrate over time.

Human influences can accelerate, reduce, or reverse the direction of hydrologic processes. Across much of the Tennessee landscape, agriculture, construction, and mining have reduced infiltration, increased runoff and erosion on hillsides, and increased valley sedimentation. Dam construction has raised the base level upstream of the dams, leading to the formation of deltas and valley sedimentation. Stream reaches downstream of dams are deprived of sediment and may begin to down-cut through their alluvial valleys, significantly lowering the channel bottom, and thereby altering hydrology.

Most of West Tennessee's floodplain wetland acreage has had its wetness reduced by agricultural drainage and stream channelization. The magnitude and permanence of floodplain drainage are highly variable. In some cases, channelization has led to a deepening and widening of stream channels sufficient to convert former floodplains into well-drained terraces. Elsewhere, beaver activity, debris, and oversupply of sediment from channelized reaches upstream have filled excavated channels, restoring or increasing floodplain wetness.

The responses of hydrologic systems, such as wetlands, to direct and indirect human interventions are often unforeseen and can be undesirable. As a result, Tennessee's wetlands are in a state of flux that often goes beyond their natural ability to adjust. Many systems are being pushed in several directions at once and cannot adapt quickly enough to survive these changes.

For instance, an oversupply of sediment upstream has resulted in local periodic ponding on many West Tennessee floodplains. Such areas are natural sediment traps; left alone they would most likely fill in and go through a succession of ecological communities adapted to progressively drier conditions. Before this adjustment can occur, however, many such ponds are drained, without any action to reduce the high sediment loads that led to their creation. Sediment is either delivered downstream, where it causes similar problems, or, more likely, builds up in the same place, eventually resulting in a recurrence of the ponding. This situation may be repeated in the same place over and over again.

Massive direct and indirect human impacts have led to a significant reduction in the quality of Tennessee's wetlands. Many areas have remained in a state of early ecological succession and have not been allowed to develop naturally toward ecological maturity. Excessive or inadequate water inputs, high sediment or nutrient loads, and direct or indirect interference with vegetation have caused imbalance among the physical, chemical, and biological processes that determine wetland functions. The natural processes that might restore functional equilibrium are rarely allowed to proceed without additional interference.

Although the general picture of disequilibrium in Tennessee's wetlands is fairly clear, we do not have the detailed information necessary to fully understand and protect our wetlands resource. No state or federal agency is systematically collecting, recording, or analyzing complete information on wetlands. Except in relatively few cases where wetlands are perceived as threatened or are under consideration for purchase, little information is

currently being collected on wetland functions. Such information as it is available is generally site-specific, and is collected under protocols narrowly designed to meet regulatory or agency requirements. There continues to be a major need for a consistent statewide program to evaluate the quality and functions of wetlands and monitor their condition. The 1994 USEPA grant for development of the HGM models for West Tennessee riverine wetlands provided a start to this process that should be continued.

Where Do Wetland Losses Occur and Why?

The National Wetlands Inventory status and trends analysis (Dahl 1990) estimates that about 53% of the nation's historic wetlands had been lost by the mid 1980's. The greatest losses occurred in forested wetlands and freshwater marshes. Dahl further estimates that Tennessee had lost 59% of its wetlands by the mid 1980's. Using the estimated 2 million acre wetland capability base derived in this report from the 1991 Soil Survey Statistical Database as an indicator of historic wetland acreage, and the current 814,000 acres of existing wetlands indicated by averaging various recent inventories, an estimate of 59% of loss of wetlands can be further supported. However, the Council on Environmental Quality (CEQ) does not list Tennessee among the states suffering the most "significant" losses.

In the past, losses of wetlands were primarily due to agricultural conversion, drainage, channelization, and sedimentation. At present, the loss/gain balance is complicated and not well defined. Current professional opinion and supporting data from the 1992 National Resources Inventory contend that the rate of wetland losses in Tennessee has significantly declined and that wetland acreage may be increasing. However, comprehensive data does not exist to accurately measure this decline. Factors affecting the balance include both primary land use conversions and long term changes in the hydrology of major drainage basins.

Although each drainage system is unique, Tennessee's wetlands managers have identified several general trends, based on their observations, knowledge, and experience:

- Agricultural conversions are decreasing;
- Marginal cropland is being abandoned and allowed to revert to wetlands;
- There is less conversion of bottomland hardwoods (BLH) to cropland;
- Urban conversions are increasing; and
- Transportation impacts (highways, airport construction) are a growing factor in wetland loss, however the use of mitigation in these projects is helping to limit the net loss of wetlands acreage.

Unfortunately, there is not complete data being collected to confirm these observations or to assess changes quantitatively.

In the future, major losses are likely to be due to urban conversion impacts, transportation construction impacts, or to continuing changes in basin hydrology (channelization, drainage or impoundments). Potential factors that

might impact wetlands in the future are: changes in timber harvest management strategies; the introduction of new agricultural crops; or changes in demand or prices of existing crops.

What Are the Economic Consequences of Wetland Loss?

It is difficult to quantify or place an economic value on the loss of wetlands resources or their functions. Principal consequences are: increased costs for water pollution control and treatment of drinking water, higher costs from flood damages, and a decreased value of wildlife, timber, and crops.

CHAPTER 2
GOAL OF THE STATE WETLANDS STRATEGY

> It shall be the goal of the State of Tennessee to provide the maximum practicable wetlands benefits to Tennessee and her citizens by conserving, enhancing, and restoring the acreage, quality, and biological diversity of Tennessee wetlands.

The management of wetlands and protection of their vital functions for the benefit of Tennessee citizens is a formidable challenge. It requires shared vision, intelligent resource-based planning, long-term commitment, and consistent cooperation. Since the Strategy was first published in 1994, we have increased our knowledge to enable us to better understand and manage our wetland resource. Most importantly, we continue to agree on a statewide goal and objectives, and the actions needed to realize that goal.

The state's goal acknowledges that the majority of the state's wetland resources are currently in private ownership and management, and are likely to remain so. It follows that many management decisions that will affect the quality and functions of wetlands will be made by individuals, private corporations or non-profit organizations.

For this reason, one theme of the Strategy is to provide private owners of wetlands with the information they need to make informed management decisions that will benefit the owner, and at the same time protect wetlands functions and the public benefits that flow from wetlands. The Strategy calls for the State to collect and share information about the resource, and to offer technical assistance to private wetlands landowners, upon request.

The Strategy places responsibility for data collection and analysis with the State. Responsibilities include inventory and characterization of the state's wetland resources, creation of a GIS-based wetlands database, research, analysis and long term monitoring of status and trends. The Strategy calls for regular dissemination of technical information to planners and wetlands managers. Improved collection and analysis of monitoring data is the main priority of the implementation phase for this edition of the Strategy.

The Strategy also calls for the State to identify unique wetlands and potential restoration sites, and to rank them. The Strategy endorses the existing state

policy to acquire certain unique or exceptionally high quality wetlands that provide many public benefits, and to manage these wetlands in such a way as to protect or enhance their functions and benefits to the public. Another strong theme in the Strategy is restoration and enhancement of wetlands, both public and private, to offset previous losses, and to increase the resource base.

The State has a broad mandate to protect its waters, including its wetlands. Tennessee shares this mandate with federal agencies. The Strategy recognizes the need for an effective regulatory program, and offers recommendations with regard to water quality standards, record keeping and follow up of mitigation projects.

The conservation of wetlands is an institutional challenge, as well as a resource management challenge. Wetlands management is fragmented and sometimes inconsistent; agency mandates and program responsibilities may overlap or conflict. Public interests may not coincide with private interests.

For this reason, another strong theme in the Strategy is coordination and cooperative action. The Strategy calls for sharing the workload, sharing information and resources, and consistently communicating and coordinating among agencies and interest groups. In short, the Strategy calls for the creation of a working partnership between the public and private sectors.

The Strategy recognizes that the actions outlined here will require a commitment of staff and money. It endorses existing funding mechanisms, and calls on respective agencies to allocate adequate funds to carry out the responsibilities assigned to them. The Strategy has proven to be a very effective tool to leverage federal funding for the actions outlined herein.

The Strategy provides the framework for wetlands protection in Tennessee. It is the foundation upon which participating agencies should build their wetlands protection efforts, and it is the evidence to be used when requesting support for those efforts.

CHAPTER 3
OBJECTIVES

Nine objectives are being implemented to achieve the wetlands goal. The action items identified to achieve these objectives are outlined in Chapter 6. Most of the Objectives and Action Items have remained the same since the First and Second Editions of the Strategy because the Interagency Wetlands Committee recognized the validity of these objectives and the need for their continued implementation. Two goals were combined in this edition based on their shared focus on information gathering. Several action items were removed from this edition as they have been completed. Removed action items are summarized in Appendix K.

The nine objectives currently being implemented are below.

1. Characterize the state's wetlands resource base more completely and identify the critical functions of the major types of wetlands in each physiographic province.

Planning, regulatory and restoration program managers need to understand the critical functions of major types of wetlands in order to better understand the need for and methods of maintaining and enhancing these critical functions.

In order to allocate scare program and financial resources intelligently, the State must consolidate existing information and collect additional information to complete an accurately located and characterized inventory of its wetland resources.

Furthermore, planning, regulatory and restoration program managers need to identify and understand the critical functions of major types of wetlands, in order to maintain and enhance these critical functions.

2. Identify and prioritize unique, exceptionally high quality, or scarce wetland community types and sites for acquisition or other equally effective protection.

Certain unique, high-quality wetlands deserve a higher level of protection because of the public benefits and ecological functions they provide. Examples of exceptional wetlands include wetlands that provide habitat for a threatened or endangered species or ecosystem; wetlands that represent a rare type in Tennessee; and wetlands that are of special value because of their function. As a result of implementation of the Strategy, unique wetlands are now being identified, acquired or otherwise protected *before*

development, conversion, or other adverse changes in land use are proposed.

A systematic review and analysis of existing data and literature on Tennessee wetlands has yielded a database of candidate acquisition sites. The acquired information can now be used by several state, federal, and non-profit programs to establish priorities and allocate available resources for acquisition, or less than fee protection.

3. Identify priority wetlands restoration sites in each river corridor and explore appropriate restoration methods for each wetland type, including the restoration of "natural" flood plain hydrology.

This objective is intended not only to target suitable sites for restoration, but to identify opportunities to restore the biological integrity of river corridors at the landscape level, including consideration of corridors, continuity, and patch size. Identification should be site specific and representative of landscape types. The candidate sites should be organized according to hydrologic units, watersheds, or existing basin authorities.

The process should also identify prime farmland, recognize its value for agricultural production, and consider this factor in assigning priority as a restoration site.

The behavior of water, the hydrologic regime, is the engine that drives wetlands function. Our understanding of the "natural" hydrology of floodplains and the interactions of rivers, lakes, and aquifers with associated wetlands is incomplete, and should be systematically addressed by a cooperative research program tailored to meet state wetlands information needs. Projects including demonstration of techniques for restoring or maintaining natural floodplain hydrology should also include sufficient monitoring and follow up work to permit an assessment of the effectiveness and transferability of these techniques. A demonstration restoration project will begin in 1998 at Stokes Creek to evaluate the effectiveness of current restoration techniques. Both baseline and post-project monitoring data will be used to evaluate the success of this demonstration.

As our understanding grows, every opportunity to restore natural meandering waterways without artificial levees should be pursued. It is not the intent of this objective to fill in existing canals, or to dredge all streams to historic elevations.

Restoration work should be targeted to those instances where a river system is attempting to reestablish a stable equilibrium, and a relatively small intervention would reinforce or enhance the natural process and restore hydrology.

4. Restore 70,000 acres of wetlands by the year 2000.

This objective calls for the restoration of approximately 10,000 acres/year from 1993 through 2000, or about a 10% gain in the acreage reported by Hefner and Brown (1984).

It should be clearly understood that the objective targets restoration of *marginal* cropland to a functional wetland it does not seek to affect prime agricultural land.

Prime candidate restoration sites overlap, but do not coincide with, priority acquisition sites. Restoration projects should be designed and carried out by each agency, according to its mission. Information will be shared, and work coordinated by TEPO and IWC-TWG.

5. Achieve no overall net loss of wetlands acreage and functions in each USGS hydrologic unit.

While individual projects may result in gains in some wetlands and offset losses in others, the result of the full array of programs will be no further loss of function in any hydrologic unit. Priority is given during this edition of the Strategy to collecting adequate data to measure progress toward achieving this goal.

Many state agencies generate or collect data on wetlands functions related to their specific programs, such as waterfowl habitat or water quality. However, there is currently no single state agency or program specifically charged with the continuing responsibility to compile *all* available qualitative and quantitative data on Tennessee wetlands or to collect new data where it is lacking. Nor is any agency directed to establish a clearinghouse and archive to assess the status of the state's wetlands resources, and monitor trends over time.

An additional permanent staff member will be needed to develop and administer a permanent program to receive, compile, collect and correlate wetlands data, to carry out periodic status trends analyses, and to prepare reports.

6. Increase the level of benefits to landowners.

The majority of Tennessee wetlands occur on private land. It is critical that landowners understand and benefit from the functions wetlands provide on their land. Enhancing these benefits will encourage voluntary wetland protection. Education, technical assistance, and incentive programs may achieve this objective. The sound and productive management of wetlands by private landowners will also assure that the public benefits of wetlands will be sustained.

7. Create more urban riparian areas, wetland greenbelts, and wildlife corridors.

The primary threats to wetlands in and near urban areas are land development, construction and associated road building. As an alternative to development, wetlands can become a community asset if they are incorporated into an urban green belt plan, park, or wildlife corridor and dedicated to low-impact recreational use and/or storm water management.

7. Increase wetlands information delivery to local governments, the public, and schools.

Many critical wetlands decisions are made by local planning commissions and elected officials; these decisions are subject to public scrutiny. It is important to provide current information on the local wetlands resources to these communities to ensure informed resource management decisions. This will be especially important during this

implementation phase as local governments work to meet new planning requirements set by the Tennessee General Assembly.

The State should encourage local communities to protect wetlands functions, or to incorporate wetlands and floodplains into conservation programs that monitor and enhance natural wetlands functions, with emphasis on water quality, flood flow attenuation, wildlife habitat, open space and greenway continuity, recreation and education.

It is also important for young people to understand the characteristics and functions of wetlands as an element of a sound environment.

9. Establish meaningful state wetlands use classifications and water quality standards.

TDEC must develop and promulgate wetlands water quality standards as required by EPA. TDEC-WPC received a grant to support this work and has undertaken development of these classifications. Tennessee's classification and standards are based on wetlands types and functions as described in the Wetlands Conservation Strategy.

CHAPTER 4
EXISTING WETLANDS AGENCIES, ORGANIZATIONS AND PROGRAMS

RESPONSIBILITIES

In Tennessee, the responsibility for wetlands conservation and management is shared among state and federal agencies, county and city planners, non-profit conservation organizations, corporations, and ultimately hundreds of private landowners that make day-to-day decisions about the management and use of the resource. None of these agencies, organizations or individuals *alone* has a broad enough mandate or adequate knowledge or resources to adequately protect wetlands and conserve their functions.

