Two Rivers Ranch

Description

Two Rivers Ranch is a year round, highly managed sportsman's and recreational paradise, comprising of approximately 685 acres located at the confluence of the Blue and Red Rivers in Bryan County, Oklahoma. This property is located within the 1,300 acre Riverbend Ranch and is two hours from US 75 and Northwest Highway in Dallas, northeast of Bonham Texas. The property is very secluded and is bordered by two large ranches ,and one and one-half mile frontage on the Blue River and Red River.

The property is very diverse, consisting of approximately 75% of native hardwoods, river bottom terrain, deep ravine creeks, modest elevation changes, and wetland habitat. There are improved roads, jeep trails, 8 ft high game fence, 2 lakes, 8 shallow water duck marshes and 6 food plots.

Improvements

Lodge

There is a 3,200 sq. ft, block construction rock faced lodge. The Lodge is fully furnished, has 4 bedrooms, 4 baths, a large great room, bar area, large kitchen, gun room, card room and pool table room. It was furnished and decorated by the former owner of Anteks furniture store based in Dallas. At the rear of the lodge is a 700 sq. ft. newly constructed rock deck with fire pit. The Lodge is nestled within mature hardwoods and overlooking the scenic Blue River. It has been properly maintained and improved.

Garage

Near the Lodge is a newly renovated 2 car garage with electricity

Horse Barn

There is a 7 stall newly constructed horse barn. It also consists of a tack room and feed room. The barn is adjacent to a set of metal corrals and pens. In addition there is an adjacent 27 acre improved horse pasture for use.

Wildlife

With its close proximity to the river, the soils of the ranch are very productive which is the foundation for the abundance of wildlife that exists. Besides game animals there is an abundance of birds, coyotes, otters, bobcats, beavers, raccoons, armadillos, foxes, and the occasional bald eagle. The only hunting that has been performed in the last 10 years has been with family and friends.

Two Rivers Ranch

Whitetail Deer

The number one goal at the ranch has been improving the quality of the deer herd. After being under high fence for 7 years, and following most known management practices such as protein feeding, food plots, prescribed burning, minimum buck harvest, bow hunting, and heavy doe harvest, the owner wanted to achieve higher goals in the quality of the herd. To grow deer in the 200+ BC ranged it was important to radically change the management practices. First of all, the owner was successful in obtaining a highly sought after commercial hunting license with the State of Oklahoma. This License allows the owner to introduce new genetics to the property and while having full control of the amount and time to harvest deer. Essentially the deer have become a private herd, not the property of the State of Oklahoma. Currently there are only 42 ranches with this coveted permit in the state.

After the removal of the native deer, deer have been released with 300 Class B&C genetics. These deer were from three breeders in Oklahoma, Diamond T Whitetails, Circle P Whitetails www.circlepwhitetails.com and Double T Whitetails. These successful breeders have developed their herds from northern deer genetics and are members of www.WhitetailsofOklahoma , as is the owner.

Upland Birds

There is an approximate 75 acre open parcel along the Blue River that bird hunts are conducted. Pheasants, chukar and quail that are purchased nearby from a nearby supplier are released. The owner has used German Short Hair Pointers and Labs to hunt with. This bird hunting has been a favorite hunting experience with family and friends, allowing moderately easy, enjoyable and successful hunting. Several charitable and business hunts have been performed, while using the Lodge as accommodations.

In addition management practices have been followed to establish and maintain an excellent amount of native Eastern Turkeys. They have only been hunted once, but are enjoyed by their year–round presence.

Waterfowl

The southern portion of Oklahoma and Northeastern Texas is continuing to be a mecca for waterfowl. There are many Dallas member based waterfowl clubs nearby such as www.Pintailfarms.com .With consultation from Ducks Unlimited and U.S. Fish and Wildlife Service, 29 acres of shallow water wetlands were developed over the years. The owner has had incredible success in hunting waterfowl on these wetlands as well as the

Blue and Red River. Moist soil management practices have been followed on the 8 wetlands with proper piping and release valves (See attachment). Mallards are the primary duck, along with wooducks, pintails, gadwalls, teal and the occasional Canada Goose from the resident flock of 500 birds that reside in the immediate area. In addition, The Lower Bois d'arc Creek Reservoir consisting of 16,000 acres, located a few miles south near Bonham Texas, will be under construction in a few years, and will attract many waterfowl.

Fishing

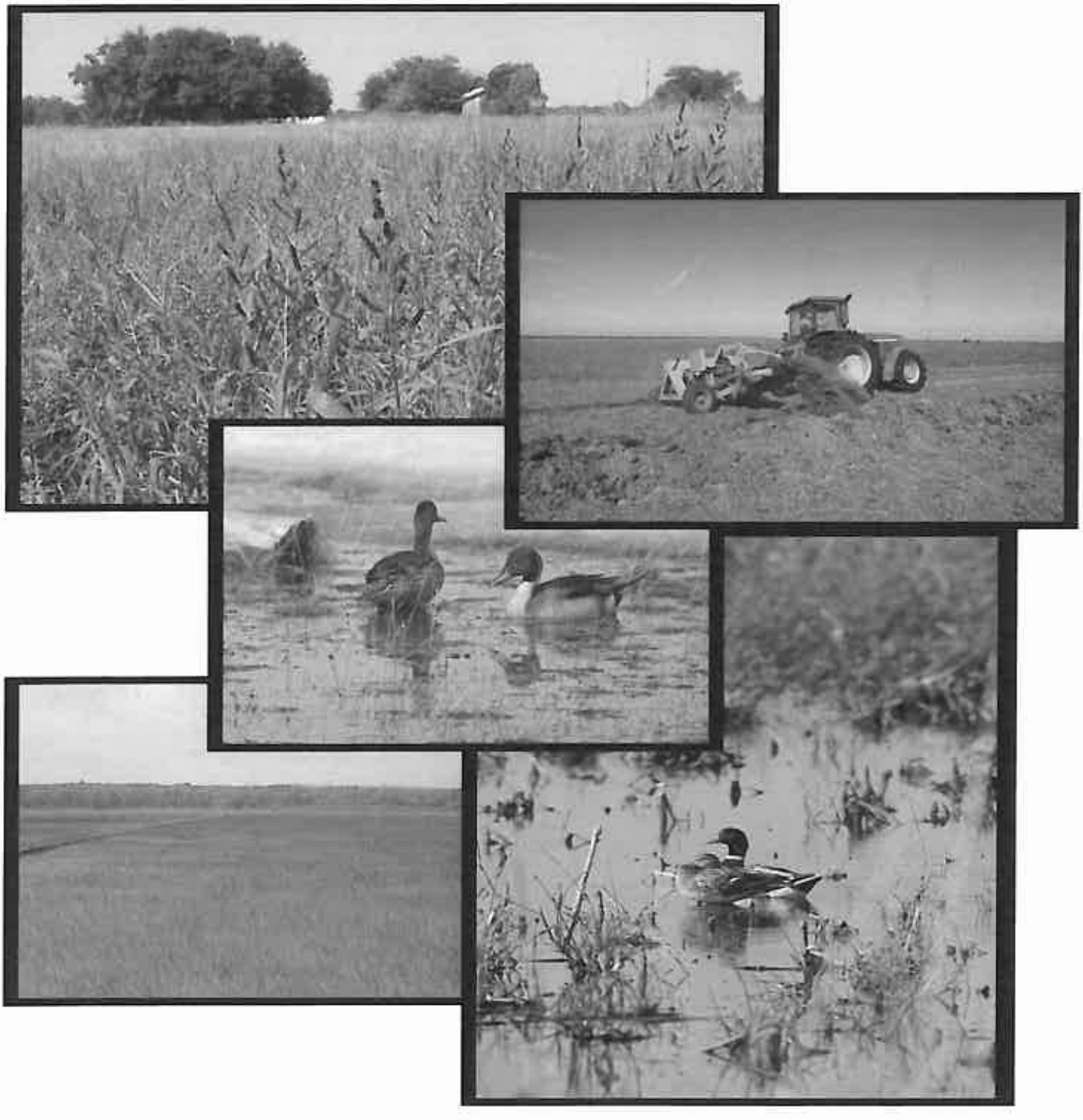
Excellent bass fishing is present with the introduction of bass in 2002 from the famed "ShareLunker" program of the State of Texas (See attachment) through a major donation to the Tyler Fish Hatchery in Texas for its construction. See attached Pedigree. This feat of having these bass is incredible since these fish are not available for purchase to the general public. The owner has "shocked" lakes on several occasions and follow proper management practices such as proper harvest, and forage fish feeding, to insure plentiful and healthy large mouth bass.

