

Waterfowl Strategic Plan

Spring 2011
A Look to the Future



Life's better outside.®

Texas Parks and Wildlife Department
Waterfowl Strategic Plan
Spring 2011
A Look to the Future

Compiled under the direction of the Migratory Game Bird Advisory Committee and the Texas Parks and Wildlife Migratory Game Bird Technical Committee



Appreciation is expressed to the following contributors (alphabetically):

Migratory Game Bird Advisory Committee

Robert Abbott, Ph.D.*, Bill Ansell, Bart Ballard, Ph.D., Mike Berger, Ph.D., Kirby Brown*, Terry Cooke, Douglas Frey, Jim Gregory, Jim Henderson*, Rogers Hoyt Jr., W. A. Landreth, Jr., Bruce McNabb, Alton Moczygemba, Sammy Nooner, William Osborn III (Chair), Greg Peavy, James Prince and Todd Steele

Texas Parks and Wildlife Department Migratory Game Bird Technical Committee

Steve Benn, Alan Cain, Gary Calkins, Linda Campbell, Trey Carpenter, David Forrester, Kevin Hartke, Bill Johnson, Kevin Kraai, Shelly Kremer, Mike Krueger, Jared Laing, David Lobpries, Corey Mason, Dave Morrison, Kevin Mote, Matt Nelson, Mike Rezsutek, Ph.D., Calvin Richardson, Chip Ruthven, David Sierra, Major David Sinclair, Jim Sutherlin, Matt Symmank and Billy Tarrant

Other Contributors

Lang Alford, David Butler, Marc Ealy, Kevin Kriegel, Andrew Peters, Jeff Raasch, Tucker Slack and Randy Watts

* Past member

Creative Design: Elishea Smith and Mike Wallace, TPWD Wildlife Interpretive Program

Cover photos: top - Flock of mottled ducks. Courtesy of Ron Bielefeld

bottom left - Flock of snow and ross geese. Courtesy of Kammie Kruse, USFWS

bottom right - Overflight of marsh. Courtesy of Jim Sutherlin, TPWD

© 2011 TPWD PWD BK W7000-1691 (7/11)

In accordance with Texas State Depository Law, this publication is available at the Texas State Publications Clearinghouse and/or Texas Depository Libraries.

Table of Contents

5. **Keys to the Future of Waterfowl Management in Texas**
6. **Coastal Regions (Gulf Coast Prairies and Marshes)**
 - Gulf Coast Joint Venture
 - Habitat Loss and Habitat Degradation
 - Land Conversion
 - Population Growth
 - Wildlife Management Areas
 - Importance of Freshwater for Management of Impoundments
 - Encroachment of Invasive and Noxious Exotic Plants
 - Land Acquisition
11. **High Plains Region (Playa Wetlands)**
 - Threats to the Playa Wetlands
 - Playa Lakes Joint Venture
 - Farm Bill Programs
 - Moist Soil Management
 - Continuing Education
 - Energy Development Impacts
14. **Oak Woods/Blackland Prairie and Pineywoods**
 - The West Gulf Coastal Plain of the Lower Mississippi Valley Joint Venture
 - Loss and Degradation of Forested Wetlands
 - Reservoir Development
 - Forested Wetlands on Private Lands
 - Wetland Reserve Program Delivery Process
 - Wildlife Management Areas
 - Education
17. **Other Regions of Texas**
18. **Regulations**
 - National and Regional Involvement
 - Harvest Strategies
 - State Hunting Regulations
 - Environmental Impact Statement for Migratory Bird Hunting
 - Public Waterfowl Hunting Opportunities
21. **Funding: Present and Future**
 - Declining Hunter Numbers
 - Public Awareness
 - Federal Funding
 - Leveraging Matching Funds to Maximize Federal Dollars
 - Wildlife Management Area Wetland Management Funding
 - Recruiting and Maintaining Quality Employees
24. **Legislation**
 - The North American Wetlands Conservation Act of 1989
 - The Federal Migratory Bird Hunting and Conservation Stamp (Duck Stamp)
 - Captive-Reared and Released Waterfowl

25. Implications of Disease to Waterfowl

25. Surveys, Research and Communication

Surveys
Research
Communication and Outreach

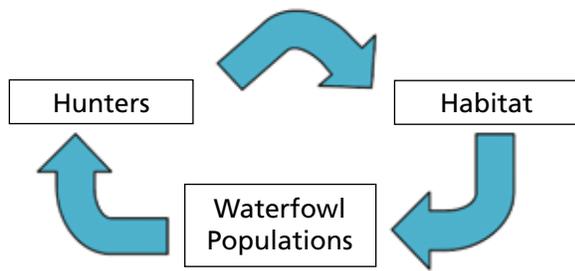
28. Habitat Management

29. Related Organizations, Programs and Plans

North American Waterfowl Management Plan
North American Bird Conservation Initiative
North American Land Bird Conservation Plan
U. S. Shorebird Conservation Plan
Conservation Reserve Program
Grassland Reserve Program
North American Waterbird Conservation Plan
Northern Bobwhite Conservation Initiative
Wetland Reserve Program
Gulf Coast Joint Venture
Gulf Coast Joint Venture —*Laguna Madre Initiative*
Gulf Coast Joint Venture —*Texas Mid-Coast Initiative*
Gulf Coast Joint Venture —*Chenier Plains Initiative*
Gulf Coast Joint Venture —*Mottled Duck Conservation Plan*
Playa Lake Joint Venture
Lower Mississippi Valley Joint Venture
Central Flyway Council

33. Attachments

Attachment 1. Bird Habitat Joint Ventures and Adaptive Management
Attachment 2. Bird Conservation Regions in Texas
Attachment 3. Joint Ventures in the United States
Attachment 4. Graphic Illustration of the Federal/State Migratory Regulations
Attachment 5. Texas Waterfowl Survey Zones, Transects and Selected Playas.
Attachment 6. Gulf Coast Midwinter Duck Estimates, 1997-2011
Attachment 7. Coastal Sand Plains Midwinter Duck Estimates, 1998-2011
Attachment 8. High Plains Midwinter Duck Estimates, 1997-2011
Attachment 9. Oak Woods/Blackland Prairie Midwinter Duck Estimates, 1997-2011
Attachment 10. Rolling Plains Midwinter Duck Estimates, 1997-2011
Attachment 11. Pineywoods Midwinter Duck Estimates, 1997-2011
Attachment 12. Brush Country Midwinter Duck Estimates, 1998-2011
Attachment 13. Statewide Midwinter Duck Estimates, 1997-2011
Attachment 14. Statewide Midwinter Goose Estimates, 1997-2011



Waterfowl management in its most simplistic terms is predicated on three key components; habitat, duck populations and hunters. Each component is directly tied to the other. If waterfowl management is to be successful in future years, all facets must be addressed to ensure the future of waterfowl.

Keys to the Future of Waterfowl Management in Texas

In almost every respect, the size and diversity of Texas is overwhelming. Precipitation varies from seven plus inches a year in El Paso to 50 plus inches a year in Port Arthur. Winter temperatures vary from semi-tropical in south Texas, where the average January low is above 50° F, to frigid in the High Plains, where the average January low is 23° F and the average winter snowfall exceeds 16 inches. When coupled with the diverse wetland types that occur across the state, these extremes drive the distribution and species diversity of migrating and wintering waterfowl.

Wetland types across Texas differ by ecoregion. The High Plains include natural and man influenced playa wetlands while the coastal zone includes managed rice fields of the coastal prairies; tidal and non-tidal marshes; bays and estuaries. East Texas wetlands are predominantly bottomland hardwoods, farm ponds, backwater sloughs and moist soil wetlands; and well over a million stock tanks and ponds constitute the bulk of wetlands across the Rolling Plains, Black-land Prairie, Post Oak Savannah, Edwards Plateau, and south Texas regions. Indeed, the diversity of wetland types in Texas is unparalleled.

This great diversity is one reason Texas is a major wintering area for millions of ducks and geese annually. Habitat is the key to a bright future for waterfowl resources and waterfowl hunting. If waterfowl are to continue to be an important part of our outdoor resources and recreation, management for waterfowl must address habitat concerns.

Texas has long been recognized as the top waterfowl harvest state in the Central Flyway and in

the top five in the United States. Since 1999, Texas accounted for 42 percent of the total duck harvest and 47 percent of the total goose harvest in the Central Flyway. Forty percent of the Federal duck stamp sales over the same time period were in Texas.

Similarly, Texas historically has been a leader in wetland acquisition, management, and conservation. A key component of our leadership can be tied directly to a stable funding source. The Texas waterfowl stamp (now Migratory Game Bird Stamp) is required of all Texas waterfowl hunters, and has been a stable funding source to meet the needs of waterfowl locally, nationally and internationally.

Texas waterfowl hunter numbers have been relatively stable over the last decade, but national trends suggest that total waterfowl hunters are on the decline. There are suggestions that we could lose up to one half of our hunters in the coming decades. Shrinking numbers of waterfowl hunters will result in reduced dollars from dedicated funds and license sales and will have a negative effect on our ability to maintain Texas' leadership role in the waterfowl community.

If Texas is to maintain our leadership role, we must be proactive and begin to prepare for the possible downturn in revenue that could result from declining hunter numbers. Texas must be proactive in maintaining existing partnerships and look to expand our vision to include non-traditional partners to meet the ever growing needs of waterfowl and the habitats that are essential for their life cycle.

Waterfowl management is relatively simple; however the difficulty is addressing each of the components with the right mix to ensure that the equation is balanced. To that end, the Waterfowl Program has five goals for this Strategic Plan:

- 1. Maintain waterfowl populations in Texas for their intrinsic value.**
- 2. Sustain or increase the current levels of waterfowl hunter participation.**
- 3. Increase or maintain public and political support for waterfowl and habitat management.**
- 4. Maintain or increase ecosystem goods and services for the benefit of waterfowl and wetland systems.**
- 5. Increase support of non-consumptive users for waterfowl conservation.**

This plan is an attempt to address each goal and factor of waterfowl management. It is a commitment of the Texas Parks and Wildlife Department (TPWD) to the management, research and surveys of waterfowl populations and the development and acquisition of wetland habitats for the benefit of migrating, wintering and breeding waterfowl. Habitat issues are addressed on an ecoregion or Joint Venture (JV) level. Specific guidance and action items are listed by ecoregion or JV; however many of the key points are interchangeable with other regions of the state.

Because of the importance of JVs and their role in waterfowl management, it is important to understand the JVs, their role and how they operate to better understand the implementation of the strategic plan (See Attachment 1).



Coastal Regions (Gulf Coast Prairies and Marshes)

During autumn and winter, a significant portion of the North American population of ducks and geese migrate to the southern end of the Central Flyway to winter along the Texas Gulf Coast. Between 2000 and 2008, annual waterfowl surveys conducted by TPWD in January suggest that over 1.9 million ducks winter along the coast. Thus, the Texas Gulf Coast is the prime wintering area for ducks. The region also is an important wintering area for geese, as numbers have averaged over 552,000 annually from 2001–2009. Besides providing critical wintering habitat for migratory waterfowl, the region also provides year-round habitat for mottled ducks (a species of special concern), black-bellied whistling ducks, fulvous whistling ducks, and to a lesser extent blue-winged teal.

The importance of the coastal marshes, seasonal freshwater wetlands, and seasonally-flooded agricultural lands within the Gulf Coast Prairies and Marshes Ecoregion is undeniable. These wetland habitats provide foraging and roosting opportunities for migratory waterfowl and breeding habitat for mottled ducks. However, changes to the

landscape within the region threaten much of the historic waterfowl habitat. Expansion of urban areas, development of commercial and industrial infrastructure, declines in cereal grain agriculture, loss of freshwater inflows, salt water intrusion, and intrusion and expansion of noxious exotic plants continue to adversely impact available habitat.

Recent hurricanes in 2004 and 2008 wrought havoc on the Texas Upper Coast and significantly impacted the coastal marshes and the coastal plain as well as the people living in these regions. These major storms have emphasized the important storm buffer effect of healthy coastal marshes and grasslands along the Gulf Coast. Public and political support for restoring emergent marshes and beach elevations is building along the Texas Upper Coast at the time this document is being developed.

If the Texas coast is to continue to be a major wintering area for waterfowl, proactive measures must be implemented to ensure adequate quality habitat is available in the future.

Gulf Coast Joint Venture

The Gulf Coast Joint Venture (GCJV) is a regional partnership composed of individuals, conservation organizations, and state and federal agencies that are concerned with conserving waterfowl and other migratory birds and their habitats along the Gulf Coast between Mobile Bay in Alabama and the Rio Grande. The primary objective of the GCJV is to conserve wintering waterfowl habitat in the Gulf Coast that are critical to the overall success of the North American Waterfowl Management Plan (NAWMP). The GCJV crosses four states and has five habitat initiative areas. Three initiative areas are within the boundaries of Texas (Chenier Plain, Texas Mid-Coast and Laguna Madre Initiative Areas). TPWD is an active participant in the GCJV at multiple levels (board meetings, initiative teams, advisory teams) and the JV staff seeks our guidance on issues relevant to the Texas Coast.

Action Item: Continue support of the GCJV by providing financial support and technical expertise on issues related to the conservation of coastal habitats in Texas that are important for breeding and migratory waterfowl.

Action Item: Develop sanctuaries to address the declining snow goose population and to influence low survival rates for wintering northern pintails along the Texas coast.

Habitat Loss and Habitat Degradation

Loss of native wetlands and prairies continues to be a threat to waterfowl and other wildlife within the Gulf Coast Prairies and Marshes Ecoregion. Conversion of habitat for agricultural, commercial, industrial and urban uses is a major threat

that results in loss of important wildlife habitat. Population growth along the Texas Coast will be a primary influence for the conversion of land for subdivisions, commercial property, transportation and related infrastructure. Channelization and dredging projects, such as the Gulf Intracoastal Waterway (GIWW), Sabine Neches Waterway, and access canals used for oil and natural gas extraction activities, have had both direct (conversion of marsh to deep water, erosion) and indirect (salt water intrusion) impacts leading to loss of coastal marsh. Impacts by these developments continue to expand the rate and extent of marsh loss across the coastal landscape, especially the Texas Chenier Plain. As the human population along the coast expands, so too will these activities and their impacts to wetlands and prairies.

Action Item: Support the use of easements and acquisitions by TPWD and their partners to protect priority wetland and prairie habitat from conversion for other land uses.

Action Item: Identify areas of important marsh habitat adjacent to the GIWW and other canals for nautical transportation that are at high risk of being impacted from shoreline erosion. Support shoreline protection projects that reduce erosion of coastal marshes. Identify funding sources and potential partners to assist in accomplishing this action.

Action Item: Provide input on the review of permits related to pipeline projects. Provide alternative site locations for such projects or give recommendations that result in fewer negative impacts on coastal wetlands and wildlife.



Erosion project on the Gulf Intracoastal Waterway on the J.D. Murphree WMA.

Courtesy Ducks Unlimited

Action Item: Encourage through the permit review process beneficial use of dredged material in association with dredging for navigation projects and mitigation for permitted wetland impacts. Create new and expand existing partnerships that employ beneficial use of dredged materials for habitat enhancement on degraded marsh, or restoration in areas that have converted from marsh to open water.

Action Item: Provide access to Wildlife Management Areas and State Parks having degraded wetlands to agencies, permit applicants and other interested parties for large-scale restoration and beneficial use projects that provide significant benefit to waterfowl.

Action Item: Work to restore landscape scale hydrologic functions, especially in the coastal zone where channelization has cut landscape freshwater sheet flows off from coastal tidal marshes.

