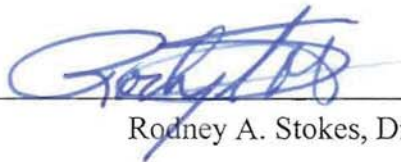


MICHIGAN
ELK MANAGEMENT PLAN



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Approved:



Rodney A. Stokes, Director

Michigan Department of Natural Resources

Lansing, Michigan

April 5, 2012
Date

ACKNOWLEDGEMENTS

The Michigan Department of Natural Resources appreciates the valuable contributions offered by many individuals, agencies and organizations during the development of this plan.

We thank the members of the Elk Management Advisory team for their dedication and work as they developed a framework for elk management. Their recommendations on issues are directly reflected in many of the management strategies in this plan. Special thanks in this process go to Jordan Burroughs with Michigan State University Cooperative Extension Service. Her knowledge, enthusiasm and skill as a facilitator helped this team build consensus around some contentious issues.

We thank our state and Tribal agency partners for their cooperation in elk management and the information and feedback they provided for this plan.

Finally we thank the members of the public and of the Department both past and present whose efforts have helped maintain a place for elk in Michigan. We can be successful today only because of the work that brought us to where we are.

COVER ART BY JENNIFER KLEITCH

Jennifer Kleitch is a Wildlife Biologist with the Michigan Department of Natural Resources and has had her art featured on Deer Management Cooperator patches, the Statewide Bear Management Plan and at the Tenth American Woodcock Symposium. Her art depicts wildlife in detail using graphite or pen and ink.

LIST OF ABBREVIATIONS

CWD	Chronic Wasting Disease
DNR	Department of Natural Resources
DRIP	Deer Range Improvement Program
EMAT	Elk Management Advisory Team
GPS	Guiding Principles and Strategies (Wildlife Division Strategic Plan)
MSU	Michigan State University
NRC	Natural Resources Commission
PRC	Pigeon River Country State Forest
tb	Bovine Tuberculosis

1. INTRODUCTION

1.1 Purpose of Plan

This plan provides strategic guidance for the management of elk in Michigan. This guidance will help: 1) manage for a sustainable elk population in balance with habitat; 2) use hunting as the primary method to control elk numbers, herd composition and distribution; 3) enhance public understanding of elk management in Michigan. This plan is appropriately aligned with the Wildlife Division strategic plan, “Guiding Principles and Strategies,” or GPS.

The Michigan Department of Natural Resources (Department) has the statutory authority and primary responsibility for the management of resident wildlife in Michigan. Accordingly, this plan was developed to guide the Department’s management of elk in Michigan. However, partnerships with other organizations have assisted with elk management in the past and will be increasingly important in the future. This plan identifies areas where sharing of resources, collaboration on educational campaigns and providing technical support may be especially valuable to the management of elk. While the Department can provide leadership for maintaining partnerships and seeking to establish new ones, all parties with an interest in elk and elk management may play a role in such efforts.

This plan does not outline operational details of elk management in Michigan. Operational details will be formulated within an adaptive approach to management, in which specific management methods are routinely adjusted and updated as local conditions, technology, regulations and other aspects of management change.

1.2 Current Management Authority and Process

The Department has a public trust responsibility for the management of all wildlife species and populations. Primary legal authority for wildlife management and regulation comes from the Natural Resources and Environmental Protection Act, Public Act 451 of 1994. Part 401 of Public Act 451 gives authority to the Natural Resources Commission (NRC) and the Department Director to issue orders (the Wildlife Conservation Order) specific to wildlife management and hunting.

In 1996, Michigan voters passed a referendum requiring the NRC to use “Principles of sound scientific management” when making decisions concerning the taking of game. Passage of this ballot initiative gave exclusive authority to the NRC over the method and manner of take for game species. Following passage of the initiative, it was codified as Section 40113a of Public Act No. 451 of the Public Acts of 1994, MCL 324.40113a.

Effective wildlife management incorporates assessments of both biological and social factors influencing management. Elk management is supported by quantitative data from research, field surveys, mail surveys and published literature. Elk management also incorporates qualitative information in the form of: general experience, observations in

the field, and discussions with Tribal governments, stakeholders, Department staff, and other agency staff in Michigan and in other states.

Scientific management incorporates an adaptive approach to resource management, which is an iterative process whereby changes in management actions (e.g., hunting regulations or educational efforts) are monitored and evaluated to determine if these changes achieve management goals. Management efforts are modified over time as new information is obtained, new analyses are conducted, or factors that influence elk ecology change.