At the confluence of the Rivers many Blue, Flathead and Channel Catfish have been caught along with carp and alligator gar

Management

A wonderful family lives on and operates the day-to-day management of the neighboring Riverbend Ranch. The owner of Two Rivers could use the services of the Adams on a reasonable hourly basis, without having to provide the housing, utilities, gas, vehicles that are provided at Riverbend. Greg and Lisa work as a team in performing the tasks and are passionate about the property and truly enjoy being there. They are very accommodating and versatile and can practically do anything. In addition the owner of Riverbend has accumulated much machinery, vehicles and equipment. The owners of Two Rivers could use on a reasonable basis, rather than having to purchase their own. Since the Lodge is fully furnished all someone would need is some personable vehicles and or atv's.

Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service Southeast Region



Moist-Soil Management Guidelines

for the

U.S. Fish and Wildlife Service

Southeast Region

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Division of Migratory Birds
Southeast Region
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TABLE OF CONTENTS

LIST OF TABLES AND FIGURE

LIST OF APPENDICES

Introduction

Moist-soil impoundments provide plant and animal foods that are a critical part of the diet of wintering and migrating waterfowl and have become a significant part of management efforts on many refuges and some private lands projects. Preferred moist-soil plants provide seeds and other plant parts (e.g., leaves, roots, and tubers) that generally have low deterioration rates after flooding and provide substantial energy and essential nutrients less available to wintering waterfowl in common agricultural grains (i.e., corn, milo, and soybeans). Moist-soil impoundments also support diverse populations of invertebrates, an important protein source for waterfowl. The plants and invertebrates available in moist-soil impoundments provide food resources necessary for wintering and migrating waterfowl to complete critical aspects of the annual cycle such as molt and reproduction.

The purpose of these guidelines is to provide the moist-soil manager on national wildlife refuges in the Southeast Region with some basic information that can be used to manage and evaluate moist-soil management units for wintering waterfowl foraging habitat. The basis for much of the information presented is from the *Waterfowl Management Handbook* [Cross, D.H. (Compiler). 1988. Waterfowl Management Handbook. Fish and Wildlife Leaflet 13. United States Department of the Interior, Fish and Wildlife Service. Washington, D.C.] and supplemented with the observations of the authors and personal experience of wetland managers working mostly in Louisiana and Mississippi. The guidelines are presented in nine sections, representing some of the most critical aspects of moist-soil management and evaluation: 1.) management objectives; 2.) moist-soil plant management; 3.) a list of plants by their relative foraging value to waterfowl; 4.) nuisance plant control; 5.) procedures for quantifying the foraging value of moist-soil units to migrating and wintering waterfowl; 6.) supplemental planting; 7.) flood schedule; 8.) integrating management for other wetland-dependent birds; and 9.) keeping records and reporting.

More detailed information on moist-soil plant management and foraging values for migrating and wintering waterfowl is presented in the *Waterfowl Management Handbook*, available on-line or as a CD available from the Publications Unit, U.S. Fish and Wildlife Service, Department of the Interior, 1849 C Street NW, MS 130 Webb Building, Washington, D.C. 202440 (FAX 703/358-2283). Several of the most pertinent articles in the *Waterfowl Management Handbook* are included in a publication titled *Wetland Management for Waterfowl Handbook* edited and compiled by Kevin Nelms in 2001 (most refuges and Migratory Bird biologists should have a copy of this handbook).

Management Objective

For moist-soil impoundments, the average foraging value varies tremendously depending on factors affecting food availability, production, and quality. Samples collected from a few selected refuge impoundments in the Lower Mississippi Valley

(LMV) from 2001 through 2004 using the sampling technique provided in APPENDIX 2 indicated moist-soil seed production ranged from 50 to almost 1,000 pounds per acre. A realistic goal should be to achieve at least 50% cover of "good" or "fair" plants as listed in APPENDIX 1 and/or produce a minimum of 400 pounds of readily available moist-soil seeds per acre in each impoundment, realizing some impoundments will be undergoing necessary or planned management treatments that will reduce waterfowl food production that year.

This moist-soil objective of 400 pounds per acre is at least partially derived from the Lower Mississippi Valley Joint Venture (LMVJV). In calculating the acreage needed to meet waterfowl foraging habitat objectives in the LMV, that Joint Venture established wintering waterfowl foraging habitat capabilities by habitat type. These capabilities are derived from the daily energy requirements of mallards (ducks) and represent the number of ducks that could obtain daily food requirements (duck use-days) from each acre of major foraging habitats, including various agricultural grains (harvested and unharvested), moist-soil habitat, and bottomland hardwoods (Table 1). In calculating the duck use-day value for moist-soil habitat, the LMVJV assumed an average of about 400 pounds per acre of native seeds were available to waterfowl.

Table 1. LMVJV waterfowl foraging capabilities by habitat type [expressed as duck use-days (DUD) per acre].[a]

Habitat type	DUD/acre
Moist-soil	1,386
Harvested crop	
Rice[b]	131
Soybean	121
Milo	849
Corn	970
Unharvested crop	
Rice	29,364
Soybean	3,246
Milo	16,269
Corn	25,669
Millet	3,292
Bottomland hardwood	
30% red oak	62
60% red oak	191
90% red oak	320

[a] From the LMVJV Evaluation Plan, page 15.

[b] From Stafford, J.D., R.M. Kaminski, K.J. Reinecke, and S.W. Manley. 2005. Waste grain for waterfowl in the Mississippi Alluvial Valley. Journal of Wildlife Management 69:in press.

Moist-Soil Plant Management

Moist-soil management is often referred to as more of an art than a science. However, through adaptive management and evaluation, moist-soil management is being science directed and, as such, positive results can be repeated. There is no easy formula for success across the southeast beyond the need to develop a **plan**; frequently **monitor** plant and wildlife responses; and **keep detailed records** of natural conditions, management actions, and plant and wildlife responses. The most important factors that determine plant responses to moist-soil manipulations are:

1.) amount of sunlight reaching the ground/plant;
2.) soil temperature;
3.) soil moisture;
4.) soil chemistry (pH, nutrients, etc.);
5.) seed bank; and
6.) successional stage of the plant community.

Sunlight. Moist-soil management involves managing early successional, herbaceous vegetation that typically requires full sunlight to maximize growth and seed production. Thus, moist-soil management should be focused in impoundments with little or no woody vegetation.

Soil temperature. Soil temperature, as it relates to the timing of the drawdown, has a great effect on the species of plants that germinate. Often the timing of the drawdown is presented in moist-soil management literature as early, mid-season, and late. These are relative terms that vary depending on location. In the *Waterfowl Management Handbook*, Chapter 13.4.6., "Strategies for Water Level Manipulations in Moist-soil Systems," Dr. Leigh Fredrickson describes early drawdowns as those that occur during the first 45 days of the growing season, late drawdowns as those that occur during the last 90 days of the growing season, leaving mid-season drawdowns as a variable length depending on the location and length of time between average first and last frosts. A description of soil temperature, moisture conditions, and expected plant response is provided in generic terms in Table 2 and are generally applicable regardless of your location.

Soil moisture. Maintaining high soil moisture (or true moist-soil conditions) throughout the growing season is key to producing large quantities of desired waterfowl food (e.g., smartweed, millet, sedge, sprangletop, etc.) on a consistent basis. A slow drawdown is an effective way to conserve soil moisture early in the growing season. In most cases, frequent, complete to partial re-flooding or flushing the impoundment throughout the growing season is desirable, followed by fall and winter shallow flooding to ensure food availability.

Table 2. A general description of soil temperature, moisture conditions, and expected plant response.