Land Conversion

Conversion of land for the cultivation of agricultural crops was detrimental to the coastal prairie landscape. Fortunately, the introduction of rice farming proved to be seasonally beneficial to wintering waterfowl along the Texas Coast. When flooded during winter, the agricultural landscape of the Texas Coast contributes a significant portion to the GCJV waterfowl foraging habitat objectives in the Texas Mid-Coast and Chenier Plain Initiative for waterfowl and other waterbirds. However, decreasing profit margins for rice farmers and increasing land values during the last 25 to 30 years have resulted in a substantial decline in rice acreage farmed across the Texas Coast. Many acres of rice fields have been converted to row crops, developed for urban uses, or simply abandoned. Abandoned rice fields can be easily enhanced to benefit waterfowl because of the existing infrastructure (levees, irrigation, water control structures, etc.) developed for cultivation of rice. However, many of these abandoned fields have been invaded by Chinese tallow, deep-rooted sedge, and other non-native and invasive vegetation. Landowners interested in managing for waterfowl on former agricultural lands need technical guidance and financial assistance to restore habitats that benefit waterfowl.

Action Item: Continue financial and technical support of wetland management assistance programs for private landowners such as the Texas Prairie Wetlands Project and Gulf Coast Prairies State Acres for Wildlife Enhancement that provide wintering habitat for migratory waterfowl and nesting and brood rearing habitat for mottled ducks (see GCJV Mottled Duck Conservation Plan for guidance). Coordinate with partners to develop best management practices for wetlands and waterfowl to be implemented by private landowners.

Action Item: Continue financial and personnel support for internal and external programs that provide assistance to private landowners to control and remove non-native and invasive plants from habitats that can provide benefits to waterfowl.

Action Item: Work with River Authorities to provide sufficient water supplies during the winter and spring months to meet the demands of wintering and breeding waterfowl.

Action Item: Support research to find successful habitat management techniques that control and reduce non-native and invasive vegetation in wetlands, coastal prairies and aquatic habitats. Develop educational materials for public distribution that describe successful preventive and control measures.

Action Item: Work with the agricultural community to identify ways to maintain rice production at or above current levels. Work to develop programs that return rice fields to be taken out of production back into productive coastal prairie/wetland complexes which benefit resident and migrating waterfowl.

Action Item: Identify and work with water regulatory authorities to ensure that water for farming and waterfowl related activities are priorities during planning for future water needs.

Population Growth

Population growth within the Gulf Coast Prairies and Marshes Ecoregion has resulted in an increased demand for water and electrical power. Many public water projects are diverting or planning to divert water from watersheds into

reservoirs for use in urban areas. Without an adequate flow of freshwater, the coastal bays, estuaries and marshes that provide habitat for hundreds of thousands of waterfowl and other wetland birds will degrade from the negative impacts associated with increased salinity. The increased demand for electrical power has resulted in the search for alternative sources of energy. One alternative power source that is becoming popular in Texas is wind power. Wind turbine fields are being developed along the coast. The impacts of wind turbines on waterfowl populations are not well understood.

Action Item: Ensure that TPWD – Wildlife Division has a presence on local water boards and water project advisory committees. Provide input concerning river inflows of freshwater into coastal wetlands to ensure the health of these habitats and to meet the needs of waterfowl and other wetland species.

Action Item: Ensure that TPWD has a presence on wind energy committees and advisory boards. Support research that examines the influence of wind turbines on waterfowl and other wildlife.

Action Item: Ensure that TPWD has an awareness of new transmission line development plans for industrial and commercial power transmission where these power lines are likely to impact bird mortality through increased bird strike incidence in the coastal plain.

Wildlife Management Areas

TPWD manages nearly 68,000 acres of Wildlife Management Areas within the Gulf Coast Prairies and Marshes Ecoregion. Important wetland habitats within these WMAs include freshwater, intermediate, brackish and to a small extent saline wetlands. In addition to providing nearby communities with values such as storm surge protection, wetlands on these WMAs provide important habitat for migratory waterfowl, breeding mottled ducks and other wetland birds. These WMAs also provide the public with

opportunities for hunting, fishing, birding and other outdoor recreational activities.

Action Item: Develop supplemental funding outside of the general operating budget to ensure WMAs can maintain quality habitat for waterfowl and other wildlife. For example: 1) allocate funds from the sale of Annual Public Hunting permits proportional to the percent public use of WMAs, 2) dedicate funds annually from the revenue generated by the state migratory game bird stamp program and 3) foster partnerships with other agencies and non-profit conservation groups (e.g., U.S. Fish and Wildlife Service [USFWS], Ducks Unlimited, Inc. [DU]) for new funding opportunities.

Action Item: Develop an aggressive grant matching plan to allow TPWD to take advantage of grant opportunities on an on going basis to continue facilities and habitat restoration and rehabilitation on TPWD owned lands and in partnerships with an array of agencies, Non-governmental Organizations (NGOs), and private landowners.

Importance of Freshwater for Management of Impoundments

Freshwater marsh is an important habitat feature for waterfowl that use coastal wetland habitat in Texas. The availability of freshwater marsh relative to saltwater marsh (i.e., intermediate, brackish and saline) declines with latitude along the Texas Coast. A key component of waterfowl management on WMAs is management of man-made wetland impoundments. A majority of these impoundments are dependent on rainfall as a source of freshwater. In times of drought, these impoundments are dry



Bluewinged teal, Courtesy Ron Bielefeld



Prescribed fire at Big Hill Unit, J.D. Murphree WMA. Courtesy Jim Sutherland

or partially flooded. This situation is unfavorable for waterfowl, especially for WMAs in the Central Coast Wetlands Ecosystem Project where natural freshwater marsh is limited. A reliable source of freshwater (e.g., deep water well) is necessary to ensure that quality waterfowl habitat is available on WMAs, especially during drought events. Further, maintaining water levels on impoundments during spring and summer droughts will provide important habitat for breeding and molting mottled ducks.

Action Item: Identify WMAs with impoundments that have a need for a water well system(s) to improve freshwater management capability. Explore and exploit funding opportunities and partnerships that will help TPWD achieve this action.

Administration and management of these WMAs is divided between two ecosystem project areas—the Upper Coast and Central Coast Wetlands Ecosystem Projects. Each of these project areas receive support from general operating funds dedicated for normal operation and maintenance of WMAs. Unfortunately, these funds are not always adequate to implement important management actions on WMAs. One such management activity that is not always required on an annual basis, and thus is difficult to plan for in general operating budgets, is the control of noxious exotic and invasive plants in wetlands. The necessary equipment, supplies and manpower for vegetation control projects can be difficult to obtain from general operating funds alone.

Encroachment of invasive and noxious exotic plants.

Encroachment of invasive and noxious exotic plants in wetland habitats is a serious problem on WMAs and the coastal regions. These noxious plants can severely reduce the productivity of wetlands and decrease habitat carrying capacity for waterfowl. Immediate action is necessary to successfully control encroachment of invasive and non-native plants. However, WMA staff do not always have proper management abilities (e.g., funds, equipment, supplies, manpower) to act quickly. In addition, there is a lack of knowledge concerning the successful prevention and control of encroachment by certain non-native plants.

Action Item: Provide consistent financial support to WMAs for the control of invasive and exotic vegetation. Work with conservation partners to develop vegetation control projects and funding assistance to accomplish work.

Action Item: Support prioritized research projects on WMAs that provide knowledge for successful control of exotic and invasive plants. Provide information to the wetland management community and users of public lands regarding preventive measures that reduce the spread of non-native plants.

Action Item: Support land management techniques that enhance and promote desirable native plant production with a historical habitat perspective. This includes active pursuit of habitat restoration opportunities and management using prescribed fire, herbicides, mechanical brush control, grazing and water level management to influence high quality habitat conditions for waterfowl and other migratory birds.

Action Item: Strengthen laws (through legislation, enforcement capabilities and penalties) to prevent introduction of additional exotic plants and wildlife.

Land Acquisition

The Texas Wildlife Action Plan identified the Gulf Coast Prairies and Marsh Ecoregion as a priority area for land acquisition. In addition, the Justin Hurst WMA and the D. R. Wintermann WMA were identified as priority areas for land expansion within the ecoregion. TPWD, in concert with other

organizations, should develop the capabilities to act quickly to purchase valuable habitat that has the highest potential for loss.

Action Item: Identify potential funding sources and partners (e.g., The Nature Conservancy, Ducks Unlimited, Inc., Trust for Public Land) to act quickly when the opportunity arises.

High Plains Region (Playa Wetlands)

The Texas High Plains is one of the most important regions in the Central Flyway for migrating and wintering waterfowl. It is estimated that as many as one-third of the pintails in the Central Flyways winter in this area, and even more migrate through the region. Playa wetlands comprise the primary wetland habitat used by waterfowl in the Southern High Plains. An estimated 19,340 playa wetlands occur in the Texas High Plains; they are the primary wetland habitat utilized by waterfowl in the region and also the dominant wetland feature of the region. Playas are shallow, generally circular basins within closed watersheds and average 6.3 hectare (15.6 acres) in size. Although some playa wetlands receive water from municipal or irrigation runoff, most are filled intermittently by intense rainfall events associated with isolated thunderstorms. Thus, these wetlands experience unpredictable, dynamic wet/dry cycles and have been described as the most ephemeral of North America's wetlands. Precipitation in the Texas High Plains averages 33 to 45 centimeters (13 to 17.7 inches) annually, and typically occurs during April through June and September through October.

Estimates from recent (2001–2008) mid-winter waterfowl surveys suggest that 504,000 ducks and 154,750 geese winter in this region. These estimates are considerably less than those from previous



Large concentration of mallards and pintails on a playa wetland during spring migration.

Courtesy Kevin Kraai

surveys in this area, which may have resulted from changes in survey methodology beginning in 2001 or because playa functions have diminished due to sedimentation. Upland habitats used by migrating and wintering waterfowl in the region include corn, sorghum and winter wheat.

Additionally, much of the wetland habitat is under threat from new development for energy production and distribution, and other economic activities.

Threats to the Playa Wetlands

The integrity of the playa wetlands as habitat for waterfowl is threatened by many causes. Specific threats and concerns are addressed below. A key component of addressing current and future threats is to develop a list of Best Management Practices (BMP) for the playa wetlands.

Action Item: Develop BMPs for playa wetlands to assess and address immediate and long-term threats to their integrity.

Soil reclassification

The Natural Resource Conservation Service (NRCS) is in the process of reclassifying soil types in the Texas High Plains, including playa soils. As a result, soils in many playa basins will be reclassified as non-hydric and these playas will lose their wetland status. This reclassification, if maintained, could have significant impacts on future conservation efforts.

Action Item: Work to inform legislators of the importance of playas and work to obtain playa-specific protections aimed at conserving and protecting their function as wetlands and values as waterfowl habitat.



Flock of Canada geese on a playa wetland.
Courtesy Kevin Kraai

Playa watershed modification

The Ogallala is a slow recharge aquifer and playas serve as the primary recharge areas for it. Properly functioning playa watersheds filter Ogallala Aquifer recharge. One critical component of maintaining properly functioning playa wetland systems are grassland buffers. Grassland buffers adjacent to playas should be large enough to minimize sedimentation, maintain water quality and slow run-off.

Action Item: Support incentive programs that provide funding to keep grasslands surrounding playas intact, and to restore stands of non-native grasses to native prairie species.

Action Item: Existing Farm Bill Programs that meet these needs should be reviewed by USDA, USFWS and TPWD and modified to make enrollment streamlined and as user friendly as possible.

Current farming practices

Agriculture drives the economy of the Texas High Plains. This plan recognizes the importance of farming and ranching to the livelihood of the High Plains landowners, but does propose to work with the agriculture industry to promote farming practices that will protect long-term integrity of playa wetlands. Practices such as overgrazing, farming through playa basins, farming to edge of playa basins, and certain irrigation practices may have negative influences on playa functions, including aquifer recharge and wildlife value. An example of such a practice that can amend many of these concerns and still be compatible to most farming operations is a grassland buffer.

Action Item: To aid farmers and ranchers, develop a playa BMP that addresses wildlife habitat concerns and major playa functions. The focus of the BMP will be to address concerns in a manner that is compatible to agricultural operations.

Playa modification to increase recharge

Many believe that playa wetlands can be modified to increase recharge to the Ogallala Aquifer. Implications of these modifications are not clearly understood. It is possible that modifications for the purpose of increasing recharge could also provide a conduit for contaminants to enter the Ogallala. Any modifications that decrease the natural frequency in which playa wetlands are inundated will have negative effects on migrating and wintering birds.

Action Item: The Wildlife Division will work to obtain an active presence on water planning districts, water conservation districts (including underground water conservation districts) and water boards in the Texas High Plains to ensure that wetland habitats and wildlife needs are considered in their planning efforts. Similarly, TPWD will work to increase our lines of communication with the Texas Water Development Board to adequately communicate with them our concerns for untested or dangerous methods for increasing Ogallala recharge.

Loss of regulatory protection

Changes in legal parameters may result in loss of regulatory protection for playa wetlands and basins.

Action Item: Work with the USDA to enforce existing wetland protection programs like Swamp Buster. Educate the public on the importance of isolated wetlands and the need to reverse the Solid Waist Agency of Northern Cook County (SWANCC) decision and the Clean Water Bill.

Playa Lake Joint Venture (PLJV)

The mission of the PLJV is to conserve playa wetlands, other wetlands and associated landscapes through partnerships for the benefit of birds, other wildlife and people. The PLJV strives to accomplish its mission through conservation partners responsible for the protection and conservation of playas, other wetlands and associated landscapes for the benefit of waterfowl and associated species.

Action Item: TPWD will work with our partners to provide financial support and technical expertise on issues of specific importance to Playa wetlands in Texas and their role for breeding, migrating and wintering waterfowl.

Action Item: The PLJV has well defined habitat and population objectives. TPWD will work cooperatively with the PLJV to meet objectives outlined in their plans. TPWD also will assist with updates to plans, including population and habitat objectives.

Action Item: Pursue long term easements (or other similar protections) that are placed strategically to meet the needs of migrating and wintering waterfowl in the High Plains.

Acquisition of long term easements or fee title purchase of playa wetlands

Most playas are in private ownership. If TPWD is to conduct research and investigate BMP for this region, it may be necessary to purchase or establish long-term easements on select playas.

Action Item: Develop a prioritized list of counties where acquisition of playas would have the greatest impact for wetlands, waterfowl and public hunting, and develop these as showcase examples of playa management.

Action Item: Develop new partners willing to hold land in permanent easements or own outright.

Farm Bill Programs

Farm Bill Programs like the Conservation Reserve Program (CRP), Grassland Reserve Program (GRP), and Wetland Reserve Program (WRP) have the greatest potential to impact and maintain playa wetlands and associated grasslands.

Action Item: Support policy efforts to keep, maintain and strengthen CRP and other similar programs in the Farm Bill. Work with the appropriate agencies to correct WRP delivery problems at the state and local levels.

Moist Soil Management

Moist Soil Management (MSM) is an accepted wetland practice in most areas, and research at Texas Tech University has demonstrated it to be effective at increasing seed production in playas. However, MSM practices in playas differ in that “draw-downs” are dependant on natural loss of water

through evaporation or seepage. However, water conservation and regulatory issues in the High Plains may make MSM of playas (particularly on a large scale) problematic.

Action Item: Evaluate the acceptability of playa MSM and explore implementation on a small scale with local landowners that have an interest in improving wildlife habitat.

Continuing Education

To garner support at local levels it is necessary to provide education and outreach on the importance of playas.

Action Item: Work with PLJV Education and Outreach Team to illustrate the importance and benefits of playa wetlands, and demonstrate how sound management can positively impact local communities and surrounding areas particularly as it relates to recharge of the Ogallala aquifer.

Energy Development Impacts

Wind power generation

Wind farms are being promoted as one of the “greener” energy sources currently available, at least with respect to pollution. However, impacts of wind turbines and associated infrastructure (e.g., transmission lines, access roads) on migratory birds, including waterfowl, have yet to be adequately investigated.

Action Item: Support on-going research and initiate new research on direct and indirect effects of wind turbines and their associated infrastructure on avifauna, in particular waterfowl. TPWD will work to obtain and maintain a support role on wind farm committees.



