

# Preserving Texas' Natural Heritage





LYNDON B. JOHNSON SCHOOL OF PUBLIC AFFAIRS  
POLICY RESEARCH PROJECT REPORT  
*Number 31*

PRESERVING  
 TEXAS'  
NATURAL  
HERITAGE

*A Report by  
The Natural Heritage Policy Research Project  
Lyndon B. Johnson School of Public Affairs  
The University of Texas at Austin  
1978*

Library of Congress Card Number: 78-68904

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# FOREWORD

The Lyndon B. Johnson School of Public Affairs has established interdisciplinary research on policy problems as the core of its educational program. A major part of this program is the nine-month policy research project, in the course of which two or three faculty members from different disciplines direct the research of ten to twenty graduate students of diverse backgrounds on a policy issue of concern to an agency of government. This "client orientation" brings the students face to face with administrators, legislators, and other officials active in the policy process, and demonstrates that research in a policy environment demands special talents. It also illuminates the occasional difficulties of relating research findings to the world of political realities.

This study reviews the need for preservation of natural heritage resources in Texas and explains how the state can develop a heritage preservation program. The report is the product of a policy research project conducted at the School during 1977-78 with funding from the Lyndon Baines Johnson Foundation. The Natural Areas Survey Project of the LBJ School cooperated in conducting the research.

It is the intention of the LBJ School both to develop men and women with the capacity to perform effectively in public service and to produce research which will enlighten and inform those already engaged in the policy process. The project which resulted in this report has helped to accomplish the former; it is our hope and expectation that the report itself will contribute to the latter.

Elsbeth Rostow  
Dean



# PREFACE

This report presents the work and recommendations of an LBJ School of Public Affairs Policy Research Project on Heritage Preservation.

Texas is rich in history, culture, and in the variety of its natural features, but with accelerating development, much of Texas' heritage will be lost or damaged beyond repair.

The LBJ School seminar studied the heritage preservation activities of other states, worked with the new national heritage program, and reviewed current heritage efforts in Texas. It viewed the work of the Texas Historical

Commission as a model to be used in recommending a Natural Heritage Program.

This report reviews the needs and opportunities for natural heritage preservation in Texas, presents the elements required for a successful heritage program, explains how Texas can build a Heritage Preservation Program for the protection of irreplaceable resources, and recommends that the Legislature establish such a program in the next session.



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# EXECUTIVE SUMMARY

## HERITAGE PRESERVATION

Heritage preservation improves and enhances the quality of life by identifying and protecting unique and beautiful natural areas and by continuing past traditions and cultures.

Heritage preservation is not new. Our National Parks and Landmarks preserve areas of national uniqueness. The State Historical Commission identifies and aids the preservation of areas, buildings, and other artifacts which present our history. Within our State Parks unique and/or fragile natural areas are preserved through special management. Private citizens and conservation groups sponsor natural area preservation and protection.

## THE IMPORTANCE OF A NATURAL HERITAGE PROGRAM IN TEXAS

Texas is rich in history and in the uniqueness and diversity of its landform and ecological communities. As its energy sources change, as new industries and businesses move to its advantageous environment, and as people migrate from the north to the south, Texas' natural land-based advantages are disappearing. Examples of its natural heritage are being irretrievably damaged each month. Texas needs a Natural Heritage Program to complement the work of the State Historical Commission and to coordinate and make more effective the many part-time activities now aimed toward natural area preservation in Texas.

## RECOMMENDATION FOR A TEXAS NATURAL HERITAGE PROGRAM

We recommend that the next Texas legislature amend the 1969 legislation which established the Texas Conservation Foundation to make it responsible for the implementation, direction, and management of the Natural Heritage Program. The Foundation members, including the Chairman of the Parks and Wildlife Commission and the Executive Director of the Historical Commission, could with the addition of the Land Commissioner provide

cohesion, direction, and coordination to the now widely scattered activities (public and private) related to natural areas protection and management. A small core program staff in the Texas Conservation Foundation could carry out the functions described below except for land acquisition and management, which should be left in the agencies currently responsible for those activities.

## ELEMENTS OF A NATURAL HERITAGE PROGRAM

State heritage programs include three groups of activities:

**Classification and Inventory**—A good program will map the state's natural regions; arrange natural resources into an element-based classification system; invite citizen and group suggestions for criteria on sites, features, and areas; and develop a data base useful to individuals, government, and industry.

**Nomination and Selection**—The program will provide for identification and nomination of candidate areas from all possible sources; provide an objective rating system to assure quality standards and methods for comparing biological, geological, and paleontological values among areas; and provide lists of natural areas in priority order for various protection and management actions.

**Protection and Management**—The protection activities of the Conservation Foundation will include maintenance of a Register of Natural Features and public information programs. The staff will also provide expert advice and consultation to local governments, groups, and individuals on protection methods available; they will develop policies, procedures, and safeguards for approval by the Foundation and/or the Legislature. Acquisition and management activities of the Heritage Preservation Program will remain the functions of Texas' land management agencies.



# INTRODUCTION

In our haste to build and better our material culture we often do damage to the natural environment which is the cradle of our culture. So swiftly is the natural landscape being altered that we are threatened with loss of the variety of plants, animals, and settings which characterize this country. Preservation of these features calls for responsible private and community action.

To many citizens the need to preserve is self-evident. But others may ask, why stop to save a rare plant or beautiful natural area? Why value these things?

The first answer is that they are irreplaceable. The beauty and economy of nature are beyond our duplication. Man often fails to recognize the value of a thing until its existence is threatened.

A second answer is their usefulness for scientific study. Unaltered areas where natural processes can be studied are becoming rare. Our ability to gauge the impacts of pollution and resource development depends upon the preservation of pristine areas to serve as yardsticks.

Another answer is their educational value. The laws of nature are the basis of human existence, and the opportunity to observe and understand them should be the birthright of every person. We must preserve now in order to be able to teach our children about nature and man's stewardship of the earth.

Finally, undisturbed nature has an emotional meaning to us which is difficult to define. Because it is not "man-made" it gives us relief from our crowded cities and structured schedules, and therefore it is one of our major recreational outlets.

The United States has long been concerned with its natural and historical heritage. Examples of public and private activity abound. The dedication of Yellowstone in 1872 marked the establishment of our National Park System. In 1924 the first wilderness area was set aside. Recent Congressional legislation, including the Wilderness Act of 1964, the Land and Water Conservation Fund Act of 1965, the Wild and Scenic Rivers Act of 1968, and the Endangered Species Conservation Act of 1969, indicates a growing public interest in the preservation of natural resources.

## NATURAL HERITAGE AND DEVELOPMENT IN TEXAS

Texas is a state especially rich in natural heritage resources. Our colorful history stemmed in large measure from the diversity of the settings in which it took place. From the Piney Woods of East Texas to the Trans-Pecos region of far West Texas, and from the High Plains of the Panhandle to the coastal prairies and marshes along the Gulf of Mexico, great variety exists in the plant and animal communities. Yet because development has altered most of the native associations of flora and fauna, only a few examples of original ecosystems exist in parts of the state.

Perhaps more than any other factor, the land has been the key to the development of Texas. Accordingly, Texans always have been proud of not only the bounties which the land has produced, but also its beauty and diversity. From the Big Bend to the Big Thicket, the differences in the land are evidence of a full spectrum of natural areas. As in the past, considerable emphasis will be placed on the land, especially as the state's population continues its rapid growth. Sites that have long been noted for their uniqueness or natural beauty will be visited more often, by both Texans and non-Texans, and new locations will become increasingly popular. The preservation of unique natural areas is not only consistent with the state's continued economic growth, it is complementary to it.

As the fulcrum of the Sunbelt region, Texas is experiencing unprecedented economic growth. A major element of this growth has been the movement of numerous industries into Texas and the concomitant in-migration of new employees and their families. The natural beauty and diversity of Texas is among the more important factors which influenced this expansion. Business and industry have begun to realize that the quality of the employees' environment is important to their overall performance on the job. In moving to Texas, they are taking advantage of our natural heritage to provide their employees the quality environment and contact with nature which are so important for well-being. The more developed and densely populated areas of the country no longer satisfy the need for contact with nature. It is therefore in our best interest

to preserve our natural heritage so it may continue to be an inspiration to those of us seeking a better way of life and for those of us fortunate enough to live in Texas.

### **PRECEDENTS FOR A PRESERVATION PROGRAM**

Heritage preservation is an idea whose time has come. National Parks, Wilderness Areas, and National Seashores programs have identified large natural areas and protected them. Most heritage areas remaining are small areas of unusual beauty, unique biological and geological examples, especially fragile ecosystems, and habitats for rare or endangered species. The preservation of these areas ultimately will be as important to us as the larger sites because of the diversity of natural features which are saved for future generations. Many of these areas are in out-of-the-way spots which have been unsuitable for human settlement or exploitation. However, with increasing population these areas are coming under pressure, and preservation programs are needed.

In the past five years, some thirty states have established or revitalized heritage programs. These states have found that heritage activities provide environmental and economic benefits commensurate with their costs.

Similarly, the State of Texas supports a number of heritage-related programs, including the Natural Areas Survey Project, programs of the Texas Parks and Wildlife Department, the Texas System of Natural Laboratories, and the Coastal Zone Management Program of the General Land Office.<sup>1</sup>

On January 23, 1978, the U.S. Department of the Interior announced a new program designed to protect and preserve the nation's significant natural and historic resources. The program will coordinate all existing federal preservation efforts and provide guidance and assistance to state and local efforts. Guidance will consist of setting criteria for evaluating resources, developing grant requirements, and providing leadership in the formulation of heritage conservation policy and standards. Assistance will be in the form of financial grants and technical assistance. Parts of the program will require Congressional approval and/or action from other governmental agencies before the program can be fully implemented.

State governments will be the main point of contact for federal financial and technical aid. The officials within the state with primary responsibility for heritage conservation are the State Historic Preservation Officer and the State Liaison Officer for the Land and Water Conservation Fund.

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<sup>1</sup> Appendix A presents the existing Texas state activities related to heritage.

States will also be expected to develop their own statewide comprehensive heritage programs.<sup>2</sup>

Preservation of heritage resources involves individuals, private groups, and local levels of government. Organizations such as the Izaak Walton League of America, the National Audubon Society, the Nature Conservancy and the Sierra Club—all founded over fifty years ago—are engaged in the preservation and wise use of significant natural areas, wildlife, and wilderness resources. These groups and their individual members are already at work in Texas. The Nature Conservancy this year helped make it possible for Texas to preserve Enchanted Rock.<sup>3</sup>

The Texas Legislature now has the opportunity to create a Texas Heritage Program which can coordinate the current diverse activities related to heritage preservation. Such a timely step will allow Texas to take advantage of the federal opportunity for financial and technical aid. If started during the next biennium, the program will cost the state little more than the total dollars now spent by different agencies. The bottom and most critical line is that there is still time to save those Texas areas that will be destroyed or damaged beyond rehabilitation if we do not organize for heritage preservation.

This policy research seminar of the Lyndon B. Johnson School of Public Affairs studied heritage activities of other states and analyzed the development of the new national program proposed by President Carter in his environmental message in May 1977. With the cooperation of the Texas Parks and Wildlife Department, the General Land Office, the State Historical Commission and the Nature Conservancy, the seminar reviewed heritage activities in Texas and the need for a formalized heritage program.

Two parts of this report complete the work of the seminar. Part I presents the elements of a heritage program and shows how other states accomplish the necessary tasks. Part II proposes a Texas Heritage Program and suggests the options available to the next Legislature for its implementation.

The seminar sponsored a workshop of an interdisciplinary team of scientists and laymen to develop a system of classifying Texas lands into natural regions. This system is useful for identifying natural areas typical of Texas' original landscape and special landscapes critical for the protection of diversity in scenery, geology, plants, animals, and their ecosystem combinations. It is contained in Part III of this publication.

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<sup>2</sup> Appendix B outlines the new federal program.

<sup>3</sup> Appendix C provides more detail on private heritage efforts.

## PART I

# ELEMENTS OF HERITAGE PRESERVATION

State heritage programs differ greatly in the scope and effectiveness of their activities. Because in each state circumstances of history, need, and opportunity have shaped the heritage program, it is not possible to describe a truly typical program. Instead this report describes the necessary activities of heritage programs, recognizing that in individual states these functions are performed with greater or lesser efficiency by a variety of organizational structures.

State heritage programs include three groups of activities:

1. **Classification and Inventory.** These activities define, identify, and catalog systematically the features and characteristics which best represent the state's natural heritage.
2. **Nomination and Selection.** This activity requires that systems for nomination and selection be developed that will assure that no worthy area or feature is overlooked and that comparisons will allow priorities for treatment to be established.
3. **Protection and Management.** The wide array of options for protection and management, whether by private or public means, have one common goal—the perpetual preservation of outstanding ecological, biological, geological, or scenic features of statewide significance.

Most successful state programs recognize and lend support to private heritage efforts. The state performs the tasks of classification and inventory, provides mechanisms for nomination and selection procedures, and recognizes that there is a major role for private and group efforts in protection and management.

A review of existing heritage programs leads to the conclusion that the general and enthusiastic support of the people is required for a program to be successful. Informed individuals and groups must participate in the identification of candidate areas. Most nature areas selected by state heritage programs are small and/or fragile areas. Private individuals and groups can assure protection of such areas as well as or better than governments. Fragile areas must be

loved and valued by local people for protection efforts to succeed. These facts suggest an important fourth activity:

4. **Public Education and Involvement.** Through cooperation with educational institutions and civic groups, this activity lends support to the program activities listed above.