Several steps are involved in reaching decisions about the management of elk in Michigan. Typically, the Wildlife Division's Elk Work Group identifies and discusses current and emerging issues and potential means for addressing them. Management recommendations are then generated by field staff and submitted to Wildlife Division or Department leadership for review for budgetary and policy implications. The Department provides recommendations to the NRC for those issues over which they have authority. The Department conducts government-to-government consultation with the Tribes, and also obtains public input through informal discussions with interested stakeholders. Additional public comment is received at meetings of the NRC once recommendations have been provided for review by the Commission. The NRC approved the last formal Michigan Elk plan in 1984.

2. THE PLANNING PROCESS

The Department developed this plan through a process that included review of scientific information and significant involvement of affected stakeholder groups and the general public. The process included the following phases:

- 1 Issue Scoping Meetings
1. Government-to-Government Tribal consultation
2. Formation of the Elk Management Advisory Team (EMAT) and Meetings
3. Department Wildlife Division Elk Work Group Meetings
4. Plan Writing
5. Public Review and Comment
6. Director Approval

The information compiled and evaluated during all of these phases was used to produce a plan that is based on sound science and careful and respectful consideration of the diverse perspectives held by Michigan society. Each phase of the planning process is described below.

2.1 Issue Scoping Meetings

In January 2010, the Department hosted two meetings to obtain information about peoples' concerns for elk and elk management. Michigan State University (MSU)

Cooperative Extension Service hosted the meetings and asked attendees to describe the issues they had concerning elk. Sixty-three people attended the two meetings.

2.2 Government to Government Tribal Consultation

The current Michigan elk range is within the area ceded by the 1836 Treaty of Washington and subsequently covered by the 2007 Inland Consent Decree. Five federally-recognized Tribes reside in this area: Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Little Traverse Bay Bands of Odawa Indians, the Sault Tribe of Chippewa Indians and the Little River Band of Ottawa Indians. The Department engaged the Tribes during this process through group discussions involving Department staff and tribal representatives. Additionally, the Department invited tribal representatives to provide their perspective during the EMAT meetings and to comment on the EMAT report to the NRC. The Department also asked the Tribes to formally convey their concerns and values in relation to elk management for this document.

2.3 Elk Management Advisory Team

To help develop a plan that considered a wide range of public interests, the Department assembled the EMAT to serve as an advisory committee. The EMAT's charge was to provide a series of recommendations regarding the future management of the state's elk population. The team included representatives from 10 agencies and organizations representing conservation, agriculture, hunting, forest management and public safety interests as well as large and small private landowners within the elk range. Organizations were selected to represent the interests of Michigan residents that are impacted by elk. Tribal and Department representatives were on the committee to provide input but not to approve or disapprove the final recommendations.

The EMAT met three times in June and July, 2010 for two-day facilitated meetings. Department staff made informational presentations and asked a series of questions designed to facilitate discussion on important aspects of elk management in Michigan. The EMAT reviewed biological and social information and engaged in sometimes-intense discussions to reach consensus on recommendations they provided to the Department.

The EMAT submitted its final report, Report of the Elk Management Advisory Team to the Department of Natural Resources and Environment (Appendix A), to the NRC in September, 2010. The report provides a vision for successful elk management and addresses issues of elk management, habitat use and home range, population and impact monitoring, herd health, population management, elk/human conflicts, funding and information and education. The recommendations presented by the EMAT were used extensively in the development of this management plan.

2.4 Wildlife Division Elk Work Group

The Elk Work Group has representatives from Wildlife, Law Enforcement and Forest Management Divisions as well as MSU, Department of Fisheries and Wildlife. This group meets annually to discuss elk management, herd health, law enforcement and research issues. They make recommendations related to rule changes for the elk hunting season structure and harvest quotas to the Wildlife Division Management Team, which are subsequently taken to the NRC for approval.

2.5 Plan Writing

Between November, 2010 and August, 2011, the Department evaluated the information and recommendations obtained in the previous phases to develop a draft of this plan. Department staff reviewed the draft prior to its public release.

2.6 Public Review and Comment

A draft of this plan was released in October, 2011 for public review and comment. Nine individuals and organizations submitted comments during this period. An open house was also held in Gaylord to solicit input with nine people attending. The Department reviewed the comments received and modified the plan as appropriate prior to its final approval by the Director.