A list of the agencies and organizations in Tennessee that administer programs affecting wetlands appears in TABLE 2. A general description of agency programs by program category follows.

Tennessee wetlands managers and owners have made a conscious effort to work together to share information, pool resources and act cooperatively in order to carry out their program responsibilities for wetlands effectively and efficiently.

Wetlands program activities in Tennessee may be grouped into six major categories: data collection, analysis and planning; research; wetlands acquisition, restoration and management; assistance to private landowners; regulation; and public information, education and other efforts.

1. Data Collection, Analysis and Planning

At the federal level of government, the U.S. Fish and Wildlife Service (USFWS) has primary responsibility for conducting periodic inventories and analyzing the status and trends of the nation's wetlands. TVA monitors the status of wetlands adjoining the Tennessee River, its tributaries, and reservoirs. EPA, through Wetlands Program Development Grants and its Advance Identification of Wetlands Program (ADID) supports wetlands characterization and planning at state and local levels.

TABLE 2
AGENCIES, ORGANIZATIONS AND PROGRAMS
AFFECTING TENNESSEE WETLANDS

FEDERAL AGENCIES AND PROGRAMS

United States Department of Agriculture: USDA

- Farm Services Agency: FSA
  Agriculture Conservation Program: ACP
  Conservation Reserve Program: CRP
  Wetlands Reserve Program: WRP
  Swampbuster

- Natural Resource Conservation Service: NRCS
  Conservation Technical Assistance
  Cooperative Soil Surveys
  Wetland Delineation for 404 Permits (agriculture land only)
  Resource Conservation and Development Program: RC & D
  Stewardship Incentive Program: SIP

United States Department of Defense: USDOD

- Army Corps of Engineers: USCOE
  Clean Water Act, Section 404 Permit Program: 404
  Water Resources Development Act of 1986: Section 1135
  Water Resources Development Act of 1996: Section 206

United States Department of the Interior

- Fish and Wildlife Service: FWS
  National Wetlands Inventory: NWI
  Fish & Wildlife Coordination Act: FWCA
  National Wetlands Priority Conservation Plan: NWCP
  North American Waterfowl Management Plan: NAWMP
  Partners for Fish and Wildlife
  Management of National Wildlife Refuges
  Endangered Species Act: ESA

- Geological Survey: USGS
  Cooperative Research Program
  National Water Quality Assessment: NAWQA

United States Environmental Protection Agency

Wetlands Protection Development Grant Program: Section 104(b)(3)
Nonpoint Source Grant Program: NPS
Clean Water Act, Section 404 Permit Review: 404
Advance Identification of Wetlands: ADID

TABLE 2 (CONT'D)

Tennessee Valley Authority: TVA
Research and Technical Assistance
Constructed Wetlands Demonstrations
Management of Wetlands on TVA Reservoir Lands

II. STATE AGENCIES AND PROGRAMS

Interagency Wetlands Committee: IWC
- Technical Working Group: TWG

Department of Agriculture: TDA
- Division of Agriculture Resources: AR
  Local Conservation Technical Assistance
  State Nonpoint Source Program
  Federal 319 NPS Program Management: NPS
  Soil Conservation Districts: SCD

- Division of Forestry: DF
  Forest Incentives Program: FIP
  Technical Assistance

Department of Environment and Conservation: TDEC
- Division of Water Pollution Control: WPC
  Clean Water Act, Section 401 Certification: 401
  Aquatic Resource Alteration Permit Program: ARAP

- Division of Natural Heritage: NH
  Natural Areas Designation and Registration
  Wetlands Acquisition
  Biological Inventories and Assessments
  Technical Assistance

- Division of Recreation Resources
  Parks and Recreation Technical Assistance Service: PARTAS
  State Comprehensive Outdoor Recreation Plan & Wetlands Adden.- SCORP
  Local Park and Recreation Fund: LPRF
  Governor's Council on Greenways and Trails
  Tennessee Greenways and Trails Program

- Environmental Policy Office
  State Wetlands Policy Development
  NEPA Review for Wetlands
  State Wetland Plan Updates and Implementation Coordination

Department of Economic and Community Development: ECD
Local Planning: LP
Development Districts: DD's

TABLE 2 (CONT'D)

Department of Transportation: TDOT
Wetlands Mitigation Bank

Tennessee Wildlife Resources Agency: TWRA
Geographic Information Systems: GIS
Wetlands Acquisition Program: WAF
North American Waterfowl Management Plan - NAWMP - & Tennessee Implementation Plan: TIP
Management of Wildlife Management Areas - WMA - Wildlife Refuges - WR - and Wildlife Observation Sites
Nongame Program (Habitat Protection)
Endangered/Threatened Species Act: ETS
Wetlands Mitigation Bank

University of Tennessee: UT
- Water Resources Research Center: WRRC

- Institute for Public Service: IPS
  County Technical Assistance Services: CTAS
  Municipal Technical Advisory Services: MTAS
  Cooperative Extension Service: CES

Tennessee Technological University: TTU
- Center for the Management, Utilization and Protection of Water (Water Center)

III. PRIVATE CONSERVATION ORGANIZATIONS & LANDOWNER ASSOCIATIONS

- Ducks Unlimited: DU
- National Ecological Foundation (NEF)
- Tennessee Conservation League: TCL
- The Nature Conservancy: TNC
- Tennessee Farm Bureau Federation: TFBF
- Tennessee Forestry Association: TFA
- The Wolf River Conservancy: WRC
- Tennessee Parks and Greenways Foundation: TPGF
- The Conservation Fund: CF

IV. JOINT EFFORTS

- Tennessee Partners Program (NRCS, USF&W, TWRA, TDA, UTAE and DU)

At the state level, the Department of Environment and Conservation (TDEC) and the Tennessee Wildlife Resources Agency (TWRA) collect and analyze data on wetlands water quality and the occurrences of rare plants, animals and communities. TDEC includes wetlands in the State Comprehensive Outdoor Recreation Plan. The Environmental Policy Office (EPO) leads and coordinates statewide wetlands policy and planning.

2. Research

At the federal level, the United States Geological Survey (USGS) conducts an active research program, focusing on wetlands hydrology and functions. The USCOE, at its Waterways Experiment Station, conducts active research, with emphasis on modeling and development of a wetlands functional assessment method. The USFWS, TVA, and EPA also sponsor or conduct wetlands research.

State research efforts are conducted primarily by scientists at its academic institutions. A major research effort, the Biodiversity Project, is led by the Tennessee Conservation League, with cooperation from both state and federal agencies.

3. Wetlands Acquisition, Restoration and Management

In recent years, acquisition of wetlands in Tennessee has been primarily a state function, led by the TWRA with the active collaboration of TDEC and the Department of Agriculture (TDA). The Tennessee Nature Conservancy (TNC) frequently assists the state's acquisition program. Increasingly, grass roots organizations like the Wolf River Conservancy have led local fund raising efforts to purchase significant wetlands. Cooperation and assistance has also come from the regional organizations like the Conservation Fund.

Many of the wetlands purchased by TWRA, USFWS, or a state/federal/private joint venture are restored or enhanced after purchase. The state Department of Transportation (TDOT) buys and restores wetlands to mitigate unavoidable impacts of road construction on existing wetlands. Under the 1986 Water Resources Development Act, the USCOE may restore wetlands if their degradation is a consequence of USCOE projects. Section 206 of the 1996 Water Resources Development Act authorizes restoration projects where there is no link to USCOE projects. Both programs require cost-share with a non-federal sponsor.

At the federal level, the USFWS purchases and manages wetlands. Wetlands in public ownership are managed by the state or federal agencies that acquired them. Two initiatives, the Tennessee Partners Project and the USDA Wetland reserve program have also increased opportunities to either permanently protect wetlands or to provide temporary habitat where it would not otherwise be available (See TABLE 3).

Table 3
Tennessee Wetlands Acquisition, Restoration and Management

Wetlands Acquired by TWRA Wetlands Acquisition Funding 1986-97[1]: 40,696 acres

Acreage Purchased by TWRA Region

Region 1: (West TN):	34,597 acres[2]
Region 2: (Middle TN):	4,121 acres
Region 3: (the Cumberland Plateau):	678 acres
Region 4: (Eastern TN)	1,300 acres

Wetlands Enrolled in USDA Wetlands Reserve Program 1994-95 (restored wetlands under permanent and 30 year conservation easements): 4385 acres restored

Cropland Enrolled in the Tennessee Partners Project 1993-98 (temporary waterfowl habitat on cropland during winter months with 10 year commitment): 14,938 acres -- receiving technical assistance; 3,977 acres -- installed water control structures

Wetlands Acquired for TDEC Natural Area Program 1996-1998: 1934 acres in completed projects, 550 acres in pending projects

4. Assistance to Private Landowners

Providing technical and financial assistance to wetlands landowners is an important activity for many state and federal agencies. Some of the programs affect wetlands directly, but most affect them indirectly by improving the management of adjacent uplands.

At the federal level, technical and financial assistance is provided primarily by the U.S. Department of Agriculture (USDA) and its many targeted programs. The Tennessee Partners Project provides assistance for temporary waterfowl habitat on cropland using federal, state and private resources. The U.S. Forest Service

[1] This amount includes non-wetland buffer zones.

[2] It should be noted that approximately 80 percent of Tennessee's wetlands are located in West Tennessee.

offers assistance to managers of forested wetlands through its Stewardship Incentive Program. The State Division of Forestry administers federal assistance programs at the local level. Similarly, the USFWS offers technical and financial assistance for restoration and management of wetlands as wildlife habitat through the Partners for Fish and Wildlife Program. TVA offers technical assistance to landowners within their river corridors, upon request.

At the state level, technical and financial assistance is offered by several programs. Of special note is a fully staffed and funded program to assist landowners in installing best management practices (BMP's) on their property to reduce nonpoint source pollution in wetlands or streams. The TDA also manages the EPA Non-Point Source (NPS) grant program within the state. The TDEC State Natural Areas program operates a registry for privately owned sites of special biological significance, including wetlands.

5. Regulation

At the state level, the TDEC Division of Water Pollution Control reviews and certifies Federal Clean Water Act Section 404 permits, and operates the Aquatic Resources Alteration Permit Program (ARAP).

USCOE and EPA share administration of the Section 404 permit program, which regulates dredge and fill activities in the waters of the United States including wetlands.

The basic premise of the Section 404 program is that no discharge of dredged or fill material can be permitted if a practical alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded. In other words, when you apply for a permit, you must show that you have:

- taken steps to avoid wetland impacts where practicable
- minimized potential impacts to wetlands
- provided compensation for any remaining unavoidable impacts through activities to restore or create wetlands.

Regulated activities are controlled by a permit review process. An individual permit is usually required for potentially significant impacts. However, for most discharges that will have only minimal adverse effects, the USCOE often grants up-front general permits. These may be used on a nationwide, regional, or state basis for particular categories of activities (for example, minor road crossings, utility line backfill, and bedding) as a means to expedite the permitting process.

On December 13, 1996, the USCOE announced that it would phase out Nationwide Permit 26 (NWP 26) which covered certain activities in isolated waters and waters above the "headwaters" point on streams. The USCOE is currently proposing to issue six new Nationwide Permits (NWPs) and modify six NWPs when NWP 26 expires. In addition, the USCOE is proposing to add one NWP condition and modify six existing NWP conditions that would apply to all existing NWPs as well as the proposed and modified NWPs. These NWPs are activity specific and size limited, and most are restricted to discharges of dredged or fill material into non-tidal waters of the United States including "below the headwaters." The NWP proposal

allows extensive opportunity for public and agency comments, and requires that regional conditions be developed for the NWPs.

The USCOE is also proposing to modify its "single family home" NWP (NWP 29) to change the acreage limit to 1/4 acre. In the interim, NWP 29 for single family housing activities that result in the loss of greater than 1/4 acre of non-tidal waters of the United States, including wetlands is being suspended.

6. Public Information, Education and Other Efforts

Almost every agency and organization makes an effort to educate landowners, wetlands users and the public about wetlands and their functions and values. The agencies and organizations disseminate information through publications, slide shows, videotapes, speakers and special events. The TDEC Division of Recreation Resources and the Tennessee Greenways organization combine the multiple benefits of greenways such as recreation, aesthetic improvement, and green space preservation with wetlands conservation in a statewide greenways development project. The TDEC Division of Recreation Resources also places emphasis on wetlands conservation through its broader recreational assistance programs. By incorporating wetlands information in its education and outreach efforts, local government officials and recreation development directors become more aware of opportunities for wetlands in urban settings.

EVALUATION OF WETLANDS PROGRAMS

The scope of this Strategy does not allow a comprehensive assessment of each program. Several programs are especially noteworthy, and are commended by the IWC/TWG as a model for future program design. These are:

- Tennessee Wetlands Acquisition Program: The acquisition program is well designed, targeted, adequately funded, and broadly supported.

- North American Waterfowl Management Plan: This conservation program has had a stunning impact on the resource, in dollars and acres. It is a cooperative, public-private partnership with specific, clearly defined goals. It is "politically correct," non-confrontational, and targeted, both geographically and with respect to the resources.

- Regulatory Programs (Sections 404, 401 and ARAP): These permit programs are controversial; however, they arguably have curtailed loss of wetlands to development. The 401-404 permitting review process has frequently resulted in plan modification, and reduced adverse impacts on the resource. In many cases, degraded wetlands are being restored as mitigation for unavoidable adverse impacts. However, some landowners avoid ownership and management of wetlands, because of regulatory restrictions.

- Federal Conservation Reserve Program (CRP) / Wetlands Reserve Program (WRP): CRP provides successful upland erosion control, with downstream benefits to wetlands. WRP has the potential for major impact.

An effectively managed regulatory program combined with an incentive program for sound management has been shown to be an effective strategy for wetlands conservation.

STRATEGY IMPLEMENTATION

The only agents for implementing the State Wetlands Conservation Strategy are the existing agencies, organizations and programs. It is not likely that there will be any new wetlands program, or a major wetlands program reorganization or consolidation. None is recommended in the Strategy. Instead the Strategy assumes that implementation of the Action Plan described in Chapter 6 will be through the programs and people now working to conserve wetlands and use them wisely. Continuing coordination and cooperation is required.

CHAPTER 5
PROGRESS AND ACCOMPLISHMENTS

Much progress has been made since the Strategy was first published in 1994. State and federal wetlands program staff have used the Strategy to guide decisions, focus efforts, and plan future activities. Following is a description of accomplishments and activities cited by participating agencies and organizations as contributing to the goals of the Strategy.

State Agencies

Tennessee Department of Agriculture - Forestry Division: The Division is performing GIS digitization and mapping work for Prentice Cooper, Standing Stone, Chuck Swan, Chickasaw, and Natchez Trace State Forests. The Division has been tracking wetlands found marked on maps by the standard USGS symbol and then requesting foresters to ground truth each site. Once the site has been verified, the location data is placed into the class reserved for wetlands. This work has found that many wetlands on the USGS maps, especially in Prentice Cooper, Standing Stone, and Chuck Swan State Forests, are not actually present on the ground.