### CLASSIFICATION AND INVENTORY

Classification and inventory systems are central to the development of a good heritage preservation program. Only through classification and inventory can rational decisions be made about what needs to be preserved, how much needs to be preserved, and how best the preservation effort can be organized. A comprehensive inventory system becomes of compelling importance if a program's goals include any of the following:

1. selecting the best one of two examples of a certain ecosystem or plant community;
2. identifying and preserving rare, threatened, or endangered species;
3. finding areas or species previously unnoticed or unrecorded; or
4. setting some final registration or acquisition goals.

When necessary, a heritage program may also rely on an inventory system that is something less than comprehensive. The most common types of noncomprehensive inventory systems include ad hoc surveys of areas and citizen nominations. In either case, these less-than-comprehensive systems do not afford policymakers the advantages of a statewide perspective. While initially less expensive, they may result in:

1. preserving areas which are not the best examples available;
2. preserving areas which are not the easiest to manage;

3. missing opportunities to preserve areas which are less expensive to acquire; and/or
4. failing to provide a comprehensive data base which is useful in development siting and environmental impact analyses.

In Illinois, for example, the state acquired a sand prairie near Springfield before the comprehensive inventory was finished. This prairie was thought to be one of the last remaining (and possibly the best) sand prairie sites. After the inventory, the state became aware of several better examples that were less expensive to acquire and easier to manage. As a result, Illinois will buy more examples of sand prairie than might have been necessary in order to preserve the best representation.

Comprehensive inventories cannot guarantee the absence of such selection problems, because knowledge is not perfect. However, they *can* minimize the difficulties involved in selection, particularly if the inventory is systematically and continuously updated.

Although comprehensive classification and inventory systems are a relatively new phenomenon in the United States, they have demonstrated some remarkable potential for success. In North Carolina, the Federal Paper Board Company gave the Green Swamp to the Nature Conservancy when the State Heritage Program discovered that the swamp was the most important remaining habitat for the Venus Flytrap and five other threatened or endangered plant species. The Conservancy later gave the Green Swamp to the state for management. In Illinois, the last remaining bits of prairie were located, and some of these pieces have now been acquired by the state. Nevertheless, the total number of sites which have been acquired to date is quite small. This is an advantage inherent in comprehensive inventories, since they allow the state to acquire fewer properties by locating areas with high concentrations of heritage resources.

Frequent users of the data in all states with comprehensive inventory systems are persons and companies conducting development siting and environmental impact studies. The Tennessee Valley Authority (TVA) has found its inventory especially useful in siting construction projects and in many aspects of management. Using the data that have been compiled, the TVA can forestall future conflicts between plans for development and needs for preservation.

The state heritage program in Tennessee receives between 275 and 300 requests per month for information required to produce OMB Circular A-95 review documents. This figure has steadily increased since the Tennessee program's inception. In fact, no comprehensive state inventory has found that its primary mission is toward state acquisition. The greatest value is, instead, associated with guiding development so that it is compatible with critical

natural areas. In South Carolina, Tennessee, Illinois, New Mexico, and other states, the inventories have also assisted state and federal agencies in planning for improved management of lands they presently own.

Classification and inventory, to be most effective, must be planned together. Inventory follows from the classification. In addition, data collected should be organized from the beginning to meet other data needs besides acquisition by the state; for example, other-than-acquisition preservation and environmental impact statements. Therefore, early in the planning there should be a provision for identifying and locating rare, endangered and threatened species as well as biotic communities and unique scenery. The system should contain detailed documentation on the status, location, and numbers of those entities which may be expanded or modified as more information becomes available. A computer is usually the best way to store basic information, but good manual files are necessary for maps, cross-referencing, additional information about elements, and possible leads to further information.

Federal goals should be considered in developing a classification and inventory system to assure that the state program will be consistent with federal guidelines and will be eligible for any federal money that becomes available.

#### Typical Comprehensive Classification and Inventory Systems

There are two basic types of comprehensive classification and inventory methods: 1) land-based, and 2) element-based.

In a *land-based system*, the state is first classified by ecological or natural regions. Such classification is usually done by a panel or task force of natural scientists and widely reviewed and commented upon before adoption. Illinois, the only state to have yet completed a comprehensive land-based inventory, has had no serious problems with the classification system that was developed in this manner. However, minor adjustments can and should be made as new information becomes available through research or field surveys.

The second step in such a system is a survey of the entire state to identify areas which are totally or substantially undisturbed. This begins with an examination of aerial photographs. Areas which appear undisturbed are then viewed from the air in low-flying aircraft. Land which has been modified is thus eliminated from consideration. A field survey of remaining candidate areas leads to a list of undisturbed sites. Intensive field surveys are conducted on this land. The sites are then catalogued as to degree of disturbance, types of plant and animal communities contained, and possible management problems. The information is used by decisionmakers in determining preservation priorities.

An *element-based system*<sup>4</sup> uses a classification scheme consisting of the following element types: plant communities, indigenous vegetation, special plant and animal species (rare, endangered, or threatened), aquatic types, and other natural features. Location of these element types is determined through the study of secondary sources in natural history collections, journals, herbaria, expert contacts, and lists compiled by groups concerned with conservation. This information is stored and cross-referenced in manual files, on coded maps, or in computer information retrieval systems. For verification of data, field surveys are organized in areas where:

1. special species are congregated;
2. a rare species or community is located; or
3. a unique site is discovered.

With this information (which is continuously gathered from a statewide network of interested scientists and citizens), the data base is updated and expanded in order to provide the best possible information to decisionmakers.

In either system, the goals of the preservation program must be clearly stated and intensive field surveys must be made prior to initiating preservation activities. In the land-based system, species considerations follow natural sites identification. In the element approach, the natural state of the land is secondary to species considerations. Both systems may, and usually do, make use of citizens' nominations.

There are many similarities between the two basic systems. In both systems, classification requirements are identical. For example:

1. both need a map of biological regions if one goal is to preserve representative examples of each major natural division of the state;
2. both require a file of special sites in the state if these are to be preserved;
3. both require a description of major plant communities and indication of animal species in each biological region if preservation of representative species and ecosystems is a goal.

Likewise, inventory system requirements are similar. Both systems require maps of the state on which to plot special species, representative communities, and special features under consideration. Also, both require a list of

rare, endangered, or threatened species if such preservation is a program goal.

It becomes clear that the main difference between the two systems lies in the initiation of the inventory phase—with the main focus either on natural sites or on the species and communities. Either system package will initially sacrifice one aspect of the inventory to place priority on the other. As the inventory systems mature, concern for data gaps will eventually cause the two systems to look much more alike. The critical consideration is not the approach, but the quality of the data management itself. Both systems can be quite workable if the data are gathered carefully, stored in a flexible system that can be expanded and corrected, and developed with close cooperation between the prospective users and the system technicians. One advantage of the element-based approach is that its data management system has been tested and refined through the experiences of fifteen element-based heritage programs (Arkansas, Indiana, Kentucky, Mississippi, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, Tennessee, Washington, West Virginia, and Wyoming).

In addition, either system encounters some built-in problems which should be acknowledged and planned for early. Those problems are:

1. Both systems must rely upon secondary information to a large extent. Early development of a systematic verification process is essential. This is another argument for a data system that is flexible, expandable, and correctable with a minimum amount of effort.
2. Because people use roads and live in cities and towns, many of the observed element occurrences may be near roads and cities. This problem is especially important in an element-based system. However, there are advantages in that potentially threatened species and communities are located first; that is, those species near the danger of development.
3. If a species is especially threatened, conservationists and scientists may not want the information widely known for fear of destruction. Reasonable but reliable methods of protecting sensitive data should be developed. This is especially important in the early development of the inventory before decisions about protection are made.

The costs of both systems are unpredictable due to the variation in goals of different programs. Therefore, no general cost figures have been developed. Illinois, which recently completed the first phase of a land-based inven-

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<sup>4</sup> Developed by the Nature Conservancy.

tory, spent \$600,000 over a three-year period. However, the species protection part of that program is just now beginning and no comprehensive cost estimates are available. Recently, the development of a good list of rare, endangered, and threatened species has been initiated by the National Land Institute with a grant of \$60,000; however, this includes no inventory money. No cost figures were available concerning their data management, since the information is only now being fed into the computer.

The Nature Conservancy, which began the element-based inventories on contract, estimates that a program may be run for approximately \$200,000 per year. This is a minimal program, including very little field work and few, if any, staff members for environmental impact work and public education. Some officials in the Nature Conservancy feel that an excellent program could be run in a large state for \$500,000 to \$700,000 per year.

In either system, assurance of continued funding is critical, as both should be maintained in a dynamic condition for maximum utility. Federal money will most likely be available for the classification and inventory phase of the heritage program. At present, Land and Water Conservation Fund money is used in many states to begin the inventory.

### **NOMINATION AND SELECTION**

Nomination establishes the procedures for identifying candidate areas. Selection is the process of designating and evaluating candidate areas by priority for various kinds and levels of protection and management.

Experience in states with heritage programs shows that most nominations come from the inventory process. However, citizen participation is important. There must be a procedure to encourage nominations from individuals and groups, particularly scientists, environmentalists, and others familiar with local conditions. Many states hold public hearings and give wide publicity to the need for nomination.

Nominations are usually processed through a central location, perhaps an office, individual, or organization, which is responsible for verifying descriptions and insuring that enough information is available about a site to make an objective evaluation. A natural heritage site will be evaluated according to established criteria which may include 1) unique, threatened, or representative features; 2) condition of the site; 3) the disturbance or destruction that threatens it if it is not protected; 4) availability; 5) cost and relation to fair market value; 6) geographic location in the state; 7) the need for and possibility of establishing a buffer zone; and 8) management requirements.

Selection is the designation of specific sites or elements deserving protection. The selection procedure is dependent

upon criteria developed by experts from fields such as botany, ecology, zoology, and geology.

Selection, as practiced in several states, is a two-step process. The first step is the compilation of a register of significant natural sites. In this process all nominated sites are reviewed. Duplicate nominations are discarded and inventory data are used to evaluate the features of the remaining areas. Points may be given for various natural features in a numerical rating system. Sites placed on a final nomination list are designated as worthy of preservation. A field survey should precede placement on the list. Such lists should be frequently updated as new information becomes available.

The second step in the selection process focuses upon the type of protection and management suited for each site. Sites from the primary list are cross-listed onto Protection and Management lists according to the protection techniques appropriate for each site. This step is the major planning and coordinating tool for programs relying on the cooperation of other state agencies, local governments, and citizens.

### **PROTECTION AND MANAGEMENT**

#### **Protection**

Consideration of the full complement of protection methods is extremely important, since many of the techniques which fall short of state acquisition can fulfill the goal of preservation at a lower cost and with greater public participation. This section presents the various options for the protection of natural areas, reserving state management as the least likely alternative for the protection of heritage resources.

There are at least four major protection methods available, short of acquisition. These measures include registers, permit systems, easements, and tax relief.

#### **Registers**

The federal government now has a National Register of Natural Landmarks including both public and private sites. This register will grow as all federal agencies with land management responsibilities are required to complete inventories of the land under their control by 1983. Significant natural areas will be recommended for placement on the register. Once the inventories are completed, federal agencies will be required to develop management plans for the identified areas and submit them to the Secretary of the Interior for approval. This process indicates the presence of these resources to interested citizens and officials responsible for proper land management.

States benefit from the maintenance of state registers of

natural areas for much the same reasons. Most states with heritage programs either establish new state natural area registers or modify existing ones. These registers include both public and private areas. While areas eligible for the National Register could be entered on the state register, it should definitely include those areas in the state which are not on the National Register, but are quite important to the state or the region.

A natural areas register is often maintained by the state to encourage private participation in preservation by officially recognizing sites which characterize or contain valuable features of natural heritage. It is an appealing preservation technique because it involves the least amount of government interference in the affairs of private land-owners and little expense to maintain.

Registers may vary in the degree of protection they offer. Some plans require that an owner promise to manage his property for preservation in return for recognition of the features on his land. This non-binding agreement allows the owner to remove his property from the register at any time. The public body also retains this option if the land is not managed according to the agreement.

Under other plans, listing on the register may not require the owner's approval and may not involve restriction on the use or disposition of the property.

Specific criteria for selection to the register usually need to be developed to fit each state. Advisory committees often perform this task. The public should be apprised of the requirements for including properties on the register so that: 1) other qualified sites will be nominated, and 2) registered sites can be monitored for deviations from their preserved state. Upon the request of an owner or at the discretion of the state, extremely fragile or other special areas could be listed in the register without making their locations public. This would help prevent the destruction of such areas and protect the privacy of the owners.

### **Permit System**

A second method of protection is the use of existing permitting processes for achieving preservation goals. Many activities that might affect the integrity of a natural area already require some type of state or federal permit. These regulated activities include: dredge and fill operations, waste discharges, dam construction, surface mining, oil and gas drilling, solid waste disposal, hunting, and fishing. In most cases, the criteria for evaluating a permit application give consideration to conservation and aesthetic values.

These permit requirements do not insure preservation of every natural area because not *all* land uses are covered. They may, however, be effective in preventing degradation of some sites by excluding the most harmful activities. For example, the development of privately owned natural areas

along the coast may be precluded if the owner is not granted a permit for dredge material to raise the elevation of the property (and at the same time destroy the wetlands ecosystem).

Effective use of the permit process to achieve preservation of natural areas requires close monitoring of various state and federal permit applications and OMB A-95 reviews. However, use of information derived from the heritage program inventory of natural features could make this technique a relatively inexpensive protection method.

### **Easements**

This third protection method involves the purchase of development rights for an area. Such an easement allows the title to remain with the property owner. This form of protection may be expensive, since it often approaches the cost of the outright purchase of the land. There are precedents for the use of easements in Texas because the state has been using them for the protection of its beaches for twenty years.