3. HISTORY

3.1 History of Elk and Elk Hunting in Michigan

The history of elk in Michigan is a dynamic story that blends ecological, social, cultural and economic issues. Events within and outside of the elk range influenced elk and people's concern for elk influenced both the land occupied by elk and many other species. Intertwined with the story of elk is the story of the Pigeon River Country State Forest (PRC). The Concept of Management for the Pigeon River Country (MDNR, 2007) provides a complete history of the establishment of the lands that make up the PRC. From the establishment of the former Otsego County Wildlife Refuge in 1924 to the present, elk have been part of the management, controversy and allure of the PRC. Elk were a symbol of "The Big Wild" during the oil and gas controversy of the 1970s which resulted in restricted oil and gas development within the PRC and the creation of the Michigan Natural Resources Trust Fund. Part of the policy statement of the Pigeon River Country Concept of Management is "...to sustain a healthy elk herd..." (Page 14). While many elk thrive well beyond its border, the PRC is considered the nucleus or core range of the elk herd.

Historical accounts suggest elk inhabited the eastern United States and may have been common in the Lower Peninsula of Michigan in pre-settlement times (Bryant and Maser 1982). Elk disappeared from Michigan in the late 1800s.

The current elk herd is the result of a release of seven animals from “various city parks and public institutions” (Stephenson 1942) in 1918 about three miles southeast of Wolverine. The herd grew steadily with estimates of 300-400 in 1939 (Shapton 1940) and 900 to 1,000 in 1958 (Moran 1973). The size of the elk range increased correspondingly and by the mid 1960s complaints of crop damage, reforestation problems and concerns of elk competing with deer for limited natural foods were becoming more common. Concurrently, the completion of Interstate 75 in the early 1960s made it much easier for people to travel to the elk range and interest in elk as a tourist attraction was growing. While elk numbers and range were increasing, habitat quality for elk was generally declining. The cutover hardwood hills and burned pine areas the recently released elk found in the 1920s were being replaced with a more mature forest. This resulted in less grasses, herbs and early successional hardwoods that provide food for elk.

As concerns about elk numbers grew, the Department began to advocate for the ability to actively manage elk numbers through hunting. The first public hunts took place in 1964 and 1965. During these two years, 596 hunters legally harvested a total of 452 elk. These hunts reduced the size of the elk herd as intended but while the hunts were not re-authorized after 1965, elk numbers continued to decline. The decline was due in part to the continued deterioration of elk habitat but increased human activity in the elk range may have contributed as well. Also, there was significant local resentment over certain aspects of the elk hunt that led, in part, to noticeable losses due to illegal shooting. In 1974, 45 elk were known to have been illegally killed and in 1975, an air and ground survey counted 159 animals and estimated the population to be 200.

The first Michigan Elk Plan was written in 1975 (MDNR, 1975), largely in response to the alarming decline in elk abundance. This plan helped the Department set elk as a priority species for management and outlined actions needed to maintain elk on the landscape. One important outcome of this planning effort was the assignment of additional Conservation Officers to the elk range to reduce the illegal killing of elk. Completion of many of the habitat management recommendations in the 1975 plan were made possible by the 1972 implementation of the Deer Range Improvement Program (DRIP). This \$1.50 earmark from every deer license was used to fund habitat manipulation for deer and this improved habitat for elk as well. At the same time, the trees on the forested land that had been cutover when elk were introduced were now large enough to produce timber products. A timber mill was built in Gaylord in 1964 and expanded significantly in 1978 to take advantage of the available timber. The increased demand for wood meant that commercial timber cutting could provide early successional vegetation types favored by elk. The commercial harvest along with non-commercial forest regeneration activities completed primarily for deer and funded through the DRIP program improved habitat greatly.

The increase in law enforcement efforts and the improving elk habitat helped elk numbers rebound in the late 1970s and early 1980s. In 1984 the Department adopted the second Elk Management Plan (MDNR, 1984) with the goal of “A viable elk population in harmony with the environment, affording optimal recreational opportunities.” This

plan designated 576 square miles of northern Michigan as elk range and set a population objective of 600-800 animals. The basic tenets of this plan were to control elk numbers through recreational hunting while maintaining a viewable elk herd with a high proportion of bulls. The Department created an Elk Management Team, which is now referred to as the Elk Work Group. This group's charge was to annually review elk related issues, including research, from the past year and to make recommendations for the next year. This included assessing the most recent population estimate and making decisions related to harvesting elk. The NRC authorized an elk hunt for December of 1984. It was limited to 50 hunters with a quota of 40 antlerless and 10 any elk licenses and hunters harvested 49 elk.

