Tennessee Wildlife Resources Agency

Deer Management in Tennessee

2019-2023

A Strategic Plan for the Systems, Processes, Protocols, and Programs Pertaining to the Management of White-tailed Deer in Tennessee

February 21, 2019

Tennessee Wildlife Resources Agency Authorization No. 328921, 100 copies, February 2019.
This public document was promulgated at a cost of $2.30 per copy.

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Special thanks are extended to the following partner agencies and stakeholder groups for engaging with TWRA during the planning process: Giles County Deer Hunters Association, TN Association of Soil Conservation Districts, TN Wildlife Federation, TN Department of Agriculture, US Fish and Wildlife Service, Quality Deer Management Association, Farm Bureau, TNDeer, University of Tennessee Cooperative Extension, Hendersonville Deer Depredation Committee, USDA Wildlife Services, The Nature Conservancy of TN, TN Forestry Commission, TN Cattlemen's Association, TN Tech University, TN Department of Agriculture, USDA Natural Resources Conservation Service, University of Tennessee, and TN State Parks.

Special thanks are also extended to the following individuals for providing expert input, time, energy, and/or support at various stages throughout the development of this plan: Dr. Dan Decker (Cornell University), Ann Forstchen and Cory Morea (Florida Fish and Wildlife Conservation Commission), Phil Seng and Dave Case (DJ Case & Associates), Steve Williams (Wildlife Management Institute), Pat Lederle (Michigan Department of Natural Resources), Brad Cohen (Tennessee Tech University) and the following TWRA staff: Jason Harmon, Don King, Melissa Raulerson, Joy Sweaney, and Jamie Feddersen.

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Our vision or Desired Future Condition is:

"White-tailed deer populations are managed within an adaptive framework utilizing scientifically valid information at the management unit level. Objectives for each unit balance biological and social carrying capacity by considering the values of stakeholders. Regular proactive engagement with stakeholders identifies significant changes in stakeholder values and/or social carrying capacity that may warrant adjustment of objectives within a unit."

Executive Summary

Beginning February 2016, we began a comprehensive strategic planning effort to develop a 5-year strategic plan for deer management in Tennessee. Early in the process, we identified a desired future condition (DFC) for the management system. The DFC is the TWRA's long-term vision for deer management in Tennessee. That is, successful implementation of this plan will make significant progress towards the following DFC:

"White-tailed deer populations are managed within an adaptive framework utilizing scientifically valid information at the management unit level. Objectives for each unit balance biological and social carrying capacity by considering the values of stakeholders. Regular proactive engagement with stakeholders identifies significant changes in stakeholder values and/or social carrying capacity that may warrant adjustment of objectives within a unit."

The foundation of the plan is its six major goals:

1. Science Goal: Monitor, predict, and evaluate impacts at the management unit scale with scientifically valid protocols.

2. Decision-making Goal: Make decisions using objective, transparent, and data-driven processes.

3. Support Goal: Develop programs that allow landowners/communities ability to address localized impacts.

4. CWD Goal: Minimize the threat of Chronic Wasting Disease.

5. Communication Goal: Foster increased understanding about deer with the public.

6. Resource Goal: Obtain adequate resources to implement this strategic plan.

The plan provides strategic guidance but does not list specific management outcomes (with the exception of the CWD Goal) because foundational components (e.g., geographic scale, key metrics, desired levels of precision, management alternatives, etc.) or systems (e.g., monitoring protocols, decision-making processes, etc.) have not been identified or are not yet in place. This plan focuses on building that critical foundation. Once we are successful in completing this plan, future plans will likely be more oriented towards specific management outcomes (e.g., reduce the deer population by a certain percent in a given managemnt unit by a certain date).

The following are the objectives for this plan:

- Develop experimental design and infrastructure for
- long-term monitoring of deer, deer habitat, and people
- Monitor human dimensions of deer in Tennessee
- Improve harvest monitoring system
- Model trends in deer population
- Assess amount of huntable deer habitat in each DMU
- and appropriate WMAs
- Explore opportunities for development of a DMU-scale habitat metric
- Develop an adaptive, transparent process for setting harvest management objectives in each DMU
- Identify a suite of management alternatives to be used in adaptive harvest management of DMUs
- Develop a standardized transparent process for setting harvest management objectives and corresponding suite of management alternatives for WMAs
- Establish process to tie together all components of setup phase of adaptive management
- Develop a program for guiding and assisting communities and/or homeowners with deer overabundance
- Revise SOP for guiding, assisting, educating, and permitting farmers experiencing negative impacts from deer
- Explore program that provides additional antlerless
- harvest opportunities for landowners or land managers
- Minimize risk of introduction into new areas
- Maximize the probability of early detection in other counties
- Maximize containment of CWD where currently endemic
- Develop and share information regarding deer biology, management, and hunting
- Increase internal and external stakeholder engagement
- Identify adequate funding for successful plan delivery
- Add or reallocate additional personnel and expertise for successful plan delivery
- Ensure resources, regulations, and procedures allow for efficient and effective enforcement of regulations by TWRA Wildlife Officers
- Explore opportunities to leverage citizen science to achieve objectives in Science Goal
- Provide continuing education opportunities for TWRA personnel

Introduction

The mission of the Tennessee Wildlife Resources Agency (TWRA) is "to preserve, conserve, manage, protect, and enhance the fish and wildlife of the state and their habitats for the use, benefit, and enjoyment of the citizens of Tennessee and its visitors."

White-tailed deer (Odocoileus virginanus) are a large and important part of this mission. This strategic plan is intended to guide the deer management program in Tennessee for the five-year period from 2019-2023.

Throughout development, we concentrated on ensuring that this plan would be "stakeholder-focused, science-based, and data-driven." In other words, we commit to seek an understanding of our stakeholder desires and then identifying, collecting, and analyzing scientific information to guide our management decisions.

Title 70 of Tennessee Code Annotated (TCA) provides the overall authority to the TWRA for all native wildlife (e.g., white-tailed deer, wild elk, etc.) and its management, conservation, protection and propagation. See more details on statutory authority in Appendix A.

History of Deer in Tennessee

Today, Tennessee has huntable white-tailed deer populations throughout the state; however this has not always been the case. Past troubles for the deer population in Tennessee have been traced back as far as 1896 when Rhoads, an early scientific writer, reported deer had been extirpated over the greater part of Tennessee (Schultz 1955).

As late as the 1940's, the deer population was fewer than 1,000 animals (Nichols 1978). Fortunately, successful restocking efforts in the 1930's through the 1980's and protective game laws have resulted in a deer population with an annual harvest now exceeding 160,000 animals.

Beginning in the 1930's, several agencies began deer restoration efforts on a few public lands in Tennessee. The Game and Fish Division of the Tennessee Department of Conservation, United States Forest Service, Tennessee Valley Authority, and the United States Navy restocked deer at this time. The TWRA, known then as the Tennessee Game and Fish Commission, began restocking public lands in 1949 and private lands in the mid-1950's. Roughly 9,000 deer were released in Tennessee by these agencies from 1940-1985. Deer were brought in from Michigan, Maryland, Wisconsin, North Carolina, Virginia, and Texas. Once adequate populations of deer were built from these initial stockings, in-state deer became the primary source for later restocking efforts (TWRA 1991).

After the deer population had rebounded sufficiently, the first limited deer hunting seasons were established in the 1940s on select public lands. Limited private lands hunting began in the 1950s (Nichols 1978). By 1990, all counties in the state were open to deer hunting (TWRA 1991). Currently, Tennessee has some of the most liberal deer harvest regulations and longest hunting seasons in the United States.

TWRA's restocking and management efforts have been highly successful. Of course, healthy and growing deer populations, which are a boon to hunters, wildlife viewers, and many sectors of the recreation industry, can also be a detriment to others through crop damage, auto collisions, tree/shrub damage, etc.

Balancing the deer population to fit the needs and desires of competing human interests is a high priority of the Plan, as indicated in the Desired Future Condition (DFC) statement (see executive summary).

We commit to seek an understanding of our stakeholder desires and then identifying, collecting, and analyzing scientific information to guide our management decisions.

About the Plan

This plan is organized in a top-down hierarchy of goals, objectives, strategies, and actions.

Goals: End result TWRA is trying to accomplish with this effort (at the 30,000-foot level).

Objectives: Specific things we need to accomplish to achieve the goal.

Strategies: Overall approach we will use to achieve objectives.

Actions: Specific things that must be accomplished to achieve strategies/objectives.

Acronyms

Acronyms are defined during their initial use in the body of the plan and provided here for quick reference.

ADC — Animal Damage Control
CWD — Chronic Wasting Disease
DFC — Desired Future Condition
DMAP — Deer Management Assistance Program
DMU — Deer Management Unit
DVC — Deer-Vehicle Collision
GIS — Geographic Information Systems
HD — Hemorrhagic Disease
NGO — Non-governmental Organization
PHA — Public Hunting Area
QDM — Quality Deer Management
SOP — Standard Operating Procedure
SMAT — Subject Matter Action Team
TCA — Tennessee Code Annotated
TDA — Tennessee Department of Agriculture
TFWC — Tennessee Fish and Wildlife Commission
TSE — Transmissible Spongiform Encephalopathy
TWRA — Tennessee Wildlife Resources Agency
USDA — U.S. Department of Agriculture
WMA — Wildlife Management Area

Science Goal

Monitor, predict, and evaluate impacts at the management unit scale with scientifically valid protocols

Sound scientific information is the cornerstone of TWRA's deer management program and this plan. To effectively manage the herd, we need current, reliable information from three broad categories:

1) deer population and harvest
2) stakeholder values
3) availability and quality of deer habitat.

If we achieve the Science objectives below, we will be able to effectively monitor deer population trends and harvest, predict changes in harvest in response to various management alternatives (e.g. season lengths, bag limits) that might be implemented, and develop techniques to assess potential impacts of deer populations on their habitat. In addition, we will know stakeholder desires, which will inform our management decisions.

Objective 1

Develop experimental design and infrastructure for long-term monitoring of deer, deer habitat, and people

The first step in gathering scientifically valid information is to design an effective "experiment." In this case, we want to know how various management actions might affect deer populations, deer habitat, and people (human dimensions).

STRATEGY 1.1 ESTABLISH KEY PROGRAM METRICS AND DESIRED LEVELS OF PRECISION

1.1(a) Develop criteria for metrics to be included in the program

As an example, Rosenberry et al. (2009) identified four criteria that must be met for a potential metric to be included in their deer management program. The four criteria were that data must be available for all management units, be representative of each unit, allow for comparison across units, and respond to changes in deer abundance. The criteria we identify may or may not mirror these.

1.1(b) Select program metrics based on specific criteria

Using the criteria from 1.1(a), we will select the metrics to monitor over time.

1.1(c) Establish desired levels of precision for metrics

Once program metrics have been identified that meet the established criteria, we will next decide on level of precision needed when estimating each metric. We need data we can be confident in while also balancing sample collection costs.

STRATEGY 1.2 ASSESS/ADJUST DEER MANAGEMENT UNITS

One of the foundational components of an adaptive harvest management framework is accurately delineating Deer Management Units (DMUs), which are the spatial units at which management alternatives will be applied and responses in program metrics (see 1.1 above) will be monitored. We must take great care in setting DMUs to ensure our metrics are generated at this scale repeatedly over time.