Drawdown date	Soil temperature	Rainfall	Evaporation	Expected plant response
early (first 45 days after average last frost)	cool to moderate	high	low	smartweed, chufa, spikerush, millet *(E. crusgalli)*
mid-season	moderate to warm	moderate	moderate to high	red rooted sedge, panic grass, millet *(E. colonum and walteri)*, coffeebean, cocklebur
late (last 90 days before average first frost)	warm	moderate to low	high	sprangletop, crabgrass, beggarticks
shallow flood through-out growing season				duck potato, spikerush

The importance of complete water control or the ability to flood and drain impoundments as needed cannot be overstated when managing moist-soil. This is not to say that moist-soil impoundments cannot be successfully managed without complete water control, but management options are certainly increased with the ability to flood and drain when necessary, especially if each impoundment can be flooded and drained independent of all other impoundments. Stoplog water control structures that permit water level manipulations as small as 2 inches provide a level of fine tuning that facilitates control of problem vegetation or enhancement of desirable vegetation. If 6-inch and 4-inch boards are used to hold water behind stoplog structures, 2-inch boards need to be available to facilitate water level management during drawdowns.

Without the ability to re-flood or irrigate an impoundment during the growing season as needed, it has been our experience that a better plant response is achieved by keeping water control structures closed to hold winter water and additional rainfall, allowing water to slowly evaporate through the growing season. The practice of opening structures to dewater the impoundment during the spring and leaving it dry all summer generally results in poor moist-soil seed production.

Another option for impoundments with partial water control is to conduct an early drawdown and then replace boards to catch additional rainfall that may or may not occur at a rate fast enough to compensate for evaporation and transpiration later in the summer. If adequate rainfall is received, this option can result in a plant community important to waterfowl (e.g., barnyard grass and smartweed). However, if inadequate rainfall results in moist-soil seed production well below desired levels, other options (e.g., disk, plant a crop, etc.) should be considered. Remember that, as a general rule, desirable moist-soil plants can tolerate more flooding than nuisance plants such as coffeebean and cocklebur, two plant species that can dominate a site to the point of virtually eliminating more preferred species within an entire impoundment.

Soil chemistry. Salinity and pH have significant influences on plant response to management actions but do not receive much attention in the literature. Both are factors that must be considered where applicable. Soil tests should be conducted to assess pH and other nutrient levels and provide recommendations for lime and fertilization to address soil deficiencies. Particularly in coastal impoundments, water with moderate levels of salinity can be used as a management tool by timing the opening of structures to irrigate or flood an impoundment to control salt-intolerant plants.

Seed bank. In most cases, seeds of preferred moist-soil plants remain abundant in the soil, even following years of intensive agricultural activity. Where there is concern about the lack of available seed, supplemental planting (see below) could be considered until an adequate seed bank develops.

Successional stage. Generally, the most prolific seed producers and, therefore, the most desirable plants for waterfowl are annuals that dominate early successional seral stage. Without disturbance, plant succession proceeds within a few years to perennial plants that are generally less desirable for waterfowl food production. It is necessary to set back plant succession by disking, burning, or year-round flooding every 2 to 4 years to stimulate the growth of annuals. If the manager does not have the ability to re-flood following disking, the ground is usually dry, creating conditions that favor a flush of undesirable plants (e.g., coffeebean and cocklebur). In an effort to keep from having a year of low food production, it may be necessary to rotate a grain crop (e.g., rice, corn, milo, millet, etc.) by force account or cooperative farming. Another alternative would be to disk, re-flood, and dedicate that impoundment to shorebird foraging habitat during fall migration. Shorebird foraging habitat can be created by maintaining the re-flood for at least 2-3 weeks to allow invertebrate populations to respond before initiating a slow drawdown from mid-July through October (at this time of the year evaporation may cause a drawdown faster than desired, requiring some supplemental pumping to keep from losing water/moisture too fast). Deep disking (24-36 inches) is a tool that has been used to set back succession and improve soil fertility. Whenever disking is used, it is preferred to follow with a cultipacker or other implement to finish with a smooth surface. Large clumps will result in uneven soil moisture as the tops of clumps dry much faster and create conditions more conducive to less desirable species, such as coffeebean and cocklebur.

Traditionally, soil disturbance occurs in the spring followed by a grain crop or other management action(s) (e.g., re-flooding) with the objective of good waterfowl food production that same year. Some units, or at least in wet springs, remain too wet to till until early summer and can be planted to a relatively quick maturing crop such as millet. In extreme cases, tillage is completed so late that foraging habitat is essentially foregone in that year to improve production of preferred moist-soil plants or crops the following year(s).

To maintain a dominance of annual plants, managers should set up a 2 to 4-year rotational schedule for disturbing moist-soil impoundments based on site specific objectives, capabilities, control of nuisance plants, and knowledge of the area. Simple examples include:

Year 1	early season drawdown followed by disking and either 1) planting a grain crop, 2) frequent flushing of water for moist-soil plant production, or 3) shallow re-flood and hold until late summer drawdown for shorebirds;
Year 2	slow drawdown in early/mid season keeping soil moist for as long in the growing season as possible; and
Year 3	either early season drawdown or maintain shallow water throughout growing season, if monitoring indicates a less than desirable plant response, then conduct a late summer drawdown for fall migrating shorebirds, then disk (an alternative would be to have a late summer drawdown for fall migrating shorebirds, then disk).

or

Year 1	maintain 12-inch depth until July 15, then allow water to drop with evaporation and hold a shallow flood until winter or release any remaining water on September 15 to disk if needed (encourages delta duck potato);
Year 2	early drawdown by March 1 then close structure to catch rainfall or pump to flush impoundment, monitor for coffeebean and overtop to control if necessary, flood October – December (encourages wild millet);
Year 3	maintain 36-inch depth through the growing season and winter until the following July (encourages recycling of plant debris by invertebrates and provides diving duck habitat);
Year 4	maintain 36-inch depth until July1, then stagger drawdown for shorebirds, pump as necessary to maintain mudflats, re-flood November 1 (provides fall shorebird habitat).

The 4-year rotation is a simplified version of the one used at the Cox Ponds moist-soil complex on Yazoo NWR. These scenarios may be modified to find rotation(s)/practices that best meet specific management objectives. Consistently acceptable moist-soil seed production requires intensive management by managers who are perceptive, flexible, and able to adjust quickly to various situations. To achieve best results, it is critical that plans be developed, plant and animal responses monitored, and records maintained and reviewed.

Moist-Soil Plants

Hundreds of plant species would be found in moist-soil units across the southeast if complete plant inventories were conducted. Some of these plants provide good food

value to waterfowl and some are of little or no value to waterfowl. A listing of some plants and relative food values for waterfowl is attached (APPENDIX 1: A Waterfowl Food Value Guide for Common Moist-Soil Plants in the Southeast). The plants on that list are given relative food values of good, fair, or none (little or no known value) as an arbitrary classification based on several plant guides and professional judgment.

Fortunately, impoundments on most refuges will be dominated by 25 or fewer species depending upon the successional stage of the plant community. Knowledge of those plants and their ecology is critical to successful moist-soil management. In meeting moist-soil objectives, the manager must be sensitive to plant species tolerance to dry or wet soil conditions, whether it can tolerate flooding, if it is an annual or perennial, its usefulness to waterfowl, etc. Species composition of a plant community is a product of past and current site conditions. The moist-soil manager must create the conditions necessary to produce and maintain the most valuable plants to waterfowl and other waterbirds.

Typically, preferred moist-soil plants are valued for the above-ground seed production. Plants such as duck potato and chufa provide valuable underground tubers that present a viable alternative. Promotion of these plant species can provide additional diversity to waterfowl/wetland habitats that should not be overlooked in developing and monitoring a moist-soil management program. David Linden reports that duck potato can be promoted in selected impoundments by maintaining a shallow-flooded (12 inches) condition through the growing season where tubers exist or tubers have been planted to colonize an impoundment. Once established, duck potato production typically increases for several years or until other plant species begin to dominate the site. Chufa tubers can reportedly be promoted by drying, shallow (2 inches) disking, and flushing an impoundment. Chufa tubers are commercially available and can be planted to colonize an impoundment (additional information is available in "Chufa Biology and Management," Chapter 13.4.18. in the *Waterfowl Management Handbook*).

Undesirable Plant Control

In "Preliminary Considerations for Manipulating Vegetation" (*Waterfowl Management Handbook*, Section 13.4.9., page 2), Drs. Leigh Fredrickson and Fritz Reid stated that,

> "'Undesirable' plants are not simply 'a group of plants whose seeds rarely occur in waterfowl gizzard samples.' Rather, plants that quickly shift diverse floral systems toward monocultures, are difficult to reduce in abundance, have minimal values for wetland wildlife, or out compete plants with greater value should be considered less desirable."