In 1988, the Elk Work Group recommended expanding the area designated as elk range by including areas where elk could be tolerated without causing additional management problems. The elk range was then divided into four elk management units, which are somewhat unique in physiographic characteristics and, at the time, roughly represented discrete population segments (Figure 1). These units formed the basis for the current elk hunting zones. Based on the expanded range, the NRC established a winter population goal of 800-900 elk in 1988 (Langenau 1993).

Elk hunts have occurred annually since 1984. The hunt periods have been variable with the December hunt period being the most stable (Figure 2). In general, elk seasons during August, September, October and January target elk outside of the elk management area. December hunt periods control overall elk numbers and reduce elk numbers within the elk management area. For each of the different hunt periods, well defined elk management units are open to hunting. The area is divided into units and a quota of hunters is assigned to each. Annual changes have been made to unit boundaries and a hunter's ability to move among units based mostly on the number of elk in an area. The elk management units of 1988 have undergone many changes to address management issues and no longer represent discrete elk population segments.

The zone and quota system was designed to focus the harvest in specific areas to address crop damage or forest regeneration issues and also to limit the spread of elk from the elk management area. Elk hunters are selected from a pool of applicants that is often 100 times greater than the number of permits issued. Only Michigan residents are eligible to hunt and selected applicants come from all parts of the state. Many are not familiar with the area and hire an elk hunting guide to help them locate, hunt and process elk. All elk killed are required to be taken to a check station or checked by Department personnel in the field. Between 1984 and January 2011 the Department issued 6,497 permits and hunters have taken 5,322 elk. Since 2007, the five Tribes in the 1836 Treaty-ceded territory, which includes the elk range, have issued tribal elk permits pursuant to the 2007 Inland Consent Decree. The Tribes generally issue a number of permits equal to ten percent of the licenses issued by the state. The elk population goal of 800-900 established in 1988 has been used through 2011.