1.2(a) Identify spatial variation in breeding chronology

Recent studies by state wildlife agencies in the southeastern United States show that peak breeding varies substantially <u>within</u> states (Garrison et al. 2012, Stanford et al. 2015, Sumners et al. 2015). Therefore, developing spatially explicit estimates of peak conception is a critical first step in the delineation of DMUs.

1.2(b) Identify other datasets and constraints needed to identify DMUs

We will identify available datasets relevant to deer ecology and management (including measurements of impacts) to inform DMU delineation.

1.2(c) Delineate optimal DMUs

We will use GIS software and potentially other open-source software (Python, R, etc.) to create spatially explicit units that optimize similarity metrics in deer breeding chronology and the other covariates identified. Although different spatial optimization models may be used, We will select the model that best fits the identified constraints and the constraints within the datasets used. The optimization model will assess similarities in the management indicators to produce DMUs that are as contiguous as possible with no fragmentation (Kelly and Hurst 2016). **These DMUs will serve as the units for deer research, monitoring, and harvest management.**

STRATEGY 1.3 INVESTIGATE WAYS TO IMPROVE MONITORING PROTOCOLS

1.3(a) Evaluate assumptions of current monitoring protocols

All monitoring protocols are based on assumptions, and the value and utility of the data collected is limited by these assumptions. We will continually test and evaluate the assumptions of monitoring protocols so that inferences can be made that are as accurate and precise as possible given program constraints (time, budget, etc.).

1.3(b) Build enhanced monitoring protocols

We will incorporate lessons learned from 1.3(a) into building better, more accurate/precise monitoring protocols as resources allow.

STRATEGY 1.4 COLLECT, STORE, MANAGE, AND ANALYZE DATA ACCORDING TO INDUSTRY BEST PRACTICES

Even the most accurate and precise scientific information is only meaningful when it can be accessed, analyzed and compared to other information across areas or over time. We will follow industry best practices to ensure we maximize usefulness of the information we collect.

1.4(a) Develop standard operating procedures (SOPs) regarding deer data collection, storage, management, and analysis

1.4(b) Merge historic and current harvest data into a single enterprise database

Objective 2

Monitor human dimensions of deer in Tennessee

In order to effectively manage deer for the benefit of people, we need to understand Tennessean's values regarding deer, i.e. the *human dimensions* of deer in Tennessee. Specifically, we need to improve our understanding in four broad areas: 1) how people value deer, 2) what benefits people desire from deer management, 3) acceptability of deer management practices, and 4) how various stakeholders affect or are affected by deer and deer management decisions (Decker et al. 2018).

A major component of TWRA's vision, or DFC, for deer management is to improve our relationships and communications with stakeholders. We want to be science-based and data-driven, with biological and ecological science, and in regard to social science (human dimensions).

STRATEGY 2.1 CONDUCT COMPREHENSIVE SURVEY(S) OF HUNTERS, FARMERS, AND THE GENERAL PUBLIC ON ATTITUDES, OPINIONS, AND ECONOMIC VALUE OF DEER

TWRA will gather scientifically rigorous information on the attitudes and opinions of stakeholder groups regarding their perceptions of deer and deer management. Among other state deer management programs, the most common categorization of stakeholders is hunters, farmers, and the general public (or residents). We will conduct randomized surveys, stratified by stakeholder groups and by DMU, and other groups of interest as needed.

2.1(a) Identify research objectives, key metrics, desired levels of precision, and frequency of assessing these metrics

We will begin by identifying the specific things we want to know about each stakeholder group. We will consult with social scientists (see 1.2.1(b)) for assistance, to ensure we stay focused on priority objectives and use best management practices.

2.1(b) Contract with third-party social science experts

Conducting valid, unbiased social science research is a very specialized process. It is important to rely on specialists to generate meaningful results.

2.1(c) Conduct more detailed attitude and opinion survey of hunters

TWRA has an obligation to manage deer for the benefit of present and future generations of all Tennesseans; however, because of the unique role hunters play in managing deer populations, in practice much of our active management efforts will focus on hunters. Therefore, we will seek more in-depth information on the attitudes, opinions, and values of hunters.

Although hunters are often considered as a single group, many of the management challenges TWRA faces arise because of differing values that are held by various factions within the hunting community. For instance, there are subsets of deer hunters that occasionally conflict—usually over season structure (i.e., timing, length, and bag limits). To address these issues equitably, we need scientifically valid information on the various types of hunters. We also need to account for this information varying across space and time.

A major component of TWRA's vision, or DFC, for deer management is to improve our relationships and communications with stakeholders.

Because of the unique role hunters play in managing deer populations, in practice much of our active management efforts will focus on hunters.

Objective 3

Improve harvest monitoring system

The harvest and distribution of the harvest are the main component that state agencies can manipulate with a relatively high degree of control at the DMU scale. Annually estimating how many deer are harvested of each sex and age class in each DMU is a critical component of the future of deer management in Tennessee. Harvest data will be the lifeblood of our deer management program and must be a high quality dataset in terms of statistical rigor, data integrity, and data management.

For the purposes of this plan, estimation refers to the statistical application of probability theory and random sampling to generate a scientifically valid point estimate along with a measure of precision around the estimate (e.g., confidence interval, coefficient of variation, standard error, etc.). The concept of estimation versus a complete count is a paradigm shift that we must communicate and adopt for successful delivery of this plan.

In order to effectively adjust the antlerless harvest (and ultimately the population) for a given DMU, we must first be able to estimate the harvest in each DMU. Below are the strategies and corresponding actions needed to achieve this mission-critical objective.

STRATEGY 3.1 ESTIMATE ANNUAL DEER HARVEST THROUGH RANDOM SAMPLING AND PROBABILITY THEORY

Total numbers of antlered and antlerless deer harvested are often reported and monitored by weapon season and by DMU. Most states obtain this information through some form of a randomized survey of licensed hunters or by requiring hunters to report their harvest within a certain period.

Currently, TWRA relies on counts of self-reported harvest to determine annual harvest totals. However, not all legally harvested deer are reported even though it is mandatory (TCA § 70-4-116 [d][1]). Research has shown the rate at which hunters report their harvest varies by DMU, weapon season (e.g., archery vs muzzleloader), and sex (Rosenberry et al. 2004). Consequently, trends in self-reported harvest likely do not reflect trends in actual harvest. Therefore, a need exists to better understand actual annual harvests.

3.1(a) Conduct annual harvest survey

We will conduct an annual survey to estimate the harvest, number of hunters, and hunter effort for each DMU. We will likely need to contract with a third party that specializes in survey methodology.

3.1(b) Develop mechanism to randomly sample license-exempt hunters

Currently, six criteria exist that would exempt a hunter from being required to purchase a hunting license before hunting in Tennessee (TCA § 70-2-204 2017).

To accurately estimate the total statewide number of deer hunters, total harvest and hunting effort we must find a way to effectively sample license-exempt deer hunters. This is especially important for those hunting with a landowner exemption (i.e., numbers 3, 4, and 5 below), as we suspect this could be a substantial and as of yet unknown portion of the statewide hunting effort and legal harvest.

The license exemptions are:

1. Residents born before March 1, 1926 (with proof of age and residency).
2. Military personnel on leave carrying leave papers.
3. Landowners, their spouses, and children who hunt on farmland which is owned by said landowners. The aforementioned must be residents of Tennessee but need not reside on the land. This license exemption does not apply if the farmland is owned jointly or in common by unrelated persons.
4. Resident grandchildren (under the age of 16) and resident great-grandchildren (under the age of 16) who hunt on farmland which is owned by their resident grandparents or great-grandparents.
5. Tenants, their spouses, and their dependent children who hunt on farmland owned by an individual or family. The aforementioned must be residents of Tennessee and must actually reside on the land and have the permission of the landowner to hunt. A tenant is a person who, for money, free rent, or other consideration, cares for farmland. The tenancy must be agricultural in nature.
6. Resident and nonresident youths under 13. Hunters ages 10-12 need only a hunter education certificate to hunt. However, youths 6-16 hunting big game on a WMA must have a valid Type 094 or Type 095 permit or quota permit, as applicable.

Currently, hunters utilizing exemptions 3, 4, and 5 (above) are required to fill out form WR-0815 (Appendix B) in accordance with subsection (b) of TCA § 70-2-204 2017, which states:

"Each person claiming a license exemption under subsection (a) shall provide identification and shall submit a signed statement attesting to the exempt status described in the statement and a description of the land and the name of the land owner when requested by an officer of the wildlife agency or upon presenting any game to a check station. Such statement shall contain information sufficient to demonstrate that such person has complied with the requirements of subsection (a). The commission shall prepare a preprinted form for the submission of such statements for convenience of use. Submission of false information in a signed statement is a Class C misdemeanor."

We will explore options to identify this segment of the deer hunting public with the purpose of including them in the annual harvest survey.

3.1(c) Develop an improved harvest registration system

For the purposes of this plan, we use harvest registration system as an all-encompassing term to describe the system for carcass possession requirements and/or any requirements for harvest reporting. For more on this topic see Strategy 3.1 in the Resource Goal.

STRATEGY 3.2 ESTIMATE DEMOGRAPHICS OF DEER HARVEST

Whereas harvest data (see Strategy 3.1 above) tells us the total number of deer harvested, demographic data provides the composition of the harvest (i.e., age, sex and herd health). This information is typically collected by state wildlife agency personnel and trained collaborators at meat processors and/or check stations. Most of this biologist-collected demographic information (hereafter referred to as deer check) is biological data, collected directly from hunter-harvested deer. Information from this sample of harvested deer can be used to estimate the demographics of the overall harvest, as well as to study reporting behaviors of hunters and adjust harvest estimates accordingly.

The number of deer physically checked by biologiest has dropped precipitously in recent years — from a high of 7,754 (2006) to 2,452 (2017). This may be due to more hunters reporting their deer online versus at a traditional check station. The decline in biologist-sampled deer introduces increasing uncertainty around the age and sex data used to inform management recommendations. This strategy focuses on how to improve precision around annual deer demographic data.

3.2(a) Develop sample size goals of hunter-harvested deer by weapon type, season, and DMU

Once key harvest metrics and desired levels of precision (see Strategy 1.1 above) have been identified, we can calculate how many hunter-harvested deer need to be sampled (i.e., measured by a biologist) in each DMU to achieve this level of precision.

3.2(b) Develop annual correction factor for sex ratio of reported antlerless harvest

Many other states have seen substantial differences between hunter-reported harvest data and data collected by staff biologists. We anticipate this to be the case in Tennessee as well. Therefore, it is imperative we adjust annual harvest estimates accordingly.

STRATEGY 3.3 CONTINUE MONITORING ANTLER METRICS

Per Strategy 1.1, it is yet to be determined if antler metrics will be a key program metric. However, in many deer management programs antler measurements (number of points, spread, beam length, and beam diameter) have been used as an index to herd health, for estimating gross Boone & Crockett score by age class (Strickland et al. 2013), and are invaluable in defining antler restrictions at the DMU or WMA scale when increased male age structure is an identified management objective.

3.3(a) Evaluate current antler metrics and improve as necessary

We will consider each of the following: 1) measuring inside spread in addition to, or perhaps instead of, outside spread, 2) recording left and right antler points instead of total antler points, and 3) recording left and right beam length and diameter measurements. Tradeoffs to be considered here include the ability to make comparisons with historic antler data, utility for evaluating potential antler restrictions, utility for predicting Boone & Crockett scores (Strickland et al. 2013), staff time, added value for law enforcement purposes, etc.