Conservation easements (also called conservation or scenic restrictions, agreements, covenants, and futures) place restrictions on the use of the land and are binding on present and future owners. These restrictions are established within a contract and normally are enforced by the agency or department which entered into the agreement. According to the terms of the easement, the owner gives up certain rights to the land (for example, the right to develop the property) while retaining all other rights inherent in ownership. These easements can provide that the land remain in its natural state or allow for certain activities such as hunting or fishing. They can apply to a certain portion of the land such as the shoreline or to an entire property. Unless specifically stated in the easement document, the property owner need not provide public access to the property.

### **Tax Relief**

Some form of local tax relief can be used as an incentive to encourage owners to protect their sites. This option was made possible by a recent Texas Constitutional Amendment (V.A.T.S. Article 8, Section 1-f) that authorized units of local government to give ad valorem tax relief to heritage properties. Local programs may not involve a permanent commitment to preservation by the landowner, but may require some restitution of taxes if the property is subsequently developed. The state could further facilitate such incentives by reimbursing the political subdivisions for the loss of tax revenues.

No matter which of these protection methods is utilized, the state needs to encourage the cooperation of local

governments and private citizens. The state should lend assistance to their preservation efforts by providing technical expertise for survey and evaluation.

Private groups such as the National Audubon Society and the Nature Conservancy offer good examples of nongovernmental preservation efforts. Appendix C contains information about the activities of these organizations.

### **Acquisitions**

An important aspect of any preservation program is its ability to acquire property and the rights of ownership. Acquisition authority usually comes from the state legislature if the heritage department or commission is newly created, or through prior authorization if existing units have been authorized to form such a program.

Acquisition involves both the protection and management functions of preservation. If the heritage program acquires fee simple title to a property it possesses all the rights of ownership and the management of that land becomes the direct responsibility of the program. The management may then be assigned to a cooperating state agency or private group.

Procedures exist to reduce the immediate financial burden on the state when it purchases property for preservation. One such method is the rolling option, which has been tried with some success in Colorado on a local level. During the first year the state purchases and receives an option to acquire another portion and deed the second year. This plan provides tax benefits to the seller as well.

A state should have the authority to accept donations of property and a reasonable means to assure that donated property is appropriate to the program's goals and can be managed adequately. Gifts of land have been important factors in many heritage programs since donation of appreciated real estate enables the landowners to receive a substantial federal income tax deduction.

### **Dedications and Trust Agreements**

An important step which follows acquisition is to guarantee that sites acquired for preservation purposes will not later be converted to other uses. This is done by dedication. The state legislature may choose to review each site before establishing the dedication or it may delegate this duty to a review panel or to the heritage program. The general form of the dedication is to declare that the site has found its "highest and best use" and cannot be condemned for other purposes.

The ability to make dedications in perpetuity is a very important point in soliciting donations to the heritage program. Some agency, board or trust within the program must have the authority to assure prospective donors that the gift will be maintained as the donor wished. Similarly,

the program must have the authority to dedicate development easements and to enforce the terms of easements purchased or given. Yet another aspect of the dedication procedure involves the relationship between the heritage program and the land management agencies. Many state heritage programs do not have management staffs, but instead turn over property to other state agencies or private groups. In these cases, the heritage program must have the authority to enforce the dedication against the actions or delinquencies of the managers.

In fact, there can be no guarantee of perpetual protection. However, dedication can raise a high standard against condemnation of the property. Typically, some authority, usually an extraordinary majority of the legislature, can revoke a dedication on a finding of imperative and unavoidable necessity for some other public use.

### **Management**

Preservation alternatives which leave ownership with private citizens avoid many management problems which come with public land ownership. Among these problems are planning, staffing, and financing maintenance and controlling appropriate levels of public use.

Despite the knowledge that too much use can destroy the unique features of a site, public agencies may find it difficult to deny recreation-minded citizens entry to publicly owned property. As a compromise, multiple uses such as camping, hunting, or water-based recreation may be allowed where the property can withstand it. Multiple-use sites may require additional personnel to enforce the protection of the natural features, but they are still preferable to closed preserves in terms of educational and recreational benefits.

Typically, management operations of heritage programs operate on tight budgets. This creates a problem when acquisitions appear to outstrip the programs' ability to manage properties. The Georgia Heritage program faced this problem squarely in its policy of prompt acquisition. Since land must be under threat of alteration to receive priority for acquisition, the Georgia program decided to proceed swiftly on the assumption that site conditions and property costs would become less favorable over time. Bare bones management may be short of the program goal, but it is no excuse for losing a natural resource.

Compounding the problems of management are the various organizational arrangements found in heritage programs. In many states, the heritage program does not have management capability, but instead works with other state, local, or private programs to provide site management. Since many of the cooperators have other primary tasks, the management strategies of the heritage program may be neglected or contradicted by the actual management

practices. Examples of contradictory management practices are overuse for recreation, alteration for wildlife propagation, and grazing. The heritage program can defend against some of the practices by participating in the management planning.

A first step in public management (and often a determinant for acquisition) is the *categorization of property according to its actual or possible use*.

New York's Adirondack Park Agency divides its holdings into seven categories: wilderness/primitive, canoe, wild forest, intensive use, wild/scenic, recreational rivers, and travel corridors. These categories were formulated on the land's "characteristics and capacity to withstand use." Wilderness/primitive and wild forest areas are separately managed by the Department of Environmental Conservation.

This system is more detailed than that of most states. The use of several narrow categories gives greater guidance to the management program and the category names help to educate park users to the appropriate uses of each area.

Site management planning is already an accepted function of conservation, parks, wildlife, and tourist departments. However, heritage areas may require that different approaches be used in management since the emphasis here is on preservation rather than utilization.

The fragility, uniqueness or threat of destruction to a heritage site may necessitate that access to it be limited. This can be accomplished through a variety of accepted means including:

1. permitting the occurrence of only certain activities, such as camping or boating;
2. regulating on-site human presence by the issuance of passes;
3. limiting the hours of admittance;
4. rotating periods of access on a weekly, monthly, or seasonal basis;
5. fencing or otherwise structurally prohibiting free access to the site.

Site interpretation is a widely used management aid of most state parks, recreation, tourism, or conservation departments. It is an educational service which uses diagrams, trail guides, and identification plaques or signs to explain the special features of a heritage site to visitors. Site interpretation not only relays the significance of a special area but also tends to educate visitors about the importance of natural heritage preservation.

The buffer zone is gaining popularity as a management tool since its presence insulates the heritage site and protects its features. The buffer zone is capable of sustaining more activity and use than the area to be preserved, and by surrounding it, tends to minimize actual

damage to the site. This in turn reduces management responsibilities.

Buffer zones can be established at the time of acquisition of a heritage site or later if effective management of the site requires it. To reduce costs, the zone can also be established through permitting. Certain activities—for example, camping, fishing, boating—would be allowed near a heritage area only by permit. This plan is found in parks which feature limited-use heritage sites but which also include camping and recreation areas as buffer zones.

## PROGRAMS IN OTHER STATES

Because programs differ greatly in the scope of their activities, it is not possible to describe a typical or best structure on the basis of other states' experiences. Some states have formal heritage programs; others accomplish some of the same results with programs of their parks departments or natural resources agencies. There are two basic methods of organization: decentralized and centralized.

In a decentralized organizational structure, responsibilities are divided among a number of agencies and offices, as in New Mexico, Michigan, Idaho, and Maryland. This method of organization allows each agency to initiate and perform preservation activities and to exercise some or all functions involved. In some states, as in Tennessee, an advisory council coordinates agencies participating in preservation. Without such coordination, a decentralized organizational structure can result in many overlapping functions with unnecessarily high cost.

A centralized structure focuses decisionmaking and policy development in one agency, as in Hawaii, Arkansas and Illinois. In some states (Georgia and Illinois), the historical and natural parts of the preservation program are located within one heritage program agency. In most cases, management of the natural areas is not done by the heritage program staff but on contract with other state agencies or private groups equipped to do land management.

Another variable of program organization is the location of the program within state government. Programs may report to an independent board or commission, directly to the legislature or chief executive, or may be part of another agency or department. No one of these structures guarantees a better program. So long as public support is strong, an independent, highly visible structure offers the greatest potential; but if public support is weak, integration into the structure of an existing agency or department offers the best chance of program continuity.

## PLANNING A STATE HERITAGE PROGRAM

State planning efforts range from minimal to compre-

hensive. New York and Maryland prepare only individual site-management plans. Hawaii and Pennsylvania include the broad categories of conservation and preservation areas in their land-use plans. A third strategy is a state heritage plan which sets preservation objectives based on the resources identified through the inventory process. This type of plan provides more guidance to the program than site-management planning and retains more flexibility in the event of new information than a land-use plan. Arkansas, Wisconsin, and Georgia use this middle level of planning.

Two points should be considered in determining the nature of the state planning effort. First, if federal funding becomes available to the states through a National Heritage Program, there will be a planning requirement. A new state program should consult with the Department of the Interior to anticipate the federal requirements. Second, other federal programs have required state plans, notably the State Comprehensive Outdoor Recreation Plan (SCORP) and the Coastal Zone Management Plan. Since these planning efforts have encompassed natural areas and environmentally critical areas, a state heritage program should seek coordination.

Many states have encompassed heritage planning within their SCORP in order to secure federal planning money and to qualify sites for matching funds for acquisition. When this is done preservation must compete with recreation for priority. In addition, heritage areas may be maneuvered into recreation functions unsuited to preservation goals. Nevertheless, under the Department of the Interior's recent reorganization, heritage and recreation are united in one agency, the Heritage Conservation and Recreation Service. Since this agency provides funds for the SCORPs, states may be encouraged to merge these planning efforts.

#### **HERITAGE PROGRAM FUNDING**

State size is an important factor in the cost of a heritage program. Other factors are the complexity of the preser-

vation plan, the number of agencies involved, and the amount of private participation.

The most comprehensive and effective heritage programs will need funding in three major categories: classification and inventory, acquisition, and land management. Other program expenses are small. A wide range of funding sources exists, and most programs are funded through a combination of state, federal, and private sources.

The most significant source of federal funds is the Land and Water Conservation Fund administered by the Heritage Conservation and Recreation Service. Matching funds are available to states on a formula basis for planning, including both classification and inventory, and for acquisition. A proposal included in the National Heritage Program would increase the funding from this source with a portion of the funds earmarked for heritage purposes. Some states include lands acquired for species propagation purposes under the federal Pittman-Robertson and Dingell-Johnson acts among their heritage funds.

State monies come through general appropriation, issuance of bonds, dedicated tax revenues, and sale of special items. Texas is unique in its dedication of a one cent per pack cigarette tax for parks acquisition. In Wisconsin, a percentage of the state's general property tax is set aside to match available federal acquisition funds. In California, the sale of personalized license plates brings in \$350,000 each year for the purchase of ecological preserves. California also issues certificates and windshield decals for minimum contributions to conservation programs.

In addition to donations of land and easements, funds are available from a variety of private sources. The Nature Conservancy assists states in establishing inventories and in land acquisition. Large gifts from local foundations working with the Nature Conservancy were instrumental in beginning heritage programs in Ohio and North Carolina. The state of California has established a semi-public agency, the California Parks Foundation, to solicit private donations for the state parks and preservation program. Idaho has a similar program.

## PART II

# PROPOSAL FOR A TEXAS NATURAL HERITAGE PROGRAM

The natural features of the Texas landscape should be preserved so that present and future Texans can know and understand their heritage.

*We recommend that the Texas Legislature create a program within state government whose purpose is to select and protect areas which are unique in nature, unusually scenic, or representative of Texas ecosystems.*

The study of alternative procedures and activities in other states made against the background of Texas traditions and current activities provides information for the following recommendations on the elements of a Texas Heritage Program.

### ELEMENTS OF A TEXAS HERITAGE PROGRAM

The first step toward development of a heritage program in Texas should be the definition of goals. Some goals discussed below could be met simultaneously. In other cases, portions of the goal(s) might be postponed until the system matures.

Recommended goals are:

1. To produce a body of information necessary for identifying areas to be selected for preservation of:
  - a. Species diversity. (First attention should be paid to rare, endangered, or threatened species.)
  - b. Representative examples of Texas natural regions. (In some cases this part of the goal will be accomplished simultaneously with part [a]. Eventually, however, representative natural regions in the state and their sub-regions should be included in the preservation system.)
2. To develop protection methods including those methods that fall short of acquisition. (In many instances, the state can rely upon private individuals, corporations or nonprofit groups to protect important areas. When possible this is the least expensive method.)
3. To develop alternative management plans for state-acquired areas. (The inventory data will be invaluable in deciding management methodology.)
4. To identify and survey areas already protected, freeing money for more critical acquisition or other

protection methods. (On the maps used to plot locations of species, communities and special features, boundaries of existing state parks, federal preserves and parks, and other government-owned land will appear. For these lands, a request to the managing entity for special attention to the environmentally critical area may stimulate protection at little or no additional cost.)

5. To provide information for environmental impact assessments to all levels of government and private enterprise.

### ORGANIZATION AND DIRECTION OF NATURAL HERITAGE PRESERVATION IN TEXAS

Texas now has some activities related to natural heritage preservation, but it is far from an effective and efficient program. Unless a legislated mandate requires the development of a realistic program, it will soon be too late.

The Texas Parks and Wildlife Department, as part of its recreation program, is performing parts of heritage preservation. It protects fragile areas in state parks; it collects data on natural areas in the state; it has developed a rating system for natural areas; and it has started to use a \$1,500,000 appropriation to acquire natural heritage areas.

The General Land Office is studying the resources of the coast through its Coastal Zone Management program. It is also evaluating its upland holdings and, though it does not now manage land for conservation purposes, it is demonstrating its concern and ability to broaden its mission.