OVERALL ACCOMPLISHMENTS

- Wetland Acreage Gains
- A "Blue Print" to Guide State Policy
- Computerized Wetland Maps for 95% of Tennessee's Wetlands
- Improved Regulatory Guidelines
- New Emphasis on River Restoration
- Wetland "Banks" to Replace Lost Wetlands
- Help for Landowners and Local Government
- National Model for Wetland Planning
- Computerized Mapping for Local Government Planning
- A Wetlands "Shopping List" and Database
- Improved Coordination Between State and Federal Agencies

TDA - Non Point Source Program 319(h) Funded Wetland Acquisition Project: EPA has provided sixty percent of the funding for this wetland project through a supplemental funding offer within the FY –95 319(h) grant.

A supplemental award of $250,000 was given to the NPS program that has been used to acquire approximately a 2,500 acre tract along the portion of the Wolf River locally known as the "Ghost River" in West Tennessee.

This tract was selected because it encompasses an outstanding old growth cypress/tupelo forested wetland and a bottomland hardwood forested floodplain.

Governor Sundquist, with the approval of the General Assembly, declared this site a State Natural Area in 1997. Currently the land is being used for cattle grazing and rowcropping. As a Natural Area, the area will exclude livestock, will provide alternative water source systems, will restore riparian buffer zones, and will implement the use of best management practices for the agricultural areas.

Tennessee Department of Environment and Conservation - Natural Heritage: The Division of Natural Heritage completed a database that gleaned existing data from state and federal agencies on wetlands. Completion of this database met a significant Objective from the first and second editions of the Strategy. The data were used to compile a master list of candidate sites to be investigated and evaluated as exceptional wetlands. This list was shared with the Nashville and Memphis District USCOE, with TWRA, TDOT, TDEC-WPC, USFWS, NRCS, USGS, ECD and TVA.

In addition to the recent Wolf River acquisition, the Division is working on acquiring approximately 500 acres in Lauderdale County. The Division has also worked in partnership with TWRA to increase protection of certain rare and high quality wetlands under the Tennessee Natural Areas Preservation Act. Since the last edition of the Strategy, approximately 275 acres in Hardin county and approximately 110 acres in Polk county, both owned by TWRA, were placed under such protection.

TDEC – Recreation Resources Division: The Division is preparing a greenways and trails plan which will include a chapter dedicated to wetlands. The Division is working with communities to develop wetland mitigation banking opportunities that benefit greenways. Shelby County is the first case study of this approach, and will be used to develop a model to share with other communities.

TDEC - Water Pollution Control: The Division of Water Pollution Control has worked with other resource agencies, TDOT and the private sector to develop five wetlands mitigation banks across the state. One additional mitigation bank project is in the planning stage. The mitigation banking approach is working well to streamline wetlands permitting in some circumstances. The Division also works with local governments, school systems, and communities to establish wetlands on public property as part of the permitting process.

The Division, with funding from EPA and through a contract with Tennessee Technological University, has

a field review of wetlands mitigation sites statewide. Preliminary results indicate a higher success rate than has been found in similar studies in other states. The Division has developed a separate database of wetland mitigation sites and is systematically tracking these projects.

In its most recent revision of Water Quality Standards, the Division proposed designation of wetlands adjacent to Reelfoot Lake as Outstanding National Resource Waters. The Water Quality Control Board has approved the designation, and it is currently under review by the Attorney General's office.

The Division has also drafted wetlands water quality standards as encouraged by EPA.

Tennessee Department of Transportation: TDOT will continue to avoid wetlands where possible and minimize impacts to wetlands in fulfilling its mission to plan, implement, maintain and manage the transportation system in Tennessee. Where impacts to wetlands are unavoidable, the Department will continue to support the use of wetland banking in compensating for these impacts.

TDOT currently maintains numerous wetland mitigation and banking sites across the state. The Department will continue to maintain and observe these sites to determine their success and use them as guides for developing future sites. The Department will also continue to work with resource agencies in the restoration of streams and wetlands in achieving the objectives of the Tennessee Wetlands Conservation Strategy.

Tennessee Wildlife Resources Agency: In 1994, TWRA received a grant from EPA to begin wetland protection implementation as outlined in the Strategy. TWRA used the grant for two projects 1) soil map recompilation and digitizing and 2) enhancement of GIS assessment models.

By April 1997, eighty-eight West Tennessee soils maps had been scanned, vectorized, and encoded. The image scanner, which replaces the process of digitizing, and the new scanning software expedited the process of vectorizing the data. All eighty-eight soils maps have been geo-referenced, which allows them to be overlaid with any 7.5 minute topographic quadrangle at 1:24000 scale. These maps represent approximately 70% of the state's historical wetland base.

GIS assessment models were employed by the Technical Working Group of the Governor's Interagency Wetlands committee (IWC-TWG) to demonstrate the feasibility and utility of GIS technology in managing and presenting complex sets of wetland data. A GIS assessment model depicting the status and trends of wetlands is the device by which static data is converted into relevant facts and subsequent knowledge about these living ecosystems. The IWC-TWG's past research demonstrated that a geo-referenced, digital soils data layer can enhance wetlands overlay analysis significantly.

The current GIS project began in 1996 with the modification of existing models to a new version of GIS software. All previous models were updated to take full advantage of new Arc Macro Language Functions. Continuity between the original

Continuity between the original assessment programs and the program upgrades was maintained to retain the capabilities of previous research designs.

A new research design was developed and tested against the current model. The new design utilizes mapunit-level soil descriptions from NRCS databases. This exceeds the ability of the IWC's generalized soils databases by describing each mapping unit for every county. For future assessments this will mean the potential for integrating digital elevation models (e.g. slope, aspect, water flow and attenuation), vegetation mapping, and the ability to conduct *map algebra*. In the future, this data should be available nationwide from NRCS, Ft. Worth, Texas.

TWRA has worked to implement the cooperative goals of Strategy by: including the Protection Planning Committee priorities for wetland acquisition; developing ten wetland project proposals for $4 million North American Wetlands Conservation Act funding with emphasis on partnerships; and partnering a private lands program promoting the temporary ponding of winter water in areas such as crop stubble.

TWRA includes other agencies' and organizations' priorities when making acquisition decisions. The Agency has acquired almost all wetlands identified as high priority wetlands that had willing sellers.

In addition, TWRA has included the USFWS in joint venture efforts to identify tracts of wetlands contiguous with their existing projects for acquisition. The two agencies have also jointly identified and agreed upon tracts necessary to develop the Reelfoot Sediment Basin, with each agency sharing equally the necessary acquisitions.

TWRA provides technical assistance to private landowners for waterfowl food crops and also technical and financial assistance through the Tennessee Partners Project for landowner management of waterfowl habitat. NRCS, TDA, USFWS, DU and the Agricultural Extension Service jointly sponsor the TPP.

TWRA has also participated in Greenbelt initiatives such as the North Chickamauga Greenbelt Initiative. The Agency evaluates additional riparian wetland found in other greenbelt initiatives.

Federal Agencies

TVA: The Tennessee Valley Authority is involved in wetland research, protection, identification and assessment through its responsibilities for land and water stewardship, and to a limited degree through regulatory responsibilities associated with permitting certain activities on TVA lands.

Land and water stewardship activities fall under TVA's Land and Water Management divisions. As a public land steward, TVA manages approximately 300,000 acres of reservoir land along the Tennessee River system. To effectively manage and protect wetland resources, TVA has implemented a GIS database of National Wetland Inventory maps for most of the Tennessee Valley region. Protection of wetlands has also been incorporated into TVA's Shoreline Management Inventory and Lands Planning projects. Wetlands on and

adjacent to TVA-owned shorelines and properties have been identified and surveyed for most of the reservoirs in Tennessee, and ecologically significant wetlands set aside for protection.

TVA's Clean Water Initiative actively works to implement cooperative water quality improvement projects throughout the Tennessee Valley. Watershed-based River Action Teams provide technical assistance to communities involved in wetland protection efforts, and incorporate wetland protection into riparian zone protection and streambank restoration projects. These River Action Teams also implement a key goal of the Strategy by providing on-going outreach and education projects to local schools, community, and civic groups that include information about the value of wetlands for watershed health,.

Additional agency activities involving wetlands include working with the USCOE to potentially develop a hydrogeomorphic model for lacustrine fringe wetlands in the Tennessee Valley, and also examining the possibilities for wetland enhancement and restoration activities on TVA lands in the context of wetland mitigation banking.

United States Army Corps of Engineers: Memphis and Nashville Districts: The USCOE is currently expanding its role in wetlands conservation. The Memphis and Nashville Districts are focusing on enhancement and restoration of wetlands, and have begun new efforts in ecosystem restoration. The USCOE also currently has an excellent opportunity to undertake restoration projects, as it now has the authority to undertake projects that are not related to federal projects.

Section 206 of the USCOE Continuing Assistance Authorities Program provides for planning, design, and construction of aquatic ecosystem restoration projects when it is found that the project will improve the quality of the environment, is in the public interest, and is cost-effective.

Section 1135 of the USOCE Continuing Authorities Program provides for planning, design, and construction of environmental restoration projects, either on or off-site, of water resources projects constructed by the Secretary of the Army when it is found that a USCOE project contributed to the degradation of the environment.

The USCOE is working to achieve no net loss of wetlands by avoiding wetlands where possible, minimizing project impacts where avoidance is impossible, and mitigating those losses that occur by creation or restoration of wetlands and their functions. The USCOE is working to stay current on state wetland efforts and functional assessment methodologies to facilitate cooperation and consensus among Tennessee state and federal agencies regarding water resource projects and related wetland impacts. They are also examining potential ecosystem restoration projects that provide opportunities for restoration or enhancement of wetland functions.

United States Department of Agriculture - Natural Resource Conservation Service: The NRCS implements several projects that are key contributors toward achieving the goals of restoring wetlands and providing additional benefits to landowners.

The Wetlands Reserve Program (WRP), was initiated in Tennessee in 1994. The program requires placement of permanent or 30 year easements with the USDA, and the full restoration of previously converted wetlands. To date, 30 easements for 6,495 acres have been filed. Complete wetland restoration has occurred on 3,686 acres. Approximately 2,522 additional acres is in the process of having easements filed, with an estimated 1,935 acres of wetland restoration anticipated to be completed by 2000.

The NRCS also administers the Conservation Reserve Program (CRP). The CRP began a new wildlife initiative in 1997. Landowners willing to enroll lands eligible for riparian zones or filter strips would be automatically accepted into the program. These buffer areas may be established around permanently or semi-permanently inundated wetlands. Approximately 500 acres of riparian zones and filter strips were accepted in the program in 1997.

The Wildlife Habitat Incentives Program (WHIP) provides federal cost-share to private landowners for the establishment of permanent wildlife habitat. Wetland wildlife habitat development is a national priority. Sign-ups began March 2, 1998 for this program and will run continuously. Eligible wetland practices under this program include wetland restoration, enhancement, buffer establishment and livestock exclusion.

The National Resources Inventory (NRI) is one of the main sources of wetlands data collected by the federal government. The NRI is currently in a data collection period. This inventory is conducted once every five years. Tennessee has approximately 21,000 randomly selected sampling points across the state that are being analyzed to determine trends in land use, land cover, management, urbanization, etc. The general status of the extent of wetlands and wetlands conversion will be defined. As of May 1998, approximately 80% of the data collection is complete. Interpretations of the data should be available by January 1999.

USDA - Rural Development: The Rural Development Agency incorporates wetlands avoidance and protection concepts into their loan programs. They are looking to further incorporate wetlands data and restoration techniques into their planning studies of the secondary and cumulative impacts of growth.

United States Fish and Wildlife Service: Since 1996, USFWS has been actively promoting the "Partners for Fish and Wildlife" Program within the State of Tennessee. Through this program, the Service has assisted private landowners in the restoration of wetland and riparian habitats. Restoration of these habitats, through technical and financial assistance provided by the Service, promotes the enhancement of water quality and provides valuable habitat for a variety of neotropical migrants, waterfowl and threatened and endangered species.

In addition, the Service assisted the Natural Resources Conservation Service (NRCS) in the implementation of its many conservation programs, including the Wildlife Habitat Incentives Program, Environmental Quality Incentives Program, National Buffers Initiative, Conservation Reserve

Program and Wetlands Reserve Program. The Service partners with the NRCS to provide technical and financial assistance to private landowners interested in enrolling in one of these programs.

United States Geological Survey:
The USGS provides data in support of documenting and characterizing riparian resources which in turn provides information for wetlands projects and research. The Survey collects and interprets data on hydrology, geomorphology, and water quality.

Non Profit Organizations and Universities

Tennessee Conservation League:
TCL works to conserve wetlands by promoting wetland restoration efforts, improving information exchange among private landowners and state, federal, and county offices, and advocating for the protection of existing wetlands. Examples of this work are TCL's efforts to help restore bottomland hardwood wetlands in the Mississippi Alluvial Plain, as well as public outreach and education on wetlands conservation and management in Fayette, Franklin, Lauderdale, and Rutherford counties.

Tennessee Farm Bureau Federation:
The Farm Bureau supports the preservation and maintenance of true, functional wetlands through educational, voluntary and incentive-based efforts. The Tennessee Ag-In-The-Classroom program has developed fourth through eighth grade curricula that teaches the scientific aspects of wetlands and functions. Informational material on voluntary programs, cost-share programs and technical assistance are made available to over 480,000 member families across the state through publications and ninety-five County Farm Bureau offices. Farm Bureau continues to support tax and cost-share incentives on the state and local level that allow landowners to protect vital wetlands with minimal loss in land productivity.

Tennessee Forestry Association:
The Tennessee Forestry Association is composed of private sector forestry companies. TFA has developed a sustainable forestry initiative in which each member company commits to certain principles regarding land management. These include: riparian protection, unique area protection, supplying purchasers with reforestation techniques, and training loggers. Changes in the economics of the forestry industry have spurred further changes, that include reforestation to address hypoxia in the Gulf of Mexico as a result of excessive sediment loading from the Mississippi River, market based solutions, and the use of fast growing species.

The Tennessee Partners Project:
This Project is a joint venture between NRCS, Ducks Unlimited, TDA, TWRA, USFWS and the Agricultural Extension Service. The program goal is to enter into ten-year contracts with private landowners to install water control structures and hold water on croplands throughout the winter for waterfowl. The program was initiated in Tennessee in 1992 and to date 80 landowners in West Tennessee have entered into contracts to flood approximately 4,400 acres through the winter months each

year. About 3,600 project acres are installed at this time.

Tennessee Technological University: TTU provides research and analysis support to the Strategy. TTU researchers have worked to develop hydrogeomorphic models for bottomland hardwood forests in West Tennessee and are planning to develop HGM models for depressional wetlands in middle and east Tennessee. These models will provide specific procedures for agencies to use in identifying wetlands and understanding the potential impacts of various activities to these wetlands.

CHAPTER 6
ACTION PLAN

This chapter describes specific actions needed to meet the objectives first set forth in Chapter 3. Some of the action items are intended to improve the effectiveness of existing programs, or to strengthen coordination and cooperative action. The Strategy will describe, at least in concept, several new initiatives or programs needed to meet the stated objectives.

For each action item, the Strategy identifies the agency or agencies bearing primary implementation responsibility, and lists all cooperating agencies and organizations.