3.3(b) Continue monitoring "antlerless" males

To understand the implications of various definitions of antlered and antlerless deer, we will continue to monitor antlerless males (i.e., both antlers less than or equal to 3 inches) for two things: 1) presence/absence of antler protruding above the hairline and 2) beam length for those with antlers protruding above the hairline.

STRATEGY 3.4 MONITOR HUNTER-HARVESTED DEER FOR DISEASE

Biologist-sampled deer are commonly used as an opportunity to survey for presence and/or prevalence of deer diseases such as Chronic Wasting Disease(CWD, see CWD Goal for more about this disease) or hemorrhagic disease (HD) and others. HD is a broad term for a group of Orbiviruses known to cause disease in wild cervids. Historically, in the southeastern United States, both Epizootic Hemorrhagic Disease (EHD) and Bluetongue Viruses (BTV) have caused die-offs in deer. HD may cause local and regional population declines in years when outbreaks occur.

To accurately estimate the total statewide number of deer hunters, total harvest and hunting effort we must find a way to effectively sample license-exempt deer hunters.

Objective 4

Model trends in deer population

STRATEGY 4.1. DEVELOP OPTIMAL POPULATION MODEL

Many population models have been developed for estimating abundance and for monitoring trends in populations of white-tailed deer. Wildlife Management Institute (2016) described the ideal statewide deer population model as one that "balances statistical rigor, management utility and data integrity." We will seek a gold standard model that fits our unique constraints and circumstances.

We will work with decision analysts using contemporary modeling procedures to incorporate our objectives for desired levels of precision, ability to utilize historic age and sex data, and any specific agency constraints. See Cummings (2014) for an example of where a species program in another state used a similar approach.

STRATEGY 4.2 INCORPORATE SPATIALLY EXPLICIT DISEASE INFORMATION INTO POPULATION MODEL

HD and other disease outbreaks are unpredictable, but their effects, and other diseases as applicable, should be factored into deer population modeling efforts.

STRATEGY 4.3 USE POPULATION MODEL TO EVALUATE AND PREDICT IMPACTS OF MANAGEMENT ALTERNATIVES BEING CONSIDERED

STRATEGY 4.4 ENSURE POPULATION MODEL REMAINS CURRENT AND OPTIMAL

Compare predicted impacts to actual impacts and improve population model annually. Continuously improving the model will improved decision-making and management effectiveness.

Objective 5

Assess amount of huntable deer habitat in each DMU and appropriate WMAs

Harvest estimates not adjusted by amount of land area are misleading, especially when comparing among DMUs or WMAs. Furthermore, not all areas are habitable by white-tailed deer (e.g., open water) or accessible for hunting (e.g., some state parks, public land within 100 yards of a visible dwelling, safety zones, etc.).

STRATEGY 5.1 UTILIZE GEOGRAPHIC INFORMATION SYSTEMS (GIS) TO QUANTIFY HUNTABLE AND HABITABLE LAND AREA BY DMU

At a minimum, this would exclude open water and any public lands known to be closed to hunting.

STRATEGY 5.2 EXPRESS HARVEST ESTIMATES AS DEER KILLED PER SQUARE MILE OF HABITABLE AND HUNTABLE LAND AREA FOR EACH DMU AND APPROPRIATE WMAS

Several states (e.g., West Virginia, New York, etc.) use harvest density of antlered deer as an index to population abundance.

Objective 6

Explore opportunities for development of a DMU-scale habitat metric

The role of white-tailed deer as a keystone herbivore is well-documented (Waller and Alverson 1997). Given TWRA's focus on private and public lands habitat management, we need metrics to effectively address the nutritional needs of deer on the landscape and to assess ecosystem health.

STRATEGY 6.1 REVIEW THE SCIENTIFIC LITERATURE TO IDENTIFY VEGETATION RESPONSE VARIABLES AND OTHER METRICS IMPORTANT FOR DEER NUTRITIONAL NEEDS

We will search the literature for habitat variables and associated evaluation methods that allow for easy data collection at a scale that informs decisions at the DMU level. Vegetation surveys are labor intensive and influenced by site. Human health (e.g., tick-borne illnesses), Deer Vehicle Collisions (DVCs), and agricultural damage complaints are currently compiled statewide and may be good predictors of deer impacts on plant communities.

STRATEGY 6.2 ESTABLISH THRESHOLDS FOR ACUTE AND CHRONIC IMPACTS ON FOREST REGENERATION, UNDERSTORY VEGETATION, AND ECOSYSTEM FUNCTION

Deer browse on an assortment of plant species that have a variety of social and economic significance. However, thresholds of browsing and associated deer densities that have negative impacts on vegetation have not been established.

6.2(a) Review the scientific literature and consult with partner agencies to find thresholds that are informative in Tennessee

STRATEGY 6.3 EXPLORE OPPORTUNITIES FOR RESEARCHING DEER IMPACTS ON ECOSYSTEM/ FOREST HEALTH IN TENNESSEE

Decision-Making Goal

Make decisions using objective, transparent, and data-driven processes

This goal is about applying the information gathered through the Science Goal to the decisions TWRA makes about deer management. Even with the best science available, if we do not apply it well to our decision-making process, it does not provide much benefit and management of the deer population will be ineffective.

Like all state wildlife agencies, we regularly make two major types of decisions: 1) setting management objectives and 2) selecting management alternatives to achieve those objectives. In other words, deciding where we want to go and how to get there. For the purposes of this plan, we will address these two types of decisions at both the DMU scale and subsequently, at the Wildlife Management Area (WMA) scale.

We need to consider our stakeholders, too. Riley et al. (2018) found the process by which a decision was made was just as important as the outcome itself when it came to how much stakeholders trusted their state wildlife agency. We will strive to make deer management processes transparent, well documented, publicly accessible, have input and buy-in from stakeholders, and to the extent feasible, adhere to the wildlife governance principles outlined in Decker et al. (2016).

Objective 1

Develop an adaptive, transparent process for setting harvest management objectives in each DMU

Setting the management objective is often the most difficult part of wildlife management. This is especially true for deer management because oftentimes there are conflicting viewpoints amongst stakeholders on what the objective should be. Therefore, we need a systematic process for setting objectives for each DMU.

Management objectives reflect human values, not wildlife science. However, science can inform the process of setting objectives, and science can be used to achieve the objectives once they are set. Once objectives are set and methods developed to collect required data with appropriate precision, decision trees (e.g., if-then statements) or more sophisticated processes like structured decision making may be used to make objective decisions. We will incorporate such tools wherever possible into the deer management program.

We plan to build the management objectives for each DMU around the desired population trend (i.e., increase, decrease, or stay the same) for each Unit; however, other objectives (such as identifying a desired trend in age structure) may also be included. If other objectives are included in the process, they should be included consistently in all DMUs.

STRATEGY 1.1 DETERMINE STAKEHOLDER PREFERENCES FOR POPULATION TRENDS

1.1(a) Add appropriate questions to comprehensive survey (see Strategy 2.1)

STRATEGY 1.2 DEVELOP PROCESS FOR SETTING POPULATION TREND OBJECTIVES WHEN THERE ARE DISPARATE VALUES AMONG STAKEHOLDER GROUPS

We will strive to make deer management processes transparent, well documented, publicly accessible, have input and buy-in from stakeholders, and to the extent feasible, adhere to wildlife governance principles

Objective 2

Identify a suite of management alternatives to be used in adaptive harvest management of DMUs

STRATEGY 2.1 INVOLVE KEY STAKEHOLDERS IN IDENTIFICATION OF MANAGEMENT ALTERNATIVES

STRATEGY 2.2 DEVELOP PROGRAM(S) TO FACILITATE ADDITIONAL ANTLERLESS HARVEST AT THE DMU SCALE

2.2(a) Investigate unique hunting opportunities to encourage antlerless harvest in specific areas

2.2(b) Encourage landowners to allow hunter access

2.2(c) Support efforts of other non-governmental organizations (NGOs) or non-profits to process donated venison

Objective 3

Develop an adpative, standardized, transparent process for setting harvest management objectives and corresponding suite of management alternatives for WMAs

TWRA manages over 100 WMAs across Tennessee. These areas vary greatly in size, habitat types, deer hunting opportunity, and tradition. We will investigate and evaluate management objectives and management alternatives on WMAs to help standardize and reduce complexity of regulations. WMA regulations will likely fall within their corresponding DMU regulations.

STRATEGY 3.1 CONVENE SUBJECT MATTER ACTION TEAM (SMAT) TO DEVELOP WMA DECISION-MAKING PROCESS

3.1(a) Ensure strong representation from WMA managers on SMAT

3.1(b) Ensure adaptive management experts are available for consultation throughout process.

3.1(c) SMAT should consider several criteria for each WMA

At a minimum, criteria to consider includes: DMU regulatory framework, human dimensions information on user preference and local input, WMA size and location relative to other WMAs, focus of WMA (e.g. any focal species), management history and property goals. Managers of each WMA will have opportunity to provide any additional site-specific input related to the process.

Objective 4

Establish process to tie together all components of setup phase of adaptive management

Williams et al. (2009) describe in detail the setup phase of adaptive management. TWRAs deer plan addresses all of the needed components of the setup phase (i.e., stakeholders, objectives, alternatives, models, and monitoring). Tying all of these components together in an adaptive harvest management system, in order to move to the iterative phase of management, is a very complex endeavor and will require outside expertise.

STRATEGY 4.1 CONSULT WITH EXPERTS IN ADAPTIVE MANAGEMENT

Support Goal

Develop programs that allow landowners/communities ability to address localized impacts

The vision for TWRA's deer program is to manage deer at the DMU level. We also recognize that we need programs offering additional flexibility for landowners to meet objectives on their properties. We anticipate interest from stakeholder groups in such programs to include farmers, hunt clubs, properties implementing a Quality Deer Management (QDM) plan, or communities or municipalities with an overabundance of deer.

Objective 1

Develop a program for guiding and assisting communities and/or homeowners with deer overabundance

We want to provide flexibility to address this important issue and the strategies we develop should be consistent in all DMUs. We will look for strategies previously developed by other states, many of whom have been dealing with urban/suburban deer overabundance issues since before TWRA completed deer restocking efforts. In addition, the Northeast Section of The Wildlife Society (2016) developed a position statement that provides guiding principles as TWRA further explores this issue. We will seek a standardized set of guiding principles.

STRATEGY 1.1 TRAIN AGENCY PERSONNEL IN BEST PRACTICES FOR COMMUNITY-BASED DEER MANAGEMENT

To effectively guide communities in dealing with deer management in their local area TWRA personnel need to be aware of and understand management techniques and options for deer control and management in these sensitive locations. Community-based deer management can be highly controversial. Local residents with strong emotional responses may have vastly different ideas about appropriate solutions to a management issue. We will seek to provide staff awareness training in both management alternatives and options in guiding people and communities in this process.

STRATEGY 1.2 DEVELOP SOP WITH AGENCY PROTOCOLS ON HOW TO GUIDE COMMUNITIES WITH DEER OVERABUNDANCE

Deer management and control in urban communities is frequently emotional, controversial and often fraught with legal challenges.

Once appropriate personnel have been trained in best practices (1.1 above), we can begin to design and standardize our approach to this issue in Tennessee. We will develop a standard operating procedure (SOP) to clarify both agency and community responsibilities, strategies to guide communities, and deer management alternatives. The SOP will emphasize that communities are ultimately responsible for determining management objectives, selecting management alternatives for their local area, and garnering appropriate local support.