The Natural Areas Survey and the Texas System of Natural Laboratories, supported by state appropriations, are small programs performing some of the functions of inventory and classification.

Faculties at the state's colleges and universities have collections and personal records documenting many of our natural features.

The Texas Historical Commission has a well-organized and nationally recognized program which could supply historical and archeological information and cooperate with a natural heritage program in preservation of sites of mutual interest.

To consolidate these efforts and provide a comprehen-

sive, coordinated and effective Texas Natural Heritage Program would require only a small program staff. A competent core program staff with soundly legislated program guidelines could be located in any one of several existing state agencies. Because of the highly specialized nature of natural areas preservation and its possible conflict with other forms of land management, *we recommend that program responsibility be assigned to the Texas Conservation Foundation.*

#### **WHY THE TEXAS CONSERVATION FOUNDATION?**

The Texas Conservation Foundation (Natural Resources Code, Title 8, Chapter 181), was created in 1969 to encourage gifts to the state for the creation of parks, refuges, and scientific or historical areas. The Foundation consists of twelve members: nine private citizens (appointed by the governor), the executive director of the Parks and Wildlife Department, the chairman of the Parks and Wildlife Commission, and the executive director of the Texas Historical Commission.

The Foundation has no state appropriation, no staff, and has not filed an annual report since 1975. Nevertheless, there are several advantages to placing the Natural Heritage Program under its auspices:

1. The Foundation already has in its membership most of the key officials required to develop and oversee the program.
2. It already has the authority to accept private gifts.
3. It already has the authority to acquire land by purchase.
4. It already has the authority to contract with state agencies and others.
5. It will be able to coordinate the information compiled by the Parks and Wildlife Department, the General Land Office, the Texas Historical Commission, and others to establish a single data base for natural elements and sites in the state.
6. Because of its singular purpose, the Foundation will communicate well with individuals, and private and public groups.
7. Because it has no other program, it will be able to concentrate on its assigned task—the preservation of heritage sites.

#### **THE ROLE OF THE TEXAS CONSERVATION FOUNDATION**

The recommendation to center the heritage program in the Conservation Foundation represents a compromise among many possible alternatives. It is a choice which recognizes the unique mission of a preservation program

and, at the same time, recognizes the contributions which other, independently administered agencies can make to the goals.

A heritage program could be located in either the Parks and Wildlife Department or the General Land Office. Both agencies have staffs trained in land management and hold substantial acreages. However, both agencies hold land for purposes other than preservation. In either agency, a heritage program could be neglected in favor of older agency programs. Worse, lands coming into state ownership through this program might be converted to some inappropriate use, such as grazing or intensive recreation. As is the case with the Texas Historical Commission, there are advantages to having a separate agency attentive to this single program.

Ideally, the heritage program would have the capacity to manage sites in state ownership. Realistically, however, creation of yet another land management agency would be a burden. Again, as the Historical Commission, the Conservation Foundation could function as a program planning and information center. Actual land management services could be provided through agreement with the Parks and Wildlife Department, the General Land Office, universities and private organizations.

Similarly, the Conservation Foundation may wish to draw on universities and private groups to research because of their staffs and facilities. The program could not, however, be located at a university and still achieve the necessary coordination of related programs.

The Conservation Foundation, following these recommendations, would have a limited but central role in heritage activities. The specific responsibilities are listed below.

The board of the Foundation would:

- develop policies;
- provide a point of coordination of state and private heritage activities;
- encourage private donations and heritage activities.

Under the guidelines of the board, the staff would:

- develop criteria and specifications for classification and inventory;
- conduct the inventory and maintain the data base;
- develop procedures for nomination and selection;
- maintain a Register of Natural Features of Texas;
- establish guidelines for Texas state land management agencies to follow in acquiring and managing natural areas;
- provide technical assistance to local governments and private property owners;
- coordinate the Texas program with national activities.

In order to perform these tasks, the Foundation would require a staff and funding. *We recommend that the Legislature appropriate funds to the Texas Conservation Foundation and authorize it to employ a staff to carry out the described functions.*

In order to coordinate state activities toward the goals of the program, the Foundation board should include the major land managing agency of the state. *We recommend that the Commissioner of the General Land Office be made, ex officio, a member of the board of the Conservation Foundation.*

**Specific Program Recommendations:  
Classification and Inventory**

The Conservation Foundation staff should be directed to develop a classification and inventory system for Texas. It is important that the classification and inventory system chosen define and attempt to locate the scope of the state's rich diversity. We recommend the following classification actions:

1. Map the state's natural regions and subregions where possible.
2. Categorize the state's natural heritage resources into an element-based classification.

The inventory staff should begin to accumulate data, using museums, collections, journals, experts and interested citizens. Development of a computer system should begin simultaneously with continuous input from all staff members and potential users. In Texas it is especially important to cross-map with the Texas Historical Commission's inventory. Thus, sites which have both natural and historical significance may be readily identified, allowing less expensive protection for both programs.

At this early stage, the system should be ready to provide information for private industry, state and federal government and nonprofit groups. It should also be possible to begin contacting groups or persons who control appropriate natural areas to encourage them to undertake voluntary preservation.

As the element data system matures, it may become evident that certain areas of Texas are not adequately covered by available information. Land-based inventories of these areas may then be desirable. In Texas, a comprehensive land-based inventory would be very expensive due to the size of the state. On a limited scale, however, a land-based inventory may provide some valuable information—at least concerning largely undisturbed areas in certain portions of the state.

The above recommendations combine the two basic classification and inventory systems, and emphasize the element-based approach.

There is a wealth of knowledge in Texas to meet the challenge of saving our natural diversity for future generations. There will never be a universal all-purpose classification and inventory system. Good systems are those that are tailored to the specific goals and needs of a state to meet the demands of its citizens.

**Specific Program Recommendations:  
Nomination and Selection**

Many site identifications will come from the inventory, but the Foundation will need to develop a procedure to insure nominations from individuals and groups. Publicity for the nomination process will also alert potential donors to the program.

The selection process should have two stages. The first is the compilation of a list of significant natural areas developed from the nominations list. Areas should be evaluated on the basis of available information on the uniqueness and abundance of natural features.

The second stage is the recommendation of a preservation technique appropriate for each area. Because the powers of the Foundation will be limited, one product of this stage should be lists of areas recommended to cooperating state agencies for their attention. The list of officially recognized sites, the Register of Natural Features, would be another product.

Evaluation of areas will require a rating technique. The Texas Parks and Wildlife Department has developed a preliminary rating system with which to compare the biological, geological and paleontological values of Texas Natural Areas and to determine priorities for preservation (unpublished; available through Parks Division, Texas Parks and Wildlife Department). This device should provide the starting point for the heritage program.

**Specific Program Recommendations:  
Protection Techniques**

Once natural areas have been selected, preservation arrangements must be made for protection that will maintain the integrity of the sites. The Texas program should provide for protection ranging from site registration and voluntary protection to state acquisition and management of areas of extreme significance or under threat of destruction. Methods of protection falling between these two extremes are permitting, purchase of development rights, and management agreements with private groups.

The Register of Natural Features of Texas, including both public and private lands, should be developed as a means of publicizing the notable natural features of the state and of recognizing examples of careful stewardship. Registration should be made at the direction of the board

with the consent of private property owners. No restrictions on the future uses of property should be imposed by Register status. Such a Register could be the basis for local property tax relief authorized by a 1976 amendment to the Texas Constitution (*Tx. State Const.*, Art. VIII, sec. 1-f). Tax incentives for encouragement of preservation should include use restrictions, but these decisions would be made by local taxing jurisdictions.

Provisions should be made for withholding information on the location of particularly fragile features which publicity and subsequent misuse might damage. Some monitoring of registered areas for alteration or degradation is desirable. This could be done through agreements with other agencies such as Parks and Wildlife, the Texas Forest Service, the General Land Office and interested conservation organizations.

The heritage program does not itself require permitting authority, but only the opportunity to supply information from its inventory to agencies issuing permits and to planning review panels when threat to a significant natural feature is involved. In most cases the review and permitting procedures give consideration to conservation and aesthetic values. The recommendation can be met simply by allowing sufficient staff time to monitor the hearings held by the permitting and review agencies.

The Conservation Foundation requires no additional grant of authority to purchase or accept the donation of development easements of fee simple titles to land. Purchases are limited by the reliance of the Foundation on contributed support. However, information gathered by the Foundation's inventory can be used by state agencies such as the Parks and Wildlife Department and the General Land Office which have authority to acquire land by purchase and trade. Texas now has two natural areas in the Parks and Wildlife system. The last Legislature appropriated \$1.5 million for acquisition by Parks and Wildlife of sites with scientific interest. In special cases the Legislature may wish to utilize the Foundation for acquisitions. Special appropriations could be made to the Foundation, but this recommendation does not envision a regular appropriation for acquisition purposes.

#### **Specific Program Recommendations: Management of Acquired Rights and Titles**

When lands with heritage value are acquired by other state agencies, those agencies should be expected to manage them in a manner consistent with their value. Information from the Conservation Foundation should assist in this goal. In the case of the Foundation itself, decisions concerning management should be made prior to any acquisition by gift or purchase. Since the Foundation will not have a management staff, provision will have to be made for another party to assume this responsibility and expense. A variety of options are available. In the case of

easements, property management can be left to the landowner. Some acquisitions can be turned over to the Parks and Wildlife Department for incorporation into the state parks system. In some cases title should remain in the name of the Foundation, with management undertaken by others. Property of scientific interest might be managed by colleges and universities in return for the privilege of study. Sites of wildlife and educational value might be managed by private organizations. Remote areas requiring little management might be the responsibility of the General Land Office. In all cases, a responsible party willing to cooperate with the management guidelines of the Foundation should be found prior to acquisition. The Foundation should reserve the right to cancel a management agreement for good cause and to reassign this responsibility to others.

#### **Specific Program Recommendations: Funding**

This set of recommendations has been designed to provide a program for the preservation of Texas Natural Heritage with a minimum of administrative costs. A small permanent staff is needed to promote donations, to handle acquisitions and to plan for management. A small technical staff is needed to handle classification, inventory, nomination and selection. Research costs of the inventory will be greater at the beginning than after a few years of operation. Staff expenses can be kept low by contracting with universities or others for research needed to fill gaps in our knowledge of the state.

Private donations can be applied to program expenses, but to assure continuity, minimum operating expenses should be supplied by state appropriation.

Should a National Heritage Program be enacted, matching funds would be available to the state for most program expenses, including acquisition. Texas should prepare for this possibility by designating the Conservation Foundation the cooperating agency for a federal program. At present, many program expenses would qualify for matching dollars from the Land and Water Conservation Fund. Texas' allocation from this fund, however, is fully committed by Parks and Wildlife Department policy to meeting urban recreational needs. This policy could be revised, but revision would require a reconciliation of the urban constituency and the preservation needs of the state.

These recommendations reflect the experience of other states and are adapted to the specific requirements of Texas. They would create a new program to meet the urgent need of the state to protect its heritage resources, but would not create a new agency or require large state expenditures. The program of the Conservation Foundation would provide leadership and coordination for private activities and existing state programs, and in doing so would satisfy the need for public action in an area of common concern.

## PART III

# THE NATURAL REGIONS OF TEXAS

Today there is a need to preserve representative areas of the natural regions that make Texas unique among the states. Identification and protection of land and related resources as examples of Texas' natural heritage obviously must be based on a system of classification. This system should help to identify (1) natural areas typical of Texas' original landscape, and (2) special landscapes which are critical for the protection of diversity in scenery, geology, plants, and animals, and their ecosystem combinations.

An interdisciplinary team of scientists and laymen met at Winedale, Texas on February 24 and 25, 1978 to develop a system of classifying Texas into natural regions.<sup>1</sup> They recognized that regions should be distinguished by physiographic or biologic differences and should be readily identifiable by scientists and local citizens. They sought a system that would be useful:

- to identify the broad natural regions of Texas;
- to serve as a common point of reference for scientists, students, visitors, and all citizens of Texas; and
- to locate and recommend for preservation natural areas that contain unique, significant, unusual, and scenic resources, including rare or endangered species and endangered geological formations and ecosystems, with the goal of preserving elements of Texas' natural diversity.

The Winedale conference reached consensus on eleven natural regions (most containing identifiable subregions) whose description would highlight the diversity of the state. These regions are shown in Figure 1. The descriptions of the regions draw on several earlier publications which presented classifications of the natural resources of the state, especially the works of Drs. Chester Rowell<sup>2</sup> and

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<sup>1</sup> Participants of this conference included W. Frank Blair, Chris Durden, Mark Gosdin, Frank Gould, Marshall Johnston, Don Kennard, Steve Kennedy, Claude Lard, Red Oliver, David Riskind, Chester Rowell, Mary Shannon, Steve Smith, Steve Spurr, Barbara Walker, Rom Welborn, Jerry Wermund, and John Williams.

<sup>2</sup> Chester Rowell, unpublished manuscript.

F.W. Gould.<sup>3</sup> Table 1 relates the natural regions to the widely known Biotic Provinces of Texas described by Dr. Frank Blair.<sup>4</sup>

### REGION 1: THE PINEY WOODS

35-50 inches annual rainfall  
23,500 square miles

Piney Woods topography is gently rolling to hilly forested land. It is part of a much larger region of pine-hardwood forest that extends into Louisiana, Arkansas, and Oklahoma. Available moisture and soil differences limit the forest on the west. Elevation in Texas varies from 200 to 500 feet above sea level.

The average annual rainfall of 35 to 50 inches is fairly uniformly distributed throughout the year. Humidity and temperatures are typically high and the area is comparatively free from persistent winds.

Soils are mostly pale to dark gray sands or sandy loams and are generally acidic.