This edition of the Strategy notes a continuation of sound programs and action items, and adds several new components. Items that have been completed are no longer listed in the Action Plan, and can be found in Appendix K.

OBJECTIVE 1: CHARACTERIZE THE STATE'S WETLANDS RESOURCE BASE MORE COMPLETELY AND IDENTIFY THE CRITICAL FUNCTIONS OF THE MAJOR TYPES OF WETLANDS IN EACH PHYSIOGRAPHIC PROVINCE

A. The IWC-TWG and TDEC-EPO should design a common framework for entering, storing and analyzing statistical data collected by cooperating agencies.

B. TDEC-NH and TDEC-EPO should coordinate a long-term program to monitor Tennessee wetlands resources and their functions. The individual responsible for this action item must have Geographic Information Systems expertise.

C. TDEC-EPO and TDEC-NH should secure funding to compile and update monitoring data, at least biennially. On a six year cycle, the individual holding the position described in Objective 1 Item C should correlate and analyze the data to prepare a detailed "status and trends" report on Tennessee's wetlands resources. The study should specifically evaluate the state's wetlands resource

base in the context of the "No Overall Net Loss of Function" objective according to the eight-digit USGS hydrologic units.

D. The State (TWRA) should continue to collect updated geo-referenced wetlands-related digitized data from other agencies and institutions working with wetlands and incorporate those changes in the State's digital wetlands database, where appropriate.

E. As new county soils surveys are completed by NRCS, the State (TWRA) should continue to acquire and import digitized soils survey data into the state GIS wetlands database.

F. For soil surveys that are not digitized, the State (TWRA) and appropriate federal agencies should initiate a systematic program to convert data to digital form and incorporate it into the state GIS wetlands database.

G. The State, Federal Agencies, and TTU should continue to seek funding for and coordinate the development of hydrogeomorphic functional assessment models for all Tennessee wetland types. The following steps are included:

1. Refine or modify the description of 10 types of wetlands identified in the Strategy, using a hydrogeomorphic approach;

2. Identify reference wetlands for each type and the functions they perform;

3. Develop criteria, and a standard state-level hydrogeomorphic assessment method, for the functional assessment of wetlands. This criteria should be developed in conjunction with national efforts; and

4. TTU, TDEC and IWC-TWG should develop hydrogeomorphic models for middle Tennessee wetlands emphasizing depressional wetlands initially.

5. TVA will develop a hydrogeomorphic model for lacustrine fringe wetlands.

OBJECTIVE 2: IDENTIFY AND PRIORITIZE UNIQUE, EXCEPTIONALLY HIGH QUALITY, OR SCARCE WETLAND COMMUNITY TYPES AND SITES FOR ACQUISITION, OR EQUALLY EFFECTIVE PROTECTION

A. TDEC-NH should distribute information on candidate sites from the wetland database and other available sources to appropriate federal, state, and local agencies.

B. TDEC-NH in cooperation with other agencies should review the criteria used in Item 2-A and "ground truth" the data.

C. TDEC-EPO should coordinate an annual meeting and field trip with resource agencies and the Department of Finance and Administration to discuss wetland issues.

D. TDEC-EPO should coordinate with state agencies (TWRA, TDEC, TDA, TDOT and the Tennessee Department of Finance and Administration) in establishing and maintaining the legal framework and cooperative atmosphere for joint ventures or public/private partnerships with federal agencies, local governments, businesses and private groups, and non-profit conservation organizations. These entities should focus on strategies that meet conservation intent, reduce total costs and accelerate closure once willing sellers are identified. These entities should also develop strategies that facilitate the acceptance of donated conservation easements and fee simple interests in high priority wetlands.

E. All participating state and federal agencies and private organizations should continue to support the interagency Biodiversity and GAP Analysis. Based on the Analysis, participating agencies should continue to:

1. Identify and locate wetlands which support rare organisms or are otherwise of high ecological significance;

2. Use the collected data to guide future inventory efforts, including remote sensing and related ground truthing; and

3. Establish a priority list of high-quality wetlands for acquisition and/or other protection measures.

F. The State (TWRA, TDEC-NH, PPC and TDOT) should maintain the coordination of their priority lists for full fee and/or less-than-fee acquisition programs and coordinate them with federal agencies and private organizations. The agencies should continue to:

1. Add objectives and criteria for protection of unique wetlands;

2. Revisit current procedure for assigning priority;

3. Schedule and carry out more extensive field work to identify rare species/communities, develop a uniform methodology for quality judgment and share information; and

4. Consider placing a high priority on rare and unique wetlands for protection using conservation approaches other than simple fee acquisition.

4. Consider placing a high priority on rare and unique wetlands for protection using conservation approaches other than simple fee acquisition.

G. The State (TWRA) should continue the Wetlands Acquisition Program at current levels.

H. The State (TDEC-NH) should continue to encourage the Natural Areas Program to include unique wetlands candidates for acquisition, using LWCF, or transfer tax funds.

OBJECTIVE 3: IDENTIFY PRIORITY WETLANDS RESTORATION SITES IN EACH RIVER CORRIDOR AND EXPLORE APPROPRIATE RESTORATION METHODS FOR EACH WETLAND TYPE, INCLUDING THE RESTORATION OF "NATURAL" FLOODPLAIN HYDROLOGY.

A. TDEC-EPO and state resource management agencies should continue to design and fund projects demonstrating restoration of wetland hydrology and incorporating natural meandering waterways.

B. State and federal agencies should continue to support the demonstration of the restoration of wetlands and natural floodplain hydrology as components of agricultural and other flood damage reduction projects, ecosystem restoration projects, and project maintenance.

C. The State (TDEC-EPO, IWC-TWG, TDEC-NH) should evaluate existing criteria to be used to evaluate and rank candidate restoration sites, and to predict the probable success of restoration. Factors to be considered should include landscape unity, important functions to be performed by restored wetlands, presence of hydric soils and restorable hydrology.

D. TDEC-EPO and the IWC-TWG should research and document the economic benefits of wetland restoration.

E. TDEC-EPO and the IWC-TWG should sponsor an annual meeting to allow wetlands researchers to report their findings and to solicit recommendations on future research needs, and areas in which research is most needed. A list of tentative research needs adopted by the IWC-TWG appears in APPENDIX D. When research needs have been determined, TDEC-EPO and the IWC-TWG should identify an appropriate agency to sponsor, fund, or conduct the needed research.

F. The Memphis District Corps of Engineers will examine opportunities for restoration of wetlands and "natural" floodplain hydrology within Federal water resource projects under appropriate authorities by working under appropriate authorities to develop projects which will demonstrate environmentally sensitive methods and include such features as meander restoration and levee removal.

OBJECTIVE 4: RESTORE 70,000 ACRES OF WETLANDS BY THE YEAR 2000

A. The State (TDEC-EPO and cooperating agencies) should utilize the reformulation of the West Tennessee Tributaries project as an opportunity to undertake a significant floodplain restoration project.

B. TDA should promote use of the CWA Nonpoint Source Abatement programs [Section 319 (h)] to restore and improve wetlands for water quality enhancement.

C. TDA-AR should continue its cost-sharing program for private landowners to implement NPS BMP's on private land.

D. TDA-DF should continue to place priority on wetlands restoration in administering the national Stewardship Incentive Program (SIP) on private land.

E. USFWS should promote and implement the "Partners for Fish and Wildlife" program in Tennessee to restore wetlands functions supporting wildlife on privately owned wetlands.

F. TDEC-NH should develop a database to track and evaluate restoration projects. The database should record the number of acres restored and document restoration of function, where possible.

G. TDEC-EPO and IWC-TWG should prepare and issue an annual report to the Governor and legislature on the status of restoration projects and, if appropriate, offer recommendations to state leaders on revising the state's long range wetlands restoration strategy.

H. All state/local agencies should cooperate with USCOE to utilize Section 206, Section 1135 programs, Ecosystem Restoration programs, and other authorities to restore wetlands or wetlands functions.

I. The State (TDA) and federal agencies should provide assistance to landowners that wish to establish or restore natural hydrologic conditions to former wetlands.

OBJECTIVE 5: ACHIEVE NO OVERALL NET LOSS OF THE WETLAND ACREAGE AND FUNCTIONS IN EACH USGS HYDROLOGIC UNIT

A. The State (TDEC-WPC) and the IWC-TWG should develop field procedures that utilize the HGM process and are realistically usable on routine wetland evaluations to identify wetlands and quantify functions. The procedures should address all wetland types in the state, and should utilize to the extent possible data that is currently collected during routine wetland determinations.

B. TDEC-WPC and the IWC-TWG should develop a data entry form that would be usable by the various regulatory agencies and provide summary information that addresses Objective 5.

C. The State (TDEC-WPC) should formalize a mitigation approach consistent with federal guidance and the guidelines specified in the 1990 Memorandum of Agreement between the EPA and the COE to avoid, minimize, and compensate impacts to wetlands.

D. The IWC-TWG should support the use of compensation ratios developed as part of an HGM assessment. Ratios should be based on a scientifically defensible methodology that considers the functional capacity of the existing wetland, time needed for full replacement of function, potential failure probability of the mitigation effort, and other pertinent factors.

E. The IWC-TWG should develop guidelines for the establishment and distribution of mitigation banks.

1. The IWC-TWG should update the Mitigation Banking policy.

2. The State (TDEC-WPC, TDEC-NH, TWRA) should develop a prioritized listing of potential bank locations for regulatory agencies to use.

3. TVA should identify potential opportunities for wetland mitigation banking on TVA lands.

F. TDOT should continue its mitigation banking program to restore wetlands in compensation for unavoidable adverse impacts of road construction on wetlands.

G. The IWC-TWG should develop a procedure to monitor the success of mitigation projects to ensure no net loss.

H. Based on the status and trends conclusions described in Objective 1, the IWC-TWG should evaluate the "No Overall Net Loss of Function" objective, and if the goal has not been achieved, prepare recommendations to the state leaders.

OBJECTIVE 6: INCREASE THE LEVEL OF BENEFITS TO LANDOWNERS

A. Federal assistance agencies should provide technical assistance and new cost-share programs to restore marginal cropland to bottomland hardwood forests.

B. The IWC-TWG should promote existing non-profit, federal, and state programs to recognize and reward landowners that protect wetlands.

C. The IWC-TWG should request UT-AES to develop and deliver a wetlands education program for technical assistance staff and landowners.

D. The State (TWRA) and federal agencies should provide technical assistance to landowners to allow winter flooding of cropped fields located in non-wetland and non-flood prone areas to enhance waterfowl habitat and conserve soil moisture.

E. The State (TDEC-NH) should continue to investigate the use of tax incentives for private, landowners that protect wetlands.

OBJECTIVE 7: CREATE MORE URBAN RIPARIAN AREAS, WETLAND GREENBELTS, AND WILDLIFE CORRIDORS.

A. The TDEC Division of Recreation Resources (TDEC-RR) should continue to incorporate wetlands conservation sites and riparian greenbelts into its Parks and Recreation Technical Assistance Service (PARTAS) and funding assistance programs (LPRF) to local governments.

B. TDEC-EPO, IWC-TWG and TDEC-RR should continue to coordinate with, and encourage the federal conservation and recreation agencies to include wetlands in urban greenbelt and greenway plans.

C. The state (TDEC-WPC & TDEC-RR) should continue to coordinate potential wetland mitigation projects with established urban greenbelt plans. State and federal agencies (TDEC-WPC & TDEC-RR and USCOE) should:

1. Encourage communities to incorporate wetlands and floodplains into a greenbelt concept;

2. Make urban planners aware of financial assistance for greenway projects; and

3. Include wetlands in appropriate planning documents such as the Tennessee Greenways and Trails Plan and the Tennessee State Recreation Plan.

D. The Department of Economic and Community Development, Local Planning Division (ECD-LP) should continue to encourage local governments to consider wetlands in their Federal Emergency Management Agency (FEMA) flood insurance plans.

OBJECTIVE 8: INCREASE WETLANDS INFORMATION DELIVERY TO LOCAL GOVERNMENTS, THE PUBLIC AND THE SCHOOLS.

A. The State (TDA, UT-AES) and federal assistance agencies (USDA) should continue to facilitate wetlands information delivery at the county level, using existing networks and staff. Suggested activities include continuing to develop comprehensive county-specific brochures that promote the value of wetlands and describe available programs to assist landowners in effective wetlands protection, management and enhancement.

B. The State (TDA, TDEC, ECD) should develop educational programs for state and local government officials concerning wetlands.

C. All state and federal agencies should continue to provide copies of wetlands plans, maps and reports to state university and regional library reference room collections.

D. TDEC-EPO and TWRA should make current wetlands maps, hydrologic data, and acquisition/restoration priority lists available to local planning commissions who review development plans; and to the local assistance providers who advise local governments (ECD-LP, UT-IPS MTAS and CTAS Advisors), professional planning associations, and architectural/engineering consultants

E. The State (TWRA) should include specific wetlands information in county resource maps to be developed by the Biodiversity Project to support sound natural resource conservation in land use decisions by local government.

F. The IWC-TWG and ECD-LP should encourage communities where rapid growth may threaten wetlands functions to apply for a planning grant and assistance from EPA and USCOE in order to undertake a joint wetlands Advanced Identification study (ADID) to guide future regulatory decisions.

G. TDEC-EPO and ECD should provide information to local governments on alternatives, impacts, etc. of building in or near a wetland or floodplain.

H. TCL should prepare information about wetland functions, values and management to be included in the in-service teacher training delivered by the Department of Education's CENTS program.

I. TVA should continue to incorporate wetlands information and management into its River Action Team/Clean River initiatives and programs and yearly business plans.

OBJECTIVE 9: ESTABLISH MEANINGFUL STATE WETLANDS USE CLASSIFICATIONS AND WATER QUALITY STANDARDS

A. The State (TDEC-WPC) should continue to develop a classification system and administrative rules that encompass all wetland types in the state.

B. The State (TDEC-WPC) should designate uses for each wetlands type. The uses shall be based on the functions and values attributable to wetlands.

C. The State (TDEC-WPC) should develop aesthetic and biological narrative criteria to protect the classified uses.

D. The State (TDEC-WPC) should adopt existing numeric water quality standards for those wetlands that are adjacent to or hydrologically connected to surface waters.

The timeline for implementation of these responsibilities is summarized in TABLE 4.

CHAPTER 7
COORDINATION AND FUNDING

COORDINATION

The responsibility for wetlands conservation and management is shared among federal agencies and programs, state agencies and programs, regional organizations, county and city planning commissions, and ultimately hundreds of private landowners who make day-to-day decisions about their land.

It is imperative that these agencies and individuals share their knowledge and coordinate their work and resources to implement the action plan outlined in Chapter 6. The Governor's Interagency Wetlands Committee and its Technical Working Group, staffed by the Environmental Policy Office (EPO), has proved to be an effective forum for information exchange, coordination, and planning. This strong coordination function should be continued and the concept should be incorporated into the state's long term strategy to conserve its wetlands. It is recommended that the Executive Committee meet yearly or bi-yearly to hear progress made toward meeting the goals and objectives, and to make any necessary mid-course corrections if key action items are not being carried out.