1.2(a) Develop educational materials to share with community leaders and concerned homeowners

1.2(b) Explore options to permit private Animal Damage Control (ADC) contractors to control deer

Most communities do not have the resources to conduct the deer control options (e.g. removals) that may be required to meet their management goals. We will work to provide an option for communities to contract with a professional ADC contractor for deer control, including any permitting needs.

1.2(c) Investigate implementation of urban bowhunting program

> *We will address impacts of property owners, including farmers at an appropriate local scale.*

Objective 2

Revise SOP for guiding, assisting, educating, and permitting farmers and other land owners experiencing negative impacts from deer

With increasing deer and human populations, conflicts are becoming more prevalent.

STRATEGY 2.1 ADDRESS DEER DEPREDATION ISSUES AT THE PROPERTY LEVEL

It is inappropriate to address negative impacts experienced at the property level with DMU-wide harvest regulations. This is especially true if landowners with impacts do not allow hunting. We will address impacts of property owners, including farmers at an appropriate local scale.

2.1(a) Develop educational materials that assist the public with preventing or reducing impacts of deer (including impacts to agriculture)

These materials should encourage hunting as much as possible, and could have some "myth versus fact" content regarding deer depredation and about risks and benefits of allowing hunter access.

2.1(b) Explore innovative solutions to allow hunter access to impacted properties

STRATEGY 2.2 STREAMLINE ISSUANCE AND RENEWAL OF DEER DEPREDATION PERMITS

2.2(a) Develop centralized database for depredation permit issuance and reporting

2.2(b) Develop web interface for qualifying landowners to apply for and renew permits

Once developed, we will consider auto-renewal for landowners that meet certain criteria (e.g., requested permit multiple years prior, reported annual take, etc.).

Objective 3

Explore a program that provides additional antlerless harvest opportunities for landowners or land managers

Like many states, Tennessee has a Deer Management Assistance Program (DMAP) that offers permitted landowners the flexibility to harvest more antlerless deer than otherwise allowed for the DMU that their property lies in. Currently, Tennessee's DMAP has little participation. This may be due to the additional cost associated with the program, but we suspect there is currently little need for additional antlerless harvest given long seasons and liberal antlerless bag limits. However, we suspect this could change once new DMUs are established, population trend objectives are set for each, and DMU antlerless bag limits are set accordingly. Properties or aggregations of neighboring properties practicing QDM will likely need the program to achieve their antlerless harvest objectives.

STRATEGY 3.1 DEVELOP CRITERIA FOR ISSUING ADDITIONAL ANTLERLESS HARVEST OPPORTUNITIES

STRATEGY 3.2 IF DEMAND INCREASES, SECURE ADEQUATE PERSONNEL AND RESOURCES TO CARRY OUT THE DMAP PROGRAM

CWD Goal

Minimize the threat of Chronic Wasting Disease

Chronic wasting disease (CWD) is in the family of diseases known as transmissible spongiform encephalopathies (TSE). It is caused by a prion or infectious protein particle that persists in the environment indefinitely. In Tennessee, native white-tailed deer and reintroduced wild elk, as well as several exotic captive cervid species, including captive elk, are at risk for infection with CWD. CWD is the greatest threat to the future of deer and deer hunting in Tennessee, and TWRA is proactively addressing this threat.

We have monitored deer for CWD since 2004. In November 2018, we began implementation of a new CWD surveillance strategy weighted towards counties with higher risk (Schuler et al. 2018). On December 14th, 2018 we received notification from our CWD testing facility that 10 samples collected during our CWD surveillance tested positive for CWD. The 10 positive samples occured in two counties that were considered high risk and received increased surveillance under the new strategy.

Immediate implementation of our CWD Response Plan (TWRA 2018), resulted in over 180 additional positives being confirmed in these two counties as well as one in southwest Madison County.

As this plan was being finalized, we began developing a long-term management plan for CWD in light of these findings. With the exception of minor revisions, the objectives outlined below were mostly developed prior to finding CWD in Tennessee. These objectives still apply, but more objectives, strategies, and actions will likely arise as a CWD Management Plan is further developed.

Objective 1

Minimize risk of introduction into new areas

In addition to southwest Tennessee, bordering states of Mississippi, Arkansas, Missouri, and Virginia have all found CWD in wild white-tailed deer. The TFWC and TWRA have recently taken proactive measures to prevent the introduction of CWD into new areas of Tennessee.

STRATEGY 1.1 MAINTAIN AND IMPROVE EFFECTIVENESS OF CARCASS IMPORTATION RESTRICTIONS

As of March 1, 2018, carcass importation restrictions applied to all areas outside of Tennessee. See Rule 1660-01-15.02 (Appendix C) for details of restrictions.

1.1(a) Address issue of inadvertent violations resulting in high-risk cervid parts from being disposed of inappropriatley in Tennessee

This is meant to address the situations in which a hunter realizes, after the fact, that they inadvertently violated carcass import/export restrictions. An amnesty program of sorts would encourage or incentivize these individuals to surrender those parts rather than dispose of the parts on the landscape and thereby avoid a citation.

As of March 1, 2018, carcass importation restrictions applied to all areas outside of Tennessee.

CWD is the greatest threat to the future of deer and deer hunting in Tennessee, and TWRA is proactively addressing this threat.

1.1(b) Improve education and communication about carcass import/export restrictions into Tennessee residents who hunt out of state, non-residents who hunt in Tennessee, and those who hunt within the Tennessee CWD management zone(s).

STRATEGY 1.2 MAINTAIN BAN ON USE OF NATURAL DEER URINE

The use or possession of natural deer urine while hunting will be prohibited beginning March 1, 2019. This is an important piece of CWD containment and prevention and should be maintained.

STRATEGY 1.3 EDUCATE STAKEHOLDERS ON THE RISK OF CWD AND IMPORTANCE OF MINIMIZING THE RISK OF ITS SPREAD OR INTRODUCTION TO NEW AREAS OF TENNESSEE

STRATEGY 1.4 CONTINUE TO WORK WITH THE TENNESSEE DEPARTMENT OF AGRICULTURE (TDA) TO REDUCE RISK OF INTRODUCTION OR SPREAD VIA CAPTIVE INDUSTRY

Currently in Tennessee, it is legal to transport and/or possess captive cervids, excluding white-tailed deer, some of which are CWD susceptible. It is imperative that the risk of spread or introduction of CWD into new areas via these programs is minimized.

Objective 2

Maximize the probability of early detection in other counties

Despite progressive efforts in recent years to prevent CWD from entering Tennessee, it it appears to have been here for some time and there is no guarantee it will not be introduced elsewhere in the state. With this understanding, it is important to maximize the ability to detect the disease as early after introduction as possible. CWD management is most effective if enacted when the disease has only been on the landscape for a short period of time and has not spread widely. A surveillance program focused on the demographic classes of deer and locations most likely to have CWD gives us the best opportunity to find disease at the earliest intrusion into new areas of the state.

STRATEGY 2.1 CONTINUE RISK-BASED SURVELLIANCE

In 2016 and 2017, TWRA increased the annual sampling total approximately tenfold (i.e., ~200 deer tested per year in years 2004 - 2015 versus ~2,000 in 2016 and in 2017). Once we increased our sampling effort, the next step taken was making sure we were allocating this effort to areas of the state where we were most likely to find CWD.

In 2017, TWRA assessed the risk for CWD in each of Tennessee's 95 counties. Hazards considered in the risk assessment included information from taxidermists and processors, captive cervid facilities, TWRA biologists, and neighboring states. We used this information to inform a statewide risk-based CWD surveillance plan with sampling quotas for each county. Counties with greater risk for CWD were assigned a greater point quota (Figure 1). When summed for the whole state, the quota beginning with 2018 was very similar to what we collected in 2016 and 2017; the difference was in where we were sampling (Figure 2).

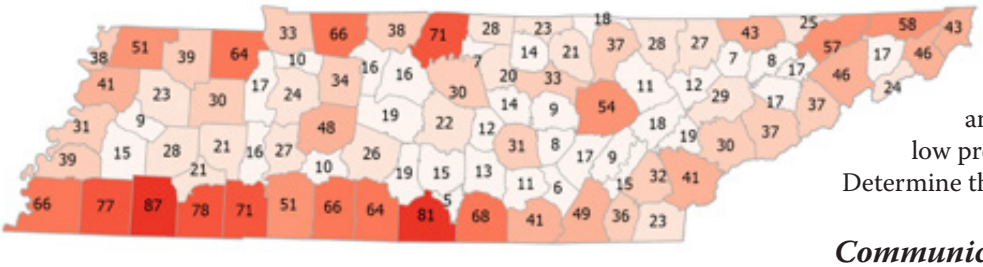

Figure 1. County point quotas for TN's 2018 risk-based CWD surveillance plan.

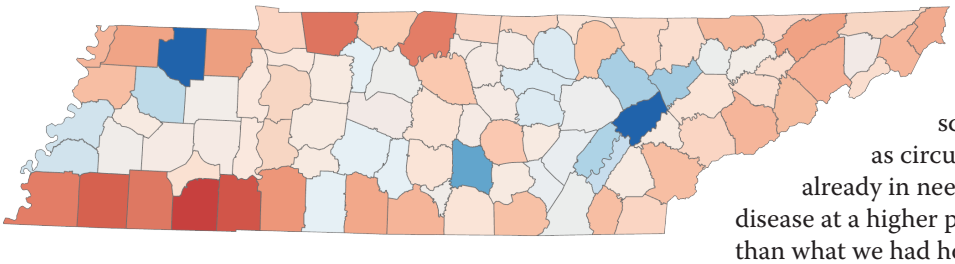

Figure 2. Shifts in sampling for TN's 2018 risk-based CWD surveillance plan compared to 2017 sampling. Darker shades of red indicate greatest sampling increases. Darker shades of blue indicate areas to reduce sampling. Neutral colors indicate no change.

It was this risk-based surveillance strategy that led us to the detection of CWD in Fayette, Hardeman, and Madison counties. However, now that we have discovered CWD in these counties we have new information to assess the risk in counties bordering these three counties. Therefore, we will rerun the risk assessment and revise the surveillance plan prior to the 2019 hunting season and annually as needed.

See report by Schuler et al. (2018) for more details on the initial version of the risk-assessment and surveillance plan and point-quota details.

Objective 3

Maximize containment of CWD where currently endemic

TWRA has a detailed CWD response plan that outlines four over-arching goals aimed at preventing and minimizing the impacts of CWD on native deer and elk populations in Tennessee (TWRA 2018). When CWD was detected in December 2018, we immediately implemented the containment and communications portions of the plan:

Prevention

Employ appropriate preventive measures to keep CWD from entering the state.

Early Detection

Implement appropriate methodologies and levels of sampling strategies (methodologies and sample size) throughout the state to ensure early detection.

Containment

Implement appropriate monitoring strategies to determine prevalence and spatial distribution of CWD, if detected.

Employ appropriate management actions that will limit the spread of CWD and eliminate or maintain the disease at a low prevalence, if detected.

Determine the origin of any CWD-positive cervid.

Communications

Distribute accurate and effective information on CWD to the public, Agency staff, the Tennessee Fish and Wildlife Commission (TFWC) and other stakeholders.