Playa wetlands near a wind farm in the High Plains. Courtesy Phil Thorpe, USFWS

Oak Woods/Blackland Prairie and Pineywoods



Flooded hardwood bottoms of the Trinity River. Courtesy Dr. Robert McFarlane

East Texas was historically known for its bottomland hardwoods, beaver ponds, bogs, springs, oxbows, sloughs and natural wetlands. However, within the last 50 years the eastern portion of the state has changed dramatically. Urban areas have grown and consumed many of the natural resources throughout the region. Thousands of acres of bottomlands have been destroyed by the creation of deep water reservoirs that serve to meet water demands and power needs. Additionally, thousands of acres of bottomlands have been cleared for grazing and grass production, with most of these areas replanted with non-native grasses. An estimated 70 percent of bottomlands in east Texas have been lost.

Although the Pineywoods portion of east Texas no longer provides the quality habitat it once did, high quality waterfowl habitat still exists along the major river systems, particularly in the Oak Woods and Blackland Prairie (OB) regions. Specifically, areas along the Red, Sulphur, Trinity, Neches, Sabine, and Angelina Rivers provide quality wintering waterfowl habitat. Waterfowl habitat in these areas primarily consists of natural wetlands, constructed wetlands, flooded fields, sloughs, oxbows and live-stock ponds. Precipitation across east Texas varies from 101 centimeters (39 inches) in the OB to 127 centimeters (50 inches) in the Pineywoods.

Estimates from recent (2000–2008) mid-winter waterfowl surveys suggest that 737,000 ducks winter in the OB region and 74,000 winter in the Pineywoods region.

The West Gulf Coastal Plain of the Lower Mississippi Valley Joint Venture (WGCP)

The mission of the WGCP is to function as the forum in which the private, state and federal conservation community develops a shared vision of bird conservation for the Lower Mississippi Valley region; cooperates in its implementation; and collaborates in its refinement. The JV partnership is focused on the protection, restoration and management of those species of North American avifauna and their habitats (endemic to the LMV Region) encompassed by the North American Waterfowl Management Plan (NAWMP); North American Land Bird Conservation Plan; United States Shorebird Conservation Plan (USSCP); North American Waterbird Conservation Plan (NAWCP); and Northern Bobwhite Conservation Initiative (NBCI).

Action Item: Develop a leadership role in JV activities associated with the West Gulf Coastal Plain.

Action Item: Work closely with the WGCP coordinator to implement habitat and population objectives set by the JV.

Loss and Degradation of Forested Wetlands

The greatest threats to wetland habitats in east Texas are the continued loss of forested wetlands and altered wetland function. Specific threats are addressed below.

Reservoir Development

As the number of people in east Texas increases, and more specifically in the Dallas/Fort Worth area, so does the demand for water. Additional deep water reservoirs are being planned that destroy bottomland hardwoods and permanently and negatively alter the associated riverine systems.

Action Item: Stay involved in Water Development Boards, particularly Regions C and D. Provide environmentally friendly alternatives to new reservoir construction and solicit to be involved from pre-construction development through completion (i.e., water level management, mitigation requirements, recreational use and off-site mitigation potential).

Action Item: Stay engaged in mitigation efforts and recommend mitigating before the impact has been made. Mitigate by reforesting and restoring previously forested bottomlands, as well as protection of unaltered bottomlands.

Action Item: Provide input to the various reservoir management boards on the best management practices that would alter water levels during the early growing season to allow for moist-soil vegetation response on the shallow flats and winter releases of water to stimulate out-of-bank flooding events to maintain forest health due to nutrient placement, sediment/seed transport and stimulating seed germination.

Action Item: Increase educational efforts on water conservation and water re-use.

Action Item: Develop and assist with the implementation of plans to manage and eliminate noxious exotic plants in reservoirs. These plants impact quality of wetland habitats, oftentimes limit access for waterfowl hunters, and can be spread to other areas.

Forested Wetlands on Private Lands

Since most of Texas is private land, restoration efforts at the landscape level must be done on privately owned land. Current forestry and logging practices often lead to conditions that promote non-desirable native and non-native woody vegetation such as green ash, hackberry and Chinese tallow trees. Various state, federal and non-government organizations (NGO) offer cost share programs that can be used to restore function to forested wetlands on private lands.

Action Item: Support existing cost share programs and work to enhance available funding mechanisms. Support and assist with the development of new watershed cooperatives across east Texas and establish focus areas and priorities (i.e., Trinity Waters). Explore new funding resources from industries and humans impacting bottomland forests.

Wetland Reserve Program Delivery Process

The delivery of the Wetland Reserve Program has been inefficient and problematic at many levels. The appraisal process has kept many people from using the program. Additionally, it often takes five

to eight years before landowners have the desired reforestation and wetland work delivered. This time lag is unacceptable and keeps many interested landowners from pursuing this program.

Action Item: Work with the State Technical Committee to address the programmatic and delivery issues.

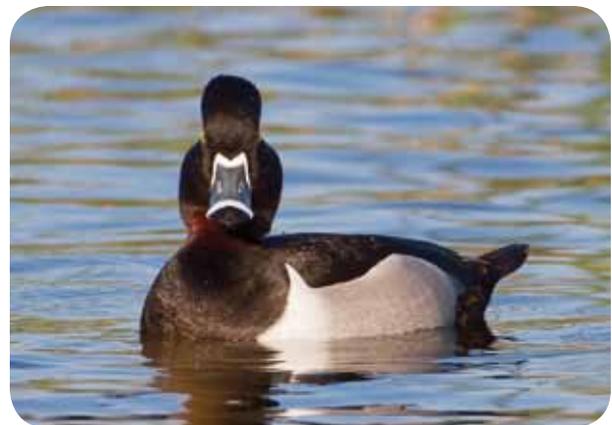
Action Item: Offer assistance to NRCS to help with WRP programmatic and delivery issues (see Education Section below).

Wildlife Management Areas

The Texas Parks and Wildlife Department manages nearly 235,000 acres of Wildlife Management Areas within the Oak Woods/Blackland prairies and Pineywoods regions. Important wetland habitats within these WMAs include forested, open water and moist-soil habitats. The wetlands on the WMAs provide important habitat for migratory waterfowl, breeding wood ducks, and many other wetland and neotropical birds. These WMAs also provide the public with opportunities for hunting, fishing, birding and other outdoor recreational activities. These areas must continue to be well managed to provide quality habitat, serve as demonstration areas, and serve as research sites for continued improvement of our wetland resources.

Funding for Management on WMAs

Moist-soil wetland habitat management is particularly expensive, as it is an on-going perennial battle to maintain early successional and productive habitats. Necessary equipment must be serviceable, levees and water control structures must be maintained and replaced when needed,



Ring-necked duck, Courtesy Ron Bielefeld



Lost Lake a major canvasback wintering site on the J.D. Murphree WMA. Courtesy Jim Sutherland

herbicide is needed to control nuisance species, and hundreds of gallons of diesel are used in tractors to perform the needed habitat work and pump water into shallow wetlands. A consistent source of annual funding is needed to provide wetland-specific maintenance and operations money outside of general WMA operating funds.

Action Item: Develop supplemental funding outside of the general operating budget to ensure WMAs can maintain quality habitat for waterfowl and other wildlife. For example: 1) allocate funds from the sale of Annual Public Hunting permits proportional to the percent of public use of WMAs, 2) dedicate funds annually from the revenue generated by the state migratory bird stamp program and 3) foster partnerships with other agencies and non-profit conservation groups (e.g., U.S. Fish and Wildlife Service, Ducks Unlimited, Inc.) for new funding opportunities.

Action Item: Develop an aggressive grant matching plan to allow TPWD to take advantage of grant opportunities on an on-going basis to

continue facilities and habitat restoration and rehabilitation on TPWD owned lands and in partnerships with an array of agencies, NGOs and private landowners.

Education

One of the most important services that TPWD can provide to landowners and other agencies is management assistance and training opportunities. Landowners that seek guidance need input on a continual basis regarding management of their unique system. TPWD should serve as the lead agency in providing technical guidance and training to landowners and other agencies regarding wetland

management.

Action Item: Partner with other agencies to hold annual landowner and interagency (NRCS, USFWS, DU) training seminars to increase educational opportunities. Depending on the information presented, these workshops may be targeted toward private landowners, wildlife/wetland professionals or both.

Action Item: Provide a clearing house for information related to waterfowl and wetland related management, and make it readily available to interested parties.



Incoming flock of mallards, Courtesy Kevin Kraai

Other Regions of Texas

Waterfowl in Texas are not restricted to the High Plains, East Texas or the coastal Regions. They can be found in most places having significant water and abundant sources of food. Midwinter surveys have shown the importance of the Brush Country and Rolling Plains ecosystems. For some species, annual estimates of abundance in these areas exceed those on the coast, and in some years the total number of ducks rival those in regions traditionally thought of as important wintering areas. However, habitat in these areas is dominated by stock tanks and the ability to manage these for waterfowl is minimal.

This document does not intend to minimize the importance of these areas for wintering waterfowl, but rather to provide emphasis on areas where management practices can be undertaken. As a result, the focus for the near future will be directed at continued monitoring of waterfowl numbers in these ecosystems of Texas and to work with the

developing Oaks and Prairie and Rio Grande JV on issues related to waterfowl.

Action Item: Quantify carrying capacity and determine what role, if any, these areas may have with respect to North American Waterfowl Management Plan goals.

Action Item: Develop white papers that describe the habitat of the Rolling Plains and the importance of these areas to wintering waterfowl. Revise and/or develop a publication for Waterfowl Management on Stock Tanks.

Action Item: Develop white papers that describe the habitat of the Brush Country and the importance of this area to wintering waterfowl. Revise and/or develop a publication for Waterfowl Management directed at wintering habitats of this region of Texas.



Livestock ponds shining in the sunset in the Rolling Plains. Courtesy Kevin Kraai

Regulations

Migratory game birds are those bird species designated in various treaties between the United States and several foreign nations (including Canada, Mexico, Japan and the former Soviet Union). Regulatory processes for waterfowl are designed for the protection and management of these birds. Under the Migratory Bird Treaty Act of 1918 (MBTA) and its amendments, the Secretary of the Interior is authorized to determine when “hunting, taking, capture, killing... of any migratory bird...” can take place and to adopt regulations for this purpose. These regulations are approved only after pertinent biological data has been reviewed and are updated annually. Responsibility for the regulatory process has been delegated to the USFWS of the Department of the Interior as the lead Federal agency for managing and conserving migratory birds in the United States. The USFWS develops migratory game bird hunting regulations by establishing the frameworks, or outside limits, for season lengths, bag limits and areas for migratory game bird hunting.

Currently, the Federal rule making process is tied to legal and administrative guidelines and dictates how long the rulemaking process will last. Since regulations are controlled by the biological cycle of migratory game birds, data-gathering activities and thus, the dates on which these results are available, determine the time frame for establishment of migratory bird hunting seasons.

The MBTA states that all migratory game bird seasons are closed unless sufficient biological data exist to support sport harvest. Surveys are conducted throughout the year in conjunction with the USFWS, Canadian Wildlife Service (CWS), and State and Provincial wildlife management agencies. Information on population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. This information is analyzed and interpreted to determine the appropriate frameworks for each species. Results of the surveys are then provided to the Flyway Councils and other interested parties.

Frameworks, or outside limits, are established for season lengths, bag limits and areas for migratory game bird hunting. This ensures that migratory

game bird management becomes a cooperative effort of State and Federal governments.

After establishment of final frameworks by the USFWS for hunting seasons, the States may select season dates, bag limits and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Waterfowl are considered a Late Season Process with adoption of a final rule for hunting season occurring sometime in mid-September. For a detailed graphic of the Federal and State responsibilities (see Attachment 4).

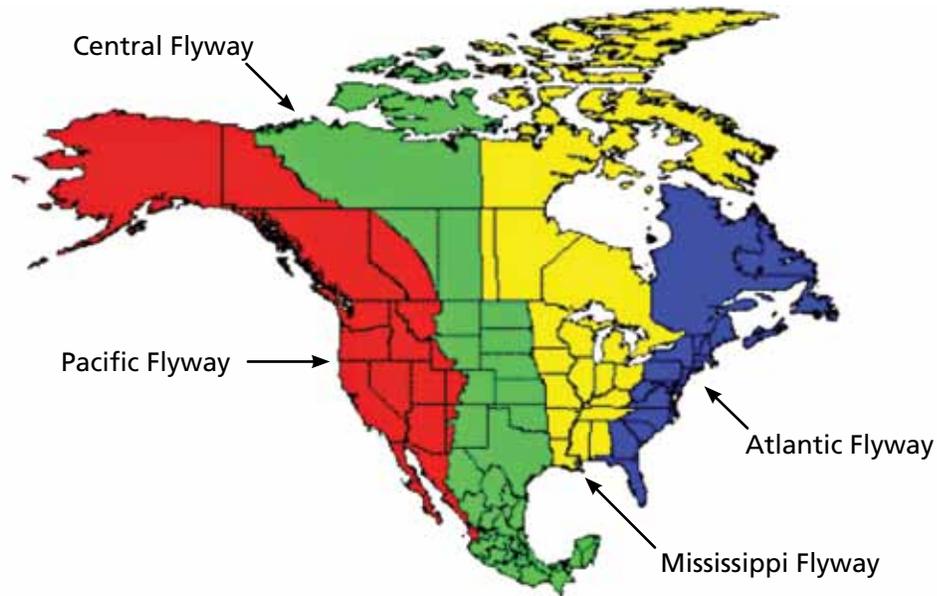
National and Regional Involvement

Acknowledging regional differences in hunting conditions, the USFWS has administratively divided the nation into four Flyways (Figure 1) for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central and Pacific) has a Flyway Council. Flyways are represented by states, provinces and territories, within these geographical regions and are comprised of a Technical and Administrative body.

Texas is part of the Central Flyway and shares management and regulatory decisions with nine other states (Colorado, Kansas, Montana, Nebraska, New Mexico, Oklahoma, North Dakota, South Dakota and Wyoming), two Canadian provinces (Alberta and Saskatchewan) and one territory (Northwest Territories). The responsibility of the Flyway is to assist in researching and providing migratory game bird management information for Federal, State and Provincial Governments, as well as private conservation agencies and the general public.

Texas ranks as the top harvest state in the Central Flyway. Since 1999, Texas accounted for 42 percent of the total duck harvest and 47 percent of the total goose harvest in the Central Flyway. Texas accounted for almost 40 percent of the Federal duck stamp sales over the same time period. This agency has a strong vested interest in harvest management in the Central Flyway and the nation and must sustain its seat as the major player in the Central Flyway arena.

Figure 1. North American Migratory Waterfowl Flyways



Action Item: Maintain a strong voice in the Central Flyway by attending and participating in various meetings and research projects. Secure adequate funding to support department staff attendance at local, national and international meetings to discuss regulatory and management issues.

Harvest Strategies

Current harvest regulations are being developed utilizing adaptive harvest management approaches. The USFWS has approved eight harvest strategies for individual and/or regional populations of ducks. Although there are management plans for geese, they have yet to be modified and restructured similar to those for ducks. Texas and the Central Flyway have been supportive of adaptive management, but there is concern that continued development of adaptive management plans for individual species will overly complicate regulations, potentially reduce opportunity and reduce waterfowl hunter numbers. The Central Flyway has taken the lead role in looking at alternative harvest strategies to meet the future demands of waterfowl hunters and at the same time ensure healthy waterfowl populations.

Action Item: Work with the USFWS and Central Flyway to develop an adaptive harvest strategy for all waterfowl that minimizes complexity of regulations, maximizes hunter opportunity and maintains waterfowl populations at levels consistent with habitat. Investigate the potential development of an adaptive harvest management approach for multiple species.

Action Item: Create a position within the Game Bird Program that has a strong background in population modeling, harvest strategies and human dimensions that will serve to enhance our Program's ability to manage harvest, identify hunter preferences and better understand harvest management practice being implemented at the Federal level.

Action Item: Work with GCJV to develop a Texas plan and strategy for mottled ducks to present options to the USFWS and the Central Flyway that focus on scientific need for statewide habitat and population assessment, then planning and action, to restore the population dynamics of this species in its Western Gulf Range.

Action Item: Habitat loss and degradation are negatively impacting mottled ducks in Texas. Work with the USFWS and the Central Flyway to tease out the difference between the impacts of hunting pressure and habitat loss for this species.

Action Item: Determine if there is a need to address current harvest of snow geese along the Texas coast.