The EPO will continue to provide staff support to the Interagency Wetlands Committee. EPO will also continue to broker federal grants for other agencies implementing the Strategy, draft and oversee publication of technical reports and/or public information and educational materials, and coordinate wetlands programs with similar cross cutting resource management programs in Tennessee, such as the Biodiversity and GAP Analysis efforts.

FUNDING

It is nearly impossible to calculate the financial resources now dedicated to wetlands conservation in Tennessee, or to determine their cost-effectiveness with precision. An early attempt to do so was abandoned by the TWG and staff.

This is due to the fact that the state's wetlands acquisition and restoration efforts, technical assistance programs, and regulatory programs are dispersed among so many agencies, organizations, and programs. In some agencies, wetlands conservation is only part of a broader program mission, and staff and institutional support are shared. The State has very limited information on the wetlands conservation costs incurred by private

or non-profit organizations, or by private landowners.

In Chapter 4, the Strategy identified several state and federal wetlands programs that were considered to be efficient and cost effective. It is recognized that the EPA State Wetland Programmatic Development Grant has sustained progress for the Strategy. The EPA grant program has basically allowed an unfunded plan to be largely funded. The Strategy commends these programs, and recommends their indefinite continuation at current or increased funding levels. These include: the state wetlands acquisition program administered by TWRA; the North American Waterfowl Management Plan joint-venture acquisition program; the federal USDA Wetlands Reserve Program (WRP); and the nonpoint source (NPS) technical assistance program administered by TDA.

The Strategy also identified unmet needs and underfunded programs. Continued implementation of the Action Plan outlined in Chapter 6 clearly requires a significant commitment of staff and money. The state's existing programs must be efficiently administered, and the work carefully coordinated; but additional resources may be required.

In general, three strategies to increase funding levels are suggested. These are:

1. EPO should help other agencies seek another EPA Wetlands Program Development grant to implement elements of the Wetlands Conservation Strategy. EPO should request state appropriations to provide required state cost shares.

2. All state agencies should compete for other federal grants/cooperative program opportunities and allocate funds, or in-kind services to provide the required state cost share. Funding assistance needs include:
   - wetlands function research (TDEC)
   - scanning and/or digitization of NWI data and recent soil surveys for counties in the state where there are abundant wetlands (TWRA, TEPO)
   - monitoring, evaluation, and trends analyses (EPO)

3. All state resource management agencies should pool their resources and data. All agencies should continue to contribute to and participate in statewide, interagency data collection and evaluation projects, such as the Biodiversity and GAP Analysis project; geo-referenced data should be collected in a compatible format and shared with the Wetlands datasets, the Biodiversity datasets, the TDEC-TRIS, and Heritage databases.

IMPLEMENTATION SCHEDULE AND MILESTONES

Each agency has carefully reviewed the Strategy document, to determine how it would carry out the responsibilities assigned to it in the Action Plan. Each agency was asked to review the assigned action items and determine their relative priority within the agency and to lay out a tentative schedule for initiating and completing the work. This information was then compiled and assembled into a tentative

implementation schedule, which is summarized in TABLE 4. This edition of the Strategy recognizes that many of the action items are activities that are designed to continue indefinitely, and identifies these activities as such.

It should be noted that the financial assistance of the US EPA has allowed the State to implement the plan on or ahead of schedule.

TABLE 4: WETLANDS CONSERVATION STRATEGY - IMPLEMENTATION SCHEDULE AND STATUS
LEAD AGENCY: *TN DEPARTMENT OF AGRICULTURE*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITIES									
4B	Support use of NPS $ to improve water quality related WL functions	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4C	Continue cost-sharing program for private landowner NPS BMP	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
	ONGOING PROJECTS									
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
3B	Support rstoration of natural flood plain hydrology in flood damage reduction and restoration projects	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4D	Emphasize WL restoration in Stewardship Incentive Program	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4H	Cooperate with USCOE to utilize available programs	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4I	Assist landowners in restoring natural hydrologic conditions	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8A	Strengthen WL information delivery at county level. Employ coordinator/trainer for local assistance providers	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*

Note: *See Table 5 and associated item #s in Chapter " for list of cooperating agencies.*

TABLE 4 (CONT'D)

LEAD AGENCY: *TN DEPARTMENT OF ENVIRONMENT & CONSERVATION - NATURAL HERITAGE*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITIES									
1C	Secure funding to compile and update monitoring data. Prepare a detailed "status and trends" report on "No Net Loss" goal	X					XXXXXX	XXXXXX	XXXXXX	XXXXXX
4F	Develop database to track/ evaluate restoration projects	X					XXXXXX	XXXXXX	XXXXXX	XXXXXX
	ONGOING PROJECTS									
2B	Review the criteria used in 2A and "ground truth" the data.					XXXXXX	XXXXXX	XXXXXX		
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2F	Strengthen coordination of priority lists	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2H	Encourage Natural Areas Program to aquire unique wetlands	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
3C	Evaluate existing criteria to rank candidate restoration sites and predict success of restoration	X $	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX		
4H	Cooperate with USCOE to utilize available programs	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
6E	Promote the use of tax incentives for landowners who protect WL's	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries	X		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*

Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)

LEAD AGENCY: *TN DEPT. OF ENVIRONMENT & CONSERVATION: RECREATION RESOURCES DIVISION*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITIES									
7A	Incorporate WL and riparian greenbelts in technical and funding assistance programs to local governments	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
7B	Encourage federal agencies to include WL in urban greenbelt and greenway plans		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
7C	Coordinate potential WL mitigation projects with established urban greenbelt plans		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
	ONGOING PROJECTS									
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4H	Cooperate with USCOE to utilize available programs	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries	X								

(S) = Status: X *denotes under way*; $ *denotes grant received: the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)

LEAD AGENCY: *TN DEPT. OF ENVIRONMENT & CONSERVATION: WATER POLLUTION CONTROL*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITIES									
9A	Develop a classification system and rules for all WL's in state	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX			
7C	Coordinate mitigation projects with urban greenbelt plans	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
5A	Develop field procedures that utilize the HGM process and are realistically usable					XXXXXX	XXXXXX			
5B	Develop a data entry form that would be usable to the regulatory agencies and provide summary information for field findings					XXXXXX	XXXXXX			
	ONGOING PROJECTS									
1G-4	Place emphasis on developing hydrogeomorphic models for middle TN					XXXXXX	XXXXXX	XXXXXX		
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
3B	Support restoration natural flood plain hydrology in flood damage reduction and restoration projects	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4H	Cooperate with USCOE to utilize available programs	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
5C	Formalize mitigation approach consistent with federal guidance		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX			
8C	Provide WL maps/info to local govt, universities, and regional libraries	X								

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD AGENCY: *TN DEPT. OF ENVIRONMENT & CONSERVATION: WATER POLLUTION CONTROL*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
9B	Designate uses for each WL type					XXXXXX	XXXXXX	XXXXXX		
9C	Develop criteria to protect uses					XXXXXX	XXXXXX	XXXXXX		
9D	Adopt existing WQ standards for WL adjacent to surface waters					XXXXXX	XXXXXX	XXXXXX		

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter " for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD AGENCY: *TN DEPT. OF TRANSPORTATION*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITY									
5F	Continue mitigation banking program	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
	ONGOING PROJECTS									
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2F	Strengthen coordination of priority lists	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4H	Cooperate with USCOE to utilize available programs		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way*; **$** *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD AGENCY: *TN WILDLIFE RESOURCES AGENCY*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	ONGOING PROJECTS									
1D	Continue to aquire updated geo-referenced WL's data & incorporate in state GIS WL database	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
1E	Acquire and import digital soil surveys into State GIS WL database	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
1F	Continue to convert non-digitized soils data to digital form	X $	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
2E	Support biodiversity project	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
2F	Strengthen coordination of priority lists	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
2G	Continue Wetlands Acquisition Program	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
4H	Cooperate with USCOE to utilize available programs		XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
6D	Provide TA to allow winter flooding on cropland	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries			XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter " for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD AGENCY: *TN WILDLIFE RESOURCES AGENCY*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
8D	Make current WL maps, hydrologic data, and acquisition/restoration priority lists to local govt. and other organizations	X		XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
8E	Include WL info. in Biodiversity Project	X	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX

(S) = Status: X *denotes under way;* **$** *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)

LEAD ORGANIZATION: *TN ENVIRONMENTAL POLICY OFFICE & GOVERNOR'S INTERAGENCY WETLAND COMMITTEE*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	TOP PRIORITIES									
1A	Design standard reporting format	X				XXXXXX	XXXXXX			
1B	Designate person to coordinate and oversee long term monitoring					XXXXXX	XXXXXX			
1C	Secure funding to compile and update monitoring data from other agencies & organizations. Prepare a detailed "status and trends" report on "NNL" goal.	X				XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
	ONGOING PROJECTS									
1G	Seek funds for HGM functional assessment models	X $	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2C	Coordinate annual meeting and field trip with resource agencies and Dept. of Finance and Administration						XXXXXX	XXXXXX	XXXXXX	XXXXXX
2D	Establish framework for joint ventures among state agencies	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
2E	Support biodiversity project	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
3A	Design & fund projects demonstrating restoration of hydrology	$	XXXXXX	XXXXXX	XXXXXX	XXXXXX				
3B	Support restoration natural flood plain hydrology in flood damage reduction and restoration projects	X			XXXXXX	XXXXXX	XXXXXX	XXXXXX		

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD ORGANIZATION: *TN ENVIRONMENTAL POLICY OFFICE & GOVERNOR'S INTERAGENCY WETLANDS COMMITTEE (CONT'D)*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
3D	Research and document economic benefits of WL restoration					XXXXXX	XXXXXX	XXXXXX		
3E	Sponsor annual WL research conference & ID research needs					XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4A	Use reformulation of W TN Tributaries project to demonstrate a significant floodplain restoration					XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
4G	Issue annual report on restoration projections and long range strategy						XXXXXX	XXXXXX	XXXXXX	XXXXXX
4H	Cooperate with USCOE to utilize available programs		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
5A	Develop field procedures that utilize the HGM process and are realistically usable					XXXXXX	XXXXXX			
5B	Develop a data entry form that would be usable to the regulatory agencies and provide summary information for field findings					XXXXXX	XXXXXX			
5D	Support use of compensation ratios developed as part of HGM assessment					XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)
LEAD ORGANIZATION: *TN ENVIRONMENTAL POLICY OFFICE & GOVERNOR'S INTERAGENCY WETLANDS COMMITTEE (CONT'D)*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
5G	Develop a procedure to monitor success of mitigation projects					XXXXXX	XXXXXX	XXXXXX		
5H	Evaluate "No Net Loss" objective and prepare recommendations to state leaders					XXXXXX	XXXXXX	XXXXXX		
6B	Promote existing programs to reward landowners who protect wetlands		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
6C	Request UT-AES to develop WL adult education program					XXXXXX				
7B	Include wetlands in urban greenbelt and greenway plans		XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8C	Provide WL maps/info to local govt, universities, and regional libraries	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8D	Make current WL maps, hydrologic data, and acquisition/restoration priority lists to local govt. and other organizations	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8F	Encourage communities to apply for federal assistance to identify wetlands in their area	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way;* $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

TABLE 4 (CONT'D)

LEAD ORGANIZATION: *TN DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT*

OBJECTIVE	ACTION & STATUS (S)	S	1995	1996	1997	1998	1999	2000	2001	2002
	ONGOING ACTIVITIES									
7D	Continue to encourage local governments to consider wetlands in their Federal Emergency Management Agency flood insurance plans	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8B	Develop education programs for state and local officials concerning WL's					XXXXXX	XXXXXX			
8F	Encourage communities to apply for federal assistance to identify wetlands in their area	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
8G	Provide info to local govts on alternatives & impacts. of building in or near a WL or floodplain	X	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

(S) = Status: X *denotes under way*; $ *denotes grant received; the absence of a symbol indicates "no progress"*
Note: *See Table 5 and associated item #s in Chapter 7 for list of cooperating agencies.*

CHAPTER 8
MONITORING AND EVALUATION

CONSIDERATIONS

There are two aspects to be considered for monitoring and evaluation of the implementation of the Strategy. The first concerns monitoring and evaluating the **actions** called for in Chapter 6 of the Strategy. The second aspect is monitoring the **condition** of the state's wetlands. Periodic evaluation of the resource base is required to measure progress on Objectives. This has been perhaps the most difficult task attempted thus far in the implementation of the Strategy, and must be effectively carried out in this implementation period in order to determine if past and current efforts are effective.

Monitoring the Action Plan

The Action Plan as set forth in Chapter 6 describes specific actions and assigns responsibility for each item to one or more agencies, or programs.

Each agency will be responsible for tracking its assigned responsibilities, documenting its program activities, and providing data and progress or status reports to the Environmental Policy Office (EPO) every two years. EPO will compile the reports, prepare and deliver a statewide progress report to the Governor, the General Assembly, and the public. The progress report will be produced every two years. This is the second such report. The next will be published in 2000.

Monitoring, Evaluation and Trends Analyses

To determine whether Tennessee's remaining wetlands resources are being lost or damaged, the State must develop or select a method to periodically determine wetland gains or losses, the types of wetlands being impacted, the activities which are contributing to these wetland changes, and changes resulting from on-going natural processes at work across the state. It is equally important to understand those activities and processes which are contributing to increases in the overall wetlands base and the restoration or enhancement of wetland functions.

The Technical Working Group has developed some preliminary restoration criteria to measure progress toward the goal of restoring 70,000 acres by 2000.[1] They are:

[1] For more information on success criteria, see Appendix J Part B.

- The site meets current federal manual criteria;
- The site has natural (i.e. non-managed) hydrology; and
- The hydrology and vegetative community is appropriate for the geomorphic setting of the site.

Following are examples of how these criteria could be applied to evaluate restoration projects. Similar criteria would need to be developed for all Tennessee wetland types.

SAMPLE RESTORATION SUCCESS CRITERIA

Example 1
Location: Haywood County
Setting: Riverine low gradient flat
Soil: Routon
Hydrology: Water Table (<1' from surface for a minimum of 12 consecutive days after March 20th)
Plants (trees): water oak, willow oak, sweetgum, green ash, red maple, swamp chestnut oak, sugarberry, and cherrybark oak

Example 2
Location: Haywood County
Setting: Riverine low gradient flat
Soil: Rosebloom silt loam depressional
Hydrology: Flooded long duration (>30 days January through April) and water table (<1' from surface for a minimum of 29 consecutive days after March 20th).
Plants (trees): Bald cypress, water tupelo, overcup oak

Tennessee's wetlands are important components of the overall habitat fabric of our state. As such, their functions and importance to various wildlife and plant species, as well as their value to man, cannot be isolated and evaluated, monitored or managed without regard to those forces and activities at work within their hydrologic unit boundaries.

CONCLUSIONS

Evaluation and monitoring of the status and trends of Tennessee's wetlands are part of a more comprehensive program of monitoring and evaluating changes in Tennessee's total habitat. This process is part of the Tennessee Biodiversity Program.

The GIS-based habitat type mapping, which is part of the Biodiversity Program, has a built-in mechanism for 5-year updates of statewide vegetation mapping using satellite imagery. Quantitative wetland habitat changes are mapped as a part of these periodic updates. This information will be reinforced and/or refined by regular NWI and NRI updates, and status and trends reports. However, not all relevant information can be captured or displayed on a GIS system.