Best management of CWD in Tennessee will require an adaptive management approach that can be refined as the science of CWD management advances and as circumstances change. Our Response Plan is already in need of revisions due to initially detecting the disease at a higher prevalence and broader spatial distribution than what we had hoped. Therefore, we are currently working on developing a revised, "phase 2" CWD Management Plan in Tennessee.

Communication Goal

Foster increased understanding about deer with the public

National surveys have shown that very few residents look to their state wildlife agencies for information. For example, a 2007 survey of Maryland deer hunters showed that while 59% of residents were looking to newspapers and TV for information regarding deer, only 2% reached out to the state wildlife agency (Responsive Management 2007). Bridging the gap between TWRA and stakeholders will be critical to the success of this plan.

Objective 1

Develop and share information regarding deer biology, management, and hunting

STRATEGY 1.1 DEVELOP HIGH-QUALITY WEB CONTENT FOR TWRA WEBSITE THAT WILL EDUCATE PEOPLE ON DEER ECOLOGY AND TENNESSEE'S APPROACH TO MANAGING DEER

STRATEGY 1.2 HELP HUNTERS SET EXPECTATIONS FOR HUNTING IN THEIR AREA

1.2(a) Estimate mean Boone & Crocket scores by age class and by DMU

This information will be made available to hunters to help them better understand the norm for antler size in each age class in their area. This will aid in localized harvest management efforts and may improve hunter satisfaction.

1.2(b) Improve and promote use of Hunter's Toolbox

The public has real-time access to our harvest database via an online report generator commonly referred to as the Hunter's Toolbox.

https://hunterstoolbox.gooutdoorstennessee.com/

STRATEGY 1.3 UTILIZE EMAIL MARKETING TO BUILD A FOLLOWING IN REGARDS TO DEER MANAGEMENT IN TENNESSEE

STRATEGY 1.4 UTILIZE SOCIAL MEDIA PLATFORMS TO ENGAGE WITH AND INFORM THE PUBLIC

STRATEGY 1.5 DEVELOP EDUCATIONAL CONTENT REGARDING PROPERTY LEVEL HABITAT AND HARVEST MANAGEMENT

STRATEGY 1.6 PROMOTE DEER HUNTING

1.6(a) Promote hunting as a sustainable source of healthy, lean meat

1.6(b) Promote advantages and debunk myths of allowing hunter access

1.6(c) Revamp Deer Registry website

http://www.twrawildlife.com/TennRegistry/

Bridging the gap between TWRA and stakeholders will be critical to the success of this plan.

Objective 2

Increase internal and external stakeholder engagement

STRATEGY 2.1 AUGMENT DIALOGUE WITH THE TENNESSEE FISH AND WILDLIFE COMMISSION ABOUT DEER MANAGEMENT

STRATEGY 2.2 SEEK INPUT FROM AND OPPORTUNITIES FOR DIALOGUE WITH DIVERSE STAKEHOLDER INTERESTS

2.2(a) Hold focus group meetings and/or working groups pertaining to specific interests or concerns related to deer management

We plan to engage in an ongoing manner with key stakeholders to ensure continued support and to ensure our systems and programs meet the needs of the public. We will need to also engage with stakeholders regarding WMA management, urban/suburban deer management, deer depredation, CWD, etc. With all of these meetings involving external stakeholders, we will need to clearly communicate roles and expectations for all stakeholders.

We plan to engage in an ongoing manner with key stakeholders

Resource Goal

Identify adequate resources to implement this strategic plan

Achieving the goals and objectives in this plan will require sustained commitment of a variety of resources including subject matter expertise, personnel, partnerships, enforcement and dedicated funding.

Deer management, and most wildlife management in Tennessee, is funded principally by sportspersons through hunting license sales and through a federal excise tax on firearms, ammunition, and archery equipment. Though sportsmen and sportswomen provide most of the funding for deer management in Tennessee, they represent less than 11% of Tennessee residents and are just one of the many stakeholder groups that appreciate and are impacted by deer. We will act appropriately to ensure that resources are available to conserve and manage deer, including seeking opportunities to broaden the funding base for high priority work.

Additionally, we must be responsive to long-term cultural and ecological changes that affect deer populations and management and must identify opportunities to adapt to shifting values and new challenges. The Agency is currently investing in efforts to better understand the dynamics of hunter recruitment and retention in Tennessee and to identify mechanisms to sustain or increase hunter participation. Outcomes from this effort will be incorporated in future deer management planning.

Objective 1

Identify adequate funding for successful plan delivery

STRATEGY 1.1 EXPLORE INNOVATIVE SOLUTIONS TO SECURE FUNDING EARMARKED FOR THE DEER MANAGEMENT PROGRAM

Objective 2

Add or reallocate additional personnel and expertise for successful plan delivery

STRATEGY 2.1 DETERMINE AND PRIORITIZE CURRENT PERSONNEL NEEDS FOR DATA COLLECTION, DATA ANALYSIS, AND TECHNICAL ASSISTANCE

STRATEGY 2.2 ADDRESS PERSONNEL NEEDS VIA CONTRACT OR HIRING

The Agency is currently investing in efforts to better understand the dynamics of hunter recruitment and retention in Tennessee and to identify mechanisms to sustain or increase hunter participation.

Objective 3

Ensure resources, regulations, and procedures allow for efficient and effective enforcement of regulations by TWRA Wildlife Officers

STRATEGY 3.1 IMPROVE DEER HARVEST REGISTRATION SYSTEM TO ALLOW FOR ACTIVE ENFORCEMENT OF DEER BAG LIMITS

Based on TFWC comments, stakeholder focus group input, internal listening session feedback, and comments from the public, there is great value and interest in a harvest registration system that provides immediate accountability and traceability.

An improved harvest registration system would:

- Emphasize the value of white-tailed deer to stakeholders,
- Promote fairness through immediate requirement of hunters to demonstrate legal possession, and
- Assist in management by adding a better measure (in the field and at processors) of harvest reporting compliance.

The harvest registration system would have reasonable reporting requirements for hunters and funding secured indefinitely.

STRATEGY 3.2 STRENGTHEN LAW ENFORCEMENT PROCEDURES FOR CWD CARCASS IMPORTATION/EXPORTATION RESTRICTIONS

Objective 4

Explore opportunities to leverage citizen science to achieve objectives in Science Goal

Historically, TWRA has relied heavily on other work units (Law Enforcement and regional work groups) to gather data. With the increasing workload demands in these units, data collection goals are regularly not met. In addition to these shortcomings, new needs for data have been identified. One argument against utilizing citizen science is reliability of the data. This concern of utilizing untrained citizens to collect data, is justified. However, as data collection needs continue to increase it is imperative that citizen science be formally explored to identify where it may be feasible to address personnel shortcomings.

STRATEGY 4.1 GAUGE PUBLIC INTEREST IN A FORMAL VOLUNTEER CITIZEN SCIENCE PROGRAM

STRATEGY 4.2 USE THE TENNESSEE HUNTER EDUCATION VOLUNTEER PROGRAM AS A MODEL TO DEVELOP A FORMAL CITIZEN SCIENCE PROGRAM

STRATEGY 4.3 DEVELOP A FORMALIZED TRAINING AND ANNUAL TESTING PROGRAM FOR VOLUNTEERS

STRATEGY 4.4 UTILIZE VOLUNTEER HOURS TO LEVERAGE ADDITIONAL FEDERAL FUNDS FOR DEER MANAGEMENT

Objective 5

Provide continuing education opportunities for TWRA personnel

STRATEGY 5.1 SEND BIOLOGISTS ANNUALLY TO SOUTHEAST DEER STUDY GROUP AND OTHER APPROPRIATE PROFESSIONAL MEETINGS

Glossary

Adaptive Management — A rigorous approach for learning through deliberately designing and carrying out management actions as experiments, specifically to learn how the system responds to management and to increase the level of certainty regarding how best to achieve desired results.

Citizen science — the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

Deer check — biological data collected directly from a sample of hunter-harvested deer in a quasi-random fashion.

Estimation — statistical application of probability theory and random sampling to generate a scientifically valid point estimate along with a measure of precision around the estimate.

Harvest registration system — an all-encompassing term to describe the system for carcass possession requirements and/or any requirements for harvest reporting.

Hemorrhagic disease (HD) — a broad term for a group of vector borne Orbiviruses known to cause disease in wild cervids including EHD and BTV.

Metric — a standard for measuring or evaluating something, especially one that uses figures or statistics.

Precision — a statistical measure of certainty around the estimated value of a given metric in relation to the actual value of said metric (which is unknown).

Structured decision making — Structured decision making is an approach for careful and organized analysis of natural resource management decisions. For more information on structured decision making see (USGS n.d.).

References

Cummings, J. 2014. Decision support for natural resource management [dissertation]. University of Vermont. <https://www.researchgate.net/publication/287975204_Decision_Support_for_Natural_Resource_Management>. Accessed 1 Dec 2018.

Decker, D. J., W. F. Siemer, A. B. Forstchen, and C. Smith. 2018. The role of human dimensions. Pages 194–207 in. State Wildlife Management and Conservation.

Decker, D., C. Smith, A. Forstchen, D. Hare, E. Pomeranz, C. Doyle-Capitman, K. Schuler, and J. Organ. 2016. Governance principles for wildlife conservation in the 21st Century. Conservation Letters 9:290–295. <http://doi.wiley.com/10.1111/conl.12211>. Accessed 11 Oct 2018.

Dickson, J. G. 2001. Wildlife of Southern Forest: Habitat and Management. Hancock House Publishers. Blaine, WA.

Garrison, E. P., R. A. Kiltie, L. S. Perrin, S. M. Shea, G. M. Mohr, and R. S. Butryn. 2012. Evaluation of White-tailed Deer Breeding Chronology and Productivity in Florida. The 35th Annual Meeting of the Southeast Deer Study Group. Destin, FL.

Goddard, J. L., and C. A. Miller. 2009. Assessment of deer harvest reporting systems in the eastern United States. Human Dimensions of Wildlife 14:458–459. <https://www.tandfonline.com/doi/abs/10.1080/10871200903061639>. Accessed 11 Oct. 2018.

Kelly, J. D., and J. E. Hurst. 2016. Defining management units for deer in New York: finding a balance between desired precision and fine-scale management. The 39th Annual Meeting of the Southeast Deer Study Group, Concord, NC.

Nichols, R. G. 1978. East Tennessee deer research investigations. TWRA Wildlife Technical Report 78-2. Tennessee Wildlife Resources Agency, Nashville, TN.

Northeast Section of The Wildlife Society. 2016. Position statement: managing chronically overabundant deer. Newport, RI. <http://wildlife.org/wp-content uploads/2016/05/OverabundantDeerPositionStatement.pdf>. Accessed 11 Oct 2018.

Responsive Management. 2007. The opinions of residents, deer hunters, and landowners on deer management in Maryland. Harrisonburg, VA. <https://dnr.maryland.gov/wildlife/Documents/MDDeerReportVol1.pdf>. Accessed 11 Oct 2018.

Riley, S. J., J. K. Ford, H. A. Triezenberg, and P. E. Lederle. 2018. Stakeholder trust in a state wildlife agency. The Journal of Wildlife Management 82:1528–1535. <http://doi.wiley.com/10.1002/jwmg.21501>. Accessed 11 Oct. 2018.