State Hunting Regulations

Texas Parks and Wildlife Department is charged with development of annual hunting regulations for waterfowl. We are constrained by the current USFWS regulatory processes which force the agency to work within timelines that are short and usually late in the year. Ensuring public opportunity to review and comment on season dates is always a challenge but must be a priority.

Action Item: Develop a transparent method that allows the public an opportunity to be engaged in the process. Provide a forum for waterfowl hunters in Texas to voice their concerns and support for changes to future regulations.

Action Item: Improve communication with Texas hunters about proposed changes and solicit “buy-in” early in the process.

Environmental Impact Statement for Migratory Bird Hunting

The USFWS is developing a new Supplemental Environmental Impact Statement (SEIS) for Migratory Bird Hunting. The last EIS was published and adopted in 1988. Since the last adoption there have been major changes in: 1) our knowledge of waterfowl management; 2) landscape and available habitat; 3) understanding of the interrelationships of habitat and populations; and, 4) how hunting regulations are developed (i.e., Adaptive Harvest Management). A final time-line has yet to be developed, but a draft outline of the SEIS is expected to be completed in 2011. Since this will be the guiding document for future migratory hunting regulations, TPWD must be engaged throughout the process.

Action Item: The new SEIS for Migratory Bird Hunting will drive regulatory decisions for the next decade at a minimum. TPWD must be engaged in development of the new SEIS

to ensure the best possible outcome for our hunters.

Public Waterfowl Hunting Opportunities

Based on Federal Duck Stamp information, Texas has averaged over 94,000 active duck hunters since 1999. This is by far the most in the Central Flyway and ranks near the top nationally. In Texas, however, duck hunters have difficulties finding suitable areas for hunting within a reasonable distance from major urban centers. Currently most waterfowl hunting in Texas occurs on private lands. Those hunters that do not have access to private lands must rely on public access lands and waterways. TPWD offers access to our Wildlife Management Areas and Public Hunting areas, but many hunters believe these areas are over crowded and may not provide a satisfying experience.

At this time there are many areas that offer public access for fishing and other outdoor recreation but do not provide access for waterfowl hunting. Areas to direct focus for waterfowl hunting access include the many reservoirs that dot the Texas landscape. However, these all operate under different jurisdiction and attempting to locate appropriate decision makers will be difficult.

Texas must maintain its position as a top state with respect to waterfowl hunter numbers; thus, time and perhaps money must be invested to identify and make available new areas for the waterfowl hunting public.

Action Item: Identify state reservoirs close to large metropolitan areas that may provide reasonable waterfowl hunting opportunity. Determine the point of contact on selected reservoirs and actively pursue access for waterfowl hunting.

Action Item: Investigate new sources of funds for the leasing of new public hunting areas.

Action Item: On existing WMAs that provide waterfowl hunting, determine the feasibility of providing more opportunity (i.e., more days back to back or increased weekend opportunity).

Action Item: Study how other states plan, regulate and implement hunts on public lands. Determine through human dimensions if waterfowl hunters prefer quality over quantity.

Action Item: Identify selected areas that currently provide a “quality” experience and support continued programs on those WMAs and expand to other areas.

Action Item: Identify private hunting lands in Texas which can be leased, or otherwise obtained for public use for hunting and other

outdoor recreation which may be otherwise idle.

Action Item: Continue to monitor lead ingesting in mottled ducks harvested from state and federally owned lands and pursue studies to examine the potential impacts of chronically high lead ingestion by this species.

Funding: Present and Future

Wetlands in Texas are a vanishing resource. In the northern portion of Texas, playa wetlands and associated grasslands and prairies are lost or modified for agricultural purposes annually. In many cases, modifications to playa wetland basins cannot be reversed. Prairies associated with playa wetlands are one of the most threatened ecosystems in North America.

In coastal areas of Texas, wetlands account for six percent of the national wetland acreage. However, these are being lost at an alarming rate. Decreasing trends can be shown for the last five decades and loss of coastal wetlands is estimated at 8.9 square miles per year between the 1950s through the early 1990s with no apparent reduction in this rate in some locations.

In association with coastal wetlands are agricultural lands lying to the north. What once were coastal prairies interspersed with small depressional wetlands are now rice fields, development and small to large cities. Rice fields provided some benefit by supplying a large supply of energy (waste grain) early in the winter; however, Texas has seen large decreases in rice acreage since the mid 1970s adding to habitat concerns along the Texas coast.

East Texas has experienced significant losses of wetland habitat as well. The ever increasing need for water in large metropolitan areas has led to the development of large reservoirs that eliminate important bottomland hardwood areas that once served many wintering waterfowl.

If Texas is to maintain wetlands necessary for wintering waterfowl, efforts need to be stepped up to acquire land, restore natural wetlands, properly manage existing wetlands, provide technical

assistance to private landowners with wetlands, and reclaim areas that currently lie fallow and restore them back to a more natural system.

To accomplish this requires stable funding sources. Management of wetlands is disproportionately more expensive than management of uplands because of the required infrastructure and specialized equipment. Although Texas has funds available from the Migratory Game Bird Stamp, revenue from this source is not sufficient to meet the growing demands for wetlands.

Action Item: Identify specific wetland projects and gain legislative approval to spend funds that are currently available. Develop a communication plan for stamp buyers to gain support of projects and legislative initiatives for increased spending.

Action Item: Seek legislation that allows TPWD to utilize the entire balance of stamp funds with up to 15 percent dedicated for acquisition.

Action Item: Seek ways to get more duck hunter involvement in projects, and more funding raised at the local level for projects.

Declining Hunter Numbers

Hunters have always stepped forward and taxed themselves to meet the needs of wetlands and wildlife. Currently the majority of funding for wetland acquisition, management and enhancement is generated from hunters. This is inconsistent with the importance to the general public. However, hunter numbers continue to decline. If declines continue into the future, the main supporters and benefactors for wetland related projects will decline along with stable funding sources and wetland management.



Proud youngsters after a morning hunt on Mad Island WMA. Courtesy Matt Nelson

Action Item: TPWD will develop materials and programs to assist sportsman organizations in Texas to introduce a new generation of hunter-conservationists to waterfowl hunting. Failure to bring “new” hunters on board will result in declining revenue with an end result of a reduction in our ability to properly manage wetlands for ducks, geese and other associated wildlife.

Public Awareness

Many urban dwellers see wetlands as mosquito and snake infested wastelands that are eyesores and need to be filled for development. Others only see these wetlands as important to duck hunters and the occasional bird watcher. As biologists, we know that these misconceptions need to be addressed and the importance of wetlands to urban dwellers needs to be brought to the forefront. Only with a strong, targeted educational program can additional support for funds from non-traditional sources be generated.

Action Item: Continue to support educational programs that identify the importance of wetlands to everyone. Provide insight that functional wetlands are important to urban dwellers and serve more than hunters and birdwatchers.

Action Item: General Funds will be needed to meet needs of wetlands in the future. Investigate new funding sources that are provided by all taxpayers (i.e., an ecosystem services state sales tax).

Federal Funding

Funding for wetland conservation and management is not the strict purview of Texas hunters

or state government. Texas is one of the most important states for migratory waterfowl. These resources are shared with other states and countries, and funding from other sources beyond the boundaries of Texas needs to be investigated. Numerous opportunities exist at the federal level for substantial dollars and include the North American Wetland Conservation Act (NAWCA), funding from JVs (five established and funded in Texas), Wildlife Restoration Act (PR funds) and other federal appropriations. To ensure future benefits for waterfowl, we must continue to strive to regain focus and try to direct funds back to the original concept of the NAWMP.

North American Wetland Conservation Act

NAWCA provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada and Mexico for the benefit of wetlands-associated migratory birds and other wildlife. NAWCA funding historically has had an emphasis on critical wetland and adjacent upland habitats that are essential to waterfowl. In recent years, other wetland species and regions not critical to waterfowl have received high priority.

Action Item: Priorities for both Standard and Small NAWCA grants should be directed at the core areas of the original North American Plan.

Action Item: Identify one single TPWD contact to walk through projects that are brought forward by staff. The focus for NAWCA grants should remain waterfowl and wetland species oriented.

Leveraging Matching Funds to Maximize Federal Dollars

Federal funds are appropriated annually by Congress for wetland conservation. The ability to obtain these funds is often tied to matching dollars at the state level. A grant proposal receives higher scores if it has contributions from multiple non-federal partners and if the NAWCA funds will be highly leveraged (i.e., if the grant

proposal has significant non-federal funding as match). TPWD does provide matching dollars, but as mentioned previously, our funds are limited and will decrease if license sales continue to decline. To meet the challenge of matching funds, efforts need to be directed at finding local partners that have a shared interest in wetland conservation. Other partners could include NGOs (Ducks Unlimited, Inc., The Nature Conservancy) and local, county or civic organizations.

Action Item: Identify and promote new partnerships with non-traditional groups to increase funding potential for wetland conservation.

Action Item: Dedicate funds from migratory game bird stamp sales as matching funds for NAWCA grants annually.

Texas, like many other states, has looked at new and innovative methods to fund specific projects. Vanity license plates are one source available to TPWD.

Action Item: Continue support of the vanity license plate program and work to increase it through time as a source of conservation funding. Develop criteria for projects to be funded with these dollars.

Wildlife Management Area Wetland Management Funding

Creating, maintaining and managing wetland habitats is expensive. Factors to consider include personnel time, land acquisition, development, management, equipment, renovations and other associated costs. Wetland projects require constant maintenance and upkeep if they are to remain functional and obtain maximum benefit to waterfowl.

Action Item: Identify reliable annual funding resources for equipment acquisition, maintenance and repair of existing wetland projects, and future improvements and renovations to existing projects.

Action Item: Establish replacement guidelines for airboats, outboard boats, vehicles, pumps and other equipment necessary to properly manage and maintain wetland projects. Ensure funding sources adequate to meet these guidelines.

Action Item: Develop timelines for routine maintenance, major repairs and planned replacement to the infrastructure of wetland

projects.

Recruiting and Maintaining Quality Employees

Many have stated that management of waterfowl and wetland conservation is as much an art as it is a science. If there is any truth to this axiom, then the wildlife conservation and management profession is at a crossroad. Within the next decade, the wildlife profession will see a major turnover. Just like hunters, many that founded and implemented present day management techniques are nearing or have reached retirement age. While the “science” of conservation and management is effectively transferred in peer-reviewed journals, books and training workshops, the “art” comes only with experience. If today’s society hopes to maintain some semblance of our current heritage of wetlands and waterfowl, we need to enlist and retain the services of trained and experienced professionals to meet the challenges that are on the horizon.

Societal and economic changes may be limiting the ability of the wildlife profession to recruit and retain well-qualified professionals. Many that entered the profession in the last century did so with the belief that job satisfaction was as important as the monthly paycheck. Rising cost of living, urbanization, increase in the cost of a college education and what one can expect to earn after college are factors that are considered by modern job applicants, and may have negative impacts on future wildlife biologist. Some of these same factors are having an impact on current biologists, forcing many to seek employment outside of their educational background just to make ends meet. To become the “artist” requires several years of experience, all of which is lost if a professional is forced to leave the profession for economic reasons. This ultimately sets back efforts to conserve and manage wetland habitats and affects the quality of recreational and other uses by the general public, in turn eroding support for wetland conservation by these constituencies.

Action Item: Regularly review salary structures for biological staff and ensure that they are competitive with similar positions in the private sector.

Action Item: Establish criteria for new biological positions and replacement hires for

existing biological positions based on job responsibilities and not on arbitrary standards. Draw from a larger pool of applicants in wetland management by establishing knowledge, skills and experience requirements which cover multiple and interrelated disciplines, not

just local expertise.

Action Item: Identify stable funding sources to allow for professional development (out of state conferences, continuing education) and to attend professional meetings (requires

increase in travel budgets).

Legislation

Migratory birds, including waterfowl, are a shared resource between the United States and other countries. For this reason management responsibilities are vested with the Federal government. The Department of the Interior, through the U. S. Fish and Wildlife Service, has final authority for management of waterfowl resources.

Action Item: Comment on and provide support for federal legislation that will enhance and contribute to sound management of North America's waterfowl populations and habitat that supports this resource.

The North American Wetlands Conservation Act of 1989

The North American Wetlands Conservation Act of 1989 provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada and Mexico for the benefit of wetlands-associated migratory birds and other wildlife. Current science indicates that approximately 90 percent of variation in duck populations is associated with conditions at breeding grounds. Therefore, more emphasis should be placed on protecting and enhancing quality of wetland habitats at breeding grounds compared to wintering or stopover areas.

Action Item: Work with Central Flyway Council member agencies to develop more projects on critical wetland and adjacent upland habitats essentially important to breeding waterfowl that are submitted for NAWCA funding.

Action item: Provide comments on NAWCA grant proposals that TPWD continues to recognize the importance of breeding grounds,

and encourage selection of projects to be funded by NAWCA which focus on maintaining or improving breeding habitat for waterfowl.

The Federal Migratory Bird Hunting and Conservation Stamp (Duck Stamp)

The Federal Migratory Bird Hunting and Conservation Stamp (Duck Stamp) began in 1934 as the federal license to hunt waterfowl. Duck Stamps are still required for hunting waterfowl, and money generated from the sale of stamps is one of the primary funding sources for wetland conservation across the United States. Today, ninety eight cents of every dollar generated by this stamp is directed at the purchase or lease of wetland habitat for the National Wildlife Refuge System. The success of the Duck Stamp for protection and management of waterfowl habitat is unparalleled.

Action Item: Ensure that the original premise of the Duck Stamp remains intact and oppose any changes that would alter its current purpose.

Action Item: Review and comment on projects funded by Duck Stamps in Texas and ensure that new and existing lands continue to be available for waterfowl hunting.

Action Item: TPWD should support and promote Duck Stamp dollars directed at the breeding areas of continental duck populations. Once these needs are met then funds should be directed at migration and wintering areas.

Captive Reared and Released Waterfowl

Captive reared and released waterfowl are a common occurrence in Texas. Although many

view these releases as harmless and aesthetically pleasing, there are concerns at the biological level. The potential for disease always exists and problems have been documented in Florida where released waterfowl have hybridized with native

species.

Action Item: Seek legislation to prohibit future release of domestic waterfowl to minimize

negative impacts to migrating and wintering waterfowl.

Implications of Disease to Waterfowl

Every year disease outbreaks occur in wild waterfowl. Contributing factors include habitat conditions, lack of fresh water, natural and artificial concentration of waterfowl and contact with domestic waterfowl (park ducks) in urban areas. Impacts on wild waterfowl depend on the scale of the outbreak.

Action Item: Review, modify and update existing waterfowl disease plan and continue to support the plan.

Action Item: Identify areas of concern for waterfowl disease outbreaks and monitor waterfowl populations and roosting areas for disease outbreaks. Respond appropriately to disease outbreaks with appropriate actions for the welfare of wildlife populations and possible impacts to humans and or domestic livestock.

Action Item: Provide guidance to suburban communities with water bodies to prevent interactions between domestic waterfowl (especially pen-raised mallards) and mottled ducks (i.e., hybridization).

Action Item: Participate in the National

surveillance and early detection project for Highly Pathogenic Avian

Influenza (H5N1).

Surveys, Research and Communication

Surveys

Midwinter Waterfowl Surveys

Population and habitat surveys are a key component to the wise management of any wildlife resource. Waterfowl and wetlands are no different. If Texas is to maintain its leadership role in waterfowl and wetland conservation, we must be proactive and engage in appropriate surveys to assess population trends and available habitat (Attachments 5–13).

Action Item: Continue current waterfowl monitoring surveys (Midwinter waterfowl



USFWS aircraft conducting a cooperative goose survey. Courtesy Kevin Kraai



Justin Hurst releasing a banded mottled duck. Courtesy TPWD

and goose surveys) and expand efforts to develop migration chronology surveys to assess timing of migration to aid in wetland management efforts.

Action Item: Develop new survey methods to monitor goose population expansions into the Oak/Blackland Prairie region of Texas.