The area is interspersed with native pine-hardwood vegetation, farm lands, and pasture. Deer are locally abundant throughout the Piney Woods. Ranches are varied in size; cattle are the primary livestock. Paper pulp production is an important economic pursuit within this region.

#### Subregions

Longleaf Pine Forest  
Mixed Pine-Oak Forest

The Longleaf Pine Forest once dominated the southeastern part of the Piney Woods of Texas. A few pockets of longleaf may still be seen today.

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<sup>3</sup> Frank W. Gould, *Texas Plants—A Checklist and Ecological Summary*, 3rd Edition, 1975, College Station, Texas: Texas Agricultural Experiment Station, Texas A&M University.

<sup>4</sup> W.F. Blair, "The Biotic Provinces of Texas," *Texas Journal of Science*, vol. 2, 1950, pp. 93-117.

FIGURE 1

NATURAL REGIONS OF TEXAS

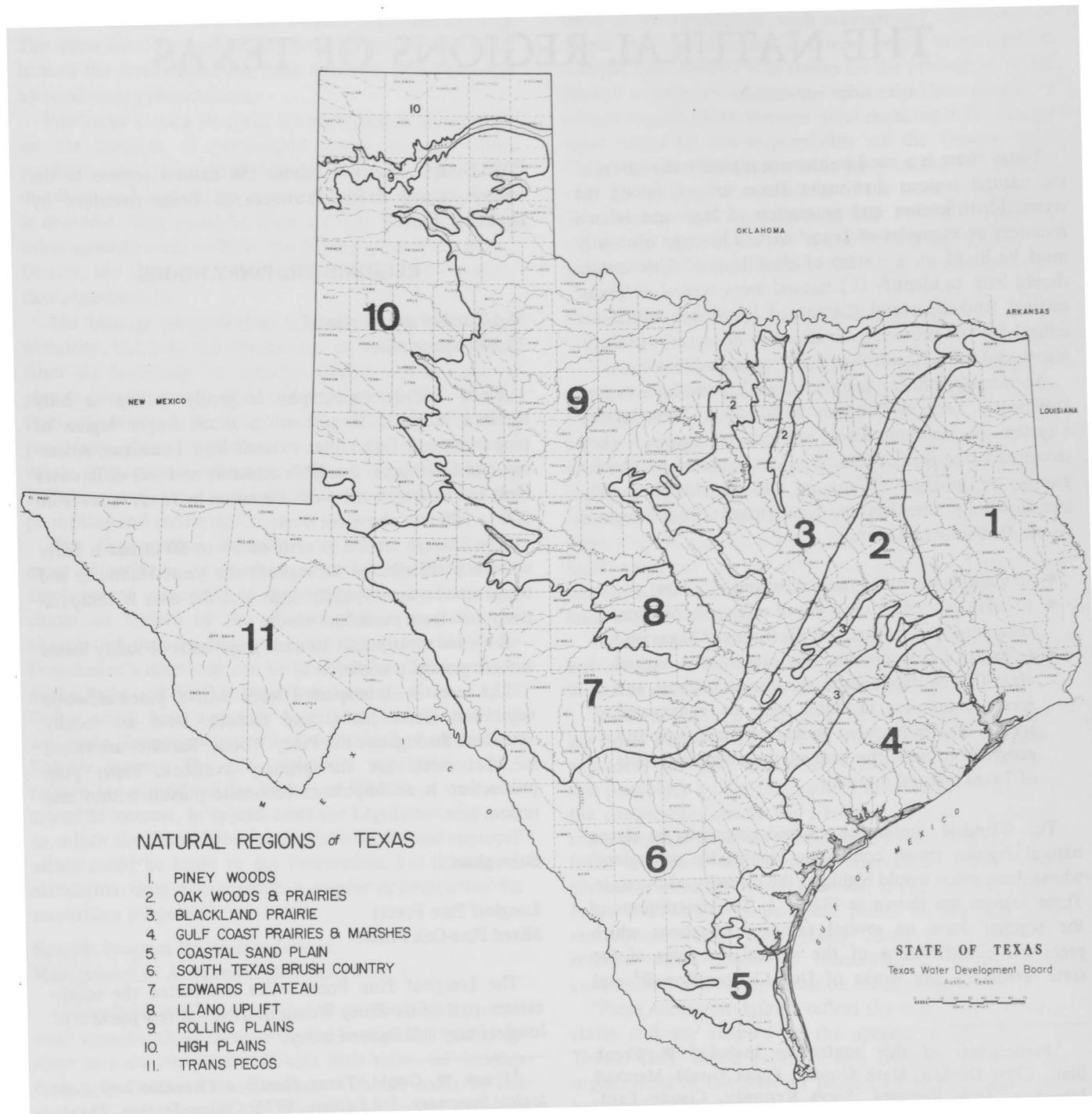
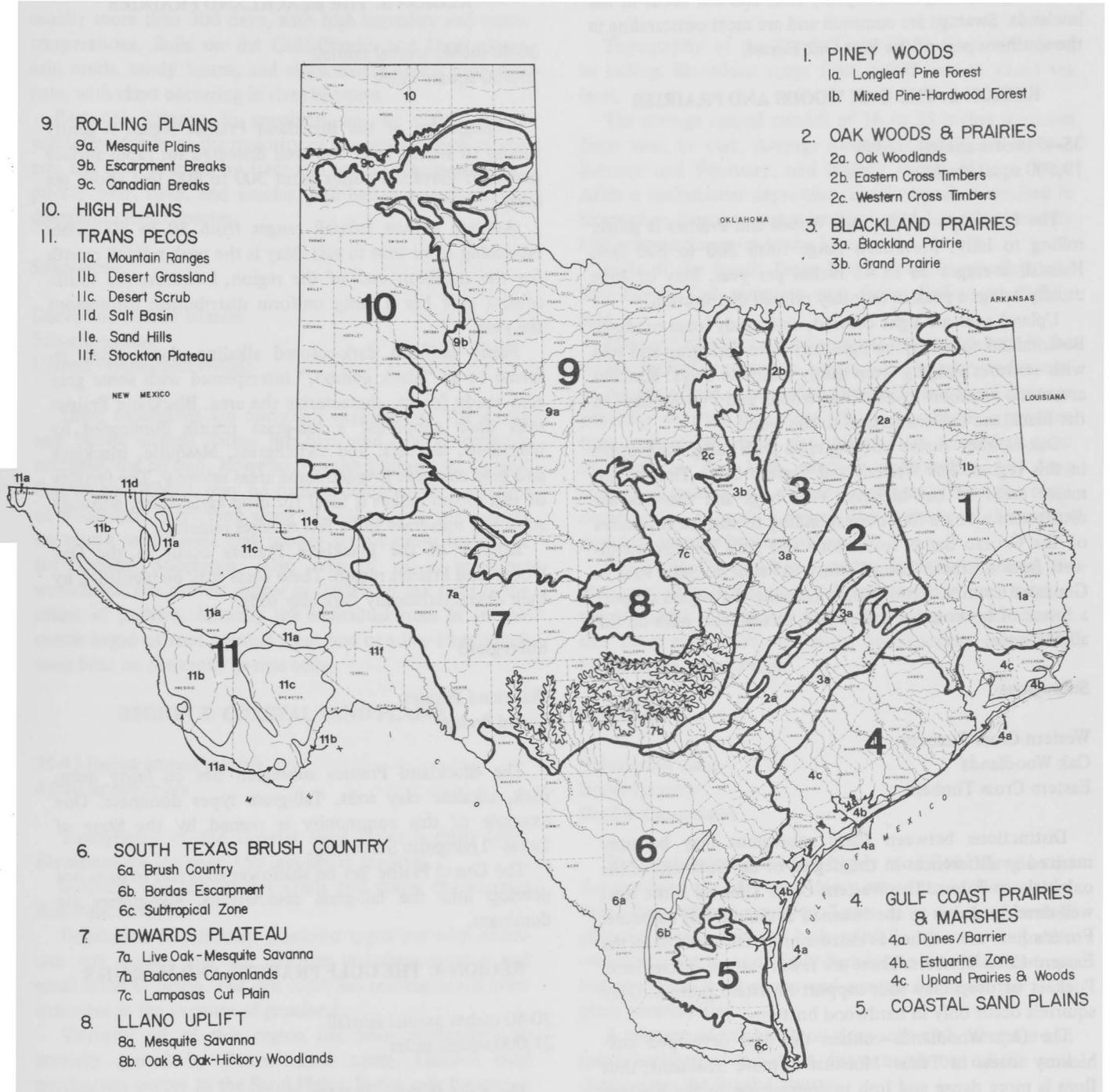


FIGURE 2

NATURAL SUBREGIONS OF TEXAS



The Mixed Pine-Oak Forest occurs to the west and north of the longleaf pine area. Major dominants are loblolly and yellow pine, and blackjack and post oak. Hardwood forests of sweetgum, magnolia, tupelo, elm, and ash occur in the lowlands. Swamps are common and are most outstanding in the southern part of the Pine-Oak Forest.

### **REGION 2: THE OAK WOODS AND PRAIRIES**

35-45 inches annual rainfall  
19,500 square miles

The landscape of the Oak Woods and Prairies is gently rolling to hilly. Elevations range from 300 to 800 feet. Rainfall averages 35 to 45 inches per year. May or June usually brings a peak in monthly rainfall distribution.

Upland soils are light colored, acid sandy loam or sands. Bottomland soils may be light brown to dark gray and acid with textures ranging from sandy loams to clays. Ranches are more common in the Oak Woods and Prairies than in the Blackland Prairies Region to the west.

Oak-hickory forest interdigitates with tall-grass prairies in this region. The Western and Eastern Cross Timbers are major areas of oak-hickory. Peat bogs and marshes are distributed along a line corresponding to surface exposures of the Carrizo Sands formations and runs roughly southwest from northern Leon County to Palmetto State Park in Gonzales County. River valleys crossing the region support a forest of hackberries and pecans mixed with oaks on the alluvial soils.

#### **Subregions**

Western Cross Timbers  
Oak Woodlands  
Eastern Cross Timbers

Distinctions between these subregions may be summarized as differences in the degree of development of the oak-hickory forest. The Western Cross Timbers is the least well-developed due to the lessened availability of moisture. Forests here are neither as dense nor as tall as those in the Eastern Cross Timbers. There are fewer eastern species here. Pockets of deep clay soils support bluestem prairies. Gray squirrels occur only in hardwood bottoms.

The Oak Woodlands contain the best developed oak-hickory forest in Texas. Moisture is more abundant; thus flora is more dense and lush in comparison to the Western Cross Timbers. Gray squirrels are abundant. Prairies are more common than in the other subregions. The peat bogs mentioned above are found here.

The Eastern Cross Timbers is best described as a mix of the Western Cross Timbers and the Oak Woodlands. Its

phase of development falls between those of the Oak Woodlands and Western Cross Timbers.

### **REGION 3: THE BLACKLAND PRAIRIES**

30-40 inches annual rainfall  
25,500 square miles

Topography of the Blackland Prairies region is gently rolling to nearly level and well dissected for rapid surface drainage. Elevation varies from 300 to 800 feet above sea level.

Average annual rainfall ranges from 30 to 40 inches increasing from west to east. May is the peak rainfall month for the northern end of the region; however, the south-central part has a fairly uniform distribution throughout the year.

Fairly uniform dark-colored alkaline clays, often referred to as "black gumbo," interspersed with some gray acid sandy loams, characterize the area. Blackland Prairies soils once supported a tall-grass prairie dominated by bluestems, sideoats, and switchgrass. Mesquite, blackjack and post oak have invaded some areas severely. The fertility of this region makes it ideal for crop agriculture, although some hay meadows and a few ranches remain.

Isolates of the Blackland Prairies occur in the Oak Woods and Prairies region. These areas may be identified by their characteristically dark clay soils.

#### **Subregions**

Blackland Prairies  
Grand Prairie

The Blackland Prairies subregion lies on fairly deep, dark, alkaline clay soils. Tall-grass types dominate. One example of this community is owned by the State of Texas—Livingston State Park.

The Grand Prairie lies on shallower soils and so does not develop into the tall-grass associations. Mid-grasses are dominant.

### **REGION 4: THE GULF PRAIRIES AND MARSHES**

20-50 inches annual rainfall  
21,000 square miles

The Gulf Prairies and Marshes region is a nearly level, slowly drained plain less than 150 feet in elevation, dissected by streams and rivers flowing into the Gulf of Mexico. The region includes the barrier islands lining the coast which protect the shoreline from the constant buffeting of harsher ocean waves, and the highly productive

estuaries and marshes that support a thriving fishing economy.

Rainfall varies from 20 to 50 inches per year distributed fairly uniformly throughout the year. The growing season is usually more than 300 days, with high humidity and warm temperatures. Soils on the Gulf Prairies and Marshes are acid sands, sandy loams, and clays. Sandy loams predominate, with clays occurring in river bottoms.

Post oak savanna or grassland are the major climax vegetation types on the majority of the region. Much of the area has been invaded by trees and brush such as mesquite, prickly pear, oaks, and acacias. Tall bunch grasses are the dominant climax species.

### **Subregions**

Dunes and Barrier Islands  
Estuarine Zone  
Upland Prairies and Woods

These subregions are fairly self explanatory. The dunes and barrier islands define the first, and coastal wetlands comprise the second. However, the third subregion, Upland Prairies and Woods, may be further described as a mixture of woodlands developing along alluvial valleys, and prairies on coarse sandy soils. Oak mottes are a curious feature of the Upland Subregion. Also referred to as maritime woodlands, oak mottes appear as clusters of oak trees in the midst of prairies. Actually the individual trees in an oak motte began as root sprouts from one or a few trees which took hold on the sandy prairie soils.