Rosenberry, C. S., D. R. Diefenbach, and B. D. Wallingford. 2004. Reporting-rate variability and precision of white-tailed deer harvest estimates in Pennsylvania. Journal of Wildlife Management 68:860–869. <http://onlinelibrary.wiley.com/doi/10.2193/0022-541X(2004)068[0860:RVAPOW]2.0.CO;2/pdf>. Accessed 11 Oct 2018.

Rosenberry, C. S., J. T. Fleegle, and B. D. Wallingford. 2009. Management and biology of white-tailed deer in Pennsylvania 2009-2018. Pennsylvania Game Commission, Harrisburg, PA. <https://www.pgc.pa.gov/Wildlife/WildlifeSpecies/White-tailedDeer/Documents/2009-2018%20PGC%20DEER%20MGMT%20PLAN%20-%20FINAL%20VERSION.pdf>. Accessed 11 Oct 2018.

Schuler, K. L., N. Hollingshead, C. Yoest, R. D. Applegate, and J. D. Kelly. 2018. Risk-based surveillance for chronic wasting disease in Tennessee. Tennessee Wildlife Resources Agency, Nashville, TN. <https://www.researchgate.net/publication/328006243_RISK-BASED_SURVEILLANCE_FOR_CHRONIC_WASTING_DISEASE_IN_TENNESSEE>. Accessed 11 Oct 2018.

Schultz, V. 1955. Status of the white-tailed deer in Tennessee. Journal of the Tennessee Academy of Science. 30:66-75.

Severinghaus, C. W. 1949. Tooth development and wear as criteria of age in white-tailed deer. The Journal of Wildlife Management 13:195–216. <https://www.jstor.org/stable/3796089?origin=crossref>. Accessed 11 Oct 2018.

Stanford, E., J. C. Shaw, R. Myers, and D. Cobb. 2015. Evaluation of deer hunting season structures and deer management units in North Carolina. Raleigh, NC. <https://www.ncwildlife.org/Portals/0/Regs/Documents/Evaluation-of-Deer-Hunting-Seasons-and-Mgt-Units.pdf>. Accessed 11 Oct 2018.

Stickles, J. H., D. B. Stone, C. S. Evans, K. V. Miller, R. J. Warren, D. A. Osborn, and C. H. Killmaster. 2015. Using deer-vehicle collisions to map white-tailed deer breeding activity in Georgia. Journal of Southeastern Association of Fish and Wildlife Agencies 2:202-207. <http://www.seafwa.org/30%20Stickles%20et%20al%20202-207.pdf>. Accessed 11 Oct 2018.

Strickland, B. K., P. D. Jones, S. Demarais, C. M. Dacus, J. R. Dillard, and H. Jacobson. 2013. Estimating Boone and Crockett scores for white-tailed deer from simple antler measurements. Wildlife Society Bulletin 37:458–463. <http://doi.wiley.com/ 10.1002/wsb.278>. Accessed 11 Oct 2018.

Sumners, J. A., S. Demarais, R. W. Deyoung, R. L. Honeycutt, A. P. Rooney, R. A. Gonzales, and K. L. Gee. 2015. Variable breeding dates among populations of white-tailed deer in the southern United States: The legacy of restocking? The Journal of Wildlife Management 79:1213–1225. <http://doi.wiley.com/10.1002/jwmg.954>. Accessed 11 Oct 2018.

Tennessee Wildlife Resources Agency. 1979. Deer operational plan. Nashville, TN.

Tennessee Wildlife Resources Agency. 1991. Deer restoration in Tennessee 1940-85: A Final Report. Nashville, TN.

Tennessee Wildlife Resources Agency. 2018. TWRA chronic wasting disease response plan. Nashville, TN. <https://www.tn.gov/content/dam/tn/twra/documents/15-12_TWRA_CWD_Response_Plan.pdf>. Accessed 5 Feb 2019.

U.S. Fish and Wildlife Service, and U.S. Census Bureau. 2016. National survey of fishing, hunting, and wildlife-associated recreation. <https://www2.census.gov/programs-surveys/fhwar/publications/2016/fhw16-nat.pdf>. Accessed 11 Oct 2018.

USGS (U.S. Geological Survey). n.d. Structured decision making. <https://www.usgs.gov/centers/pwrc/science/structured-decision-making?qt-science_center_objects=0#qt-science_center_objects>. Accessed 1 Dec 2018.

Waller, D. M., and W. S. Alverson. 1997. The white-tailed deer: a keystone herbivore. Wildlife Society Bulletin 25:217–226.<https://www.jstor.org/stable/3783435>. Accessed 11 Oct 2018.

Wieczorek Hudenko, H., D. J. Decker, and W. F. Siemer. 2008. Reliance on informants in wildlife management situation analysis—shortcut or shortcoming? Human Dimensions of Wildlife 13:459–470. Taylor & Francis Group. <http://www.tandfonline.com/doi/abs/10.1080/10871200802427964>. Accessed 11 Oct 2018.

Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive management: the U.S. Department of the Interior technical guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC. <https://www2.usgs.gov/sdc/doc/DOI-%20Adaptive%20ManagementTechGuide.pdf>. Accessed 17 Nov 2018.

Wildlife Management Institute. 2016. Technical review of Department of Natural Resources' deer population modeling and survey methods. Pages 91–154 in J. Alter and J. Hauer, editors. Department of Natural Resources: deer population management. Minnesota Office of the Legislative Auditor, St. Paul, MN. <https://www.auditor.leg.state.mn.us/ped/pedrep/deermanagement.pdf>. Accessed 11 Oct 2018.

Appendix A: Statutory Authority

Tennessee Code Annotated (TCA) Title 70 provides the overall authority to the TWRA for all native wildlife (e.g., white-tailed deer, wild elk, etc.) and its management, conservation, protection and propagation. Pursuant to TCA § 70-1-302(a)(5), the Agency has the authority to exercise control measures of undesirable species.

Pursuant to TCA § 70-4-107, the Tennessee Fish and Wildlife Commission (TFWC) has the authority to issue proclamations in order to set seasons, manner, means, etc. TCA § 70-4-107(c)(3) authorizes the Commission to summarily close, reopen and/or extend seasons during emergency conditions.

Additionally, pursuant to TCA § 70-4-113 the Executive Director and his designees have the authority to use any device to capture or kill any animal for specific purposes, or when it is considered necessary by the Executive Director to reduce or control any species that may be detrimental to human safety, health or property.

Importation and possession of live white-tailed deer is illegal in Tennessee. White-tailed deer incidentally contained within a property with high enough fencing to prevent escapes remain property of the State.

The TWRA is responsible for permitting private big game wildlife preserves. A moratorium on the establishment of new private big game wildlife preserves exists.

The Tennessee Department of Agriculture (TDA) regulates the possession of cervids other than white-tailed deer (e.g., fallow, sika, domestic elk, etc.).

Appendix B: WR-0815

FARMLAND OWNER LICENSE EXEMPTION STATEMENT

County:_____ Map #:_____ Parcel #:_____

Location: _____

_____

_____

Name of landowner:_____

Name of hunter/fisherman:_____

Address:_____

_____

TN Driver's Lic. #:_____

I attest that I am exempt from requirements to possess a hunting and fishing license under the terms of TCA 70-2-204(a) while hunting or fishing on the property identified above due to the following owner relationship: I am a resident of Tennessee and I am (check one):

- ☐ an owner of the property
- ☐ a tenant residing on the property
- ☐ a spouse of the owner
- ☐ a spouse of the tenant
- ☐ a child of the owner
- ☐ a dependent child of the tenant

_____

Signature of hunter/fisherman

This card shall be completed, signed and submitted upon the request of an officer of the TWRA, or upon presenting game to a check station.

WR-0815

TCA 70-2-204. Hunting and fishing on farm land – License exemption to owner, tenants and their spouses and children. – (a) The owners and tenants of farmlands, and their spouse and children, have the right to engage in the sport of hunting and fishing, subject to all the provisions of all laws or regulations concerning wildlife, upon such lands and waters thereon of which they or their spouses or parents are the bona fide owners or tenants with the permission of the landowner, during the season when it is lawful to do so, without procuring a hunting and sport fishing license. **Tenants and their spouses and their dependent children must be bona fide residents of the state and must actually reside on the land. Owners and their spouses and children must be bona fide residents of the state.** Land may qualify as farmland only if it is owned by no more than one (1) individual or a family; provided, that if land is owned jointly or in common by persons who are first cousins related by blood, then such cousins and their children may hunt small game and fish on such land under the provisions of this subsection. "Family" means any combination of kinship within the third degree including any spouse who has an interest in the property. "Tenant" means an individual who receives compensation such as free rent or money for acting either in the place of or at the direction of the landowner in tending to the requirements needed to care for the farmland. The primary purpose of the tenancy shall be agricultural in nature.

Appendix C: TWRA Rule 1660-01-15

CHAPTER 1660-01-15
RULES AND REGULATIONS FOR ANIMAL IMPORTATION

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1660-01-15-.01 Importation Permit

1660-01-15-.02 Importation of Wildlife Carcasses, Parts, and Products

1660-01-15-.01 IMPORTATION OF LIVE WILDLIFE.

(1) Before any person in the State of Tennessee may have in his or her possession any live wild animal species obtained from outside the State of Tennessee, he or she must import such animal in accordance with the following:

(a) Any permit obtained for importation, other than an annual importation permit, is void when the shipment of animals or any portion thereof is received or when any condition or restriction of the permit is violated.

(b) Wildlife, as referred to in these regulations, is either singular or plural, as the case may be; and is defined as all species normally found in the wild, regardless of whether they were captured in the wild or raised in captivity.

(c) Wildlife obtained through interstate commerce must be in accordance with federal laws, as well as be obtained from a dealer licensed by the U.S. Department of Agriculture under the Animal Welfare Act of 1970.

(d) When any wildlife is being shipped or transported by any carrier, private or public, the carrier shall possess the shipper's copy of the importation permit. The shipper's copy of the importation permit will be left with the consignee upon delivery of the animals. The animals and all pertinent records will be open to inspection by a representative of the Wildlife Resources Agency prior to their release.

(e) Any person, group or business entity importing wildlife for the purpose of release must notify the regional office within 24 hours prior to the arrival of the shipment. Wildlife imported for release will be subject to inspection by the Tennessee Wildlife Resources Agency prior to their release.

(f) Any wildlife imported for release will be subject to the following restrictions:

1. Annual importation permit holders shall notify the Tennessee Wildlife Resources Agency of the intent to import a shipment of captive wildlife to check to determine if the source of that species is approved.

2. The importation of animals from states having endemic disease problems in wild populations that could present a health hazard to native wildlife or the public is specifically prohibited.

3. The Tennessee Wildlife Resources Agency will annually compile a list of species and the states from which they originate that are prohibited from importation. This list will be provided to the appropriate agency personnel as well as annual importation permit holders.

(Rule 1660-01-15-.01, continued)

(g) Each request to import will be considered on its own merits, taking into consideration human health and safety, competition with or effect on native species, prolific breeders, and agricultural pests.

(h) The above mentioned requirements do not apply to Class III Wildlife.

Authority: *T.C.A. §§ 70-1-206, 70-4-401, and 70-4-404.* ***Administrative History:*** *Original rule filed February 12, 1996; effective April 27, 1996. Amendments filed February 28, 2005; effective May 14, 2005.*

1660-01-15-.02 IMPORTATION OF WILDLIFE CARCASSES, PARTS, AND PRODUCTS.