Action Item: Enhance survey methodology by acquiring the latest equipment to aid in data collection (i.e., computers, software)

Action Item: Assist with the acquisition of a new airplane to ensure the timely completion and addition of new waterfowl surveys.

Action Item: Provide personnel support for current and future monitoring of goose populations in the Arctic.

Action Item: Enhance survey methodology to monitor mottled duck populations to aid in mottled duck population and habitat recovery and long term management.

Mottled Duck Breeding Surveys

Breeding Surveys are used to monitor populations of waterfowl and in setting harvest limits for most species of waterfowl in North America. The information these surveys provide is critical to proper management of populations since it provides insights into the relative conditions and amounts of breeding habitat available, and may foretell population trends. No such survey along the entire Texas Gulf Coast is done despite the valuable information such a survey could provide. USFWS conducts a breeding pair survey on its coastal refuges, but these are a limited subset of the available breeding habitat on the coast that likely do not reflect breeding potential in Texas.

To better understand population dynamics and trends of mottled ducks in Texas, and to better manage habitat and harvest of this species, a breeding pair survey that adequately samples all available breeding habitat is needed.

Action Item: Develop a coast-wide breeding pair survey protocol for mottled ducks to monitor changes in populations, as is done for other waterfowl in the US and Canada.

Action Item: Obtain a source of annual funding for conducting breeding pair surveys for mottled ducks along the Texas Gulf Coast, and conduct surveys annually.

Banding

Waterfowl banding is a key component of modern day waterfowl management. Banding data is important to developing hunting regulations, survival estimates, populations estimates and in general increases our understanding of waterfowl life histories.

Action Item: Implement an operational banding program to monitor mottled duck vital rates across the Texas Gulf Coast annually.

Action Item: Develop annual contracts to fund banding crews to supplement mottled duck banding by TPWD employees.

Action Item: Investigate the use of summer interns as another source of personnel to assist with banding operations on State WMAs.

Action Item: Provide funds to assist with field banding operations, both locally and nationally.

Action Item: Develop protocols for internal band analysis of waterfowl marked in Texas.

Action Item: Develop and implement a whistling duck banding program to aid in development of additional hunting opportunities.

Research

To better understand population dynamics and

the role Texas plays as a major wintering area will require investigations on specific topics. Every effort will be made to enlist support from various universities to aid in development of research needs. The following is a list of concerns that have been identified and may be of value to investigate.

- Pintail survival and body condition on the Texas Gulf Coast.
- Investigate the importance of the High Plains (playas) as spring habitat for pintails and other species, and participate in studies that examine linkages between spring habitats in Texas and waterfowl recruitment.
- Participate in national scaup and mallard research.
- Pintail movements in Texas.
- Develop estimates of mottled duck nesting and brood rearing habitats presently in Texas, the distributions of those habitats, and identify areas of nesting and brood rearing habitats at risk of conversion to focus efforts in obtaining easements or fee title.
- Declines in snow goose numbers along the Texas Coast
- Continue monitoring ingestion of lead and non-toxic shot by mottled ducks.
- Assess the value of waterfowl foraging habitats (i.e., rice fields, moist-soil wetlands, coastal marsh, etc.) along the Texas Coast.
- Expand knowledge of mottled duck nesting ecology beyond the Upper Coast of Texas.
- Role of the Arctic and impacts of snow goose overpopulation on Arctic breeding ground.
- Expansion of “resident flocks” of Canada Geese and their implications on habitat and human interactions.
- Human dimensions:
 - Establish a small rapid response team from randomly selected hunters to address

immediate concerns.

- Address regulatory issues and identify the most pressing concerns of Texas hunters.
- Identify core constituency groups and the needs to maintain and increase hunter numbers.

Communication and Outreach

To better promote sound science and basic premises of waterfowl management, TPWD should strive to facilitate and educate our constituency. There are many concepts that waterfowl hunters do not fully understand and their misconceptions often result in an adversarial position. Additionally, anti-hunting groups will seize on any concept to try and end hunting. Therefore, we should make every effort to earn the support of the waterfowl community through outreach and education.

Action Item: Develop a web-based communication information page for both the public and department staff using both the Internet and Intranet that provides ongoing communications and timely information to waterfowl hunters and staff regarding changes in regulations, hunting forecasts and other information of interest.

Wounding loss is a concern and must be considered as part of the future of waterfowl hunting. Through the Cooperative North American Shotgun Education Program (CONSEP), TPWD can better educate our staff and hunters on methods to reduce wounding loss.

Action Item: Conduct workshops with department staff and hunters aimed at reducing wounding loss.



Courting pintails,
Courtesy Kevin Kraai

Aircraft activity has been identified as having an impact on migratory waterfowl.

Action Item: Work with industry personnel to develop a plan to minimize aircraft disturbance of wintering waterfowl, particularly snow geese.

Habitat Management

Habitat management is the key to managing waterfowl in Texas. The following are habitat issues that will need to be addressed in the future if Texas is to continue to be a leader in waterfowl and habitat conservation. This list is not all-encompassing, but represents items that need to be considered now and in future years.

- Water and wetland issues, such as providing sufficient freshwater inflows to coastal

wetlands, reversing impacts of salt water intrusion, restoring coastal hydrology and planning for relative sea level changes.

- Creatively resolving conflicts between fisheries legislation/ interests and wetlands management that benefits water fowl on coastal marshes.
- Bottomland hardwood restoration techniques
- Minimizing habitat impacts and understanding bird behavior associated with energy development.
- Monitor performance of wetland projects.
- Developing methods and policies for streamlining habitat restoration and creation projects.
- Developing methods and policies that



Salt Bayou Water Control Structure on the Gulf Intracoastal Waterway, J.D. Murphree WMA. Courtesy Jim Sutherlin

encourage return of rice fields that are no longer in production to coastal prairie complexes complete with depressional wetlands instead of converting them to non-native pastures or developments.

- Assure water for moist-soil management from the various River Authorities.

Related Organizations, Programs and Plans

North American Waterfowl Management Plan

<http://www.fws.gov/birdhabitat/NAWMP/index.shtmPlan>

Recognizing the importance of waterfowl and wetlands to North Americans and the need for international cooperation to help in the recovery of a shared resource, the U.S. and Canadian governments developed a strategy to restore waterfowl populations through habitat protection, restoration and enhancement. The strategy was documented in the *North American Waterfowl Management Plan* signed in 1986 by the Canadian Minister of the Environment and the U.S. Secretary of the Interior, the foundation partnership upon which hundreds of others would be built. With its update in 1994, Mexico became a signatory to the Plan.

North American Bird Conservation Initiative

<http://www.nabci-us.org/>

The *U.S. North American Bird Conservation Initiative* (NABCI) is a forum of government agencies, private organizations, and bird initiatives helping partners across the continent meet their common bird conservation objectives. Its strategy is to foster coordination and collaboration among the bird conservation community on key issues of concern.

Through annual work plans, the Committee focuses its efforts on advancing coordinated bird monitoring, conservation design, private land conservation, continentally important projects, and institutional support in state and federal agencies for integrated bird conservation.

North American Landbird Conservation Plan

http://www.pwrc.usgs.gov/pif/cont_plan/

The Partners in Flight *North American Landbird Conservation Plan* provides a continental synthesis of priorities and objectives that will guide landbird conservation actions at national and international scales. The scope for this Plan is the 448 species of native land birds that regularly breed in the U.S. and Canada.

U. S. Shorebird Conservation Plan

<http://www.fws.gov/shorebirdplan/USShorebird.htm>

Partners from state and federal agencies and non-governmental organizations from across the country pooled their resources and expertise to develop a conservation strategy for migratory shorebirds and the habitats upon which they depend. The plan provides a scientific framework to determine species, sites and habitats that most urgently need conservation action. Main goals of the plan, completed in 2000, are to ensure that adequate quantity and quality of shorebird habitat is maintained at the local level and to maintain or restore shorebird populations at the continental and hemispheric levels.

Conservation Reserve Program

<http://www.nrcs.usda.gov/programs/CRP/>

The Conservation Reserve Program reduces soil erosion, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips or riparian buffers. Farmers

receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

Grassland Reserve Program

<http://www.nrcs.usda.gov/programs/grp/>

The Grassland Reserve Program (GRP) is a voluntary program offering landowners the opportunity to protect, restore and enhance grasslands on their property. Section 2401 of the Farm Security and Rural Investment Act of 2002 (Pub. L. 107-171) amended the Food Security Act of 1985 to authorize this program. The Natural Resources Conservation Service, Farm Service Agency and Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands. The program will conserve vulnerable grasslands from conversion to cropland or other uses and conserve valuable grasslands by helping maintain viable ranching operations.

North American Waterbird Conservation Plan

<http://www.pwrc.usgs.gov/nacwcp/nawcp.html>

The *North American Waterbird Conservation Plan* provides an overarching continental framework and guide for conserving waterbirds. It sets forth goals and priorities for waterbirds in all habitats from the Canadian Arctic to Panama, from Bermuda through the U.S. Pacific Islands, at nesting sites, during annual migrations, and during non-breeding periods. It advocates continent-wide monitoring; provides an impetus for regional conservation planning; proposes national, state, provincial and other local conservation planning and action; and gives a larger context for local habitat protection. Taken together, it is hoped that these activities will assure healthy populations and habitats for the waterbirds of the Americas.

Northern Bobwhite Conservation Initiative

http://www.acjv.org/documents/Northern_Bobwhite_Plan.pdf

The *Northern Bobwhite Conservation Initiative (NBCI)* was prepared by the National Bobwhite Technical Committee at the request of the Directors of the Southeastern Association of Fish and Wildlife Agencies. The charge issued to the committee was to develop a quantitative habitat-oriented plan to restore bobwhites to the density they enjoyed during the baseline year 1980. The *NBCI* is organized to delineate population and habitat objectives for 15 Bird Conservation Regions (see Attachment 2) that comprise that portion of the bobwhite's range incorporated in the plan. This approach was selected to facilitate coordination and cooperation with other bird management plans, e.g., Partners in Flight. The *NBCI* also includes three chapters detailing specific management practices to be employed on agricultural land, grasslands and forests, and one chapter outlining the approaches to be taken to implement the plan.

Wetland Reserve Program

<http://www.nrcs.usda.gov/Programs/WRP/>

The Wetlands Reserve Program is a voluntary program offering landowners the opportunity to protect, restore and enhance wetlands on their property. The USDA Natural Resources Conservation Service provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Gulf Coast Joint Venture

<http://www.gcjv.org/>

The Gulf Coast Joint Venture (GCJV) is a regional partnership composed of individuals, conservation organizations, and state and federal agencies that are concerned with conserving migratory birds and their habitats along the western U.S. Gulf of Mexico from Brownsville, Texas to Mobile Bay in Alabama.

Gulf Coast Joint Venture—*Laguna Madre Initiative*

<http://www.gcjv.org/docs/LagunaMadrepub.pdf>

This document deals with planning efforts for the *Laguna Madre Initiative* area of south Texas and includes the counties of Nueces, Kleberg, Brooks, Kenedy, Starr, Willacy, Hidalgo and Cameron. The goal of the Laguna Madre Initiative is to provide wintering and migration habitat for significant numbers of redhead ducks, greater and lesser scaup, Northern pintails and other dabbling ducks, as well as year-round habitat for mottled ducks.

Gulf Coast Joint Venture—*Texas Mid-Coast Initiative*

<http://www.gcjv.org/docs/TXMidCoastpub.pdf>

This document deals with planning efforts for the *Texas Mid-Coast Initiative* area. The goal of the *Texas Mid-Coast Initiative* is to provide wintering and migration habitat for significant numbers of dabbling ducks, redheads, lesser snow geese and greater white-fronted geese, as well as year-round habitat for mottled ducks. There are a total of 16 counties included.

Gulf Coast Joint Venture—*Chenier Plains Initiative*

<http://www.gcjv.org/docs/ChenierPlainpub.pdf>

This document deals with planning efforts for the *Chenier Plain Initiative* area of southwest Louisiana and southeast Texas. The goal of the *Chenier Plain Initiative* is to provide wintering and migration habitat for significant numbers of dabbling ducks, diving ducks and geese (especially lesser snow and greater white-fronted), as well as year-round habitat for mottled ducks. The focal area in Texas is the upper Texas coast and includes Orange, Jefferson, Chambers, Liberty and a portion of Harris counties.

Gulf Coast Joint Venture—*Mottled Duck Conservation Plan*

<http://www.gcjv.org/docs/GCJV%20MODU%20Cons%20Plan.pdf>

Mottled ducks along the Western Gulf Coast (WGC) face potential survival and/or reproductive stresses from coastal marsh degradation, declines in rice farming, lead exposure from spent shotshells, harvest, disturbance, reptilian and mammalian predators, and the whims of precipitation. Available evidence points toward recruitment (addition of fledged young to the population) as the most likely source of current population limitation, but survival constraints also warrant attention.

The highest priorities to improve WGC mottled duck populations are actions to increase nest success and brood survival. Recommendations to improve nest success include improving nesting grassland conditions proximal to wetlands suitable for brood rearing, minimizing interactions with predators, and maintaining optimal habitat sizes. Improving brood survival incorporates management of shallow wetlands that have low salinities in mid-April through July, minimal opportunity for predator interactions, vegetative substrate to support invertebrate duckling foods and connectivity to nesting habitat.

Playa Lake Joint Venture

<http://www.pljv.org/>

The PLJV is a non-profit partnership of federal and state wildlife agencies, conservation groups, private industry and landowners dedicated to conserving bird habitat in the Southern Great Plains.

Lower Mississippi Valley Joint Venture

<http://www.lmvjv.org/>

The LMV Joint Venture partnership is focused on the protection, restoration, and management of those species of North American avifauna and their habitats (endemic to the LMV Region) encompassed by the *North American Waterfowl Management Plan (NAWMP)*; *North American Land Bird Conservation Plan*; *United States Shorebird Conservation Plan (USSCP)*; *North American Waterbird Conservation Plan (NAWCP)*; and *Northern Bobwhite Conservation Initiative (NBCI)*. Collectively, these national and international plans are recognized as the North American Bird Conservation Initiative (NABCI).

Central Flyway Council

<http://www.flyways.us/flyways/central>

The Central Flyway is composed of the states of Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota and North Dakota, and the Canadian provinces of Alberta, Saskatchewan and the Northwest Territories.

The Central Flyway Council consists of representatives (usually agency administrators) from these state agencies (and often provincial representatives from Alberta, Saskatchewan and the Northwest Territories) that have management responsibility for migratory bird resources in the Flyway.

Attachments

Attachment 1. Bird Habitat Joint Ventures and Adaptive Management

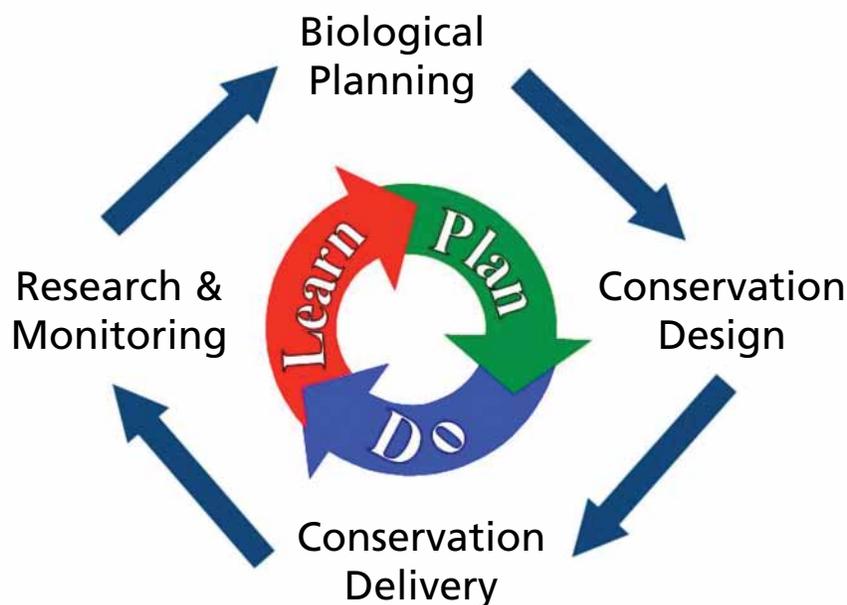
Wildlife Conservation has started to change. Historically TPWD has generally approached wildlife conservation by responding to the desire of the landowners that contact them and developing conservation plans privately with very little consideration for the surrounding landscape and priority habitat needs. Though it is important for us to be responsive to our constituents, this “reactive” approach does little to tackle the landscape level issues that Texas wildlife faces. There has to be a better way.