Coffeebean (a.k.a., *Sesbania*), cocklebur, and alligatorweed are three of the most prevalent undesirable species in actively managed moist-soil units in the southeast that can dominate a site to the point of virtually eliminating preferred species within an entire impoundment. Once these species germinate, they can be difficult to control.

Coffeebean, a legume, is a particularly common problem following disking, which scarifies seed otherwise lying dormant in the seed bank. Refuge Biologist David Linden (Yazoo NWR) has had good success controlling coffeebean by flooding over the top of young plants. It may take 10 days or more of flooding above the top of the coffeebeans before the apical meristem softens and the plants are killed depending on temperature. If coffeebean plants are not flooded early enough and grow ("stretch") to keep the top of the plant above the water surface, the water can be raised to kill the lateral meristems for some distance up the stem. After the impoundment is drained, the coffeebean can be mowed below the height of the surviving meristems to effectively eliminate the undesirable plants and encourage the growth of preferred plant species.

Cocklebur is a common product of late spring or early summer drawdowns (higher soil temperatures). It is a serious problem at St. Catherine Creek NWR where late spring/early summer floods from the Mississippi River do not recede from much of the refuge until June or July in some years. According to David Linden, cocklebur can be controlled using the flooding method described above for coffeebean. Eliminating cocklebur generally requires shorter flood duration than coffeebean and, even if the plant is not overtopped, growth can be arrested by flooding and allowing more moisture-tolerant plants to gain competitive advantage and mature.

Dr. Rick Kaminski reports that he will reverse steps in this control technique by first mowing and then flooding over the clipped stubble to kill coffeebean and other undesirable vegetation. Under either scenario, it is important to inspect the flooded undesirable plants and drain the water soon after they are killed. If the water is held too long after the undesirable plants are killed, the manager runs the risk of killing desirable plants in the impoundment, which then requires disking and flushing to stimulate germination of more seeds for a moist-soil crop or managing the area as a mudflat for shorebirds.

Alligatorweed is a common undesirable plant in some areas. Information collected by Migratory Bird Biologist Don Orr (retired), indicates that, in the more southerly portions of the region, alligator flea beetles are an effective control mechanism. (A source for beetles is Charlie Ashton, U.S. Army Corps of Engineers, Jacksonville, FL, phone: 904.232.2219.) Where alternate methods are needed, the best control method is to spray with glyphosate (other herbicides such as 2,4-D may also be effective) at the recommended rate. Two applications may be needed the first year and spot application to control residual plants thereafter. After spraying, the area can be disked and planted to a crop to achieve some food production. As an alternative,

biologists at Cameron Prairie NWR in southwest Louisiana have had some success in controlling alligatorweed by drying infested fields and disking or, if conditions require, water buffaloing (a.k.a., roller chopping) shallow-flooded fields, then draining. Note that, in southwest Louisiana, the water table remains high and fields rarely dry to the extent they do in non-coastal areas of the southeast.

"Tools" available to set back the plant community successional stage or to control problem vegetation include: maintaining moist soil conditions with irrigation throughout the summer, flooding/re-flooding, disking, water buffaloing, mowing, continuous flood, and spraying approved herbicides (APPENDIX 3). Disking can be highly effective tool for setting back plant succession and controlling woody plants (e.g., black willow and common buttonbush) but can stimulate coffeebean as well as be the vector for the spread of other undesirable plants. Mowing is an effective management tool, particularly for controlling dicots (e.g., coffeebean and cocklebur) and promoting monocots (e.g., millets and sedges) in fields dominated by early successional species. Herbicides are often the easiest and most effective method to control undesirable plant response. The manager should select the appropriate "tool" based on the objective, local effectiveness, and available resources.

Sampling Techniques

Plant species composition in moist-soil units should be monitored throughout the growing season. Cursory samples should be conducted at least weekly early in the growing season to detect undesirable plant response that can be addressed in favor of more desirable species. Later in the growing season, it is important to conduct quantitative samples of vegetation to determine if management objectives (e.g., 400 pounds of seed per acre) are being met, monitor plant response (spring, summer, and fall) to management actions, identify plant species composition, monitor vegetation trends, complete habitat evaluations for the current year, and develop habitat plans for the following year, etc. It is critical that management actions and plant response be recorded and archived in a format that others can understand so the successes can be replicated and failures avoided, data can be analyzed to establish long-term trends, and good, efficient management can be maintained following personnel changes.

A sampling strategy must be developed to gather the data needed within the available time. The following plant sampling recommendations are made for the purposes stated above. If more detailed information is needed, additional time will be required to collect the data. In some cases, other sampling methods may more efficiently/effectively meet stated objectives.
Seed estimator. One useful tool that can be used to quantify seed production is discussed in the *Waterfowl Management Handbook*, Chapter 13.4.5., entitled "A Technique for Estimating Seed Production of Common Moist-Soil Plants" (APPENDIX 2). That technique involves the collection of data from plants that occur in a 25 cm x 25 cm sample frame and use of regression analyses to calculate pounds per acre of seed produced by individual species and cumulatively across species for

the moist-soil unit. The software and other information needed to use the seed production estimator can be downloaded from the web address (or search for "seed estimation software"):
http://www.fort.usgs.gov/products/software/seedyld/seedyld.asp. This is a fairly simple program and data can be collected fairly quickly once the biologist gets familiar with the data needs. Drawbacks of this method is that regression formulas are only available for 11 plant species that are among the most common in moist-soil units and only for plants that produce seeds. Several users of this software have gotten unreasonably high seed estimates for red-rooted sedge (*Cyperus erythrorhizos*), bringing to question the reliability of the software for this species. Herbaceous plant parts, roots, and tubers are not considered in this methodology. A sample data sheet is attached to this guide (APPENDIX 4).

Plant densities. Visual estimates of the percent cover of the 5 or 6 most common species at each sample site in management units usually provide an adequate index of herbaceous plant composition for most moist-soil management needs. This information is most easily collected by estimating percent cover on a 0 to 100 percent scale within relatively small plots (e.g., 1-meter square or circular plots). Remember that dense herbaceous plant cover can be layered such that percent cover estimates could frequently exceed 100 percent. An alternative would be to estimate plant cover, by species, into classes, such as 0-5%, 6-25%, 26-50%, 51-75%, and >76%. Samples can be totaled and averaged by species. The line-intercept method (measured length of the line that each plant shades or touches) for determining plant cover of a unit can be used but data collection typically requires much more time.

Sampling schemes. It is preferred that two vegetation samples be collected each year. A sample should be taken one-third to nearly half way into the growing season to capture any early germinating species (e.g., spikerush) that could be gone and missed by a later, once-a-season vegetation sample. Another advantage of an early sample would be to allow time to plan and implement major management actions, such as herbicide treatments or disking and planting millet, to address developing problems and meet desired moist-soil production objectives.

A more comprehensive sampling and perhaps more critical sample effort should be done at least once, about two-thirds to three-fourths into the growing season. It is recommended that the sampling be conducted as described in "A Technique for Estimating Seed Production of Common Moist-Soil Plants" (APPENDIX 2) for estimating seed production and/or percent cover. It is recommended that, as a general rule, one sample be taken for every 2 acres in a moist-soil unit. Collecting 20 or 30 samples from across the entire moist-soil unit should account for variation and be adequate for most moist-soil work. Sample variability can be greatly reduced by conducting samples within homogeneous plant communities such that, if a moist-soil unit contains several distinguishable plant communities or zones, sampling should be conducted within each zone and analyzed independently. If time does not allow for sampling at this level of detail, the number of samples in each zone should be

representative of its cover extent within the unit. For example, if a 10-acre moist-soil unit has two recognizable plant zones one dominated by millet (4 acres) and a second dominated by cocklebur (6 acres), a sample design should be established to get 2 samples from the millet zone and 3 from the cocklebur zone. Properly done, a random-systematic sample design, where the first sample is randomly placed and subsequent samples are equally spaced across a sample area, should accomplish the sampling needs. If the unit is digitized in ArcView or updated program, random or random-systematic points can be easily generated. Care should be taken to not follow and sample along treatments such as disked paths. If this is a potential problem, sample points can be randomly generated in the office using ArcView and located in the field using a GPS. Further assistance can be obtained from Migratory Bird Field Offices.

Vegetation sampling is important but can get time consuming. The number of samples is almost always a compromise between sample validity (representing what is actually there) and time and money constraints. Those conducting the field work usually have a good feel if the results accurately represent what is in the moist-soil unit. If time prevents sampling as described above, it is always better to collect and archive data at 5 to 10 properly spaced plots than not to collect data at all.