(1) No person may import, transport, or possess in Tennessee a cervid carcass or carcass part from anywhere outside the state except as provided herein:

(a) Meat that has bones removed.

(b) Antlers, antlers attached to cleaned skull plates, or cleaned skulls (where no meat or tissues are attached to the skull.)

(c) Cleaned teeth.

(d) Finished taxidermy and antler products.

(e) Hides and tanned products.

Authority: *T.C.A. §§ 70-1-206 and 70-4-107.* ***Administrative History:*** *Original rule filed July 12, 2005; effective September 25, 2005. Amendment filed January 5, 2009; effective March 21, 2009. Repeal and new rule filed May 3, 2012; effective August 1, 2012. Amendments filed April 20, 2018; effective July 19, 2018.*

Appendix D: TDA Rule 0080-02-01

RULES
OF
THE TENNESSEE DEPARTMENT OF AGRICULTURE
ANIMAL HEALTH

CHAPTER 0080-02-01
HEALTH REQUIREMENTS FOR ADMISSION AND TRANSPORTATION OF LIVESTOCK AND POULTRY

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0080-02-01-.01 DEFINITIONS.

(1) For Purposes of these Rules:

(a) Accredited Veterinarian - An accredited veterinarian shall be as defined in 9 C.F.R. 160.1.

(b) Approved Livestock Market - A stockyard, livestock market, buying station, concentration point, or any other premises under state or federal veterinary supervision where livestock are assembled for sale or sale purposes, and which has been approved by the USDA, or the appropriate state animal health official in accordance with 9 C.F.R. 71.20.

(c) Approved Slaughter Establishment - Any slaughter establishment operating under the provisions of the Federal Meat Inspection Act, 21 U.S.C. 601, et seq.

(d) Breeding Swine - Swine that are used or intended to be used for breeding, including all swine other than feeder swine or slaughter swine.

(e) Brucellosis Suspect - An animal subjected to an official test resulting in a Brucellosis suspect classification or reclassified as a Brucellosis suspect by a designated epidemiologist, as provided in the definition of official test.

(f) Certified Brucellosis-Free Herd - A herd of cattle that has qualified for such status in accordance with 9 C.F.R. 78.1.

(g) Change of Ownership - Ownership changing from one individual or entity to another, either through selling, bartering, trading, or donating to another individual or entity.

(h) Classification of States - The definitions of Class A, Class B, Class C and Class Free states shall be as set forth in 9 C.F.R. 78.1.

(i) Commercial Production Swine - Those swine that are continuously managed and have adequate facilities and practices to prevent exposure to either transitional production or feral swine.

To see the entire form, visit https://publications.tnsosfiles.com

Appendix E: Strategic Planning Process

Methodology for development of a 5-year strategic plan for TWRA's Deer Management Program

The Tennessee Wildlife Resources Agency (TWRA) went through an extensive 18-month process leading to the development and final adoption of a 5-year strategic plan for their Deer Management Program. This document provides a detailed documentation of the process, whereas the strategic plan itself provides a high-level summary of the process.

The process can be divided into three major phases: 1) Pre-Planning, 2) Stakeholder Engagement & Plan Writing, and 3) Plan Review and Adoption.

Phase 1

Pre-Planning

SOCIAL-ECOLOGICAL SYSTEMS SHORT COURSE | MAY 2017

The Deer Management Team, (DMT) along with the Turkey and Quail Teams, attended a short course at the Region 2 office taught by Dr. Dan Decker.[1] The course focused on the importance of incorporating human dimensions into wildlife management, including several case studies and discussion of Tennessee cases. The intent of this course was to prime team members' perspectives regarding the respective social-ecological systems that each team operates in before embarking into strategic planning.

FINALIZED TEAM ROSTER AND TEAM CHARTER | MAY – JULY 2017

After thorough discussion and multiple drafts a formal charter for the Deer Team was approved that outlines, among other things, the overall purpose of the team, the roles and responsibilities of members, and the roster of voting and associate (non-voting) team members.

STRATEGIC BUSINESS PLANNING WORKSHOP | JULY & AUGUST 2017

The Deer Team participated in a 3-day Strategic Business Planning Workshop led by Tennessee's Chief Learning Officer, Dr. Trish Holiday. This workshop consisted of several useful exercises including a SWOT analysis of deer management in TN, group assessment of organizational health, and several discussions on the scope of the upcoming deer plan. Much of the output from this meeting was used as a "springboard" for the Manager's Model Workshop (January 2018, see below).

WILDLIFE WORKSHOP | SEPTEMBER 2017

At the 2017 Wildlife Workshop (formerly the Lands Management Meeting), the DMT held two 1-hour listening sessions. The listening sessions were facilitated so that each group gave feedback on each of four categories: strengths, weaknesses, opportunities, and threats/challenges (SWOT) in regards to deer management in TN. At the end of each session the participants prioritized the items revealed through the process. The intent of the listening sessions were primarily exploratory in nature to see what deer management themes, if any, emerged from Wildlife Division staff. A written summary of the major findings from these listening sessions was developed.

CONSULT WITH PLANNING EXPERTS | AUGUST – OCTOBER 2017

The Deer Management Program Leader (James Kelly) consulted with 6 experts in wildlife management strategic planning from 5 different states. Although there were unique and valuable experiences shared from each expert, a few key principles of strategic planning were repeatedly emphasized by each person:

1. **The process matters** — inclusiveness, fairness, transparency, etc. (and the process should include a communication component that follows the implementation of a strategy to reach both internal and external stakeholders)
2. **Requires rigorous thinking, time and expertise** — usually needs some specialized assistance, either from internal experts in the agency or from outside specialists retained specifically for the effort
3. **Must engage stakeholders early and often (enough)** — inclusiveness, transparency, knowledge contribu-

1 Dan Decker is a professor in human dimensions of wildlife management and the director of the Human Dimensions Research Unit at Cornell University. He is a past President of The Wildlife Society and recipient of the Aldo Leopold Award, the highest honor bestowed by The Wildlife Society.

tions, necessary for setting objectives, legitimacy, and support/"buy-in" (or at least consent) from internal (deer program staff and leaders at regional and local levels) and external players (TFWC, stakeholder groups) needed for sustaining financial and political support

4. **Focus on implementation** — while the planning process itself can take on a life of its own, never lose sight of the fact that planning is a means to an end, and that end is implementation of management and management-supporting strategies identified in the plan—those strategies need to be clearly stated and achievable

5. **Don't be put off by the amount of effort required and challenges of strategic planning** — the satisfaction of conducting a well-designed planning process and the benefits to the agency and its conservation effort will reward the effort put into strategic planning.

The Deer Management Program Leader also wrote a report synthesizing these findings with detailed notes from each interaction appended to that report.

DEER TEAM MEETING | OCTOBER 2017

The DMT reviewed the input from Planning Experts report (above), and unanimously agreed to contract with a stakeholder engagement and strategic planning specialist.

DEER TEAM MEETING | DECEMBER 2017

The DMT met with natural resources consulting firm, DJ Case & Associates. This preliminary consult allowed DJ Case & Associates to develop a proposal outlining a customized strategic planning process for TWRA's unique objectives, timeline, and budget. The proposal was subsequently approved by TWRA with a start date of March 1, 2018.

TENNESSEE FISH AND WILDLIFE COMMISSION UPDATE | DECEMBER 2017

At the December 2017 TFWC meeting the DMT Leader gave an update to the Commission on planning progress. That presentation can be viewed at **https://www.youtube.com/watch?v=Y1lPYpbQpGg&feature=youtu.be&t=1093**

MANAGER'S MODEL WORKSHOP | JANUARY 2018

During this 3-day workshop, lead and facilitated by Dr. Decker, the DMT identified much of the substantive content that is included in the strategic plan. During this workshop the DMT developed a common understanding of the desired future condition (DFC) and the current condition of the deer management system in TN. The Team also identified important gaps between current condition and the DFC of deer management in TN.

HOST SOUTHEAST DEER STUDY GROUP MEETING | FEBRUARY 2018

In February of 2018, TWRA hosted the 41st Annual Meeting of the Southeast Deer Study Group (SEDSG). This annual meeting includes approximately 300 deer researchers and managers from the Southeast and beyond. In most scenarios hosting a professional meeting would not be a strategic planning effort per se, but we opted to integrate the two by putting our DFC to the test. We made the theme of the meeting Stakeholder-focused, Science-based, and Data-driven: The Gold Standard for the State Deer Management System?

The following invited speakers presented during our plenary session: Dr. Steve Williams, Dr. Sean Riley, Dr. Paul Lukacs, Dr. Duane Diefenbach, and Dr. Pat Lederle Biographies about each speaker and more information about the event can be found at **https://www.regonline.com/builder/site/speaker.aspx?EventID=1981894**

During a panel discussion with the plenary speakers, the panel was asked if being stakeholder-focused, science-based, and data-driven was indeed the gold standard for the state agency deer management system. Each panelist indicated that it was.

There were also several submitted talks that were well-aligned with our theme. The talks and panel discussions at the SEDSG meeting challenged and informed the Deer Team's thinking as we moved into plan writing.

Phase 2

Stakeholder Engagement & Plan Writing

Once SEDSG was completed, the DMT moved into a phase of active plan development, plan writing, and stakeholder engagement under the facilitation of DJ Case & Associates.

PLAN WRITING | MARCH 2018 – OCTOBER 2018

The plan document was hosted on Google Drive as a google doc (web-based word processing software) and was shared only with Deer Team members. Therefore, all members of the team had real-time access to the most current version of the plan at all times during this phase. Team members were encouraged to work on the plan as much as possible in between monthly DMT meetings.

MONTHLY DEER TEAM MEETINGS | MARCH 2018 – OCTOBER 2018

The DMT met on a monthly basis (except for June) for 4 hours to review writing progress since the last meeting, discuss topics that generated a lot of edits and/or comments on the google doc, and to plan the next stakeholder engagement component of the planning process.

To maximize the Team's time together and to create the best plan possible in the amount of time available for the project, each meeting was highly structured and heavily facilitated. Phil Seng or Dave Case from DJ Case & Associates traveled in from Indiana to facilitate each of the meetings at TWRA headquarters in Nashville. The Deer Team Leader, Deer Team Sponsor and the representative from DJ Case & Associates met before each Dear Team Meeting to better maximize the progress made during each of the meetings.

An agenda was developed prior to each meeting. Deer Team members could attend in-person only (i.e., no video or teleconferencing). At the beginning of each meeting the notes and action items from the previous meeting were reviewed. Also, whenever possible the Deer Team Leader and the representative from DJ Case & Associates met for lunch afterwards to debrief the meeting and agree up on action items to complete prior to the next meeting.

FOCUS GROUP MEETINGS | JUNE 4 & 5, 2018

DJ Case & Associates conducted two focus groups with key stakeholders—people who have impact on and/or are impacted by deer management in Tennessee. The Deer Team and Team Sponsor took the lead in identifying and inviting stakeholders to the focus groups. A total of 21 stakeholders accepted the invitation to participate, but not all were able to actually attend.

Both focus groups were attended by the chair of the TFWC Wildlife Committee, the Deer Team Leader, and the Deer Team Sponsor. TWRA Executive Director Ed Carter was also on hand at the beginning of each focus group to welcome and thank participants for attending.

Objectives

The primary objectives of the focus group meetings were:

1. Describe the strategic planning process to stakeholders;
2. Ensure stakeholders that TWRA is interested in their opinions and will seek input in several different ways throughout the process; and
3. Collect initial input on deer management issues and answer questions about the process.