In order for the resource monitoring program to be successful, all agencies, both state and federal, involved in the management of some portion of Tennessee's wetlands resources, along with the regulatory community, must join in a partnership to inspect, monitor and evaluate both the quantity and quality of Tennessee wetlands. It is crucial to document changes to the various ecosystem habitats across the state in an efficient and cost-effective manner.

Resources information should be collected in a manner useable by a variety of resource managers. All parties should agree to wetlands definition, types, and functional aspects for inventory purposes. Relevant information should be collected and reported in a format that can be understood and used by all. TDEC should create a central archive to receive monitoring data and status reports; and the EPO should compile and update monitoring data every two years.

Examples of data to be reported include:

1. TWRA should continue to acquire and import current National Wetlands Inventory data.

2. TWRA should biennially inspect, monitor and prepare a report on the quantity, quality and functions of the publicly owned wetlands acquired and enhanced/restored through the state acquisition programs.

3. TDEC-WPC (Natural Resources Section – NRS) and TDEC-Environmental Assistance Centers – (EACs) should routinely monitor and document changes in water quality or other functions in wetlands, resulting from legally permitted activities or projects.

4. TDEC-WPC (NRS) should track gains and/or losses in acreage brought about by the permitting process, and examine actual delivery of wetlands functions through mitigation banking (see sidebar).

5. TDEC-WPC (NRS and Planning and Standards - PAS) should biennially inspect, assess and report on the status of wetlands designated as "Outstanding Resource Waters," or wetlands designated as "reference wetlands" for the state's regulatory wetlands classification scheme.

6. TDEC-WPC (NRS) and TDAS-NPS should biennially inspect, assess and document the status of wetlands functions restored through NPS abatement demonstration projects.

7. TDEC-WPC (NRS), TDOT and TWRA should jointly inspect, assess and report on the status of wetlands purchased and restored to mitigate unavoidable adverse construction impacts on wetlands.

8. TDEC-NH should biennially, as an element of the state's Heritage database, list, assess, and record the condition of those "unique" wetlands that support a rare ecosystem, or provide habitat for endangered plants and animals.

Mitigation Banking in Tennessee

Wetlands mitigation banking has become a reality in Tennessee. In June 1995, state and federal agencies approved a General Wetland Banking Memorandum of Agreement. This document guided the development of five mitigation bank sites across the state, totaling approximately 2200 wetland acres. The system facilitates the regulatory process and provides larger wetlands sites with better habitat and long term management potential than many smaller sites.

Wetlands mitigation banks cannot be used to short circuit the well - established mitigation sequencing approach laid out in the federal §404(b)(1) Guidelines. These guidelines establish a hierarchy of mitigative steps that begin with avoiding impacts to wetlands where practicable. Additionally, once it has been determined that there will be unavoidable impacts to wetlands, compensatory mitigation will be conducted adjacent to or contiguous with the impact site, if possible. Only after this sequence has been followed can applicants use mitigation banks for compensatory mitigation.

As the mitigation banking system continues to develop in Tennessee, all entities involved should work together to target new bank sites in areas which have been identified as high priority areas for wetlands restoration work. Mitigation banking provides an important opportunity to make front-end decisions on siting, development and management as opposed to the typically more reactive mode of regulatory programs.

9. TDEC-NH should biennially inspect and record the status of wetlands in private ownership that are registered on the state "Natural Area Registry."

10. TDA-DF should biennially monitor and document the status of bottomland hardwood stands, or other forested wetlands in private ownership, which are participating in the Forest Stewardship Incentive Program.

11. TDA-DF should biennially monitor and document the status of hydrology in bottomland hardwood forests, and adjoining agricultural lands, with particular attention to emerging problems in the Gulf Coastal Plain province.

12. USDA-NRCS (and/or the TDA-AR) should biennially monitor and report on the status of wetlands in private ownership enrolled in the USDA assistance programs.

13. USDA-NRCS should share data collected on the status and trends of wetlands on agricultural land through the NRI assessment, and periodic "swampbuster" monitoring.

14. USFWS *[with TWRA]* should biennially inspect and report on the status of wetlands acquired in fee, or by easement, under the North American Waterfowl Management Plan, or "Partners in Wildlife."

15. Other federal water resource agencies or land management agencies (e.g. USCOE, TVA, NPS, etc.) should contribute data on the

the lands that they manage in Tennessee.

16. TDEC-WPC (NRS), USCOE, and other resource agencies should carefully monitor wetlands mitigation banking in Tennessee to assure that the well established policies of mitigation sequencing are followed.

Every six years, EPO should analyze the information (or enter into a contract with one of the state's academic water resources centers to analyze the data) and prepare a detailed status and trends report on Tennessee's wetlands resources. The report should specifically evaluate the resource base in the context of the "No Overall Net Loss of Wetlands Acreage and Function" and restoration goals.

The first statewide assessment of wetlands trends should be completed in 2000, six years following the adoption of the Strategy, concurrent with the third biennial progress report, and prior to a major revision of the plan. The report should be delivered to the Governor, the members of the General Assembly, the leaders of state and federal agencies in Tennessee, and made available to the public.

Based on the conclusions of the report, the IWC should revisit and reevaluate the state's Wetlands Conservation Strategy. If the major goals have not been achieved, the committee should prepare recommendations to the state leadership to strengthen state programs to achieve these goals.

APPENDIX A
TENNESSEE INTERAGENCY WETLANDS COMMITTEE

EXECUTIVE GROUP

Justin P. Wilson
Deputy to the Governor for Policy
State Capitol
Nashville, TN 37243
615/532-4648

Dan Wheeler
Commissioner
Tennessee Department of Agriculture
P. O. Box 40627
Nashville, TN 37204
615/360-0100

Milton H. Hamilton, Jr.
Commissioner
Tennessee Department of Environment & Conservation
401 Church St., 21st Floor, L&C Tower
Nashville, TN 37243-0435
615/532-0109

Bruce Saltsman
Commissioner
Tennessee Department of Transportation
7th Floor, James K. Polk Building
Nashville, TN 37243
615/741-2848

Gary T. Myers,
Executive Director
Tennessee Wildlife Resources Agency
P. O. Box 40747
Nashville, TN 37204
615/781-6552

James Ford
State Conservationist
Natural Resource Conservation Service
675 U.S. Courthouse
Nashville, TN 37203
615/736-5471

David Sievers
State Director
Rural Economic and Community Development
3322 West End Avenue, Suite 300
Nashville, TN 37203
615/783-1300

Janet Herrin
Vice President, Water Management
Tennessee Valley Authority
400 West Summitt Drive
Knoxville, TN 37902
615/632-6770

Colonel Daniel Krueger
District Engineer
U.S. Army Corps of Engineers
167 North Main Street, B-202
Memphis, TN 38103-1894
901/544-3221

Lt. Colonel Christopher Young
District Engineer
U.S. Army Corps of Engineers
P. O. Box 1070
110 9th Avenue South
Nashville, TN 37202-1070
615/736-5626

William Cox
Chief of Wetland Planning Unit
US EPA Region IV
61 Forsyth Street
Atlanta Federal Center
Atlanta, GA 30303-3104
404/562-9351

Dr. Lee Barclay
Field Supervisor
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501
615/528-6481

Mr. W. Scott Gain
Director
U.S. Geological Survey
640 Grassmere Park, Suite 100
Nashville, TN 37211
615/837-4700

Tony Campbell
National Ecological Foundation
282 Woodland Ct.
Kingston Springs, TN 37082
615/952-3342

Andrew Walker
The Nature Conservancy
Suite 304C, Richard Jones Road
Nashville, TN 37215
615/298-3111

Ann Murray
Executive Director
Tennessee Conservation League
300 Orlando Avenue
Nashville, TN 37209
615/353-1133

Julius Johnson
Chief Administrative Officer
Tennessee Farm Bureau Federation
P. O. Box 313
Columbia, TN 38401-0313
615/388-7872

Candice Dinwiddie
Executive Director
Tennessee Forestry Commission
P. O. Box 290693
Nashville, TN 37229
615/883-3832

TECHNICAL WORKING GROUP

Mike Butler
Tennessee Conservation League
300 Orlando
Nashville, TN 37209-3200
Phone 615/353-1133
elmerfudd@nashville.com

Terry Sneed
Rural Development
3322 West End Avenue Suite 300
Nashville, TN 37203-1071
Phone 615/783
tesneed@rdmail.rural.usda.gov

Gary Mullaney
Tennessee Forestry Association
P.O. Box 458
Wickliffe, KY 42087
Phone 502/335-3151
gemulla@westvaco.com

Stefan Maupin
Public Affairs
Tennessee Farm Bureau Federation
P.O. Box 313
Columbia, TN 38402-0313
Phone 931/388-7872
smaupin@tfbf.com

Kim Pilarski
Tennessee Valley Authority
17 Ridgeway Road NRB 2B-N
Norris, TN 37828-0920
Phone 423/632-1702
kpilarski@tva.gov

Tom Roberts
Department of Biology
Tennessee Tech University
Campus Box 5063
Cookeville, TN 38505
Phone 931/372-3138
troberts@tntech.edu

Cliff Whitehead
Planning and Federal Aid Division
Tennessee Wildlife Resources Agency
P.O. Box 70747
Nashville, TN 37204
Phone 615/781-6599
cwhitehead@mail.state.tn.us

Joe Hopper
Tennessee Wildlife Resources Agency
P.O. Box 40747
Nashville, TN 37204
Phone 615/781-6612
jhopper@mail.state.tn.us

Mike Countess
Assistant Commissioner
TN Dept. of Agriculture
P.O. Box 40627
Nashville, TN 37204
Phone 615/837-5103
mcountess@mail.state.tn.us

Dave Campbell
The Nature Conservancy
50 Vantage Way Suite 250
Nashville, TN 37215
Phone 615/255-0303
David_Campbell@tnc.org

Jim Nance
TN Dept. of Agriculture
P.O. Box 40627
Nashville, TN 37204
Phone 615/837-5319

Don Green
TN Dept. of Agriculture
P.O. Box 40627
Nashville, TN 37204
Phone 615/837-5490
biomail@aol.com

Alison Brayton
Division of Recreation Resources
TN Dept. of Env. and Conservation
10th Floor, L&C Tower
401 Church Street
Nashville, TN 37243
Phone 532-0755
abrayton@mail.state.tn.us

Greg Upham
Non-Point Source Program
TN Dept. of Agriculture
P.O. Box 40627
Nashville, TN 37204
Phone 615/837-5490
biogreen@aol.com

Dodd Galbreath
Director, Environmental Policy Office
TN Dept. of Env. and Conservation
21st Fl. L & C Tower
401 Church Street
Nashville, TN 37243
Phone 615/532-8545
dgalbreath@mail.state.tn.us

Dan Eagar
Division of Water Pollution Control
TN Dept. of Env. and Conservation
401 Church Street
7th Floor L & C Annex
Nashville, TN 37243-1534
Phone 615/532-0708
deagar@mail.state.tn.us

Reggie Reeves
Director, Division of Natural Heritage
TN Dept. of Env. and Conservation
14th Floor, L&C Tower
401 Church Street
Nashville, TN 37243
Phone 615/532-0431
rreeves3@mail.state.tn.us

Paul Degges
TN Dept. of Transportation
Suite 900 James K. Polk Bldg.
Nashville, TN 37243
Phone 615/741-2612
Fax 615/532-8451
pdegges@mail.state.tn.us

Tim Davis
US Army Corps of Engineers
167 North Mid-America Mall, B-202
Memphis, TN 38103
Phone 901/544-0734
Fax 901/544-3955
davist@usace.army.mil

Ray Hedrick
US Army Corps of Engineers
ATTN: ORNE-EP-P
Room A-425 US Courthouse
Nashville, TN 37202
Phone 615/736-5026
Fax 615/736-2159
Ray.d.Hedrick@usace.army.mil

Dave Reece
US Army Corps of Engineers
167 North Mid-America Mall, B-202
Memphis, TN 38103
Phone 901/544-3970
Fax 901/544-3955
int:reeced@usace.army.mil

Eva Long
Wetlands Section
US EPA Region IV
61 Forsyth
Atlanta Federal Center
Atlanta, GA 30303-3104
Phone 404/562-9413
Fax 404/562-9343
Long.Eva@epamail.epa.gov

Doug Winford
US Fish & Wildlife Service
446 Neal Street
Cookeville, TN 38501
Phone 931/528-6481, ext. 215
Fax 931/528-7075
douglas_winford@mail.fws.gov

Tim Diehl
US Geological Survey
810 Broadway Suite 500
Nashville, TN 37203
Phone 615/837-4751
Fax 615/837-4799

Bill Wolfe
US Geological Survey
810 Broadway Suite 500
Nashville, TN 37203
Phone 615/837-4756
Fax 615/837-4799
wjwolfe@usgs.gov

Mike Zeman
US Soil Conservation Service
675 US Courthouse
Nashville, Tennessee 37203
Phone 615/736-7241
Fax 615/736-7764
mzeman@tn.nrcs.usda.gov

Melanie Catania
TN Department of Environment and Conservation
Environmental Policy Office
21st Floor, L&C Tower
401 Church Street
Nashville, TN 37243
Phone 615/532-0739
Fax 615/532-0120
mcatania@mail.state.tn.us

Dan Sherry
Tennessee Wildlife Resources Agency
P.O. Box 40747
Nashville, TN 37204
Phone 615/781-6572
Fax 615/741-4606

APPENDIX B
WETLANDS DEFINITION, IDENTIFICATION, AND DELINEATION

Wetlands possess three unique identifying characteristics: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetlands hydrology. These characteristics individually or in combination determine classification and delineation of wetlands for numerous technical and/or legal purposes.

Hydrophytic vegetation (hydrophytes) are macroscopic plants growing wholly or partly in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Hydrophytes have adapted structurally, physiologically, and/or reproductively to the rigors of a periodically anaerobic environment. The U.S. Fish and Wildlife Service has published the "National List of Plant Species That Occur in Wetlands" (Reed, 1988). There are over 7,000 species on the National List and approximately 1,600 of these occur in Tennessee.

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (typically 18 inches). In general, hydric soils are flooded, ponded, or saturated for two weeks or more during the "growing season" when the soil temperature is above biologic zero (41 degrees Fahrenheit). The National Technical Committee for Hydric Soils has developed criteria for hydric soils and has published a list of the soil phases considered hydric in "Hydric Soils of the United States" (USDA-SCS 1991).

Of the three technical criteria of wetland identification, wetlands hydrology is the most difficult to identify due to annual, seasonal, and daily fluctuations. Numerous factors influence the wetness of an area, including precipitation, topography, soil permeability, and plant cover. Permanent or periodic inundation or soil saturation are the driving forces behind wetland formation. The presence of water for two weeks or more during the growing season typically creates anaerobic conditions in the soil, which affect the types of plants that can grow and the types of soils that develop. On-site observation can sometimes be used to ascertain the presence of saturation and/or inundation. However, soil and vegetation characteristics and other surrogate indicators often must be relied upon as evidence of the hydrologic regime.