## **REGION 5: COASTAL SAND PLAINS**

35-45 inches annual rainfall  
4,000 square miles

Topography of the Coastal Sand Plains is fairly level. Elevations are less than 150 feet above sea level.

Surficial and windblown sands and dunes characterize this region's soils.

Vegetation is primarily grassland types but with extensive oak mottes and salt marshes including sacaton and small areas of brush. The oak scrub has become much more extensive at the expense of grassland.

Virtually all of this region has been moderately to severely grazed by domesticated cattle. Limited crop production occurs in the Sand Plains. In the past the region has been called the "Wild Horse Prairie" because of the large herds of feral horses roaming here in the 19th century.

## **REGION 6: SOUTH TEXAS BRUSH COUNTRY**

16-35 inches annual rainfall  
28,000 square miles

Topography of the South Texas Brush Country is level to rolling. Elevations range from 1,000 feet to about sea level.

The average annual rainfall of 16 to 35 inches increases from west to east. Average monthly rainfall is lowest in January and February, and highest during May or June. After a midsummer depression, another peak is reached in September. Summer temperatures are high, with extremely high evaporation rates in the Laredo area.

Soils of the South Texas Brush Country are clays and clay loams. Soil reactions vary from alkaline to slightly acid.

Thorny brush is the predominant vegetation type in the region, including mesquite, acacia, prickly pear, and mimosa, among others. Areas of shallow soils and rapid drainage generally support this plant life. A grassland or savanna type vegetation which also occurs was somewhat more extensive in the 19th century and earlier, but long continued grazing and other factors have altered the plant communities to such a degree that ranches of the region now face a severe brush problem.

The Brush Country has a greater diversity of animal life than any other in Texas. It is home for many near tropical species which abound in Mexico, many grassland species that range northward, and some desert species commonly found in the Trans Pecos.

### **Subregions**

Subtropical Zone  
Brush Country  
Bordas Escarpment

The Subtropical Zone is a highly modified subregion on the southern tip of Texas. Most remnants of the original vegetation, which occurs in Texas as a result of certain climatic factors such as high rainfall, are now in public ownership. Santa Anna State Park is one example. Subtropical species such as ebony and anaqua dominate the relict plant communities.

A mixture of tall brush on deep soils with mesquite and spiny hackberry, and short dense brush on caliche soils characterize the Brush Country.

The Bordas Escarpment is a continuous mass of short brush, probably the largest single mass, on caliche quеста.

## REGION 7: THE EDWARDS PLATEAU

15-33 inches annual rainfall  
31,000 square miles

The Edwards Plateau region comprises an area of West Central Texas commonly known as the "hill country." It is bounded on the east and south by the Balcones Fault. To the north it extends to the Western Cross Timbers of the Oak Woods and Prairies region and grades into the Plains regions. The Llano Uplift region also forms part of the northern border. The Pecos River and eastern edge of the Stockton Plateau define the western extent of the Edwards Plateau region.

Elevations range from slightly less than 100 feet to over 3,000 feet. Several river systems dissect the surface, creating a rough and well-drained landscape.

Average annual rainfall increases from west to east, ranging from 15 to 33 inches. Seasonal rainfall patterns peak in May/June and in September.

Soils of the Edwards Plateau are usually shallow with a variety of surface textures. They are underlain by limestone.

Man-made lakes, ranches, and farms are scattered throughout the region.

Scrub forest is the most characteristic plant association of the area. Ash, juniper, Texas oak, and stunted live oak are dominant in the more dissected southern and eastern canyonlands of the region. Mesquite occurs throughout the Edwards Plateau; together with live oak, it dominates the wood vegetation in the west. Some savanna type vegetation also occurs and was formerly more widespread.

### Subregions

Balcones Canyonlands  
Live Oak-Mesquite Savanna  
Lampasas Cut Plain

The Balcones Canyonlands subregion has the most rugged topography in the Edwards Plateau, with its steep grades and exposed geological strata. Springs abound amid the scarp woodlands of oaks and mesquite. Many plants are endemic to the area.

Live Oak-Mesquite Savanna topography is flat to rolling with oak and mesquite woods on grassland.

Grassland with scattered mesquite woods on low rolling hills underlain by limestone describes the Lampasas Cut Plain. Grasslands are found in alluvial valleys and canyon lands species on slopes.

## REGION 8: THE LLANO UPLIFT

30 inches annual rainfall  
5,000 square miles

The Uplift area is also known as the central mineral region. It is virtually surrounded by the Edwards Plateau region. Elevation ranges from 825 to 2,250 feet above sea level.

Geologically the region is a large dome with rolling to hilly topography. Granite exfoliation domes, the largest of which is known as Enchanted Rock, are common. In contrast to the clays and clay loams of the Edwards Plateau, sandy soils predominate on the Llano Uplift.

Rainfall averages about 30 inches, peaking in May or June and September.

Oak and oak-hickory woodlands are common vegetational types, along with mesquite savanna and some grassland types that were once more widely distributed.

### Subregions

Oak and Oak-Hickory Woodlands  
Mesquite-Whitebrush Savanna

The Woodlands are confined to small pockets of sandy, well-watered soils. Over thousands of years, weathering of granite deposits has produced these coarse soils. Mesquite-Whitebrush Savanna predominates in the Llano Uplift region. The Savanna occurs on loamier soils underlain by caliche.

## REGION 9: THE ROLLING PLAINS

22-30 inches annual rainfall  
43,500 square miles

The Rolling Plains region, together with the High Plains region, is the southern end of the Great Plains of the central United States. Topography is gently rolling to moderately rough and dissected by narrow intermittent stream valleys flowing east to southeast. Elevation is 800 to 3,000 feet. The eastern portion is sometimes known as the Reddish Prairies.

The region is bordered on the west by the Caprock Escarpment, on the south by the Edwards Plateau, and on the east by the Western Cross Timbers and Lampasas Cut Plain.

Annual rainfall ranges from 22 inches in the west to nearly 30 inches in the eastern portion. May and September

usually are high rainfall months. A summer dry period with high temperatures and high evaporation rates is typical.

Soils vary from coarse sands along outwash terraces adjacent to streams, to tight clays or red-bed clays and shales. Soil reaction is neutral to slightly alkaline.

The original prairie vegetation included tall and mid-grasses such as bluestems and grammas. Buffalo grass and species of three-awn, among others, tend to increase under grazing. Mesquite is a common invader on all soils. Shinnery oak and sand sage increase or invade on the sandy soils. Stream floodplains are dominated by various hardwood species. Juniper clings to the steep slopes along rivers.

### **Subregions**

Mesquite Plains

Escarpment Breaks

Canadian Breaks

The Mesquite Plains subregion typifies the Rolling Plains Region. It is a gently rolling plain of mesquite-short grass savanna. Oak, cedar, acacia, and mimosa are important secondary elements of the brush portion on the savanna.

Steep slopes, cliffs, and canyons occurring just below the edge of the High Plains Caprock comprise the Escarpment Breaks subregion. The Breaks are an ecotone or transition zone between the High Plains grasslands and the mesquite savanna of the Rolling Plains. Brush species including junipers, buffalo currant, and joint-fir dominate the vegetation of this subregion.

The Canadian Breaks subregion is similar to the Escarpment Breaks, but also includes the floodplain and sandhills of the Canadian River in the northern Panhandle, bounded north and south by the edge of the Caprock. It is a mixed grass prairie with some low shrubs grading from succulents and dwarf shrubs in the east to shinnery, a savanna or groveland of scattered clusters of woody species, in the west.

## **REGION 10: THE HIGH PLAINS**

15-21 inches annual rainfall

34,500 square miles

The High Plains region of Texas, together with the Rolling Plains region, comprise the southern end of the Great Plains. The High Plains consist of about 20 million acres of a relatively level high plateau separated from the Rolling Plains by the Caprock Escarpment. The Canadian River Breaks divide this region into southern and northern sections. Elevation ranges from 3,000 to 4,500 feet, sloping gently toward the southeast. "Playa lakes" are shallow, round depressions which spot the surface, sometimes covering more than forty acres.

The southern edge adjoins the Edwards Plateau and Trans Pecos regions. A transition from productive grazing land to sand hills marks the boundary between the High Plains and the Trans Pecos.

Average annual rainfall is 15 to 21 inches. Extended droughts have occurred here several times during this century. Rainfall is lowest in winter and mid-summer and highest in April or May and September or October.

Surface texture of soils on the High Plains ranges from clays on hardland sites in the north to medium textures on mixed land sites and sands in the southern portion of the region. Caliche generally underlies these surface soils at depths of two to five feet.

A short-grass association dominated by buffalo grass is the most important plant association on the High Plains. However, distinctly different plant communities exist on the hardlands, mixed lands, sandy lands, and draws. The region characteristically is free from brush, but mesquite and yucca have invaded parts of the area. Sandy lands support shinnery oak, and sand sage and junipers have spread out of some of the breaks onto the Plains proper.

## **REGION 11: THE TRANS PECOS**

Less than 12 inches annual rainfall

38,000 square miles

The Trans Pecos region of Texas is perhaps the most complex of all the regions. It occupies the extreme western part of the state eastward generally to the Pecos River, but including the Stockton Plateau and the Sand Hills near the southeast corner of New Mexico. Elevations range from 2,500 to more than 8,500 feet. This is a region of diverse habitats and vegetation, varying from desert valleys and plateaus to wooded mountain slopes. Even the mountain masses vary tremendously in the environments they offer for plant and animal life. Some are characterized by volcanic rocks, others by limestone.

Over most of the area average annual rainfall is less than 12 inches. Precipitation may be as high as 20 inches at higher elevations. July and August are usually the high rainfall months.

Mountain outwash materials have formed the soils of the Trans Pecos. Surface textures and profile characteristics are varied. Soil reaction is generally alkaline and poor drainage has resulted in alkali accumulations in some areas.

Due to the diversity of soils and elevations, many vegetation types exist in the region. The principal plant communities are creosote-tarbrush desert scrub, desert grassland, yucca and juniper savannas, and montane forests of pinon pine and oak.

**Subregions**

- Sand Hills
- Stockton Plateau
- Salt Basin
- Desert Scrub
- Desert Grassland
- Mountain Ranges

The Sand Hills subregion consists of shin oak and mesquite on wind-blown dunes and grasslands with some little bluestem.

Flat-topped mesas and plateaus intersected by steep-walled canyons and dry washes comprise the Stockton Plateau.

Soils with high salt concentrations and gypsum dunes on a bolson area characterize the Salt Basin. The Basin has no external drainage, hence there is this buildup of salts in its soils. Plants which grow here have a high degree of salt tolerance.

The Desert Scrub subregion is an area of low rainfall and rapid drainage. Creosote bush flats, yucca, lechuguilla, and various small-leaved plants are common. The Desert Grassland is well described by its name. It occurs in the central part of the region as a function of altitudes and soils, which are deeper with a higher clay content.

The Mountain Ranges are characterized by higher rainfalls and the development of woody vegetation such as junipers, scrub oak, live oaks, pinon pine, ponderosa pine, and Douglas fir in the Chisos and Guadalupe Mountains.

**CORRESPONDENCE TO THE BIOTIC PROVINCES OF TEXAS**

Although the borders of the natural regions described in this report were drawn largely on the basis of soil types and plant communities, there are several correspondences to the widely known Biotic Provinces described by Dr. Frank Blair. The following is a table of the rough correspondences:

**TABLE 1**

**CORRESPONDENCE BETWEEN THE NATURAL REGIONS AND BIOTIC PROVINCES OF TEXAS**

<i>Natural Region</i>	<i>Biotic Province</i>
The Piney Woods	Part of the Austroriparian Province
The Oak Woods and Prairies	Part of the Texan Province
The Blackland Prairies	Part of the Texan Province
The Gulf Prairies and Marshes	Includes parts of the Texan and Tamaulipan Provinces
The Coastal Sand Plains	Part of the Tamaulipan Province
The South Texas Brush Country	Part of the Tamaulipan Province
The Edwards Plateau	Part of the Balconian Province
The Llano Uplift	Part of the Balconian Province
The Rolling Plains	Part of the Kansan Province
The High Plains	Part of the Kansan Province
The Trans Pecos	Part of the Chihuahuan Province

# NATURAL HERITAGE PRESERVATION ACTIVITIES OF TEXAS STATE AGENCIES

## INTRODUCTION

Texas does not have a comprehensive program for either natural or cultural resource management and preservation. There are at least ten state agencies whose activities concern preservation and countless local governmental and private organizations which are so involved. There is some degree of coordination among these entities, but not to the extent that a cohesive preservation effort emerges.

The principal state agencies administering natural preservation programs include the General Land Office, Department of Parks and Wildlife, and The University of Texas. (The newly created Department of Water Resources is primarily concerned with water resource management and development and will, therefore, not be considered.)

The Land Office is the steward of over 870,000 acres of unsold public lands in addition to 5.5 million acres of riverbeds and submerged tidelands. With an activist Commissioner the Land Office has emphasized the importance of developing a comprehensive Coastal Zone Management Program. Also resulting largely from the Commissioner's zeal is an informal survey of state lands to determine the nature and extent of their resources for both controlled development and preservation where suitable.

In 1975 the Parks and Wildlife Commission adopted a change in state park policy guidelines and designated a natural area classification which enabled the Department to pursue the goal of natural area preservation within the state park system. Theretofore, the Department's activities had been limited to an unfunded scientific areas acquisition program and a natural landmarks designation program. The Department is now informally surveying natural areas for possible acquisition and developing a selection system. Other preservation activities include an endangered species program and various feasibility studies for waterways and trailways programs.