DJ Case worked with the Deer Team to develop a topic guide, which gave sideboards and direction to the focus group conversations. Similar issues were discussed at each focus group, but some of the probing and follow-up questions asked were customized at the moderator's discretion.

All focus group meetings were conducted at the TWRA headquarters in Nashville, held on consecutive weekday evenings (June 4 and 5, 2018), and lasted two hours each (6-8 PM). Participants were asked to arrive at 5:45p to register and to share a light catered dinner, with the formal focus group running from 6:30 to 8:00 p.m.

All invitees who agreed to attend received an e-mail confirmation and a follow-up reminder email a few days prior to the day of the meeting.

Results

Eighteen of the 21 stakeholders (86%) who accepted TWRA's invitation actually attended the focus group meeting (Table 1).

Second night of stakeholder focus group meetings

Table 1. Representatives from TWRA stakeholder groups who attended focus groups.

NAME	ORGANIZATION
Johnny Allred	Giles County Deer Hunters Association
Jim Bledsoe	TN Association of Soil Conservation Districts
Mike Butler	TN Wildlife Federation
Dr. Sara Clariday	TN State Veterinarian
Ricky Eastridge	U.S. Fish and Wildlife Service
Justin Lawson	Quality Deer Management Association
Stefan Maupin	Farm Bureau
Steve Nifong	TN.Deer.com
Oliver Barry	Hendersonville Deer Depredation Committee
Brett Dunlap	USDA Wildlife Services
Corey Giles	The Nature Conservancy — TN Chapter
Johnny Heard	TN Forestry Association / TN Forestry Commission
Charles Hord	TN Cattlemen's Association
Rob Kissell	TN Tech University
Susannah Kniazewycz	TN Department of Transportation
Robin Mayberry	Natural Resources Conservation Service
Lisa Muller	University of Tennessee — Knoxville
Mike Robertson	TN State Parks

Following are the key findings from the focus groups, organized by question from the topic guide.

Question 1. All participants were asked to introduce themselves by name and organization they represented. (Table 1)

Question 2. Do you think TWRA needs a strategic plan for deer management? Why?

There was unanimous support for the strategic plan.

- Without a plan the agency is pushed and pulled in too many different directions.
- Need to base decisions on science, and a plan will help keep it focused that way.
- Need to include urban areas in the plan.
- Need baseline information before we can plan where to go in the future.
- Will allow other agencies to work with your plan and follow your lead.
- A plan is mission critical and way overdue.

Question 3. What is the best thing about TWRA's current deer management system?

- Deer herd is robust and healthy. There has never been more (hunting) opportunity.
- Regulations are fairly simple.
- TWRA is taking a proactive approach to CWD. Very important.
- Provides a LOT of recreation opportunity for citizens.
- Capability to address problems (depredation permits, etc.).

Question 4. What is the worst thing about TWRA's current deer management system?

- Lack of sound biological data to support management decisions.
- Policies/regulations change direction too frequently. Inconsistent leadership.
- No follow-up assessment whether policies/regulations are effective.
- Deer density is way too high in some areas—big liability for farmers.
- There are no population goals, so no way of knowing if regulations are working.
- There are large population differences, even within certain counties, and it's very difficult to regulate the harvest to account for those differences.
- Very little accountability with current check-in system. Need tags or kill log or something similar.
- Without a management plan, people go straight to the Commission or legislators with problems, and the squeaky wheel gets the grease.
- Not enough emphasis on social carrying capacity.
- Plan should include outreach/education goals.
- Long deer season has negative impacts on small game hunting.
- Need more inter-agency communication and cooperation in managing deer on state parks and other public lands.
- Need more cooperation with universities to do research to fill data gaps.
- Plan should be broader than just sport hunting.
- WMAs are overharvested in the name of providing hunting opportunity.

Question 5. What is the biggest threat to deer management in Tennessee today?

- Chronic Wasting Disease (CWD).
- Declining hunter population (and CWD would make this even worse).
- Reduced access to hunting land—even where deer populations are too high (mismatch between deer numbers and hunter numbers).
- Lifetime license is a top seller but also a money loser.

Question 6. What is the most important thing the strategic plan must do?

- Be strategic. Look at the big picture.
- Create a baseline of information. You have to know where you are now before charting a course for where you want to get.
- Address financial and manpower issues—must have funding to get where we need to go.
- Be based on scientific data. We need to know a lot more about the herd.
- Harvest data
- Productivity data
- Human dimensions/Public opinion—cultural carrying capacity. We have to know more about our hunters-what do they want?
- Provide consistency to management—not so much bouncing around back and forth from one year to the next. (2-year regs cycle should help). Consider managing on five-year cycle. Give the management regime a chance to work before changing it.
- Include public input—from a variety of people, especially hunters. Provide a feedback loop for interested publics. (2-year regs cycle was step in the wrong direction).
- Include hunter R3.
- Consider reducing the deer herd. Quality vs. quantity.
- Include information and education—especially for non-hunting public. Coordinate I&E with stakeholders and partners—deliver common message. Improve agency website (2-way communications).
- Include habitat management.
- Include options for addressing urban/suburban issues.

COMMISSION UPDATE | JULY 2018

At the July 2018 TFWC meeting an update on planning progress was given and included a summary of the discussion at the focus group meetings. That presentation can be viewed at **https://www.youtube.com/watch?v=RQOskF3P79E&feature=youtu.be&t=11**

PUBLIC MEETINGS | SEPTEMBER 4 – 6, 2018

On three consecutive nights, TWRA hosted public meetings in Jackson, Murfreesboro, and Knoxville, respectively. To maximize engagement at the public meetings, several avenues were utilized to market the meetings, including a segment on TN WildCast, a press release, and an email that was sent to all license holders with deer hunting privileges.

At each meeting the Deer Team Leader gave a presentation regarding the strategic planning process thus far, an overview of the major goals that had been identified to that point, and a timeline with the rest of the planning process.

The meeting then transitioned to an open house format where members of the public could interact with members of the DMT and other Agency personnel to provide feedback regarding the plan that had just been presented or anything regarding deer management in general. Agency staff carried notepads and captured comments as they were interacting with members of public.

The in-person feedback from the meetings affirmed that the Agency was headed in the right direction with their plan. The Deer Team also learned about several of the issues that members of the public are dealing with in regards to deer management and deer hunting in different areas of the state.
A video recording of the Murfreesboro meeting can be found at **https://www.youtube.com/watch?v=av_kprZHd0M&feature=youtu.be**

DIGITAL OUTREACH | SEPTEMBER 5 – 28, 2018

We utilized several methods to allow feedback from those who could not attend one of the meetings physically. The meeting in Murfreesboro was streamed via Facebook Live where several stakeholders provided feedback in the comments section of the Facebook video. Furthermore, a page on TWRA's website was developed to host a recording of the meeting that also had a form for submitting written feedback. Finally, an email was sent to all license holders with deer hunting privileges inviting them to go to the link, watch the video, and submit their feedback. Through this email we received an additional 600 comments from the public. Most of the feedback was in regards to preferred hunting regulations (e.g., buck bag limits, antlerless harvest, season dates, etc.). The comments that were directed towards the plan where generally supportive of the approach outlined in the presentation.

COMMISSIONER INTERVIEWS | JUNE 2018

To get a better understanding of the desires and expectations of the Tennessee Fish and Wildlife Commission (TFWC) for the plan and deer management in Tennessee, DJ Case & Associates interviewed three members of the TFWC. The first was Commissioner Kurt Holbert, chair of the Wildlife Committee. At the end of the interview, Commissioner Holbert named two additional commissioners to be interviewed, Tony Sanders and Angie Box. Interviews lasted 40-60 minutes, and the commissioners were assured of anonymity for their specific responses. DJ Case & Associates provided a summary of the commissioners' feedback in a report that was submitted to the Deer Team Leader and Deer Team Sponsor.

WILDLIFE WORKSHOP | SEPTEMBER 19, 2018

One year after the 2017 Wildlife Division listening sessions, we provided an update on the strategic planning process. The Deer Team Leader presented an executive summary of the draft strategic plan. The intent of the presentation was to update all Wildlife Division staff on the major goals of the plan, a summary of the process on how we got there, and to get feedback from Division staff on the draft plan. Several staff members had astute questions and feedback. All Wildlife Division staff were invited to provide feedback on the website where the plan was hosted as either a TWRA employee or as a citizen.

DEER TEAM INTERVIEWS | SEPTEMBER 24 – 28, 2018

Once a solid structure and decent amount of content was drafted in the strategic plan, DJ Case & Associates conducted phone interviews with each member of the Deer Team, including the Deer Team Leader, to get impressions of the plan and the planning process. These interviews were very insightful and helped Phil Seng prepare to facilitate the October Deer Team retreat.

DEER TEAM RETREAT | OCTOBER 1 – 2, 2018

After 6 monthly Deer Team meetings and working on the plan for 7 months, the DMT convened one final time for a retreat-style off site meeting to make final decisions on what content would or would not be included in the plan. During this day and a half meeting, the DMT made 177 edits to the plan. There was general consensus on most items, but a couple items came down to a hard vote per the guidelines in the DMT Charter. This retreat was held at Montgomery Bell State Park in Burns, TN and was also facilitated by DJ Case & Associates.

Phase 3

Plan Adoption

INPUT FROM EXECUTIVE LEADERSHIP | OCTOBER – NOVEMBER 2018

In late October, the DMT submitted a final draft of the plan to the executive leadership of the Agency.

After a couple weeks of allowing executive leadership to review the plan, several members of executive leadership met with the Deer Team Leader to provide feedback regarding the plan. Most of the feedback was supportive and in agreement with the proposed plan. However, there were several suggestions to make the plan less technical and easier to read for the public.

In response to this, the agency asked our contracted consultant for the project, DJ Case & Associates, to review the plan and try to revise it to make it more palatable to the public without losing any of the original intent by the Deer Team. DJ Case did so and this version of the plan was shared with the Commission.

COMMISSION PREVIEW & OPEN COMMENT PERIOD | DECEMBER 6, 2018

The draft plan was presented at the December Commission Meeting of the TFWC which can be viewed at **https://www.youtube.com/watch?v=IHIUTmD9Skc&feature=youtu.be&t=2133**

On the same day, the draft plan was made available for public comment for 30 days, ending on January 6. The plan was posted to the TWRA website and notice of the posting was emailed to all license holders with deer hunting privileges and anyone who provided an email address on our public meeting sign-in sheet.

FINAL REVISIONS | JANUARY 6 – FEBRUARY 15, 2019

We received a total of 752 comments during the public comment period and the DMT read and considered each comment. Much of the feedback was directed towards specific regulation changes unrelated to the focus of this strategic plan. Most of the feedback regarding the plan was supportive of what TWRA had originally proposed. However, there was some constructive criticism that was embraced and incorporated into the final version of the plan.

During the 30-day comment period, Chronic Wasting Disease (CWD) was confirmed in Tennessee. This was a very significant event for deer management in TN, and the plan was updated to reflect this discovery.

PRESENT FINALIZED PLAN TO COMMISSION | FEBRUARY 2019

The Deer Team Leader presented to the Commission a brief recap of the plan, a synthesis of public comment, and a summary of changes that were made to the plan since the December Commission meeting. The plan has been approved by the Agency and the DMT will move into the implimentation phase.