Several definitions have been formulated to identify and delineate

wetlands to meet various specific legal or technical needs of resource management. The U.S. Fish and Wildlife Service (FWS) developed a definition of wetlands for purposes of conducting a National Wetlands Inventory (NWI). The inventory is performed by interpretation of aerial imagery, and observable surface conditions are a key component of the definition. The definition covers vegetated and non-vegetated wetlands, recognizing that some types of wetlands lack vegetation (e.g., open water lakes, river beds, mud flats, sand bars, rocky shores). The wetland definition and its technical application is fully explained in the FWS publication "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin, et al, 1979):

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season each year.

The definition of wetlands used by EPA and USCOE for administering the Section 404 permit program is based primarily on hydrology, with soils and vegetation implicated as on-site indicators of hydrologic conditions:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions.
>
> Wetlands generally include swamps, marshes, bogs, and similar areas. (40 CFR 230.3 and 33 CFR 328.3)

NRCS uses a definition that relies more on soils and hydrology to determine eligibility for U.S. Department of Agriculture program benefits under the provisions of the Food Security Act (USDA-1988):

> Wetlands are defined as areas that have a predominance of hydric soils and that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions...(except certain permafrost lands in Alaska.)

All four of the above agencies agreed on a unified approach for identifying and delineating wetlands for jurisdictional purposes (Federal Interagency Committee for Wetland Delineation, 1989):

> Wetlands possess three essential characteristics: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology...The three technical criteria specified are mandatory and must all be met for

an area to be identified as a wetland. Therefore, areas that meet these criteria are wetlands.

However, in the Energy and Water Development Act of 1992, Congress prohibited the use of the 1989 delineation manual for jurisdictional determinations. The federal agencies are currently using the 1987 manual. Although some of the field procedures have been modified, the technical criteria remained the same.

APPENDIX C
TECHNICAL REPORTS

TECHNICAL REPORTS SUPPORTING THE WETLANDS CONSERVATION STRATEGY

1. *The Use of Geographic Information Systems to Enhance Wetlands Data Management and Analysis* (Thomas S. Talley and Leonard Ray Tucker, June 1994)

2. *Wet Soils of Tennessee* (Thomas S. Talley, May 1994)

3. Characterization of Selected Types of Palustrine Wetlands in Tennessee Bradley W. Bingham and Thomas H. Roberts, May 1994)

4. *Tennessee Hydrogeomorphic Wetlands Classification and Functional Assessment: A Development Concept for Tennessee* (Thomas S. Talley, June 1994)

TECHNICAL WORKING GROUP SUBCOMMITTEE REPORTS INCORPORATED INTO THE STRATEGY

1. *Wetlands Technical Assistance: An Inventory and Assessment.* Report of the Private Landowner Technical Assistance Subcommittee: June 10, 1991; revised 1993.

2. *Tennessee Interim Wetlands Mitigation Policy.* Report of the Mitigation Subcommittee: June 10, 1991.

APPENDIX D
RECOMMENDED TENNESSEE WETLANDS RESEARCH TOPICS

I. **BASIC HYDROLOGY**
- A. Hydrologic Regimes of Overflow Driven and Groundwater Driven Wetlands
  - 1. Hydroperiods and Inundation Depths
  - 2. Sources, Sinks, and Pathways
    - a. Evapotranspiration Rates and Controlling Factors
    - b. Groundwater Interactions
    - c. Flow Regimes (Velocities)
- B. Functional Assessment Utilizing New HGM Models in Riverine and Depressional Wetlands

II. **WATER QUALITY**
- A. Spatial and Temporal Variability
  - 1. Water Quality Effects of Wetlands
    - a. Upstream vs. Downstream
    - b. Unaltered Streams vs. Drainage Canals
  - 2. Seasonal Variation of Water Quality
  - 3. Constructed Wetlands and Water Quality

III. **ECOLOGY**
- A. Plant Distribution and Succession
- B. Wildlife Utilization of Wetlands
- C. Fisheries Utilization of Wetlands
- D. Nutrient and Energy Pathways
- E. Invertebrates in Wetlands
- F. Importance of Small, Isolated Wetlands

IV. **HISTORICAL CHANGES**
- A. Sedimentation Rates
- B. Logging, Timber Kills, and Reforestation
- C. Channel Modification
  - 1. Catalog of Construction and Maintenance Activities
  - 2. Direct Causes and Effects of Modification
- D. Agricultural Expansion and Contraction

E. Re-establishment and Spread of Beaver
F. Landscape Aspects of Wetlands and Impacts of Fragmentation on Function
G. Cumulative Impacts

V. ECONOMICS

A. Forest Management Practices
B. Agricultural Uses and Benefits
C. Private Ownership Benefits, Liabilities, and Opportunities
D. Public Interest Benefits, Liabilities, and Opportunities

APPENDIX E
GLOSSARY

anaerobic: a condition in which molecular oxygen is absent (or effectively so) from the environment

aquifer: a layer of rock or sediment containing water that can be withdrawn in usable quantities from a well

best management practices: a set of guidelines or standards detailing the methods to be employed in the conduct of an activity (e.g. timber harvest, road construction) to reduce its impacts

biodiversity: the variety and variability within and among living organisms, and the ecological complexities in which they occur

bottomland hardwood forests: hardwood forests of periodically flooded lowlands and alluvial floodplains along streams and rivers, with diverse vegetation that varies in species composition and growth characteristics along gradients of flooding frequency and soil saturation

climax: the terminal stage of ecological succession resulting in a self perpetuating plant community

conversion: to drastically alter land use; e.g., to clear a forested area and develop a subdivision on the site

delineation manual: a set of procedures for precisely determining the boundaries of wetlands; based on hydrology, soils, and vegetation

emergent vegetation: a rooted herbaceous plant that has parts extending above the water's surface

endangered species: a species considered to be in immediate danger of extinction

enhancement: to improve; in the context of wetlands, the process of improving the functional capability and therefore the quality of wetlands that have been degraded by past activities

facultative hydrophyte: a species of plant that is equally likely to occur in a wetland or a non-wetland (estimated probability 33 to 67 percent)

function: the normal characteristic actions or activities of wetlands; e.g., many wetlands perform the function of sequestering and transforming nutrients; distinguished from value

GAP analysis: a methodology for identifying areas in which there are gaps in biodiversity; based on GIS technology and the analysis and overlaying of plant and animal distribution data bases

geographic information system (GIS): a methodology using computer maps integrated with multiple data bases; used to characterize, identify, and manage at local or landscape scales; a computerized approach for overlaying maps

hydric soil: a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part; conditions favor the growth and regeneration of hydrophytic vegetation

hydrogeomorphic system: a classification system for wetlands based on geomorphic setting, water source, and hydrodynamics; used to identify and group functionally similar wetlands

hydrologic modification: an alteration to an existing hydrologic regime

hydrologic regime: the normal characteristics of frequency, duration, seasonality, depth, and movement of water in a waterbody or wetland

hydrologic unit: land area having boundaries drawn mostly along surface water basin divides; Tennessee contains all or part of 57 cataloging units which are aggregated into 12 accounting units

hydrology: the science dealing with the properties, distribution, and circulation of water; both above and below ground

hydroperiod: pertaining to the temporal aspects of a hydrologic regime

hydrophyte: a plant (other than microscopic species) that grows in water or on a substrate that is periodically deficient in oxygen as a result of excessive water content; plants typically found in wet environments

jurisdictional wetland: an area determined to have the characteristic hydrology, vegetation, and soils typical of wetlands; therefore the area is subject to various regulations such as section 404 of the CWA

lacustrine: wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergent vegetation, emergent mosses, or lichens with greater than 30 percent aerial coverage; and (3) total area exceeds greater than 20 acres.

limnetic: all deepwater habitats in lacustrine waterbodies

littoral: wetland habitats of a lacustrine system that extends from shore to a depth of 2 meters below low water or to the maximum extent of nonpersistent emergent plants

levee: a naturally created elongate ridge formed by deposition of waterborne sediment parallel to and adjoining the shoreline of a body of open water; or a manmade feature of the landscape that restricts movement of water into or through an area

mitigation: the lessening or moderating of negative effects; in regards to wetlands, actions that result in reducing the loss or degradation of wetlands in an area

mitigation bank: an area established for the purpose of offsetting unavoidable losses of wetlands; acreages (or other units based on function) are "withdrawn" from the bank to compensate for ones that have been lost

nonpoint source pollution: pollution not associated with a specific locality such as a discharge pipe, drain, etc.; broad-based input of pollutants

no overall net loss: in reference to wetlands, the concept that acreages and functional capability will not be reduced below existing or baseline levels; any wetlands lost must be replaced by creating new ones

obligate hydrophyte: a plant that occurs almost always (estimated probability greater than 99 percent of the time) in wetlands; almost never occurs in non-wetlands

palustrine wetlands: nontidal wetlands dominated by trees, shrubs, or persistent emergent vegetation; and wetlands lacking such vegetation but with the following characteristics: (1) area less than 20 acres in size; (2) lack of wave formed or bedrock features; and (3) water depth in the deepest part of the basin of less than 2 meters at low water

poorly drained: an condition in which water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods greater than 7 days

potentially hydric soils: wetness limited soil map units that (1) are similar to hydric soils in taxonomy and water properties, (2) are not classified as hydric because they fail to demonstrate sufficient depth of saturation, flooding frequency, drainage rates or other essential criterion, and (3) may exhibit site specific morphological properties or inclusions of hydric soils upon field evaluation

prevalence index: a weighted average measure of the sum of the frequency of occurrences of all species along a single transect or as calculated for a plant community by averaging the prevalence index of all sample transects through the community

primary productivity: energy stored by the photosynthetic activity of producer organisms (chiefly green plants) in the form of organic substances which can be used as food materials

remote sensing: the gathering of information from instruments not actually on site; for example, using color infrared photography to study the species composition of a forest

restoration: the process of replacing some attribute that has been lost or decreased; with wetlands, manipulating vegetation or hydrology to facilitate the establishment and maintenance of conditions that previously existed

riparian: associated with the banks of streams, rivers, or lakes

riverine wetlands: wetlands contained within a channel; exceptions include those dominated by trees, shrubs, and persistent emergents and those in which ocean-derived salinities are greater than 5 ppt

lower perennial: riverine systems with continuous flow and low gradient
upper perennial: riverine systems with continuous flow and high gradient
intermittent: riverine systems in which water does not flow for part of the year

scrub-shrub: dominated by wood vegetation less than 6 meters tall

slough: a slowly flowing shallow swamp or marsh

soil survey: a process of identifying and mapping soils; usually within a county

succession: the orderly replacement of one plant community by another
value: benefits, goods, and services that result from functions; e.g., one function of many wetlands is the storage of surface water; the value of that function is to reduce flood damage

wetland type: a category of wetlands based on similar physical characteristics, such as vegetation, geomorphology, and/or hydrology

wetlands capability base: the acreage of existing soil map units that are indicative of existing and restorable conditions capable of supporting wetlands vegetation detectable by typical aerial inventory methodologies

wetland(s) characterization: describing the typical distinguishing attributes of a wetland type (e.g., deep floodplain basins) or the wetlands of a particular geographic area (e.g., Reelfoot Lake and watershed), including biological, geomorphological, hydrological, climatological, and chemical parameters; and socioeconomic and ecological processes and effects

wetness limited soils: those soils in which excessive water from flooding or saturation impairs or prohibits certain activities or uses, such as agriculture or septic system sewage disposal

APPENDIX F
COMMONLY USED ACRONYMS IN THE STRATEGY

BLH	Bottomland Hardwoods
BMP	Best Management Practice
CRP	Conservation Reserve Program
CWA	Clean Water Act
FEMA	Federal Emergency Management Agency
FSA	Food Security Act
GIS	Geographic Information System
HGM	Hydrogeomorphic
LWCF	Land and Water Conservation Fund
MBCF	Migratory Bird Conservation Fund
NPS	Nonpoint Source Pollution
NRI	Natural Resource Inventory
SCD	Soil Conservation District
WCP	Wetlands Conservation Plan
WRDA	Water Resources Development Act
WRP	Wetlands Reserve Program
WTT	West Tennessee Tributaries Project
TSD	Technical Summary Document

APPENDIX G
STATE WETLANDS PLANNING PROCESSES

Lessons Learned for Successful State Wetlands Planning:

- **Rely on "grass roots" support** - A planning process should be initiated by key special interest or lobbying groups. Strong grass roots support will help sustain progress during political change.

- **Be led by state government** - After securing grass roots support, the process should be led by the State, preferably the executive or legislative branch. Federal agencies should participate.

- **Seek broad participation and involve key stakeholders** - Key political interests should be involved as well as groups directly affected by or involved in wetland programs or policies. Planning committees should be diverse, relatively balanced and manageable in size. Some state and regional organization leaders offer effective representation for the general public and make consensus possible. Academic and legislative representation is important. The involvement of agency managers or staff who will implement the plan are very important for successful planning and final implementation.

- **Be committed to dialogue** - If facilitated correctly, the participants in a discussion of the issues will (1) become more personally acquainted; (2) alter personal biases and pre-conceived notions over time; and (3) learn to appreciate other participant's perspectives and values. Regular attendance by appointed committee members is important.

- **Utilize a competent, objective and neutral "process coordinator", facilitator and if necessary, a mediator** - The process coordinator chairs meetings, sets schedules, and interacts with political sponsors (Governor, etc.). The facilitator (possibly the same as the coordinator) encourages participation, keeps everyone focused and moves the process along a structured path. A process led by an ineffective facilitator can result in false consensus, meeting delays, slow progress and loss of interest by key participants. A professional mediator is helpful for

extremely polarized situations. All process leaders should be perceived as objective, neutral and fair.

- **Require open and structured dialogue** - All viewpoints should be discussed openly. The facilitator should tightly control personal attacks, value judgments or domination by individual members. Meetings should be perceived as objective, neutral and fair.

- **Seek 100 percent consensus** - If the dialogue is managed properly, total consensus can be reached on most key issues. Total consensus means that every organization has a veto. After exhaustive dialogue, if consensus cannot be reached on a certain point, move on to other issues.

- **Use sound science and technical approaches** - Wetland or environmental policy should be based on sound science tempered by public values. One successful scheme is to establish (1) a policy oversight committee of executive / management / political persons; and (2) a working group composed of key technical professionals and managers, led by the process coordinator, to work out plan details. The executive committee approves working group products.

- **Plan within the context of larger systems** - Develop a plan that recognizes the larger system context in which wetlands reside.

- **Recognize political issues** - The planning process should recognize the political risks associated with plan products and seek to address them constructively or if necessary to avoid them.

- **Involve political leaders** - The governor or the legislature should sponsor the planning process. They empower and legitimize the planning process and final plan. Their appointees also feel representative of higher authority and will usually participate more seriously.

- **Develop strategic actions and focus on results** - The planning process should focus on <u>actions</u> and "on-the-ground" results that can conserve, protect or restore wetlands.

- **Move quickly from abstract planning to implementation**. Plan implementation is the priority goal. The planning process should follow an efficient but realistic predetermined schedule.

- **The Final Plan - A State Wetland Plan Should:** *(from World Wildlife Fund recommendations and more)*

  - ✓ **Describe the status of the state wetland resource**

- ✓ **Define a future vision** or a broad goal for the resource **and list measurable actions** to implement it.