The complexity of bird conservation is set within an atmosphere of changing expectations from our conservation enterprises. Recently, the National Ecological Assessment Team identified three primary drivers of changing expectations including advances in conservation theory, emerging geospatial technology and increasing accountability. Changes in expectations resulting from these drivers include moving from site-scale conservation to a focus on producing sustainable populations and landscapes, and from activity-based conservation (where “more of everything is better”) to science-based activities with measurable objectives. These increasing expectations relate less to any one taxonomic group or type of wildlife habitat, and more to a general trend in natural resources conservation. The reality is that conservationists of all stripes are embarking on a journey to manage complex issues at large spatial scales...and the question is “how do we best get there?” The formation of the Bird Habitat JVs provides the framework for bringing together partners with overlapping interests in habitat conservation to share resources and knowledge to address the large-scale and complex issues through the creation of science-based bird population and habitat objectives.

Bird Habitat JVs are regional, self-directed partnership of government and non-governmental organizations as well as individuals working across administrative boundaries to deliver landscape-level planning and science-based conservation, linking on-the-ground management with national population goals. JVs are organized into Bird Conservation Regions (BCR) that encompasses landscapes having similar bird communities,

habitats and resource issues. JVs work to implement national and international bird conservation plans (i.e., waterfowl [North American Waterfowl Management Plan Committee 2004], Northern Bobwhite [Northern Bobwhite Conservation Initiative], landbird [Rich et al. 2004], waterbird [Kuslan et al. 2002], and shorebird [Brown et al. 2001]) by “stepping down” the population goals of the larger plans to regional or landscape habitat goals, while feeding local information up (“rolling up”) to the national and international planning groups. This process helps to bring national- and international-level priorities and resources to address local-level conservation issues, while working to ensure local-level conservation issues are incorporated into national and international policy-making. JVs help to bridge the gap between national level planning and local level actions of conservation organizations and agencies. To that end, individual JVs will focus on a broad spectrum of activities including conservation planning, conducting “on-the-ground” projects, organizing outreach, research and monitoring, creating decision support tools, and raising money for these activities through partner contributions and grants for conservation.

Because of the broad scope and the diversity of habitat needs for bird species, 1) no one conservation entity is ideally suited to the task, and 2) significant knowledge gaps exist, and will continue to exist (due to the complex nature of the problems). Adaptive conservation (Figure on next page) can be an effective approach to dealing with large-scale, complex problems. As defined here, adaptive conservation is a model that follows a **Plan, Do and Learn** cycle to iteratively improve our knowledge of the system, and allows us to evaluate the success of management practices, as well as the assumptions underlying its direction. In this model, *biological planning* (**Plan**) uses best available scientific knowledge to set population objectives and identify and prioritize conservation needs of bird species by identifying limiting factors and developing working models that link bird populations to habitat condition and specific management actions (Johnson et al. 2009). This information serves as the basis for a spatially-targeted *conservation design* (**Plan**) where habitat objectives are

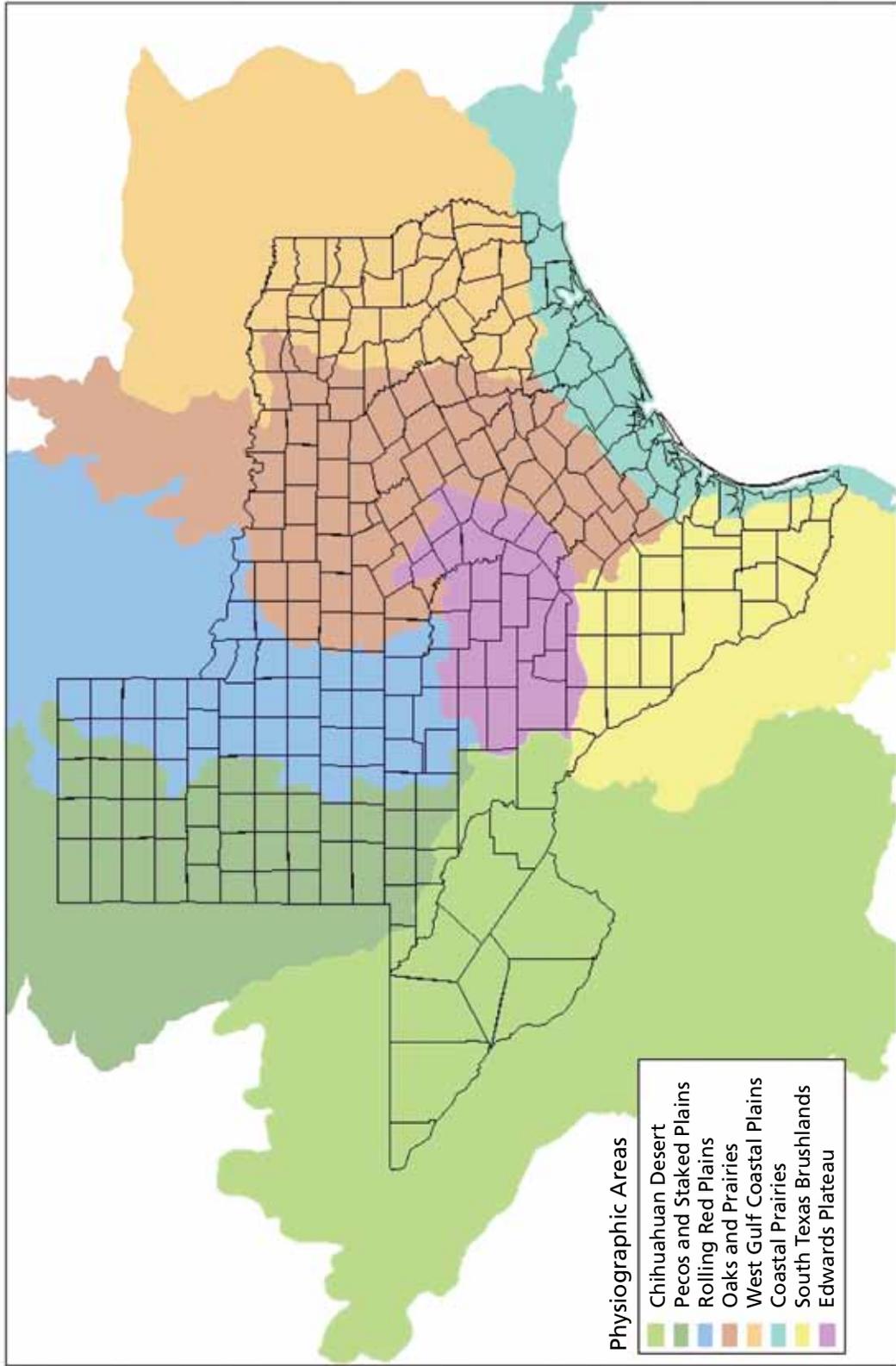


formulated, the current state of the ecosystem is assessed, and spatially explicit management plans are formulated. Management prescriptions for *conservation delivery* (**Do**) are then put together based on science and experience/intuition with both the natural and social systems in play. Assumption-based *Research* programs (**Learn**) are designed with management prescriptions to test the assumptions underlying biological planning and conservation design. Mission-based *Monitoring* (**Learn**) before, during and after management provides a reference for gauging the success of conservation planning and delivery (i.e., accountability). Research and monitoring then become an integral part of the adaptive conservation cycle instead of a costly luxury that can be cut when budgets are constrained.

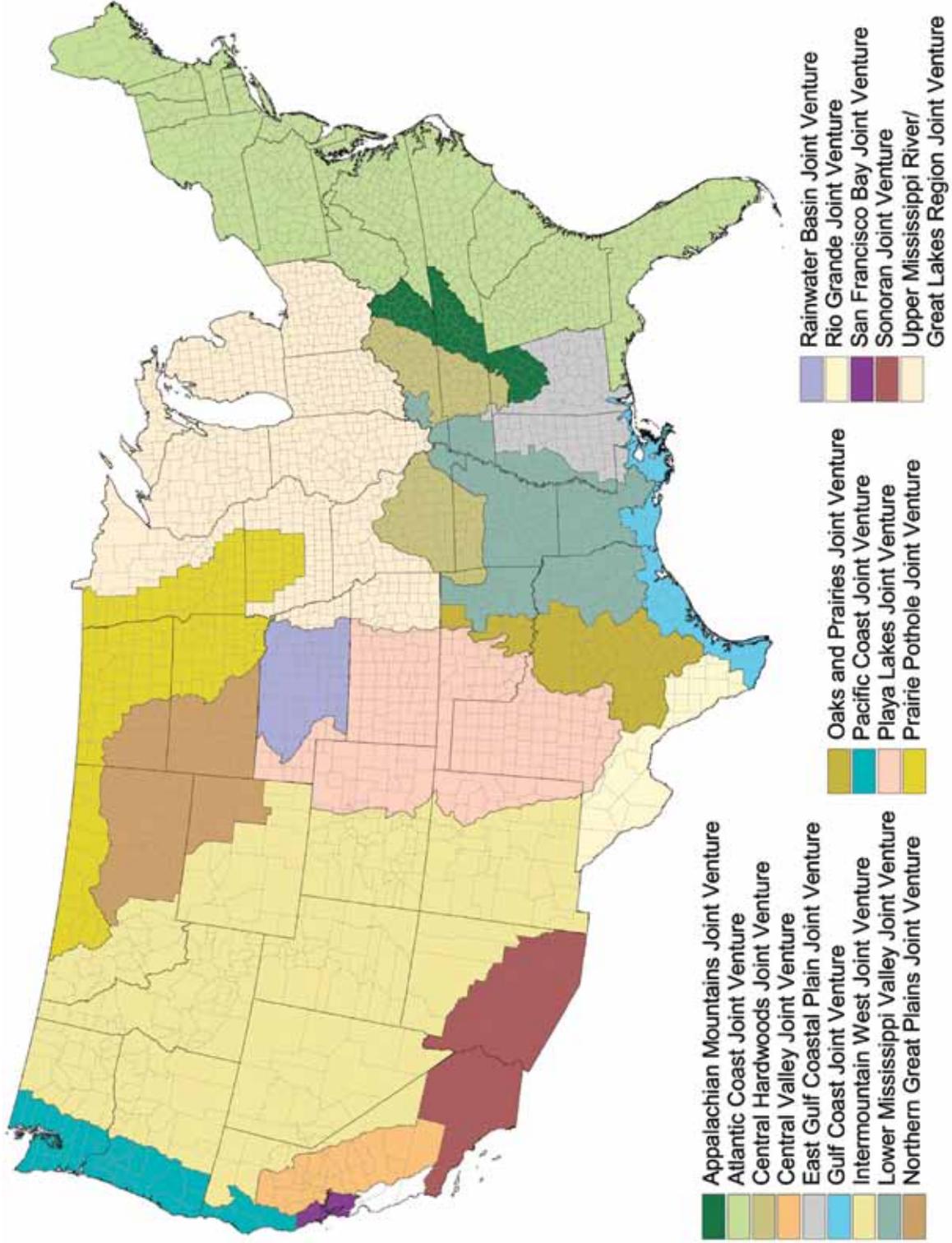
The Plan-Do-Learn process will help encourage communication among partners throughout the process and eventually create interdependency among partner organizations working to complete the cycle. Partners that focus on the “Do,” like state and federal agencies, land conservancies and other environmental organizations, will work more directly with partners that focus on the “Learn,” like universities and other research organizations, to build the “Plan.” Then all will have a stake in ensuring the success of the whole process. The Plan-Do-Learn process also results in an increased understanding of the biology and management of

bird species, and this increased understanding can be plugged back into the planning and design elements, thus completing the cycle. The important point here is that an approach that embraces adaptive conservation allows us to overcome both of the previously mentioned difficulties by: 1) laying out a framework for effective partnerships, and 2) using the Plan-Do-Learn model to create the feedback loop necessary to maintain sustainable bird populations in an uncertain environment. JVs will bring together organizations (i.e., The Nature Conservancy and Quail Unlimited) and individuals (i.e., state and federal agency personnel that focus on large-scale planning for wildlife) who focus on “Plan” parts of the cycle to build a cohesive plan with input from organizations that focus on “Do” (i.e., state agency land managers) and “Learn” (i.e., university researchers) activities. In this way, the on-the-ground conservation, research and monitoring efforts of partners will clearly add to the larger goals of the region, and fill information gaps to drive the next iteration of the planning effort, effectively increasing efficiency and providing accountability. Currently Texas has five JV partnerships that provide “wall to wall” coverage for strategic bird conservation. This strategic plan will strive to utilize the JV partnerships and its approach to conservation whenever possible to utilize the best information available to make the best decisions on the landscape.

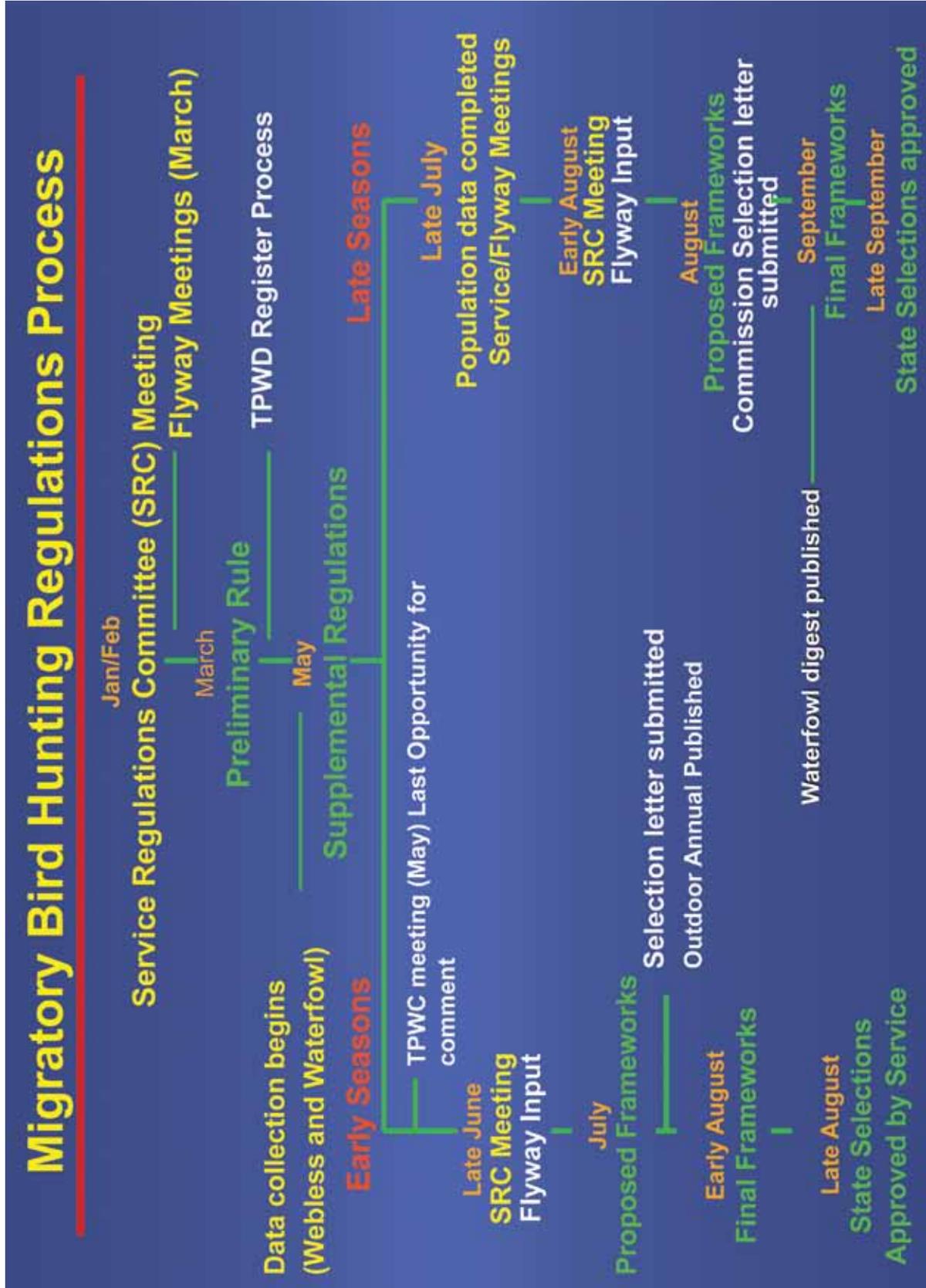
Attachment 2. Bird Conservation Regions in Texas.