The University of Texas has various research components involved in preservation activities. Foremost is the LBJ School's Natural Areas Survey Project founded by Don Kennard. Also involved with preservation are the Rare Plants Institute and Bureau of Economic Geology. The University of Texas System Office, charged with administering over 2.1 million acres of University lands, operates several

programs geared largely toward conservation rather than preservation.

The Texas Historical Commission is the primary state agency charged with the responsibility of promoting historical and cultural preservation in the state. It has developed the state preservation plan pursuant to the National Historic Preservation Act. Working within the Commission is the State Archeologist whose activities include conducting surveys of archeological sites and working with the State Antiquities Committee. Working with the Historical Commission are over 240 County Historical Commissions. The Department of Parks and Wildlife also works in historic preservation with a historical areas facet of the state park system. The University of Texas Center for Intercultural Studies in Folklore and Ethnomusicology is undertaking a comprehensive survey of Texas folk culture under a grant from the National Endowment for the Arts.

## I. Department of Parks and Wildlife

- A. *Scientific Areas Program:* To provide a means of designating any natural area of the state which should be preserved for scientific or educational uses.
  1. *Classification criteria:* A two-tier system: "any area encompassing a plant or animal community, geological, archeological, or paleontological site of such significance as to warrant designation;" areas thus qualifying are further classified into areas with features of national, regional, state, or local significance.
  2. *Identification:* by private suggestions to the Department, where they are reviewed and recommendations passed on to the Commission.
  3. *Selection:* No procedure (NP)
  4. *Resources Description:* NP
  5. *Protection and Preservation:* Public ownership is encouraged but not required for an area's

inclusion. Any private land "should be dedicated for private use in accordance with this policy."

6. *Management:* NP

7. *Intergovernmental:* The only scientific area thus far acquired is the Neches-Angelina Area in East Texas from the Corps of Army Engineers. (Note: the Wildlife Division manages this area but apparently not as part of the scientific area program policy.)

8. *Funding:* The statute authorizing this program prohibits funds for acquisition unless specifically authorized in future appropriations. No funds were appropriated until this biennium (\$1 million for 1978 and \$500,000 for 1979), ten years after the program was established.

B. *Natural Areas:*

1. *Classification criteria:* Areas exemplifying natural scenic beauty, ecosystems, biological features, geological formations of statewide significance, or possessing exceptional education or scientific values.

2. *Identification:* The Department staff has developed a list of fifteen significant natural areas for inclusion in the State park system. The list, developed from the inventories discussed below, was not made available by Department staff.

3. *Selection:* The criteria established by the State Park System Policy Guidelines: 1) State-wide significance of the area, 2) natural condition, 3) endangered by misuse or outside encroachment, 4) unrepresented in the public domain. The Department has implemented these guidelines with "A Rating System For Texas Natural Areas." The system uses a biological, paleontological, or geological value rating depending on the area's significance and an acquisitions rating.

4. *Resources Description:* The Department has relied on *The Natural Areas of Texas* published in 1970 by the Texas Natural Area Survey, a private effort by over one hundred conservationists across the state on behalf of the Texas Chapter of the Nature Conservancy. The De-

partment used a recommended list of seventy rural natural areas and thirty urban natural areas culled from over seven hundred areas for inclusion in the Texas Outdoor Recreation Plan. One problem stemming from this process is the inadequacy of the survey from which it was drawn. For example, Big Bend National Park is included as one natural area while it would clearly qualify for many more than that based on the objective criteria used by other surveys. The Department is relying more on the comprehensive and exacting surveys of the LBJ School's Natural Areas Survey Project which include the work of geologists, archeologists, botanists, cartographers, photographers, and historians. Ideally this kind of survey is needed for the areas inventoried in the 1970 Conservancy Survey of Texas. Only from an adequate base of information will the identification and selection process described above work properly.

5. *Protection and Preservation:* Natural areas would be included in the State Park System, i.e., publicly owned. According to the Department's 1975 Policy Guidelines for Acquisition, Development, and Operation, "Development in State Natural Areas shall in no way encroach upon, damage, or impair the scenic or natural feature concerned."

6. *Management:* By Department of Parks and Wildlife, Parks Division. "State Natural Areas shall be managed to insure the preservation and perpetuation of the scenic or outstanding natural feature for this and future generations." (TPWD Policy Guidelines, 1975.)

7. *Intergovernmental:* The Department has a close working relationship with the General Land Office for identification of State lands as possible natural areas. The Department's feasibility studies for a wild and scenic river system and trail system were partially in response to federal legislation (National Wild and Scenic Rivers Act, PL 90-542; and National Trails System Act, PL 90-543).

8. *Funding:* In 1967 a constitutional amendment was adopted authorizing the issuance of up to \$75 million in bonds for new park acquisition. Only \$15.75 million has been made available because revenues from park entrance

fees are not sufficient to retire any additional encumbrance. A more promising source of funding is the Texas Park Fund created by the 62nd Legislature by dedicating one cent of the cigarette tax. This fund is expected to accumulate \$31 million by the end of the current biennium. The Parks and Wildlife Commission has heretofore emphasized recreational purchases with this money and has generally avoided condemnation.

### C. Miscellaneous

1. *Endangered Species Program:* Enacted in 1973, the Endangered Species Act (U.T.C.A. Parks & Wildlife, Chapter 68) authorizes the Department to regulate the taking, possession, etc., of endangered animals. Regulations covering eleven mammals, eleven birds, four reptiles, five amphibians, and five fishes were issued in 1975 based on a survey conducted by the Texas Organization for Endangered Species. The Department also maintains a list of endangered plants developed by the Rare Plant Center at the University of Texas. Funding for the Endangered Species Program for the current biennium is \$111,204 for 1978 and \$118,359 for 1979.
2. *Natural Landmark Designation:* The Natural Features and Formations Act (V.T.C.A. Parks & Wildlife, Section 13.011) authorizes the designation of outstanding natural features in the state. Acquisition is authorized only if the landmark can logically be a subunit of an existing unit of the State Park System. It is possible that a feature on private property could be designated without public access. If degradation of the landmark occurs, its designation is removed. Perpetual preservation is the goal of the Department, but compliance is voluntary.
3. *Texas Conservation Foundation:* Created in 1969 (Texas Natural Resources Code, Chapter 181) to hold property in trust for "conservation of natural, scenic, historical, scientific, educational, . . . resources for future generations of Americans," the foundation has never been funded.

## II. General Land Office

- A. *Coastal Zone Program:* The legislature enacted the Coastal Public Lands Management Act (Texas Natural Resources Code, Chapter 33) in 1973 in response to the federal Coastal Zone Management Act. Its purpose is to effect the preservation of the natural resources of the surface estate in coastal public lands.
  1. *Classification:* Such resources shall be construed to include "the natural aesthetic values of those areas and the value of such areas in their natural state for the protection and nurture of all types of marine life and wildlife."
  2. *Identification:* The Land Office is given responsibility to conduct an inventory of endangered environments and resources in the coastal public lands.
  3. *Resources Description:* The Land Office is mandated to conduct a "continuous inventory of coastal public lands and water resources which shall include a determination of the extent and location of the coastal public lands."
  4. *Protection and Preservation:* The School Land Board, which administers the coastal public lands with the aid of the Land Office, is authorized to acquire interests in land (not by condemnation) "for the creation, maintenance, or protection of wildlife refuges, estuarine reserves, natural scenic reserves, historical or archeological sites, public recreational areas, and research facilities." The Board may also lease its public lands to Parks and Wildlife for recreational or reserve purposes, to environmental organizations for management of wildlife refuges, or to educational organizations for research purposes. The Board also has authority to control structures on coastal lands by the issuance of permits and requirement of registration.
  5. *Management:* The Coastal Zone Management Program as developed by the Land Office is the management plan. The Land Office Staff is the support staff for the School Land Board.

6. *Intergovernmental:* The Coastal Zone Management Program is federally mandated and most of the funding is federal.
  7. *Funding:* The federal planning grant this year for the Coastal Zone Management Program is \$746,000.
- B. *Land Office Activities:* Under prior administrations, there was little concern for or knowledge of the resources on State lands. Minimal revenue was generated from the lands and few personnel were assigned to their management. Under Commissioner Armstrong a general survey of State lands has been undertaken which has resulted in \$4 million in new mineral leases and new prospects for grazing leases. Although this inventory has no preservation element of a conscious nature, Armstrong's interest in this area has brought together the staffs of the Land Office and the Natural Areas Survey Project and turned some Land Office assignments into multi-purpose projects (Quitman Mountains and Salt Flats).

One major problem with the State lands is their noncontiguity, which presents major obstacles to preservation attempts. Thus far ranchers have been cooperative in preserving certain desirable lands. The Legislature provided a means by which the School Land Board could trade lands to consolidate holdings and "for acquiring lands having unique biological, geological, cultural, or recreational value . . ." (V.A.T.S., Art. 5421c-13). The authority expired December 31, 1978.

C. *Other Programs*

1. *Coastal Wetlands Acquisition Act:* This act provides that the Land Office may certify to the Parks and Wildlife Department that certain coastal wetlands should be acquired to "preserve and protect the productivity and integrity of such lands as coastal wetlands." The Legislature failed to appropriate funds

to Parks and Wildlife for this program. Because the State's option to purchase expires only one year from the certification, the Land Office has avoided certifying any lands under the program.

2. *Dune Barrier Island and Dune Protection:* This act authorizes the commissioners courts to establish dune protection lines. Conduct detrimental to the dunes is prohibited within the line unless a permit is acquired. No permit is necessary for livestock grazing or the production of oil and gas—exceptions which might be considered to frustrate the Legislative purpose.

III. Other Activities

- A. *Natural Resources Council:* Created by the 65th Legislature, the Natural Resources Council is a coordinating body which replaces the Interagency Council on Natural Resources and the Environment. That body was created in 1969 and met only in perfunctory fashion. During this decade its activities have dealt mainly with water and the voluntary Environment Impact Statement review of State funded projects. The council will likely be more active since it has been mandated to report to the Legislature on its assigned research under a companion act, the Coastal Coordination Act. Its field of study seems to be only peripherally related to the preservation of coastal resources and geared more toward the policy stated by the Legislature: to require the State to balance the economic, social and environmental consequences of its natural resource decisions.
- B. *CAPCO "On Target" Survey:* The Capital Area Planning Council has undertaken a survey of sites and areas within its region worthy of preservation. It has been holding citizen meetings in each county to help identify possible areas.

## APPENDIX B

# THE NATIONAL HERITAGE PROGRAM

### BACKGROUND

In May 1977, President Carter directed Interior Secretary Cecil Andrus to develop a proposal for a National Heritage Program, a program designed to identify and protect the nation's significant natural and historical resources. The Bureau of Outdoor Recreation (BOR) assumed responsibility for this task and released a draft description of the proposed program in January 1978. Simultaneously, Secretary Andrus, by executive order, combined BOR with the Office of Archeology and Historic Preservation (OAHP) and the National Landmarks Program to form the new Heritage Conservation and Recreation Service (HCRS). The National Landmarks Program and OAHP were previously with the National Park Service.

The program recommendations in the draft document require federal legislation for their implementation, and the Carter administration's heritage legislation will not be submitted to Congress until January 1979. A general description of the program which will be recommended to Congress can be given on the basis of the draft document published by the Interior Department in January 1978 and upon subsequent discussions with HCRS staff members.

### PROGRAM DISCUSSION

The primary objectives of the program are to identify, select, and protect significant natural and historical resources. If successful, the program will result in the first comprehensive inventory of the United States' heritage resources. The emphasis is upon voluntary action by individual citizens, private organizations and local and state governments, supported by a responsive federal government. Each member of this partnership has a distinctive and important role.

#### The Federal Role

Secretary Andrus has said the program will provide a mechanism to pull together existing federal preservation efforts and make financial and technical assistance available for heritage projects through a single point of contact (HCRS) within the Interior Department. The federal role

will consist primarily of guidance and assistance. Guidance will consist of leadership in the formation of policy and standards for heritage conservation and assistance will be in the form of monetary grants and technical expertise.

#### Heritage Conservation and Recreation Service (HCRS)

This agency will have primary responsibility for federal heritage activities. Specific tasks include the following:

- to develop standards for identification, documentation, preservation, and management of heritage resources;
- to develop a uniform data management system with the objective of a nationally compatible information exchange system;
- to administer the National Register of Historic Places and to establish a National Register of Natural Areas (uniform, simple criteria will have to be developed for evaluation of nominated natural areas);
- to assist and coordinate state heritage program development with matching grants and technical assistance;
- to set guidelines, review and approve State Comprehensive Outdoor Recreation Plans, expanded to include heritage concerns.

HCRS would also administer any new grant program concerning heritage preservation. The only federal funds now available for heritage preservation are the Land and Water Conservation Fund (LWCF), the Historic Preservation Fund, and the Department of Housing and Urban Development (HUD) Community Development Block Grant program. The two latter funds are used only for historic and urban projects respectively. The LWCF is currently the only source of federal money available for the support of state heritage programs and natural heritage resource protection. In the past, LWCF money has been used primarily for recreation projects and many states have been reluctant to use their allocation for natural preservation. Earlier this year, HCRS suggested earmarking about

\$64 million of the LWCF for heritage programs and projects. The political response was so negative the proposal was dropped. Funds for support of natural heritage preservation may be included in the program but will probably be from a new funding source.

#### **Other Federal Agencies**

The program will also mandate the establishment of the Council on Heritage Conservation, the reconstituted and expanded successor to the existing Advisory Council on Historic Preservation. This independent advisory board will review and comment on all federal projects or actions that affect identified heritage resources. Other federal agencies will be required to inventory their lands and to deliver the inventory information to the appropriate state heritage offices. They must then nominate to the registers those resources that meet the criteria and submit plans for their preservation. Project agencies will be required to consult with state heritage offices in the early stages of project planning and will not be able to go through with actions that affect nationally significant heritage resources unless there is a finding of no prudent or feasible alternative to the action.