Management implications. Sample results should be used to determine if moist-soil objectives are being met and to help determine which, if any, management actions are necessary. It is recommended that seed production be at least 400 pounds per acre and/or "good" and "fair" plants (APPENDIX 1) comprise at least 50 percent of the cover estimate for the unit. If these objectives are not being met, then some alternative management action needs to be implemented. For example, suppose seed production (or percent cover of good plants) has been declining in a unit from 900 pounds of seed per acre 2 years ago to only 350 pounds per acre this year. Or, the percent cover of "good" and "fair" plants has similarly dropped from 85 percent to 40 percent with an increasing amount of perennials dominating the site, it is likely that the timing of drawdown and some mechanical disturbance (e.g., disking) needs to be scheduled for the following growing season. If the unit is really poor (seed production had fallen to 75 pounds per acre and only 20 percent cover of "good" or "fair" plants), consideration should be given to immediate mechanical disturbance followed by planting a grain crop or re-flooding and late summer drawdown for shorebirds. Either action would increase management options and productivity the following year.

Supplemental Planting

Rice, milo, corn, and millet are high-energy foods and the top choices as grain crops for ducks. It is important to select varieties and planting methods that will encourage quick germination and successful competition with the native plants. Most grain crops will produce much more acceptable results if nitrogen is added. Extension agents and agricultural experiment stations are good sources of information for

varieties of grains and fertilization rates that will produce the best results in your area.

Rice is susceptible to depredation, sprouting, and rots following wet, warm fall conditions but is particularly resistant to decomposition once flooded in winter. Cypress and Lamont are two rice varieties that germinate quickly. Soaking rice seed prior to planting will encourage rapid germination, and keeping the soil shallowly flooded (0.1 to 8 inches of water) or at least very moist will facilitate growth and survival. Failure to maintain these moisture conditions after germination and 4-6 inches of growth will result in poor rice production. With some flooding, the addition of about 60 pounds of nitrogen fertilizer per acre and minimal broadleaf weed control, refuge grown rice on Morgan Brake NWR produced an average of about 1,500 pounds of seed per acre in addition to a good crop of moist-soil plants including sprangletop, millet, spikerush, and toothcup. Food production far exceeded the 400-pound per acre target for moist-soil plants.

Milo and corn are more suited to dry fields and can generally be kept above the water surface after fall/winter flooding. Depredation can be a problem and seeds degrade rapidly once the kernels are flooded. Short varieties of milo (~2 ft in height) are recommended so water levels can be managed to facilitate waterfowl gleaning grain from standing milo stalks. Large dabbling ducks, such as mallard and northern pintail, can readily obtain seeds from standing milo plants. Midges can be a major problem with milo and should be controlled if possible. Corn with an understory of barnyard grass and various other grasses can provide quality waterfowl foraging habitat. This is a fairly common crop planted or left for waterfowl in Tennessee and Missouri and is gaining popularity on private lands in the Mississippi Delta.

Soybeans are generally considered a poor choice of waterfowl foods because they degrade rapidly after flooding and, like some other legumes, contain digestive inhibitors that reduce the availability of protein and other nutrients. Waterfowl will eat soybeans and derive about the same energy from beans as red oaks [R.M. Kaminski, J.B. Davis, H.W. Essig, P.D. Gerard, and R.J. Reinecke. 2003. True metabolizable energy for wood ducks from acorns compared to other waterfowl foods. Journal of Wildlife Management 67(3):542-550].

Millet is another commonly planted grain because it only takes about 60 days to mature, is adapted to perform well in conditions common in moist-soil units, and is highly desired by waterfowl. The short growing season make it a preferred crop following a mid-summer treatment (e.g., disking or drawdown) when it is unlikely that desirable moist-soil plants will dominate a site and mature. Browntop millet is recommended on slightly drier sites; Japanese millet is preferred on more moist sites. Barnyard grass is a wild millet present in most fields or impoundments and is commercially available (Azlin Seed, Leland, MS, 662.686.4507). This wild millet prefers moist to shallowly flooded conditions similar to rice or moist-soil plants discussed above. Improved varieties of barnyard grass are reportedly being developed.

If millets mature too early, they frequently shatter, germinate following early fall rains, and are virtually unavailable to wintering waterfowl. David Linden reports that on Yazoo NWR in central Mississippi a slow, mid-August drawdown will produce a wild millet crop with little competition from nuisance plants due to the shortened growing season. Once flooded, seeds of at least some species of millets deteriorate rapidly. The Natural Resources Conservation Service has reportedly developed Chiwapa millet. It is similar to Japanese millet but has a 120-day maturation period. Hence, it can be planted in mid-summer, and it will mature and not resprout as much as Japanese millet. A commercial source is Specialty Seed, Inc. (662.836.5740).

Flood Schedule

Migrating and wintering waterfowl are frequently found in the Southeast Region from August until May; however, September through early April is when key concentrations are most likely to occur. It is our responsibility to provide waterfowl habitat throughout that period and to match the amount of water and foraging habitat with the needs of waterfowl as dictated by migration chronology, local population levels, and physiological needs. It should also be kept in mind that the preferred water depth for foraging ranges from ½ to 12 inches. Food resources covered by more than 18 inches of water are out of the reach of dabbling ducks. These factors should be used to modify local flood schedules depending on the location of the moist-soil units.

In central Mississippi and much of the LMV, blue-winged teal begin arriving in August followed by several other early migrants. It is not until November or December when large numbers of ducks begin to accumulate, reaching peak numbers from mid-December through mid- to late January. Numbers remain high until early to mid-February when duck numbers steadily decrease until mid-March leaving relatively low numbers of late migrants. Blue-winged teal might linger until May.

Under this central Mississippi scenario (Table 3 and Figure 1), managers should flood about 5-10% of the impoundments by mid-August and hold until early November, increasing to 15-25% of the impoundments that should be flooded by late November. By mid-December, 50-75% of the impoundments should be flooded as waterfowl begin to accumulate in the area. Additional areas should continue to be flooded until mid- to late January when 100% of the area should be flooded. By mid-January, a slow drawdown should begin in those impoundments flooded earliest and/or scheduled for early drawdown to concentrate invertebrates for ducks that are beginning to increase lipid and protein reserves. The drawdown should continue such that only 80% of the impoundments are flooded by the end of January and only 20% are flooded in mid-March.

Typically, there is enough natural flood water available on and off of refuges for waterfowl after the hunting season and through the spring to meet those late

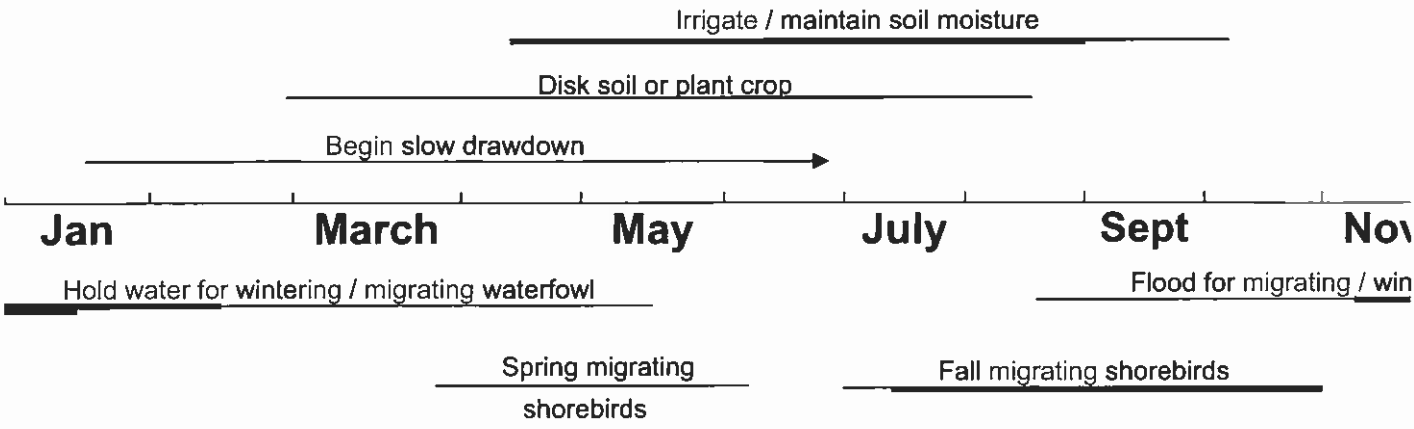
migration needs so the emphasis from this point forward should be on managing water levels in moist-soil impoundments for seed production the following year. No more than 10% of the impoundments should be purposefully flooded for waterfowl after April 15 unless it is a management strategy (e.g., mid- to late season drawdown) to either improve seed production for the following year or integrate habitat conditions for other wetland-dependent birds (e.g., shorebirds, wading birds, and secretive marsh birds). It is imperative that managers be familiar with the topography in impoundments so that optimal water depths can be factored into the recommendations expressed in Table 3 as percent of area flooded. (Note: As stated previously, impoundments that cannot readily be re-flooded or irrigated may have a better plant response by keeping water-control structures closed in spring and summer to allow water to slowly evaporate through the growing season.)