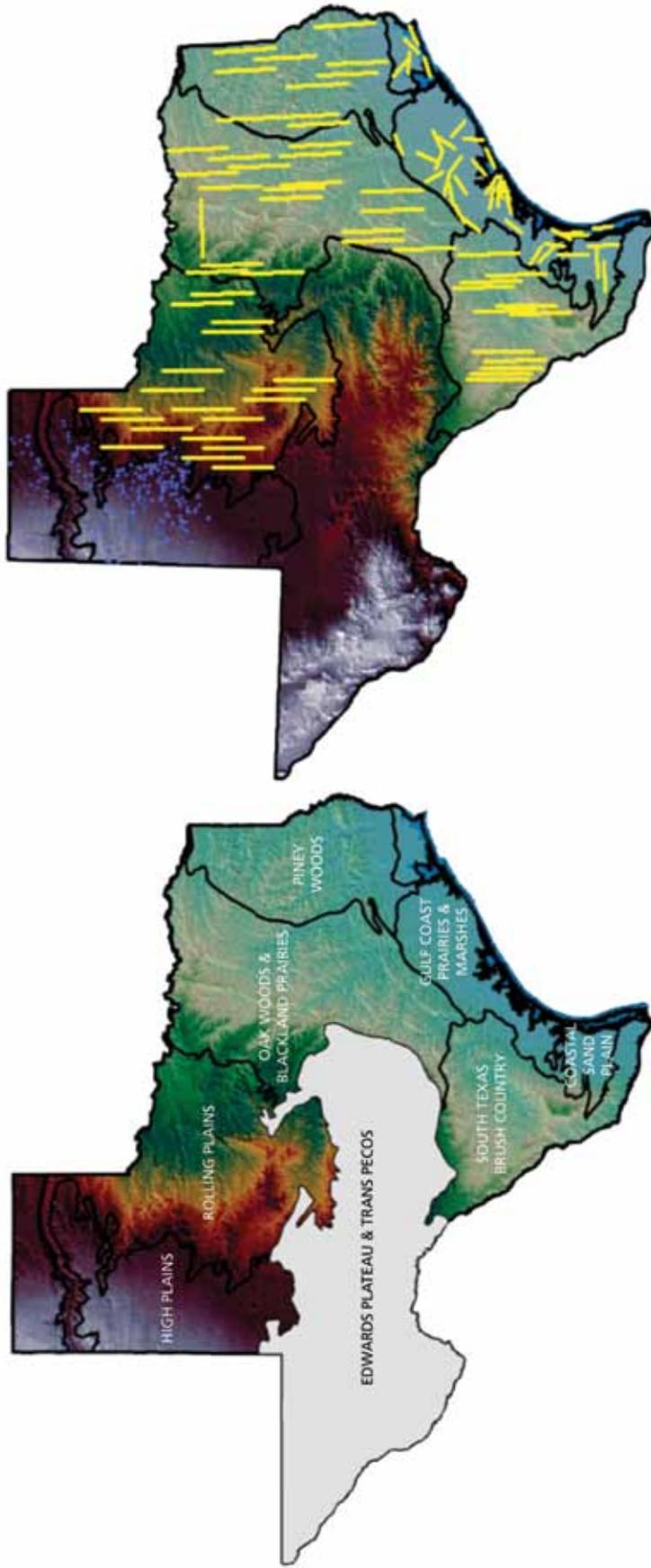
Attachment 3. Joint Ventures in the United States.



Attachment 4. Graphic Illustration of the Federal/State Migratory Regulations.



Attachment 5. Texas Waterfowl Survey Zones, Transects and Selected Playas.



Attachment 6. Gulf Coast Midwinter Duck Estimates, 1997–2011.

Midwinter Duck Estimates from The Gulf Coast Prairies and Marshes																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year average
Mallard	58,143	31,907	17,113	25,750	38,438	7,294	25,952	49,960	5,951	31,424	19,114	18,097	15,291	18,938	6,733	24,674
Mottled Duck	21,500	23,554	16,405	25,486	14,449	19,780	17,114	17,114	31,096	17,816	32,792	18,377	14,870	15,571	19,639	20,492
Pintail	401,900	309,066	836,887	234,527	208,463	353,518	403,881	470,656	276,000	635,352	333,879	324,620	141,828	153,612	281,131	357,688
Gadwall	159,056	195,177	114,641	244,563	143,371	127,098	119,943	257,423	221,990	287,725	444,529	366,705	262,333	148,000	127,238	214,653
Wigeon	16,058	54,489	52,974	219,605	14,870	10,521	64,671	54,290	65,317	43,488	85,048	45,873	17,535	13,046	10,661	51,270
Shoveler	49,800	52,248	62,970	132,581	95,393	56,675	104,933	86,555	42,255	34,931	20,517	47,978	22,585	45,732	19,639	60,506
Wood Duck	7,926	5,817	480	1,452	56,794	561	701	1,122	2,083	1,122	20,517	701	1,122	-	140	4,703
G-W Teal	319,220	200,041	287,780	457,301	167,219	386,906	95,814	368,248	70,673	360,792	382,803	831,330	505,728	239,466	114,612	319,796
B-W/Cinn. Teal	6,800	127	4,921	1,980	30,862	23,147	25,251	66,074	220,056	55,553	32,441	51,485	92,167	23,848	35,351	44,671
Black-bellied W.D.	6,000	2,375	2,796	-	-	-	280	-	-	-	52,607	-	-	280	-	4,596
Fulvous W.D.	-	-	-	-	-	-	-	-	-	-	-	3,507	-	-	-	270
TOTAL DABBLERS	1,047,003	874,801	1,396,967	1,345,245	741,860	987,502	862,367	1,373,446	937,426	1,479,209	1,459,045	1,710,681	1,075,468	660,503	615,144	1,104,444
Canvasback	40,700	3,099	26,413	-	7,014	-	2,104	-	5,653	2,806	2,104	3,788	7,575	16,834	1,963	8,004
Redhead	6,400	17,547	268,693	108,416	249,286	506,429	333,598	122,869	355,304	437,690	35,422	197,942	143,371	29,740	200,607	200,889
Scaup	29,653	30,685	96,610	75,006	27,075	104,231	228,524	214,215	51,269	64,251	82,067	44,190	748,842	336,684	159,644	152,996
Ring-necked Duck	22,106	36,701	9,946	5,150	701	1,262	1,403	701	1,190	281	6,137	1,402	1,402	76,876	1,402	11,017
Bufflehead	1,700	873	3,702	21,260	13,888	4,769	3,086	3,507	30,650	21,043	2,630	7,575	14,168	27,636	8,417	10,994
Goldeneye	400	787	1,544	2,112	15,150	8,557	3,226	7,855	4,017	281	14,555	1,964	4,068	11,082	1,402	5,133
Ruddy Duck	1,750	546	2,640	53,877	2,244	1,402	1,963	-	-	-	-	2,946	33,388	1,262	1,683	7,183
TOTAL DIVERS	102,709	90,238	411,548	265,821	315,358	625,949	573,763	350,569	450,166	526,350	142,915	259,808	952,814	500,114	375,118	396,216
TOTAL DUCKS	1,149,712	965,039	1,808,515	1,611,066	1,057,218	1,613,451	1,436,130	1,724,015	1,387,592	2,005,559	1,601,960	1,970,489	2,028,282	1,160,617	990,262	1,500,660

Attachment 7. Coastal Sand Plains Midwinter Duck Estimates, 1998–2011

Midwinter Duck Estimates from The Coastal Sand Plains															
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	14-year average
Mallard	3,080	3,080	4,211	-	-	-	-	NS	NS	NS	NS	-	-	-	708
Mottled Duck	754	754	1,194	-	471	-	3,834	NS	NS	NS	3,520	5,908	-	2,514	1,669
Pintail	11,220	11,220	16,625	1,005	4,085	34,698	81,811	NS	NS	NS	15,149	18,104	2,514	3,143	19,477
Gadwall	9,554	9,554	31,994	1,760	-	13,609	37,243	NS	NS	NS	15,369	65,469	5,908	13,200	19,604
Wigeon	16,595	16,595	28,349	157	-	3,017	19,014	NS	NS	NS	14,615	15,086	2,388	3,614	9,973
Shoveler	1,320	1,320	942	502	3,143	40,230	23,415	NS	NS	NS	-	5,028	251	7,511	7,623
Wood Duck	-	-	-	-	-	-	-	NS	NS	NS	-	-	-	-	0
G-W Teal	628	628	-	754	1,885	7,291	9,523	NS	NS	NS	17,349	754	5,657	6,977	4,963
B-W/Cinn. Teal	785	785	-	-	-	51,609	85,080	NS	NS	NS	2,828	-	-	25,144	15,041
Black-bellied W.D.	-	-	-	-	-	-	-	NS	NS	NS	-	-	-	-	0
Fulvous W.D.	-	-	-	-	-	-	-	NS	NS	NS	-	-	-	-	0
TOTAL DABBLERS	45,935	45,935	85,315	6,179	11,586	152,457	261,924	NS	NS	NS	70,838	112,358	18,728	62,103	80,860
Canvasback	-	-	-	-	-	-	-	NS	NS	NS	-	-	-	-	0
Redhead	-	-	-	-	-	3,771	3,142	NS	NS	NS	-	-	-	-	628
Scaup	-	-	3,614	-	-	2,011	9,899	NS	NS	NS	6,537	1,257	628	628	2,434
Ring-necked Duck	-	-	-	-	-	754	-	NS	NS	NS	-	-	-	-	69
Bufflehead	-	-	-	-	-	-	471	NS	NS	NS	-	-	-	471	414
Goldeneye	314	314	-	-	-	-	-	NS	NS	NS	-	-	-	-	29
Ruddy Duck	-	-	-	-	-	-	1,257	NS	NS	NS	-	-	-	-	114
TOTAL DIVERS	314	314	3,614	-	3,143	6,536	14,769	NS	NS	NS	6,537	1,257	1,099	1,099	3,688
TOTAL DUCKS	46,249	46,249	88,929	6,179	14,729	158,993	276,693	NS	NS	NS	77,375	113,615	19,827	63,202	82,913

Attachment 8. High Plains Midwinter Duck Estimates, 1997–2011.

Midwinter Duck Estimates from The High Plains																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year average
Mallard	62,080	110,301	47,022	90,391	10,523	26,702	138,301	NS	163,739	343,680	918,314	418,921	177,780	143,085	28,415	208,980
Mottled Duck	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	0
Pintail	52,192	108,485	117,875	37,565	915	2,389	142,818	NS	225,760	82,712	282,806	377,903	289,781	174,555	7,300	143,433
Gadwall	1,274	216	14,482	2,195	8	8	24	NS	145	14,710	-	-	72	4	-	2,761
Wigeon	3,146	6,521	9,099	3,603	-	110	19,827	NS	13,214	783	19,152	4,087	19,244	-	513	8,232
Showeler	12	1,830	534	5	-	-	1,462	NS	5,354	695	1,450	-	2,583	156	-	1,162
Wood Duck	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	0
G-W Teal	60,656	70,155	104,037	3,022	-	3,155	23,342	NS	60,375	210	48,188	177,120	51,966	209	500	50,186
B-W/Cinn. Teal	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	0
Black-bellied W.D.	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	0
Fulvous W.D.	-	-	-	-	-	-	-	NS	-	-	-	-	-	-	-	0
TOTAL DABBLERS	181,357	299,506	295,048	138,781	13,439	34,366	327,797	NS	470,592	444,796	1,271,917	980,039	543,435	320,019	36,728	416,756
Canvasback	10	12	57	-	-	543	2,202	NS	30	-	1,003	-	2	-	12	322
Redhead	-	13	-	-	-	-	2,200	NS	-	-	215	-	14	-	-	204
Scaup	28	20	-	-	-	5	5	NS	285	-	-	71	3	34	15	69
Ring-necked Duck	100	-	-	101	-	5	11,022	NS	-	124	396	1,792	142	15	9	1,520
Bufflehead	342	2	147	-	-	12	-	NS	25	-	-	-	-	2	2	48
Goldeneye	-	-	-	-	-	20	-	NS	169	-	8	143	30	30	212	67
Ruddy Duck	12	1	7	30	-	1	-	NS	-	69	-	-	-	-	-	11
TOTAL DIVERS	492	48	211	131	-	586	15,454	NS	509	193	1,622	2,006	191	81	250	1,949
TOTAL DUCKS	181,849	299,554	295,259	138,912	13,439	34,952	343,251	NS	471,101	444,989	1,273,539	982,045	543,626	320,100	36,978	384,257

Attachment 9. Oak Woods/Blackland Prairie Midwinter Duck Estimates, 1997–2011

Midwinter Duck Estimates from The Oak Woods/Blackland Prairie																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year average
Mallard	187,682	252,625	610,025	284,907	453,762	441,456	186,170	230,045	296,937	145,367	340,763	181,683	142,588	374,114	276,643	293,652
Mottled Duck	-	-	-	-	-	572	286	-	-	286	-	-	-	-	-	76
Pintail	6,451	37,397	4,292	22,466	37,491	32,769	4,006	27,490	3,495	5,295	3,172	89,562	-	23,200	10,195	20,485
Gadwall	159,793	149,877	265,303	203,484	245,126	211,358	195,042	329,585	128,563	199,621	117,364	214,469	146,516	430,123	304,341	220,037
Wigeon	30,668	47,892	28,762	36,418	59,600	122,348	74,983	54,330	20,391	37,492	31,267	51,338	56,038	100,053	100,937	56,868
Showeler	14,094	10,112	19,747	8,299	17,672	24,183	7,870	14,047	9,904	9,731	25,376	37,264	15,104	80,840	81,395	25,043
Wood Duck	7,940	4,960	2,575	6,582	7,655	5,580	3,577	8,005	2,330	7,441	2,719	2,398	906	1,087	36,704	6,697
G-W Teal	58,458	68,212	49,941	49,082	23,324	16,313	19,604	23,110	29,519	39,495	18,579	61,734	10,573	57,639	66,272	39,457
B-W/Cinn. Teal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,346	623
Black-bellied W.D.	-	-	-	-	-	-	-	604	-	-	-	2,398	-	-	-	200
Fulvous W.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL DABBLERS	467,083	573,073	982,644	613,238	846,631	856,578	493,541	689,720	493,144	446,754	541,247	642,854	373,734	1,069,066	885,833	665,009
Canvasback	6,650	1,431	1,717	6,725	11,090	2,432	4,865	4,380	-	3,148	-	4,158	18,890	5,256	28,378	6,607
Redhead	3,772	12,405	13,164	4,149	2,861	4,436	10,875	8,582	582	286	-	20,471	755	2,718	1,699	5,212
Scaup	10,322	10,780	27,474	35,058	32,912	6,728	22,037	3,323	-	12,736	5,438	5,117	1,661	15,888	27,188	14,557
Ring-necked Duck	28,683	57,146	127,356	51,944	40,496	62,962	62,247	76,732	33,597	55,808	27,642	70,050	62,231	65,071	161,502	65,571
Bufflehead	99	2,289	2,718	5,151	6,725	2,575	858	604	971	429	906	799	-	2,175	2,039	1,889
Goldeneye	-	-	-	-	715	-	715	-	-	-	-	-	-	-	-	52
Ruddy Duck	-	-	-	-	143	286	715	-	-	-	-	-	906	-	509	171
TOTAL DIVERS	49,526	84,051	172,429	103,742	94,298	81,419	101,597	85,039	35,150	72,407	33,986	100,595	84,433	90,808	221,415	94,060
TOTAL DUCKS	516,609	657,124	1,155,073	716,980	940,929	937,997	595,138	774,759	528,294	519,161	575,233	743,449	456,167	1,159,874	1,107,248	759,069

Attachment 10. Rolling Plains Midwinter Duck Estimates, 1997–2011.