#### **The State Role**

The states will play the leading role in the National Heritage Program. The entire concept is based upon the successful development of individual state heritage programs. States will provide the main point of contact for federal financial and technical aid and all inventory information will flow to the State Heritage Office, which will maintain the state heritage inventory. Andrus has asked each governor to participate in this effort by developing heritage programs in their own states. A state heritage program must include the following to be viable:

1. a classification system for the state's heritage resources;
2. a comprehensive inventory of the state's heritage resources;

3. a data management system for the heritage inventory information;
4. a system for selecting those sites to be given special attention;
5. a series of measures designed to protect heritage resources.

Specific responsibilities will include the following:

- to identify heritage resources through comprehensive surveys and inventories;
- to evaluate these resources against the National Register's criteria;
- to coordinate nominations to the National Registers;
- to establish state protective measures and to encourage the development of local protective measures;
- to participate in project review and to comment on activities;
- to develop information and education programs to increase public awareness of heritage conservation;
- to acquire heritage resources if other protection methods prove inadequate.

#### **The Role of Local Governments, Individual Citizens, and Private Organizations**

These individuals and organizations will be valuable partners in their states' heritage efforts. They will provide the state heritage programs with information, manpower, and financial support. They will help identify heritage resources, raise money for heritage projects, publicize threatened resources, own and manage heritage sites, and participate in programs designed to stimulate public concern. Property owner participation will be encouraged through the awarding of Register standing. Local governments can pass protective ordinances and regulations, grant property tax relief, and coordinate heritage preservation efforts with local planning.

## PRIVATE SECTOR PRESERVATION EFFORTS IN TEXAS

Several national organizations and their local affiliates are active in preserving ecologically significant lands in Texas. The Nature Conservancy, the National Audubon Society, and the World Wildlife Fund are the major groups that are involved in land acquisition, leasing, or management for preservation purposes. In addition to these national groups, the South Texas-based Rob and Bessie Welder Wildlife Foundation plays an important role as far as wildlife research and education is concerned. Various other organizations have been active in preserving areas on a local or regional basis.

The following descriptions of each of these organizations will focus upon the groups' objectives and activities in Texas, the type and amounts of land held or preserved, and the plans for future activities in Texas.

### The Nature Conservancy (TNC)

TNC is a national organization dedicated to the preservation of natural areas and ecological diversity. Its involvement in Texas includes an affiliated state chapter and a state representative of the national office. The activities of the state chapter are primarily oriented toward preservation of natural areas through ownership and management. The national organization undertakes preservation of natural areas and assists states in establishing "heritage programs."

The state chapter owns and manages a number of small tracts and leases areas from private interests. The land has been obtained mainly through donation, but some purchases have been made. Management guidelines are developed for each tract by a committee of professionals knowledgeable about the ecosystem type being preserved. While many of the areas are open to the public, at least one, Ezell's Cave in San Marcos, is closed because of the fragile ecology of the site.

TNC's national office has been instrumental in acquiring larger tracts for preservation, often serving as an "intermediary" for eventual acquisition by state or federal agencies. An example is the TNC purchase and subsequent sale to the Texas Parks and Wildlife Department of Enchanted Rock. Other areas are retained and managed by TNC itself.

A second focus of the national organization is the

preservation of ecological diversity through the development of natural heritage programs in the various states. Working in cooperation with state governments, TNC will help them to implement the computerized Heritage inventory system devised by TNC staff. The Heritage inventory aims at identifying and cataloging the elements of natural diversity in the state. Information is compiled on a state's vulnerable plant and animal species, plant communities, aquatic types, and critical habitat, as well as outstanding geologic features. Using this information, the existence, numbers, condition, status, and location of all significant examples can then be determined, and appropriate protective measures can be developed to ensure continued ecological diversity.

As of a recent tabulation, the state chapter (and TNC of Texas, Inc.) owns or leases eleven preserves which approximate 2,717 acres. Table C-1 is a breakdown of these holdings.

The national office has recently acquired several large tracts of land in Texas, including Enchanted Rock, Smith Marsh, and Perry Marsh. Enchanted Rock has subsequently been transferred to the Texas Parks and Wildlife Department. Perry Marsh and Smith Marsh are scheduled to be acquired by the Fish and Wildlife Service for inclusion in the San Bernard Refuge (TNC Texas Chapter, 1978).

It is anticipated that both the national office and the state chapter will continue activities in Texas. The diversity of natural areas needing protection in the state will provide numerous opportunities for private preservation efforts. The concentration of large energy and industrial firms in Houston, Dallas, and other Texas cities provides opportunities for corporate fundraising activities, as evidenced by the recent opening of a state office of the national organization.

Because of the nature of the interests of the members of the state chapter, it is thought that acquisitions will continue to be concentrated in the eastern portion of the state. This may also reflect the fact that much of the land thus far has been donated, and the donors have tended to come from the population centers in East Texas. The national organization could be expected to have a more statewide orientation concerning preservation of natural areas, as evidenced by their interest in the Big Bend Ranch

TABLE C-1

PRESERVES OWNED OR MANAGED BY THE NATURE CONSERVANCY

<i>Name</i>	<i>County</i>	<i>Acres</i>	<i>Biologic Description</i>
Red River Refuge	Grayson	27.8	Riparian woodland & grasses
Triden's Prairie	Lamar	97.4	Unique tall grass community
Sheff's Woods	Smith	74.7	Upland and riparian woods/perennial stream/ relict sphagnum bog
Woodland Cathedral	Panola	175.0	Pine-hardwood forest, some as climax/location of heronry
Big Thicket Bogs & Pineland	Tyler	49.4	Longleaf pine upland with baygall-pitcher plant bog
Little Rocky Preserve	Jasper	83.5	Pine-hardwood forest with small "hanging bog"
Roy E. Larsen Sandyland Sanctuary	Hardin	2,138.0	Mixed arid sandyland/longleaf pine/ baygall pond communities
Marysee Prairie	Liberty	7.0	Last remnant of Big Thicket Prairie
J. Cooke Wilson & Mary Randolph Wilson Preserve	Jefferson	40.0	Pine-hardwood forest within the city of Beaumont
Ezell's Cave	Hays	2.5	Fissure cave in the Balcones fault zone containing endemic and/or unusual cave fauna
Lown Acres	Bexar	22.0	Grassland with brush and oak mottes
	<b>TOTAL</b>	<b>2,717.3</b>	

Source: The Nature Conservancy Texas Chapter, 1977

Area. Acquisition plans are not specific, but should important opportunities arise, the state and national TNC organizations would likely respond to the need for preservation.

**World Wildlife Fund (WWF)**

WWF supports a program to save threatened and endangered wildlife and natural areas. It is an international organization that makes grants for land acquisition, habitat protection and maintenance, and scientific ecological research.

The activities of the WWF in Texas have included the purchase of habitat areas for the Attwater's Prairie Chicken, whitewing dove, and other wildlife, especially those found in the Lower Rio Grande Valley. Approximately \$800,000 was raised in the state for these purchases (Dodgen, 1978). Most of the lands have been or will be turned over to the

U.S. Fish and Wildlife Service for protection and management.

Lands purchased by the WWF include 3,000 acres of coastal prairie in Colorado County for the Attwater's Prairie Chicken. This area was later transferred to the Fish and Wildlife Service to become part of the Attwater's Prairie Chicken National Wildlife Refuge.

Approximately 1,400 acres, in scattered tracts, have been acquired by the WWF in the Lower Rio Grande Valley. These sites are primarily brush tracts that provide nesting sites for whitewing dove as well as habitat for other important bird and mammal species of the area. The Fish and Wildlife Service is scheduled to receive these sites for inclusion in their Santa Ana National Wildlife Refuge.

WWF has no express plans for further acquisitions in Texas at this time. Their activities are currently concentrated on preserving tropical rain forests and other tropical ecosystems in Central and South America. However, they

are trying to develop more projects in the U.S., and Texas could possibly be included, but there are no definite projects scheduled (Hammond, 1978).

### The National Audubon Society

The purposes of the National Audubon Society are twofold: (1) to promote the conservation of wildlife and the natural environment and (2) to educate man regarding his relationship with, and his place within, the natural environment as an ecological system. To carry out these objectives both the national organization and local affiliate organizations are active in Texas.

The national organization is responsible for a number of sanctuaries along the Texas coast that they either own, lease, or manage under agreements with the owners. With the exception of one upland site, these sanctuaries are islands that are important as rookeries or wintering grounds for fish-eating birds. They are supervised by wardens hired by the national office to enforce management and protection restrictions, either year-round or on a seasonal basis. In addition, an Audubon Society biologist is employed to carry out research, especially on the whooping cranes that winter around the Aransas National Wildlife Refuge and adjacent Audubon sanctuaries (Blankinship, 1978).

The state and local Audubon affiliates are active in both preservation of wildlife habitat and environmental education. They manage a number of sanctuaries in the state and sponsor outdoor activities that stress environmental education.

Table C-2 is a listing of the sanctuaries operated by the National Audubon Society in Texas.

While there are no comprehensive plans for National Audubon Society activities in Texas, they intend to stay involved with the protection of wildlife and natural areas. Development of new preserves will take place as the occasion arises for the Audubon Society to acquire or gain interest in important habitat areas. Often the Audubon Society will intervene in a situation where other means of protection (i.e., public sector activities) are not available (Blankinship, 1978).

An example of the National Audubon Society's ongoing interest in wildlife habitat preservation is their current negotiation with the Nueces County Navigation District to secure management authority over Pelican Island in northeast Corpus Christi Bay. This spoil island, along the Corpus Christi Ship Channel near the Point of Mustang Island, is one of the major Brown Pelican rookeries on the Texas Coast. The Audubon Society hopes to secure this site for inclusion in their sanctuaries program in order to protect this important habitat of the endangered Brown Pelican.

TABLE C-2

#### PRESERVES OWNED OR MANAGED BY THE NATIONAL AUDUBON SOCIETY

<i>Name</i>	<i>Acres</i>	<i>Location</i>
Green Island	1,584	Lower Laguna Madre
Lydia Ann and Harbor Islands	250	North of Port Aransas
Matagorda Island	5,720	South end of island
Sabal Palm Grove	172	Along Rio Grande near Brownsville
Second Chain of Island	200	Between Matagorda Island & Aransas NWR
South Bird Island	100	Laguna Madre, 15 m S of Port Aransas
Sydney Island	126	Confluence of Sabine & Neches Rivers
Three Islands	2,287	Lower Laguna Madre
Vingt-et-une Islands	150	Off Smith Point, Galveston Bay
West Bay Bird and North Dear Islands	200	In West Bay near Galveston Causeway
<b>TOTAL</b>	<b>18,515</b>	

Source: Wildlife Sanctuaries of the National Audubon Society

### **Rob and Bessie Welder Wildlife Foundation**

There are two main activities for which the Rob and Bessie Welder Wildlife Foundation was established: wildlife research and environmental education. The Foundation is interested in demonstrating to area ranchers that wildlife conservation and cattle raising are compatible activities. The research program is carried out in the context of a full scale ranching operation and many of the investigations are aimed at determining the relationship of wildlife and ranching practices.

The research is generally conducted by graduate students who are supported by the Foundation's research scholarship program. Research that is of a more long-term nature is often carried out by the Foundation's staff. Much of the effort has been directed toward the study of deer, but many other animals and bird species have been researched (Glazener, 1978).

In addition to the scholarship program, the educational activities include a teachers' conservation and natural resources workshop held each summer at the Foundation's facilities near Sinton, and public tours and lectures scheduled weekly to inform the interested public of the conservation research being conducted. The teachers' workshop is designed to achieve a "multiplier effect" by encouraging teachers, both of science and other subjects, to include conservation topics in their classes (Glazener, 1978).

The Rob and Bessie Welder Wildlife Foundation facilities occupy a 7,800-acre ranch in South Texas just outside of Sinton. The land was left to the Foundation by the Welders for a research site. The area is typical of much of the ranching country in that region of the state and lends itself well to a variety of wildlife-related research activities. While it is not being managed strictly as a natural area or wildlife reserve, the ranch could be considered a private conservation holding.

The future activities of the Foundation will probably remain much the same as they are now. Because of the nature of their charter, the Foundation is limited to their

two main activities of research and education. No acquisitions of new lands are expected. The scholarship program will continue to be the main focus and the research findings will add new light on the conservation of wildlife in the setting of ranching operations and in general. The conservation and natural resources workshops should provide needed stimulus for the inclusion of environmental education in the schools.

### **Other Organizations**

Various preservation projects have been undertaken by groups on a local or regional basis around the state. Many times these groups are focused upon acquiring and protecting a single area that is in some way ecologically significant, and usually the site is in some way threatened by development activities or other threats to its integrity. As such, the organizations may be of a temporary nature, dissolving when the task is completed. An example of a local or regional project is the move to create a wilderness area on a watershed of Lake Austin, the "Wild Basin," which is being spearheaded by "The Environmental Conservancy of Austin and Central Texas." Another example is the successful effort of Houston area residents in turning a threatened portion of that city's Armand Bayou into a center for outdoor and environmental education in the area.

These ad hoc efforts are important because they help to preserve locally significant ecological systems and perhaps should be encouraged more widely. Another type of organization that is preservation-oriented, but generally does not become involved in site specific efforts, is represented by the Texas Organization for Endangered Species. This group provides information and support for the protection of endangered species throughout the state.

Preservation activities are carried out on a small scale in many communities and regions in Texas by concerned individuals, student groups, and clubs. Many of these efforts may go unrecognized, but in the long run they contribute to the overall goal of ecosystem protection.

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