Table 3. Suggested flood schedule to provide migrating and wintering waterfowl foraging habitat at the latitude of central Mississippi. The timing of water management may change depending on latitude, objectives, and target bird species.

Date	Area flooded (%) and comments
Mid-August until early November	5-10%; maintain flood
Early November - late November	15-25%; increase flood to support arriving ducks
Late November - mid-December	50-75%; increase flood to support arriving ducks
Mid-December - late January	80-100%; slow drawdown on some impoundments after January 15
Early February – mid-March	20-80%*; decrease flood to concentrate invertebrates
After mid-March	Water management should focus on food production for the following year and spring and fall shorebird migration.

* After early to mid-February, it may be more important to adjust flood schedules in preparation for moist-soil production in subsequent years. This management decision should be based on the availability of alternate, post hunting season habitat in the general vicinity and location relative to migration chronology. Refuges farther north in the flyway may want to delay late season management actions (e.g., drawdowns) until March or April.

Figure 1. Conceptual timeline for moist-soil management actions for the latitu Mississippi. The timing of water management changes depending o objectives, and target species.



15

Integrating Management for other Wetland-Dependent Birds

Sites with wetland complexes comprised of a number of impoundments having independent water management capabilities provide the manager the luxury of implementing strategies that accommodate a variety of vegetation, water regimes, and waterbird guilds in the same year. Often slight variations in management actions can provide significant benefits to other wetland-dependent birds. Shorebirds migrate through the Southeast Region in the spring from March through May and in the fall from July through October. During migration they are seeking mudflat to shallowly flooded (<4" deep) areas varying in size from small pools for foraging to larger sites providing a minimum of 40-100 acres of suitable habitat for foraging and roosting. Vegetation must be absent or very sparse. Matching drawdowns on moist-soil impoundments to coincide with migration can provide habitat for impressive numbers of shorebirds. Shorebird habitat is generally considered to be much more limiting during fall migration and, therefore, higher priority than spring habitat in the LMV.

Moist-soil management can produce abundant crops of crawfish and other invertebrates, herps, and can trap small fish following flood events. Slow drawdowns are typically best for moist-soil management and tend to concentrate food for wading birds for an extended period of time. Standing water under wading bird rookeries is critical to limiting predation and enhancing nest success. Draining impoundments while wading birds are actively nesting is strongly discouraged, regardless of other management needs.

Secretive marsh birds (e.g., rails, gallinules, etc.) seek permanently flooded marsh habitats that are typically dominated by tall emergent vegetation (e.g., rushes and cattail). These plant communities generally represent the next seral stage succeeding desired moist-soil habitat conditions (annual plants). Where space or management opportunities/limitations allow, consideration should be given to managing some units for tall emergent vegetation, which also provides preferred habitat for numerous species of amphibians and reptiles, and wood duck broods. Rails require areas within marsh habitats that naturally dry during the summer for brood foraging. The drying marsh often produces desirable moist-soil plants.

Records/Reporting

It is important that records for each impoundment be kept through the year and include management objective, management actions, natural events/conditions (e.g., rainfall), water level, plant responses, plant composition (% cover) and seed production (weight), and wildlife responses. At the end of the season a **brief** narrative should be written summarizing these variables, responses, and recommended management actions. Include alternatives that might improve management of each unit in the future. If possible, a photographic record should also be maintained. All of this information can be mainta ined in a digital format and included in annual habitat management plans. This could be the most valuable source

of information a new manager/biologist will have to continue management of moist-soil units as personnel changes occur.

The LMVJV is in the process of developing a database link on their web site (LMVJV.org) for estimating seed production and calculating percent cover by wetland unit. The user will be able to also use that database for archiving management actions.

Conclusions

Moist-soil impoundments are a critical part of waterfowl management on refuges and have an established goal to produce at least 400 pounds of available seed per acre. Because moist-soil management is different in every location, it is not possible to produce a step-by-step listing of what the manager/biologist should do to maximize production on each moist-soil unit. However, it is critical that a plan be developed, plant and animal responses monitored, and records kept in a form usable by whoever is managing the unit, current staff as well as those that might be assuming those duties in the future. Intensive water management, regular soil disturbance, monitoring moist-soil plant responses and associated waterfowl use, controlling nuisance plants, and archiving of data are the keys to successful, consistent moist-soil seed production and waterfowl use of the impoundments. With a scientific approach and adaptive management, moist soil objectives can be consistently met or exceeded. In addition, knowledge and awareness of the habitat needs of other species often allows the moist-soil manager an opportunity to exercise management options that benefit other species groups while minimally affecting moist-soil seed production.

APPENDIX 1: A Waterfowl Food Value Guide for Common Moist-Soil Plants in the Southeast

A Waterfowl Food Value Guide for Common Moist-Soil Plants in the Southeast

Scientific Name	Common Name	Food Value
Acer spp.	maple[1]	Good (wood ducks)
Agrostis spp.	bent grasses	Fair
Alisma subcordatum	water plantain	Fair
Alopecurus carolinianus	foxtail	Fair
Alternanthera philoxeroides	alligatorweed	None
Amaranthus spp.	pigweed	Fair
Ambrosia artemisiifolia	common ragweed	Fair
Ammania latifolia	ammania	Fair
Ammannia coccinea	toothcup	Fair
Amorpha fruticosa	indigo bush	None
Andropogon virginicus	broomsedge	None
Apocynum cannabinum	indian hemp	
Arundiraria gigantea	cane, switch	None
Asclepiadacea currassavica	milkweed, scarlet	None
Asclepias spp.	milkweed	None
Aster spp.	aster, fall	None
Aster spp.	aster	None
Baccharis halimifolia	baccharis	None
Bacopa spp.	water hyssop, bacopa	Good
Bidens cernua	beggar ticks	Good
Bidens laevis	bur marigold	Good
Bidens spp.	beggar ticks	Good
Brasenia shreberii	watershield	Fair
Brunnichia cirrhosa	redvine	None
Calamagrostis cinnoides	reed grass	Good
Campsis radicans	trumpet creeper	None
Cardiospermum halicacabum	balloon-vine	None
Carex spp.	sedge	Good
Centella asiatica	centella	Fair
Cephalanthus occidentalis	buttonbush[1,3]	Fair
Ceratophyllum demersum	coontail	Fair
Chara spp.	muskgrass	Good
Chenopodium album	goosefoot	Good
Clethora alnifolia	sweet pepperbush	Fair
Cyperus erythrorhizos	flatsedge, redroot	Good
Cyperus esculentus	sedge, yellow nut	Good
Cyperus iria	rice flatsedge	Good
Cyperus spp.	flatsedge[3]	Good