Midwinter Duck Estimates from The Rolling Plains																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year average
Mallard	39,432	80,048	141,455	89,362	123,755	53,387	230,961	61,158	234,703	250,685	NS	200,598	108,757	90985	214629	137,137
Mottled Duck	-	-	-	-	-	-	-	-	-	-	NS	-	-	-	-	0
Pintail	7,004	52,160	719	33,529	25,326	6,043	101,306	18,275	10,360	104,580	NS	55,978	51,796	29,467	73,479	40,716
Gadwall	29,262	7,855	14,102	44,321	42,019	76,123	65,619	123,755	50,077	196,686	NS	122,604	95,988	78,074	75,872	73,026
Wigeon	16,502	22,449	9,929	86,916	34,824	70,799	203,908	77,994	128,216	110,220	NS	101,738	85,213	265,514	50,239	90,319
Shoveler	7,100	1,439	2,590	1,151	12,951	2,590	863	15,109	14,246	31,272	NS	15,685	23,999	2,582	341	9,423
Wood Duck	480	6,056	1,726	287	287	863	575	143	-	684	NS	288	607	1,879	991	991
G-W Teal	4,701	22,857	11,080	28,636	1,582	11,943	16,980	15,397	37,126	71,087	NS	100,299	85,517	20,809	31,784	32,843
B-W/Cinn. Teal	-	-	-	-	-	-	-	-	-	-	NS	-	-	303	-	22
Black-bellied W.D.	-	-	-	-	-	-	-	-	-	-	NS	-	-	-	-	0
Fulvous W.D.	-	-	-	-	-	-	-	-	-	-	NS	-	-	-	-	0
TOTAL DABLERS	104,481	192,864	181,601	284,202	240,744	221,748	620,212	311,831	474,728	765,214	NS	597,190	451,280	488,341	448,223	384,476
Canvasback	576	5,246	1,726	575	2,590	-	1,295	2,158	575	342	NS	7,339	4,860	12,911	2,392	3,042
Redhead	1,439	12,466	6,043	1,439	1,439	1,151	1,151	287	4,748	-	NS	4,605	9,265	3,037	4,613	3,692
Scaup	5,757	19,061	143	15,397	13,526	8,346	16,280	863	10,936	5,126	NS	31,227	25,214	66,138	5,810	15,200
Ring-necked Duck	9,114	75,857	41,155	60,582	34,680	37,414	35,111	53,963	101,738	18,968	NS	87,924	68,201	96,390	63,665	55,939
Bufflehead	1,439	9,593	7,914	7,914	9,209	8,036	4,460	2,302	1,726	1,538	NS	1,151	3,037	1,974	341	4,331
Goldeneye	-	-	-	-	-	-	-	-	575	342	NS	2,015	303	-	-	282
Ruddy Duck	-	-	-	-	-	-	287	-	-	-	NS	-	-	-	-	22
TOTAL DIVERS	18,325	122,223	56,981	86,626	61,444	54,947	58,564	59,573	120,298	26,316	NS	134,261	110,880	168,450	76,211	82,507
TOTAL DUCKS	122,806	315,087	238,582	370,828	302,188	276,695	678,776	371,404	595,026	791,530	NS	731,451	562,160	656,791	524,434	466,983

Attachment 11. Piney Woods Midwinter Duck Estimates, 1997–2011.

Midwinter Duck Estimates from The Piney Woods																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year avg
Mallard	49,493	15,559	110,779	44,754	19,497	32,938	17,724	14,032	16,986	22,599	23,485	14,475	9,010	31,314	41,062	30,914
Mottled Duck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Pintail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	738	49
Gadwall	5,656	13,392	1,312	93,645	42,539	15,509	18,167	12,850	3,692	19,349	25,405	5,170	8,419	15,657	62,036	22,853
Wigeon	5,858	2,166	21,827	9,010	1,477	3,988	-	2,263	1,477	295	3,545	-	-	11,964	12,554	5,095
Shoveler	-	-	5,415	-	1,772	590	-	1,181	-	-	-	-	591	-	2,215	784
Wood Duck	7,676	4,431	6,564	4,135	4,431	2,067	1,033	3,940	738	2,511	295	3,397	1,624	9,896	18,167	4,720
G-W Teal	2,020	295	656	5,908	443	1,477	-	1,033	-	3,693	3,397	-	-	3,693	9,453	2,138
B-W/Cinn. Teal	-	-	9,682	-	-	-	-	-	-	-	-	-	-	-	-	645
Black-bellied W.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Fulvous W.D.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL DABLERS	72,700	37,841	156,234	159,452	72,160	58,571	38,927	37,203	24,898	48,448	68,134	25,050	21,653	72,524	146,225	68,801
Canvasback	-	-	10,011	7,385	-	58,639	5,169	-	-	739	-	-	-	-	147	5,473
Redhead	-	2,461	4,102	-	-	-	-	-	-	-	-	-	-	-	-	438
Scaup	303	3,446	3,446	6,499	5,612	-	7,385	1,477	4,874	-	-	-	-	6,204	-	2,387
Ring-necked Duck	15,656	7,090	9,354	6,646	6,794	12,111	1,920	2,658	738	2,954	13,146	-	12,702	14,475	25,700	8,796
Bufflehead	-	-	-	1,477	-	-	-	295	-	295	-	-	-	-	147	148
Goldeneye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Ruddy Duck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL DIVERS	15,959	9,551	26,913	22,007	12,406	70,750	14,474	4,430	5,612	3,249	13,146	739	12,702	20,679	25,984	17,241
TOTAL DUCKS	88,659	47,392	185,147	181,459	84,566	129,321	53,401	41,633	30,510	51,697	71,280	25,789	34,355	93,203	172,219	86,042

Attachment 12. Brush Country Midwinter Duck Estimates, 1997–2011.

Midwinter Duck Estimates from The South Texas Brush Country															
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	14-year avg
Mallard	782	14,665	19,065	3,373	6,599	10,999	5,426	146	-	293	1,760	-	8,095	15,105	6,165
Mottled Duck	-	733	3,959	586	4,253	5,573	2,786	293	293	5,426	5,573	4,546	7,743	17,305	4,219
Pintail	25,226	7,186	10,852	41,944	73,915	10,266	50,597	36,077	2,640	27,425	50,744	38,424	4,223	42,824	30,167
Gadwall	94,647	94,887	117,619	77,875	83,155	157,510	180,389	182,296	124,806	64,236	293,170	102,660	97,146	162,350	130,910
Wigeon	18,284	22,145	25,371	64,236	70,102	72,889	103,247	108,673	22,732	17,012	51,184	51,917	9,503	29,478	47,627
Shoveler	8,017	10,266	13,199	18,332	27,131	8,946	20,972	21,412	45,757	10,119	8,653	25,958	61,244	19,358	21,383
Wood Duck	1,173	-	-	-	-	-	-	-	-	-	-	-	-	-	90
G-W Teal	8,017	10,266	9,239	11,732	10,706	2,346	7,186	20,678	3,813	11,293	57,197	15,985	23,582	57,636	17,834
B-W/Cinn. Teal	195	9,386	293	-	439	72,449	64,089	67,169	-	11,879	6,600	4,839	1,759	5,866	17,497
Black-bellied W.D.	1,075	-	-	-	-	10,266	14,665	8,066	-	-	81,102	-	-	-	8,227
Fulvous W.D.	-	-	-	-	-	1,173	-	19,505	-	-	-	-	-	-	1,477
TOTAL DABBLERS	159,414	171,533	201,597	220,079	278,302	354,420	451,361	466,320	202,048	149,690	557,991	246,338	215,305	349,922	287,451
Canvasback	293	-	-	1,173	723	-	-	-	10,266	-	440	-	-	-	921
Redhead	1,759	879	-	1,906	3,519	7,332	-	-	18,332	-	-	-	351	-	2,434
Scaup	195	1,026	8,506	10,119	19,212	48,837	37,251	27,425	6,306	6,013	2,933	10,559	2,815	20,238	14,388
Ring-necked Duck	10,266	5,279	-	14,665	2,199	12,769	19,945	57,050	147	32,705	60,277	7,332	23,934	22,145	19,193
Bufflehead	-	-	-	13,639	1,759	-	-	-	-	-	-	-	-	-	1,100
Goldeneye	-	-	-	-	1,759	-	-	-	-	-	-	-	-	-	126
Ruddy Duck	97	-	-	586	-	-	-	-	-	-	-	-	703	-	99
TOTAL DIVERS	12,610	7,184	8,506	42,088	29,171	68,928	57,196	84,475	35,051	38,718	63,650	17,891	27,803	42,383	38,261
TOTAL DUCKS	172,024	178,717	210,103	262,167	307,473	423,348	508,557	550,795	237,099	188,408	621,641	264,229	243,108	392,305	325,712

Attachment 13. Statewide Midwinter Duck Estimates, 1997–2011

State Wide Midwinter Duck Estimates																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year avg
Mallard	405,500	508,092	961,252	532,690	649,348	568,376	610,107	360,621	718,462	793,776	1,301,969	835,534	453,426	666,531	582,587	663,218
Mottled Duck	43,314	48,042	34,297	30,639	15,035	25,076	24,797	23,734	31,389	18,396	38,218	27,470	25,324	23,314	39,458	29,900
Pintail	895,550	909,293	1,815,066	121,037	315,144	472,719	696,975	648,029	551,692	830,578	647,282	913,956	539,933	387,571	418,810	677,629
Gadwall	510,858	672,263	628,922	493,258	552,690	513,248	569,914	941,245	586,763	842,898	651,534	1,017,487	681,467	774,912	745,037	678,833
Wigeon	90,712	225,775	214,305	189,667	175,164	277,868	439,295	311,638	337,288	215,010	156,024	268,835	245,033	402,468	207,996	250,472
Shoveler	123,915	132,046	165,812	23,596	148,622	114,312	164,324	161,279	93,171	122,386	90,253	109,580	95,848	193,803	130,459	124,294
Wood Duck	24,272	23,823	11,825	11,004	39,167	9,071	5,886	13,110	5,151	11,768	23,531	6,784	3,652	11,590	56,899	17,168
G-W Teal	764,915	576,374	752,168	95,887	205,054	432,385	165,377	424,497	218,371	488,090	464,260	1,245,029	670,523	351,055	287,234	476,081
B-W/Cinn. Teal	13,665	2,594	29,695	293	30,862	23,586	149,309	215,243	287,225	55,553	44,320	60,913	97,006	25,910	75,707	74,125
Fulvous W.D.	-	5,885	5,592	-	-	-	10,546	15,269	8,066	-	52,607	83,500	-	280	-	12,116
TOTAL DABBLERS	2,884,701	3,104,187	4,618,934	1,472,585	2,129,086	2,436,641	2,837,703	3,115,465	2,857,083	3,378,444	3,469,998	4,572,595	2,812,212	2,834,436	2,544,178	3,004,550
Canvasback	336,485	13,830	66,337	14,635	21,867	62,337	15,635	6,638	6,258	16,562	3,107	16,464	31,317	35,001	32,892	45,288
Redhead	19,518	271,042	561,574	5,588	255,492	515,535	358,927	126,318	360,634	456,308	35,637	223,018	153,405	35,846	206,919	239,051
Scaup	84,496	103,167	229,309	69,074	89,244	140,522	325,054	267,028	94,789	88,419	93,518	90,075	787,536	417,091	213,523	206,190
Ring-necked Duck	82,109	216,671	203,036	119,273	97,336	114,691	125,075	153,999	194,313	78,281	80,026	221,446	152,010	275,761	213,913	159,196
Bufflehead	7,983	14,837	18,183	14,542	43,461	20,294	8,404	7,179	33,372	23,305	3,536	9,525	17,205	32,258	11,417	17,700
Goldeneye	1,727	2,005	3,402	1,434	15,221	10,336	3,256	7,855	4,761	622	14,563	4,122	4,401	11,112	1,614	5,762
Ruddy Duck	5,540	1,460	5,287	30	2,973	2,250	2,965	2,859	2,083	69	-	2,946	34,294	1,965	2,192	4,448
TOTAL DIVERS	537,858	623,012	1,087,128	224,626	525,594	865,965	839,316	571,576	696,210	663,567	230,387	567,596	1,180,168	809,034	742,470	677,634

Peak Values

Attachment 14. Statewide Midwinter Goose Estimates, 1997–2011.

Midwinter Goose Estimates																
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	15-year avg
Coastal																
White-Fronted	296,341	289,680	330,235	-	98,656	231,610	130,605	31,437	42,224	43,622	69,904	28,738	28,617	51,715	69,311	124,478
Canada	30,355	68,148	125,321	-	27,993	157,119	8,417	4,793	3,775	157	9,142	1,978	2,550	7,010	3,215	32,141
Light Geese	1,681,950	1,663,627	1,010,689	-	652,861	535,187	363,847	469,975	404,990	399,240	558,494	299,661	362,980	431,348	631,753	676,186
Total Geese	2,008,646	2,021,455	1,466,245	-	779,510	923,916	502,869	506,205	450,989	443,019	637,540	330,377	394,147	490,073	704,279	832,805
High Plains																
White-Fronted	383	8,030	3,101	-	-	-	-	-	-	-	-	-	13	1	-	2,306
Canada	338,984	315,582	345,652	97,145	70,567	89,981	65,429	71,791	93,136	106,424	99,906	121,127	116,947	207,658	209,530	156,657
Light Geese	40,368	27,666	156,569	63,197	29,112	35,688	58,660	71,675	54,137	68,316	110,632	95,398	74,668	78,840	93,365	70,553
Total Geese	379,735	351,278	505,322	160,342	99,679	125,669	124,089	143,466	147,273	174,740	210,538	216,525	191,628	286,499	302,895	227,979
Rolling Plains																
White-Fronted	-	-	-	-	-	725	35,250	26,600	-	56,000	32,095	10,040	7,660	44,900	43,950	28,580
Canada	-	-	108,213	37,414	3,207	74,791	144,975	86,515	72,239	126,751	161,565	121,820	32,217	79,710	66,350	85,836
Light Geese	-	-	-	-	-	3,555	13,056	4,865	896	18,500	8,427	11,865	635	10,520	13,720	8,604
Total Geese	-	-	108,213	37,414	3,207	79,071	193,281	117,980	73,135	201,251	202,187	143,725	40,512	135,130	124,020	112,240
Oakwoods/Blackland																
White-Fronted	-	-	-	-	211	2,289	-	-	-	-	-	-	-	-	-	1,250
Canada	1,588	-	-	-	850	29,048	286	11,479	-	-	-	-	-	-	62	7,219
Light Geese	-	-	126,784	-	7,300	500,698	-	-	10,700	100	1,600	-	100	3,000	14,150	73,826
Total Geese	1,588	0	126,784	-	8,361	532,035	286	11,479	10,700	100	1,600	-	100	3,000	14,212	54,534
Statewide Totals	2,389,969	2,372,733	2,206,564	197,756	890,757	1,660,691	820,525	779,130	682,097	819,110	1,051,865	690,627	626,387	914,702	1,145,406	1,149,888



Life's better outside.®

4200 Smith School Road
Austin, Texas 78744
www.tpwd.state.tx.us

TPWD receives federal assistance from the U.S. Fish and Wildlife Service and other federal agencies and is subject to Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and state anti-discrimination laws which prohibit discrimination the basis of race, color, national origin, age, sex or disability. If you believe that you have been discriminated against in any TPWD program, activity or facility, or need more information, please contact Civil Rights Coordinator for Public Access, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Mail Stop: MBSP-4020, Arlington, VA 22203.