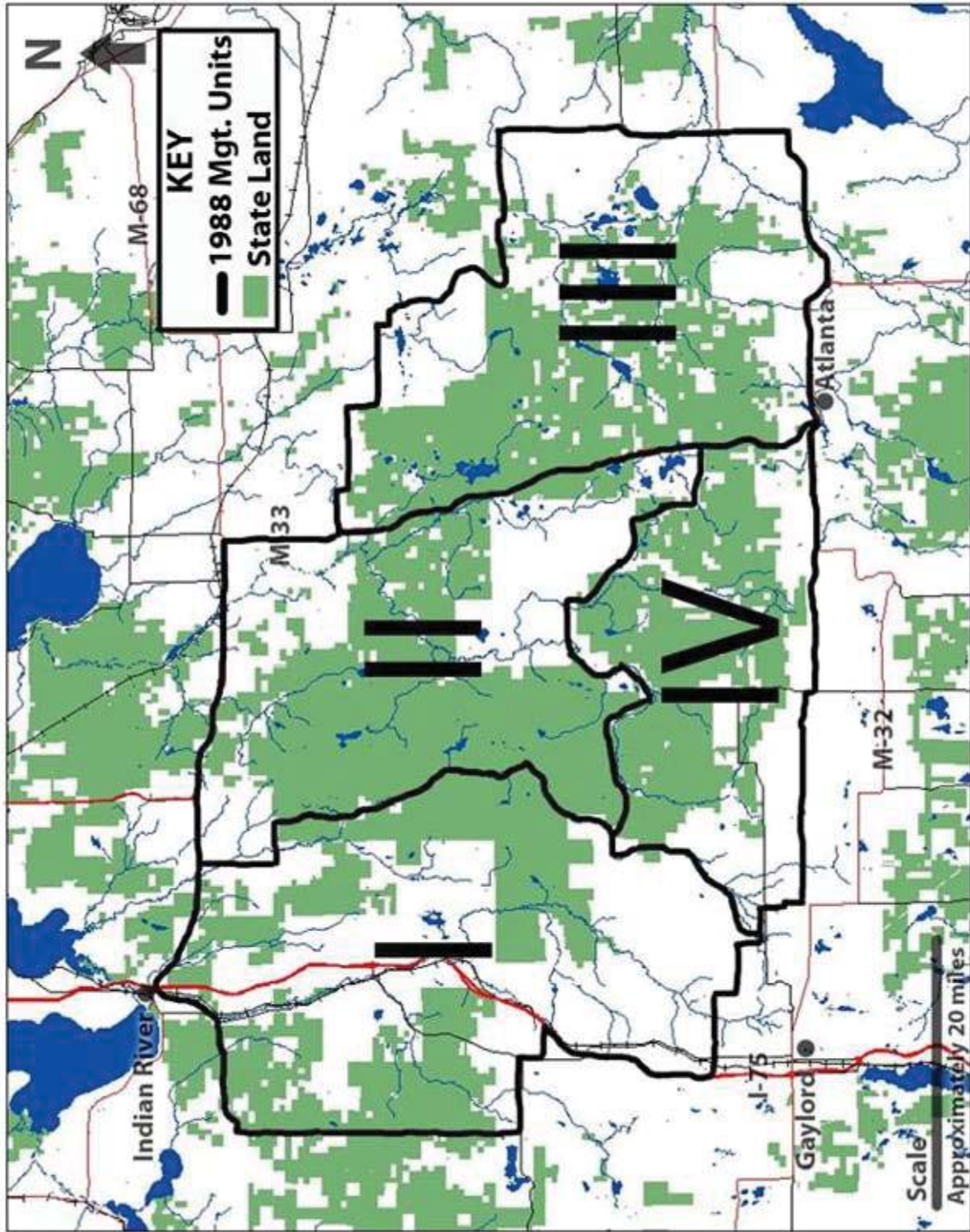


Figure 1. 1988 Elk Management Units

Year	January	August/Sept.	October	December
1984				
1985				
1986				
1987				
1988				
1989				
1990				
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2005				
2006				
2007				
2008				
2009				
2010				

Figure 2. Michigan Elk Hunting Periods 1984 - 2010

The continued presence of elk in Michigan is a wildlife management success story made possible by the many individuals and organizations who worked to maintain a place for this species in Michigan. The 1975 Elk Management Plan was a formal acknowledgement by the Department that elk were an important resource to the people of the State and set the stage for increasing elk numbers. There was real concern at this time that elk could be lost from the landscape. The 1984 plan recognized the importance of elk viewing and made elk hunting the preferred method for controlling elk numbers and distribution. However, some of the consequences of the hunts in 1964-65, such as a steep drop in the population and increased illegal shooting were major concerns. The Department implemented the hunts in the 1980s cautiously, testing and refining this tool to control elk numbers and distribution. While the hunts proved effective and were socially acceptable, there was growing concern from the mid 1990s to the present that more needed to be done to reduce elk depredation. At the same time others wanted elk numbers increased and their range expanded. The formation of the EMAT was an attempt by the Department to bring diverse voices to the same table and find common ground among them. The hard work from all the members of the EMAT resulted in consensus on many issues. This plan draws on this consensus, takes into account ecological changes of the landscape and builds on the successes of the earlier planning efforts to guide elk management in the future.

3.2 Current Population Status and Range

Elk population survey techniques have changed significantly through time. From the release of the elk up to the 1960s estimates were based on track counts, personal

observations of elk groups and information gathered from deer hunters and local residents. In the 1960s, elk pellet group surveys were used to try to determine the size and distribution of the elk herd. While this technique was useful for determining population trends, the confidence limits were too large to allow it to be a reliable census method (Moran 1973). From 1975 to 2001, the Department used a combination air and snowmobile survey. This survey provided a minimum count and biologists estimated the number of elk missed during the survey based on the conditions of the survey. From 2006 to the present, we have used a fixed wing aerial survey corrected with a sightability model (Walsh 2007, Walsh et al 2009). The last survey, in January 2010, provided a population estimate of 778 elk with 95% confidence limits of 592-964. The elk population increased from their release in 1918 until the mid 1960s when it declined to around 200 animals in 1975. The population increased again in the late 1970s (Figure 3) and has varied from 800 to 1,400 animals between 1985 and 2010.