Scientific Name	Common Name	Food Value
Decodon verticillatus	water loosestrife	None
Digitaria spp.	crabgrass	Good
Diodia virginiana	buttonweed	Fair
Distichlis spicata	saltgrass	Fair
Echinochloa colonum	jungle rice	Good
Echinochloa crusgalli	barnyardgrass	Good
Echinochloa spp.	millet	Good
Echinochloa walteri	millet, walter's	Good
Echinodorus cordifolius	burhead	None
Eclipta alba	eclipta	None
Elatine spp.	waterwort	Fair
Eleocharis obtusa	spikerush, blunt	Good
Eleocharis palustris	spikerush,common	Fair
Eleocharis parvula	spikerush, dwarf	Good
Eleocharis quadrangulata	foursquare	Good
Eleocharis spp.	spikerush	Good
Eleocharis tenuis	spikerush, slender	Fair
Elodea spp.	waterweed	Fair
Eragrostis spp.	love grass	Good
Erianthus giganteus	beardgrass, wooly	None
Erianthus giganteus	grass, plume	None
Erigeron belliadastrum	fleabane daisy	
Erigeron spp.	horseweed	None
Eupatorium capillifolium	dog fennel	None
Eupatorium serotinum	boneset	None
Fimbristylis spadicea	fimbristylis	Fair
Fraxinus spp.	ash[1]	Fair
Fuirena squarrosa	umbrella-grass	Fair
Gerardia spp.	gerardia	None
Helenium spp.	sneezeweed	None
Heteranthera limosa	mudplantain	None
Hibiscus moscheutos	marsh mallow	None
Hibiscus spp.	rose mallow	None
Hydrochloa spp.	watergrass	Fair
Hydrocotyle umbellata	pennywort, marsh	Fair
Hydrolea ovata	hydrolea	None
Hypericum spp.	st. johns wort	None
Ipomoea purpurea	morning glory	None
Ipomoea spp.	morning glory	None
Iva annua	sumpweed	None
Iva frutescens	marsh elder	None
Juncus effusus	rush, soft	None

Scientific Name	Common Name	Food Value
Juncus repens	rush, creeping	Fair
Juncus roemerianus	needlerush, black	None
Juncus spp.	rushes	Fair
Lachnanthes caroliniana	redroot	Good
Leersia oryzoides	rice cutgrass	Good
Lemna spp.	duckweed	Good
Leptochloa filiformis	sprangletop	Good
Leptochloa spp.	sprangletop	Good
Lippia lanceolata	frog fruit	None
Ludwigia spp.	seedbox	Fair
Ludwigia spp.	water primrose[2]	Fair
Lysimachia terrestris	loosestrife, swamp	None
Lythrum salicaria	loosestrife, purple[2]	PEST
Melilotus alba	white sweet clover	None
Mikania scandens	hempweed, climbing	None
Myriophyllum spp.	milfoil, water	Fair
Najas guadalupensis	naiad, southern	Good
Najas spp.	naiads	Good
Nelumbo lutea	american lotus	None
Nitella spp.	nitella	Fair
Nuphar luteum	yellow cow-lily	Fair
Nymphaea mexicana	banana water lily	Good
Nymphaea odorata (or tuberosa)	white waterlily	Fair
Obolaria virginica	pennywort	Fair
Oryza sativa	red rice	Good
Panicum dichotomiflorum	fall panicum	Good
Panicum spp.	grasses, panic	Fair to Good
Paspalum disticum	knotgrass	Fair
Paspalum spp.	paspalum	Fair
Paspalum urvillei	vasey grass	None
Peltandra virginica	arrow arum	Fair
Phalaris arundinacea	reed canary grass	
Phragmites communis	common reed	PEST
Plantago lanceolata	english plantain	None
Pluchea camphorata	camphorweed	None
Pluchea pupurascens	fleabane, saltmarsh	None
Polygonum coccineum	water smartweed	Fair
Polygonum hydropiperoides	water pepper	Fair
Polygonum hydropiper	water pepper	Fair
Polygonum lapathifolium	ladysthumb smartweed	Good
Polygonum pensylvanicum	penns. smartweed	Good
Polygonum spp.	smartweed	Fair/Good

Scientific Name	Common Name	Food Value
Polypogon monspeliensis	rabbits-foot grass	Fair
Pontederia cordata	pickerelweed	Fair
Populus spp.	cottonwood	None
Potamogeton pectinatus	pondweed, sago	Good
Potamogeton perfoliatus	redhead grass	Good
Potamogeton spp.	pondweed	Good
Proserpinaca palustris	mermaidweed	Fair
Quercus spp.	oak[1]	None
Ranunculus spp.	buttercup	Fair
Rhynchospora spp.	rush, beaked	Fair
Rotala ramosior	rotala	Fair
Rubus spp.	blackberry	None
Rumex spp.	dock, swamp	Fair
Ruppia maritima	widgeon grass	Good
Sabatia stellaris	marsh pink	None
Sacciolepis striata	gibbons panicgrass	Good
Sagittaria graminea	grassy arrowhead	Good
Sagittaria lancifolia	bulltongue	Fair
Sagittaria latifolia	arrowhead, duck potato	Fair/Good
Sagittaria longiloba	narrow leaf arrowhead	None
Sagittaria montevidensis	giant arrowhead	Good
Sagittaria platyphylla	delta duck potato	Good
Sagittaria spp.	arrowhead	Fair
Salicornia spp.	glasswort	Fair
Salix spp.	willow[1]	None
Saururus cernuus	lizard's tail	None
Scirpus americanus	bulrush, american (olneyi-three	Good
Scirpus confervoides	bulrush, algal	Fair
Scirpus cyperinus	woolgrass	None
Scirpus pungens	sword-grass	Fair
Scirpus robustus	bulrush, saltmarsh	Good
Scirpus spp.	bulrush	Fair
Scirpus spp.	bulrush, slender	None
Scirpus validus	bulrush, softstem[4]	Fair
Sesbania exaltata	sesbania[2]	Fair
Sesbania macrocarpa	sesbania[2]	None
Sesbania spp.	sesbania	None
Setaria spp.	foxtail	Good
Sida spinosa	prickly mallow (ironweed)	None
Solanum spp.	nightshade	None
Solidago spp.	goldenrod	None
Sonchus spp.	sowthistle	

Scientific Name	Common Name	Food Value
Sorghum halepense	johnson grass	
Sorghum vulgare	milo	Good
Sparganium spp.	burreed	Fair
Spartina cynosuroides	big cordgrass	None
Spartina patens	grass, cord (saltmeadow hay)	Fair
Sphenoclea zeylanica	goose weed	None
Spirodella spp.	duckweed, great	Good
Sporobolus spp.	dropseed	Fair
Triglochin striata	arrowgrass	Good
Tripsacum dactyloides	grass, gamma	None
Typha angustifolia	narrow-leaf cattail	None
Typha spp.	cattail	None
Utricularia spp.	bladderwort[5]	Fair
Vallisneria americana	wild celery	Good
Wolffia spp.	water meal	Good
Woodwardia aredata	fern, netted chain	None
Xanthium spp.	cocklebur[2]	None
Xanthium strumarium	cocklebur[2]	None
Xyris spp.	yellow-eyed grass	Fair
Zizania aquatica	southern giant rice	Fair
Zizania aquatica	wild rice, northern	Good
Zizaniopsis miliacea	wild rice, southern, giant cut-	Good

1. Woody plants typically undesirable in moist-soil units.
2. Can be undesirable.
3. When in abundant stands.
4. Tubers only.
5. With invertebrates present.

This guide was originally prepared by the Biologists' Group of the Roanoke-Tar-Neuse-Cape Fear Ecosystem of the U.S. Fish and Wildlife Service in September 2000. It was developed to assist them in standardizing waterfowl food values rankings for freshwater marsh/swamp vegetation. The original area the guide covered is northeastern North Carolina and southeastern Virginia. Several of the National Wildlife Refuges in this area complete annual vegetation transects in moist-soil impoundments and summarize these data to monitor vegetation response to various management actions. The ranking classifications were chosen arbitrarily as None, Fair, and Good. In an attempt to broaden the scope of the RTNCF Ecosystem efforts to the entire southeast, particularly the MAV, the Jackson Migratory Bird Field Office, with comments from biologists from the MAV, added numerous species and rankings to their list. Various published plants guides were consulted and professional judgment was used to assign the rankings. **This guide is considered a**

working guide and as new information becomes available, will be updated and redistributed. Please send comments and additions to Bob Strader, Migratory Bird Field Office, Jackson, MS 39213, 601-965-4903 x12 or e-mail: bob_strader@fws.gov.

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Toyota Sharelunker Program

History

The Toyota ShareLunker Program (formerly called Operation Share a Lone Star Lunker and sponsored by the Lone Star Brewing Company, Jungle Labs and Cajun Boats) was established in 1986 to promote catch-and-release of large fish and to selectively breed trophy largemouth bass. The first fish entered into the program was also a new state record, a 17.67-pounder caught from Lake Fork in November.

Search the Sharelunker Archives.