- ✓ **Address the issues comprehensively and prioritize their importance** - The plan should address all relevant issues. However, the issues and corresponding actions should be prioritized and scheduled over a limited time frame.

- ✓ **List existing programs and government agency responsibilities**

- ✓ **List why the actions are needed, what actions will be done, when to do them, who will do them and in what priority** - The plan should list specific actions, their implementation schedule and those responsible for implementing them in a concise and clear manner so that accountability can be established and progress can be measured.

APPENDIX H
EXECUTIVE ENDORSEMENT LETTER FOR SECOND EDITION

STATE OF TENNESSEE

DON SUNDQUIST
GOVERNOR

January 18, 1995

Dear Fellow Tennesseans,

I am very pleased to share with you the *Tennessee Wetlands Conservation Strategy, Second Edition: Current Progress and Continuing Goals.* This plan and its accomplishments result from a concerted effort by private, state and federal interests to balance the genuine necessity of wetlands conservation with a sensitivity to the rights and concerns of our citizens.

Over the last two years, the *Strategy* has been implemented largely on schedule with success inside and outside of Tennessee. The *Strategy* has encouraged state agencies to direct state and federal funding for wetlands conservation in much more effective directions than the past. State wetlands and soils information has been computerized not only for the benefit of wetlands, but also for more thoughtful agricultural, economic and transportation activities. Gradual improvements are being made in the fairness and objectivity of wetlands regulations. More information and technical support are being provided to improve the natural and economic opportunities for privately owned wetlands. In addition, the *Strategy* and its unique consensus approach has catalyzed numerous out of state requests for copies of the plan and advice.

It is true that wetlands resources are vital components of Tennessee's valuable and sometimes threatened ecosystems. Recent data and current professional opinion indicate that the rate of wetlands loss has significantly declined. However, we still recognize that our "no net loss" goal for the state's wetlands remains a challenge. To maintain the momentum of our accomplishments, my administration will continue to support the *Strategy* and its related activities. To all citizens of Tennessee, I urge your support and assistance.

Sincerely,

Don Sundquist

Don Sundquist

APPENDIX I
EXECUTIVE ENDORSEMENT LETTER FOR FIRST EDITION

State of Tennessee

NED McWHERTER
GOVERNOR

February 22, 1994

To the Citizens of Tennessee:

In my seven years as Governor of Tennessee, we have attempted to move forward and resolve the most pressing and difficult issues of our time. The Tennessee Wetlands Conservation Strategy provides us with a consensus approach that addresses the issues surrounding wetland conservation. This Strategy provides us with a blueprint to guide a partnership of state and federal agencies, as well as private organizations, to make sound wetland policy and management decisions in the future.

We recognize that Tennessee's wetlands are important and vital components of our landscape. Properly functioning wetland areas enhance and support the diversity of our natural and biological resources as well as help lessen the intensity of artificially induced and naturally occurring impacts on our environment.

Through the Tennessee Wetlands Conservation Strategy, we seek to focus the financial and human resources currently available in our state to pursue a common goal. Together, we seek to conserve, enhance and restore the acreage, diversity and quality of wetlands in Tennessee. To accomplish this, we will quantify our wetland assets, prioritize our interests, address fundamental reasons for wetland losses and measure our progress.

Tennessee's wetlands and other natural resources are our inheritance and our gift to future generations. I urge every Tennessean to play a part in the public and private cooperation required to implement this Strategy.

Sincerely,

Ned McWherter

Ned McWherter

APPENDIX J - PART A
DETAIL CONCERNING KEY IMPLEMENTATION ACTIONS

The Tennessee Wetlands Conservation Strategy:

- resulted in a focused, action oriented, policy blueprint to guide state actions;
- catalyzed $2.2 million in federal wetland grants to Tennessee (many are listed below);
- helped to direct over $700,000 in federal wetland funding toward the West Tennessee Tributaries river / floodplain / wetlands restoration demonstration project;
- resulted in the digitization of over 70% of the state's historic wetlands base;
- resulted in the digitization of 88 quads
- began efforts in 1994 to improve the predictability and objectiveness of state and federal regulatory wetland permitting using the hydrogeomorphic methodology (HGM) and functional assessment method;
- catalyzed a 1995 project to identify and prioritize wetland restoration sites in TN;
- catalyzed a 1993 technical assistance program for temporary waterfowl habitats;
- catalyzed a 1996 forestry assistance program for bottomland hardwood restoration;
- initiated a 1995 standard reporting system for wetlands restoration and mitigation;
- resulted in four pilot studies in 1994 identify effective technologies and methods;
- increased public and local government outreach and education (a local officials regional workshop was held Summer 1995, brochure slated for development in 1996);
- increased interagency coordination and communication through Governor's IWC;
- helped to initiate the "General Memorandum of Agreement for Wetlands Mitigation Banks in Tennessee (5 sanctioned banks exist); and

- catalyzed legislative investigations for landowner incentives (wetland property tax relief to be acted on in 1996 session); and

- lessened negative perceptions and increased appreciation for wetland conservation among non-environmental interests.

APPENDIX J PART B
POLICY GUIDANCE

WETLAND RESTORATION, ENHANCEMENT AND CREATION
Definitions and General Success Criteria for Wetlands in Tennessee

INTERAGENCY WETLANDS COMMITTEE
Adopted May 8, 1995

Since Tennessee was first settled, over 59 percent of its original wetlands have been converted or substantially degraded. The goal of the State of Tennessee is to regain both the quantity and quality of wetlands. *Restoration* of "converted wetlands" and *enhancement* of severely degraded wetlands are the preferred alternatives to achieve this goal. The focus of any effort to restore, enhance or create wetlands is to first establish natural hydrology from which all other attributes in a wetland will arise.

For the purposes of the Tennessee Wetlands Conservation Strategy wetland restoration goal *Restore 70,000 acres of wetlands by the year 2000* and for regulatory activities in Tennessee, the State of Tennessee defines the following terms:

Wetland Restoration: To return a *former* wetland area to a wetland
Wetland Enhancement: To improve the functional capacity of a *degraded* wetland
Wetland Creation: To create a wetland where a wetland *never existed*

General Success Criteria: Use with the above definitions for all wetland types in Tennessee.

In general, a successfully restored, enhanced or created wetland should:

- **have naturally sustained and self-regulating hydrology:** Wetland hydrology should not depend on "active management." However, it is recognized that actively managed wetland systems such as low-level terraces, waste water treatment wetlands and other "constructed wetlands," provide important functions;
- **use hydrology to drive the return and establishment of hydric soils, hydrophytic vegetation, and biological and chemical wetland functions;**
- **closely approximate a holistic set of functional attributes in a reference wetland:** an HGM or other "officially" designated reference site;

- **possess at a minimum certain critical functions within a very short time period after initial establishment**;
- **be the result of a process that allows for passive adaptive management be a dynamic system capable of natural change over time;**
- **when appropriate, be given additional legal protection** in the form of easements, deed restrictions, purchase of development rights or fee simple acquisition (In most situations, these transactions will be voluntary. However, for regulatory mitigation or when public funds are invested to restore, enhance, or create wetlands, *perpetual* protection should be required.); **and**
- (*for restored and enhanced wetlands only*) **be established in an area with a predominance of historically wet soils** (hydric soils or soils with hydric indicators).

Special Note: Wetland restoration for "prior converted" farmland should primarily target marginally productive land.

Preferred Assessment Methods: The State of Tennessee supports the HGM as the process to classify wetlands by type and the HGM Functional Assessment Models as the procedure to identify and rate wetland functions.

APPENDIX J PART C
POLICY RECOMMENDATION

Purple Loosestrife: A Threat to Tennessee's Wetlands

Interagency Wetlands Committee
Adopted May 8, 1995

Background

Purple Loosestrife (Lythrum salicaria) is an aquatic plant that has been transported into the United States from Europe. Purple Loosestrife has spread throughout the northeastern U.S. and is currently becoming established in several locations in Tennessee.

Purple Loosestrife is an invasive, aggressive species that crowds out native vegetation. A single plant can produce up to 2.5 million seeds annually. The seeds have a germination rate in excess of 80 percent and are viable in wet soils for years. Plants can grow up to eight feet tall and six feet wide with 30-50 stems per plant. Infestations in one state grew seven thousand acres in six years.

The following detrimental impacts of Purple Loosestrife have been documented:

- Purple Loosestrife displaces natural vegetation at an aggressive rate (much like Kudzu and Johnson Grass) and has no value for wildlife habitat or as a food source. Aquatic habitats can be "sterilized" reducing acreage available for hunting and fishing.
- State investments to restore or protect high quality wetlands can be nullified when Purple Loosestrife becomes established in wetlands.
- Existing urban flood control ditches, agricultural drainage ditches, and highway drainage ditches can be choked by aggressive infestations of Purple Loosestrife increasing maintenance costs and impairing positive drainage.
- Loosestrife can invade bottomland pasture land by crowding out desirable forage.
- Loosestrife can reduce property value by limiting landuse opportunities through large, aggressive infestations that are very difficult to eradicate.

Many states have listed Purple Loosestrife as a noxious weed and have passed legislation to ban the planting and selling of Loosestrife. No such designation exists in Tennessee. Currently, nurseries and other businesses in Tennessee are selling

Loosestrife to the public due to its attractive flowering plumage as a landscape perennial.

Policy Recommendation

The Department of Agriculture (TDA) has the authority to control certain "pest plants". Plants species can be formally targeted as pest plants through "Departmental rule" and a public comment review processes. Quarantine procedures can be used to prevent the importation, sale, distribution and possession of targeted pest plants. Such a rule is currently pending for purple loosestrife.

APPENDIX K
PREVIOUS ACTION ITEMS

Below are action items from the First and Second Editions of the Strategy that have been removed because they have been achieved. Items that were removed because they are no longer valid for other reasons are italicized.

OBJECTIVE 1

B. The State (TWRA, TEPO) should request an appropriation (or seek other funding) to purchase digitized NWI data from the USFWS for all undigitized Tennessee quadrangles and import it into the state GIS wetlands database.

F. The State (TEPO, IWC-TWG, and the University Water Centers) should fund and conduct research or field investigations to characterize wetlands hydrology and ecological functions more precisely.

OBJECTIVE 2

A. TDEC-NH and the Protection Planning Committee (PPC) should review recent academic studies and literature and compile a master list of candidate sites to be investigated and evaluated as exceptional wetlands.

F. The State (TDEC-WPC) should, within 2 years, promulgate criteria and designate selected high quality, rare or unique wetlands as "Outstanding Resource Wetlands." Such formally designated wetlands will require additional scrutiny, or more stringent restrictions on any proposed permits for projects which would affect their water quality, and/or critical wetlands functions.

G. The State (TWRA, TDEC) and non-profit organizations should request the USFWS to renew its acquisition programs in Tennessee for purchase of rare or species-rich wetland sites.

OBJECTIVE 3

B. The field staff of all state and federal wetlands-related agencies should identify candidate wetland restoration sites in the course of their regular responsibilities and add them to a common list, or database (maintained by TEPO or TDEC-NH) for further evaluation.

C. Using the evaluation criteria, the State (TEPO, TWG-IWC) should coordinate the evaluation of candidate restoration sites, prepare a list of priority restoration sites and distribute it to state and federal resource managers, local government officials, technical assistance providers, private landowners and wetlands conservation organizations.

D. The State should test the hypothesis that the presence of hydric soils is a reliable predictor of probable restoration success by determining the relationship between specific hydric soils and inventoried wetlands. As soils maps are imported into the GIS wetlands database, TWRA, TEPO and the IWC-TWG should:

1. Examine the correlation between hydric soils and NWI wetlands in the 21 West Tennessee counties
2. Examine soils/wetlands correlations in other watersheds, where hydric soils data is digitized

OBJECTIVE 4

A. TEPO and IWC-TWG should develop a common definition for "restoration" and develop restoration criteria for each wetland type.

B. TEPO and IWC-TWG should develop a consolidated list of priority candidate wetlands restoration sites and disseminate the list widely to state and federal program planners and managers.

C. TWRA should encourage and institutionalize joint ventures with private non-profit organizations to implement the North American Waterfowl Management Project and/or other wetlands restoration projects [proposal currently submitted].

D. TWRA should consider use of the federal "Aid to Fisheries Act" (Wallop-Breaux) funds to enhance or restore fisheries in acquired wetlands, where necessary.

K. The State (TDA and TEPO) should seek the support of the Tennessee Farm Bureau Federation (TFBF) to designate Tennessee as a participating state in the next funding cycle of the USDA Wetlands Reserve Program (WRP).

M. A tracking system should be coordinated with the North American Waterfowl Management Plan Tracking System. The system identifies wetlands acquired and restored on public lands; wetlands on private land registered in a joint venture project; wetlands on private land participating in the Partners for Wildlife programs; and wetlands on private land under USDA conservation program contracts.

Objective 7

B. TDA should employ at least one full-time employee to train and work with the county assistance providers, and/or directly with landowners to manage/protect wetlands and wetlands functions.

OBJECIVE 9

F. TEPO should expand the membership of the Governor's IWC to include a commercial developer, a local government representative, and a planner.

OBJECTIVE 10

E. Develop criteria for Outstanding Resource Wetlands (ORW).

F. Extend the antidegradation policy and implementation methods to wetlands.

APPENDIX L
REFERENCES

Brinson, M.M. 1992. A Hydrogeomorphic Classification of Wetlands. U.S. Army Corps of Engineers, Washington, D.C. Technical Report WRP-DE-4. (Unpublished Draft).

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, D.C. 131 pp.

Dahl, T.T. 1990. Wetlands losses in the United States 1780's to 1980's. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 22 pp.

Federal Interagency Committee for Wetland Delineation. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service. Washington, D.C. Cooperative Technical Publication. 77 pp. plus appendices.

Hefner, J.M. and J.D. Brown. 1984. Wetlands Trends in the Southeastern United States. Wetlands. vol. 4, pp. 1-11.

Mitch, W.J. and Gosselink, J.G. 1993. Wetlands. Second Edition. Van Nostrand Reinhold, 115 Fifth Ave., New York, NY 697 pp.

Pavelis, G.A. 1987. Economic Survey of Farm Drainage. Farm Drainage in the United States. U.S.D.A., Economic Research Service, Washington, D.C. pp. 110-136.

Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands: National Summary. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Biol. Rpt. 88(2A). 244 pp.

Shaw, S.P. and C.G. Fredine. 1956. Wetlands of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Circular 39. 67 pp.

Tennessee Department of Conservation. 1988. Tennessee Wetlands Plan: An Addendum to the Tennessee State Recreation Planning Report. Nashville, TN. 118 pp.

U.S. Department of Agriculture, Soil Conservation Service. 1988. National Food Security Act Manual. Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service. 1982. National Resources Inventory, Washington D.C.

U.S. Department of Agriculture, Soil Conservation Service. 1987. National Resources Inventory, Washington D.C.

U.S. Department of Agriculture, Soil Conservation Service. 1991. Hydric Soils of the United States, Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service. 1991. Soil Survey Statistical Database. (Unpublished). Iowa State University Statistical Laboratory, Ames, Iowa.