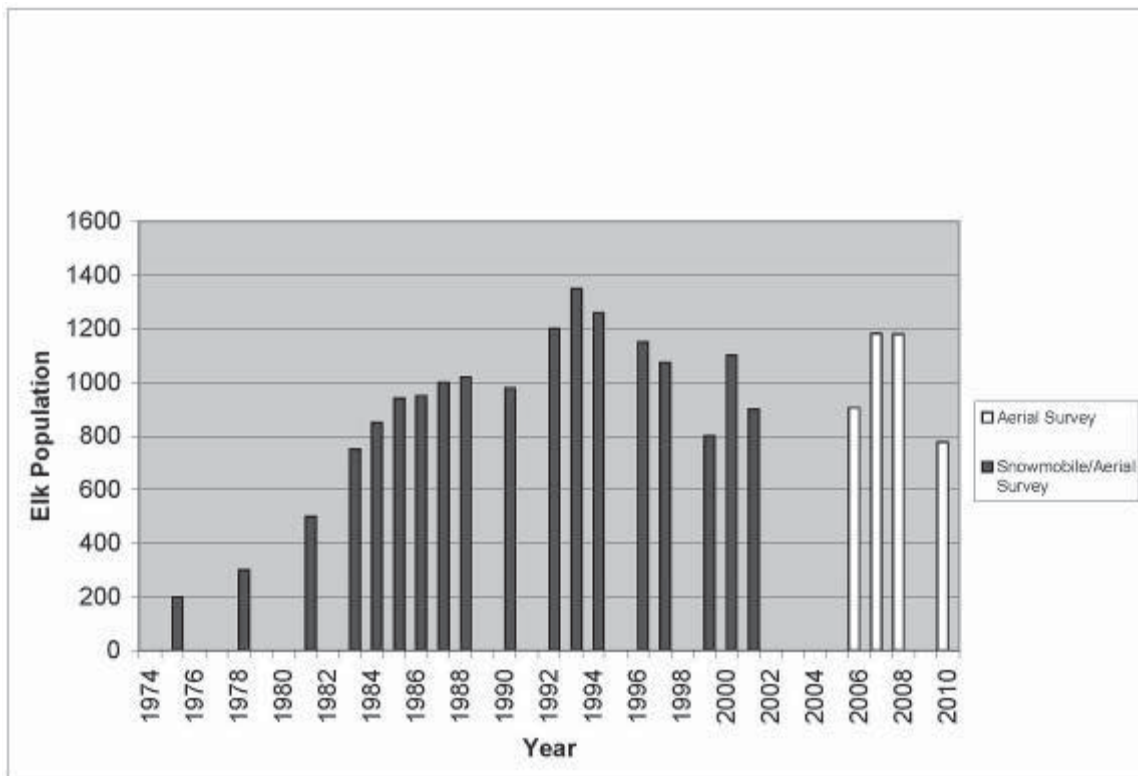


Figure 3. Michigan Elk Population Estimates 1975 - 2010

The distribution of elk has changed in the same way as the population. The area elk occupied expanded from their release in 1918 through the 1960s, contracted through the early 1970s and has since expanded again. Range estimates from 1940, 1960 (Moran 1973), 1975 (MDNR 1975) and the current range, which was derived from information from hunter kill locations, informal reports to Department staff and the 2010 survey, also shows this pattern (Figure 4).