In 1993 the name of the program was changed to Share a Lunker, Inc., and it was merged with the Parks and Wildlife Foundation of Texas. Anheuser Busch was the official sponsor from 1996 to 2008, providing prizes for anglers and a specially equipped truck used to pick up and return lunkers. During that time the program was known as the Budweiser ShareLunker Program. The name was changed to the Toyota ShareLunker Program in 2009 when Toyota became the new sponsor.

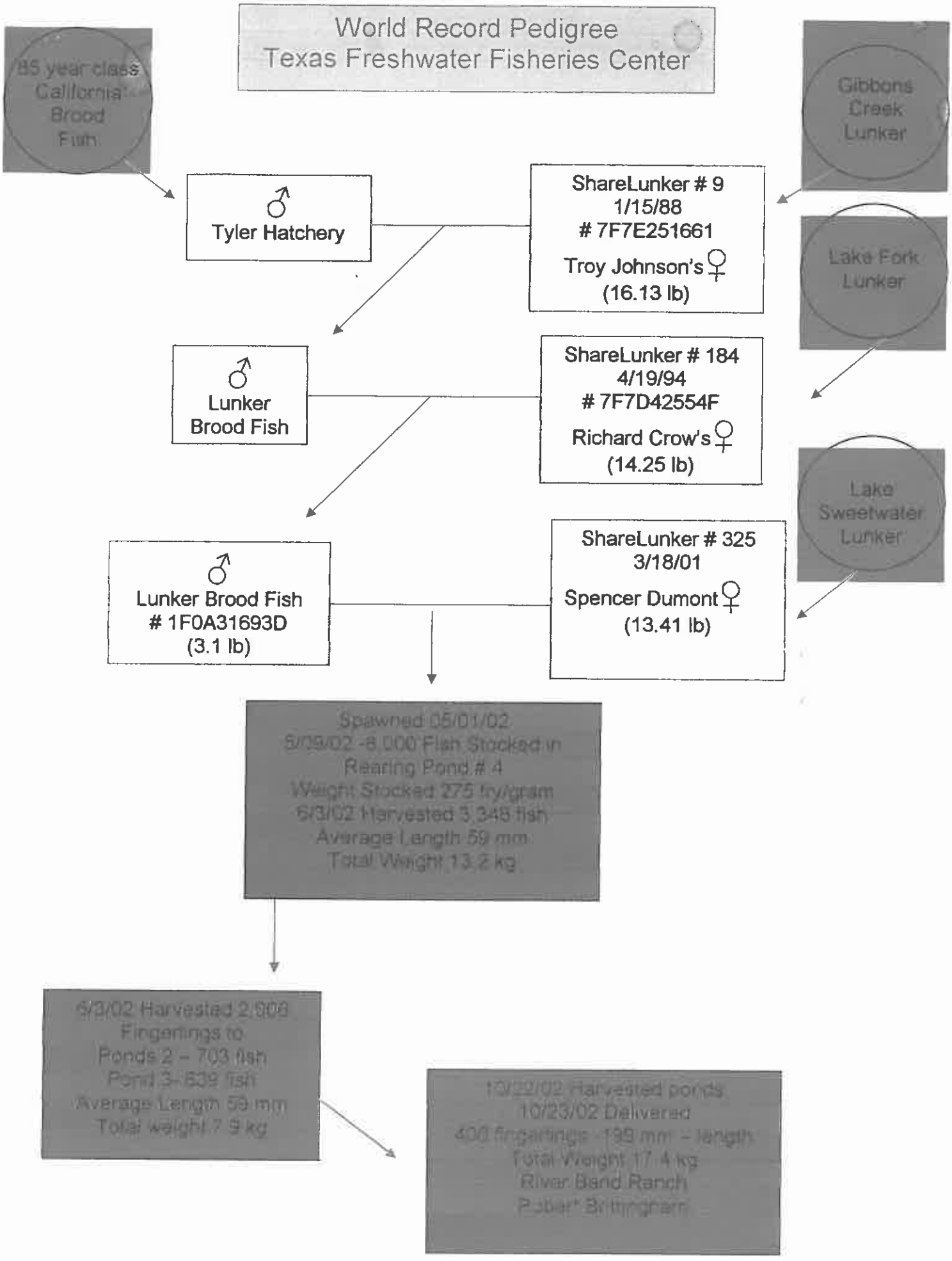
Since the program's inception, more than 400 largemouth bass have been donated from 55 public reservoirs and more than a dozen private lakes.

The House that Big Bass Built

As the program grew, it became obvious that the Tyler hatchery was inadequate, but there was no state money available to build a new hatchery, one tailored specifically to the needs of the program. It was decided to let cities bid to become the site and help raise the money for it.

Specifications called for the facility to be built within 50 miles of Lake Fork, because the majority of big fish are caught there. The Athens community pledged more than $4 million to win the bidding for the site, and the balance of the cost came from federal Sport Fish and Wildlife Restoration funds and donations. No state money was used for construction.

The Edwin L. Cox, Jr., Texas Freshwater Fisheries Center was built around the ShareLunker program. The Visitor Center complex, including the Lunker Bunker, was completed in 1996, and the exterior hatchery ponds went into operation in 1998.


World Record Pedigree
Texas Freshwater Fisheries Center
85 year class California Brood Fish
Gibbons Creek Lunker
Tyler Hatchery
ShareLunker # 9
1/15/88
7F7E251661
Troy Johnson's
(16.13 lb)
Lake Fork Lunker
Lunker Brood Fish
ShareLunker # 184
4/19/94
7F7D42554F
Richard Crow's
(14.25 lb)
Lake Sweetwater Lunker
Lunker Brood Fish
1F0A31693D
(3.1 lb)
ShareLunker # 325
3/18/01
Spencer Dumont
(13.41 lb)
Spawned 05/01/02
6/09/02 -8,000 Fish Stocked in
Rearing Pond # 4
Weight Stocked 275 fry/gram
6/3/02 Harvested 3,348 fish
Average Length 59 mm
Total Weight 13.2 kg
6/3/02 Harvested 2,909
Fingerlings to
Ponds 2 – 703 fish
Pond 3- 639 fish
Average Length 59 mm
Total weight 7.9 kg
10/22/02 Harvested ponds
10/23/02 Delivered
400 fingerlings - 139 mm - length
Total Weight 17.4 kg
River Bend Ranch
Robert Brittingham

These guidelines have been prepared to provide the moist-soil manager with some basic information that can be used to manage and evaluate moist-soil management units for wintering waterfowl foraging habitat. The contents are intended to improve moist-soil management on national wildlife refuges in the Southeast Region. The contents are not intended to be mandatory or to restrict the actions of any agency, organization, or individual. Literature citations and scientific names are purposefully kept to a minimum in the text. A listing of many common and scientific names of moist-soil plants is included in APPENDIX 1. References to seed sources are provided for information purposes only and do not represent an endorsement.

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As the program grew, it became obvious that the Tyler hatchery was inadequate, but there was no state money available to build a new hatchery, one tailored specifically to the needs of the program. It was decided to let cities bid to become the site and help raise the money for it.

Specifications called for the facility to be built within 50 miles of Lake Fork, because the majority of big fish are caught there. The Athens community pledged more than $4 million to win the bidding for the site, and the balance of the cost came from federal Sport Fish and Wildlife Restoration funds and donations. No state money was used for construction.

The Edwin L. Cox, Jr., Texas Freshwater Fisheries Center was built around the ShareLunker program. The Visitor Center complex, including the Lunker Bunker, was completed in 1996, and the exterior hatchery ponds went into operation in 1998.

Toyota Sharelunker Program

History

The Toyota ShareLunker Program (formerly called Operation Share a Lone Star Lunker and sponsored by the Lone Star Brewing Company, Jungle Labs and Cajun Boats) was established in 1986 to promote catch-and-release of large fish and to selectively breed trophy largemouth bass. The first fish entered into the program was also a new state record, a 17.67-pounder caught from Lake Fork in November.

Search the Sharelunker Archives.

In 1993 the name of the program was changed to Share a Lunker, Inc., and it was merged with the Parks and Wildlife Foundation of Texas. Anheuser Busch was the official sponsor from 1996 to 2008, providing prizes for anglers and a specially equipped truck used to pick up and return lunkers. During that time the program was known as the Budweiser ShareLunker Program. The name was changed to the Toyota ShareLunker Program in 2009 when Toyota became the new sponsor.

Since the program's inception, more than 400 largemouth bass have been donated from 55 public reservoirs and more than a dozen private lakes.

The House that Big Bass Built