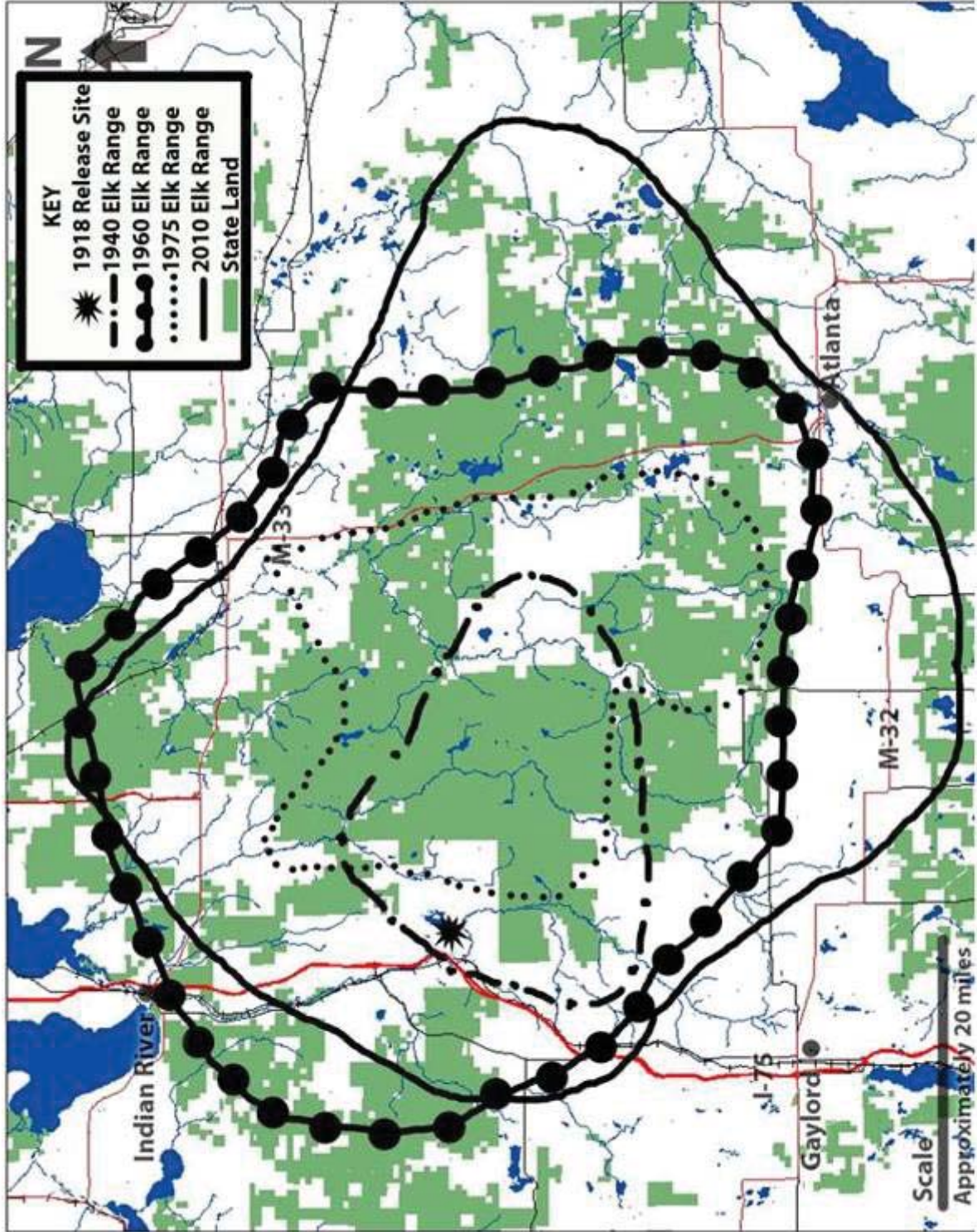


Figure 4. Historical and Current Elk Distribution

An important factor that affects elk distribution is food availability. Aspen stands less than 15 years old are a preferred vegetation type for elk in Michigan because of the food provided by the aspen and other plants in this community. The acreage of young aspen available to elk on state land within the elk range has also changed significantly over time. Young aspen increased from around 4,000 acres in the 1960s to almost 20,000 acres in the 1970s. It remained fairly high through the 1990s but was back to the earlier low levels from 2001-2010 (Figure 5). The amount projected for the period 2011-2020 is midway between the highs and the lows of the past 40 years and should stabilize at or near that level for the foreseeable future. This increase in young aspen in the next 10 years should reduce the potential for forest regeneration issues on state and private lands within the core range if the elk population remains stable.

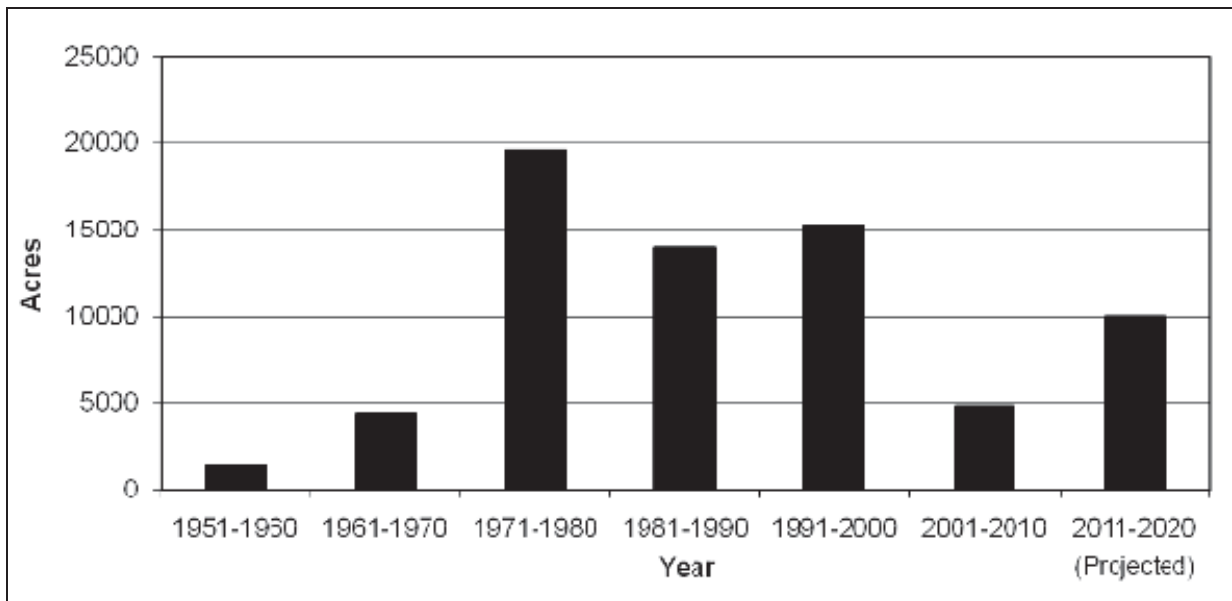


Figure 5. Acres of 0-10 year old aspen in the elk range of Michigan 1951-2020.

One factor mentioned in many Michigan elk planning and research documents is change in land use and how it can affect elk distribution. On private lands in the elk management area there has been a continuation of both the subdivision of land into smaller parcels and a shift from owning lands for hunting to owning it for other purposes. On public lands there has been increasing pressure to accommodate new forms of recreation such as, but not limited to, mountain biking and horseback riding. Both of these trends are expected to continue.

As a species, elk can be tolerant of a variety of land use activities. Nationwide, like white-tailed deer, Canada geese and coyotes, elk occupy ranges from wilderness areas to agricultural areas and wooded subdivisions. Since their introduction to Michigan in 1918, elk have moved into new areas and even if a landscape were perfect for elk, every year there has been single elk or groups of elk that move out from this area to explore and perhaps occupy a place outside of the “core” range.

The combination of elk being highly visible, very adaptable and tending to range long distances along with the changes taking place on both private and public land can lead to conflicts. These conflicts can be between neighbors who may hold differing views of whether elk are desired in the area or not or between users of state forest land who have differing views of the importance of elk in the area. The Department must address these conflicts and this work is part of the continued effort necessary to maintain elk on the landscape.

The Department first designated a specific management area for elk in the 1975 Elk Plan. The 1984 plan adopted the same management area lines and the management area expanded in 1988. There are benefits and consequences to defining distinct boundaries to designate zones of management. The largest benefit is that a line makes it easy for everyone to understand where the priority is for elk management. Operationally, the goals for habitat management and decisions as to how the Department addresses elk/human conflicts may be different within and outside of the elk management boundary. Defining habitat priorities and how the Department will react to elk/human conflicts in relation to whether they are within the elk management area or outside of it makes it easier for both citizens and Department personnel to anticipate and respond to elk issues.

One of the consequences of distinctly designating an elk management boundary is that a line, often designated by a road, is usually not an ecologically or a socially significant feature. Conditions on the land change annually and elk may respond to these changes resulting in elk spending part of a year outside of the management boundary line and part within it. Also, as noted earlier, some elk will always be moving from within to outside of the elk management area. From both a strategic and operational management perspective the benefits of a well defined elk management area boundary that is clear, easy to understand and will direct future actions outweighs the consequences of a minority of elk occupying the area near or just outside of the boundary line.

Operationally, the line will serve to guide actions. We will define actions to address different elk issues within the elk management area and outside of it but there will always be a tension zone where elk occupy the land at or near the boundary of the elk management area. Actions taken in this border area will vary depending on ecological conditions and social or economic concerns. For instance, elk outside of the line occupying a block of state land where they are not causing damage to the resource or increasing the disease risk to any other animals will be tolerated at a higher rate than animals outside the line that are in a primarily agricultural or residential area.

The line on Figure 6 shows the elk management area boundary and delineates where elk management will be a priority. Outside of this line state land is in smaller blocks and the interspersions of private land is greater which diminishes the Department's ability to manage elk numbers through hunting. The state land east of M-33 is fairly contiguous but the threat for transmission of bovine tuberculosis (tb) from deer to elk is greater than any place else that elk occupy. Elk will exist outside of the elk management area and in some cases will have positive benefits, in other areas there will be costs. We will tolerate elk outside of the boundary at low levels as long as there are not significant negative social,

economic or ecological effects or if their occupation of an area does not lead them to other areas where they can have greater negative effects.

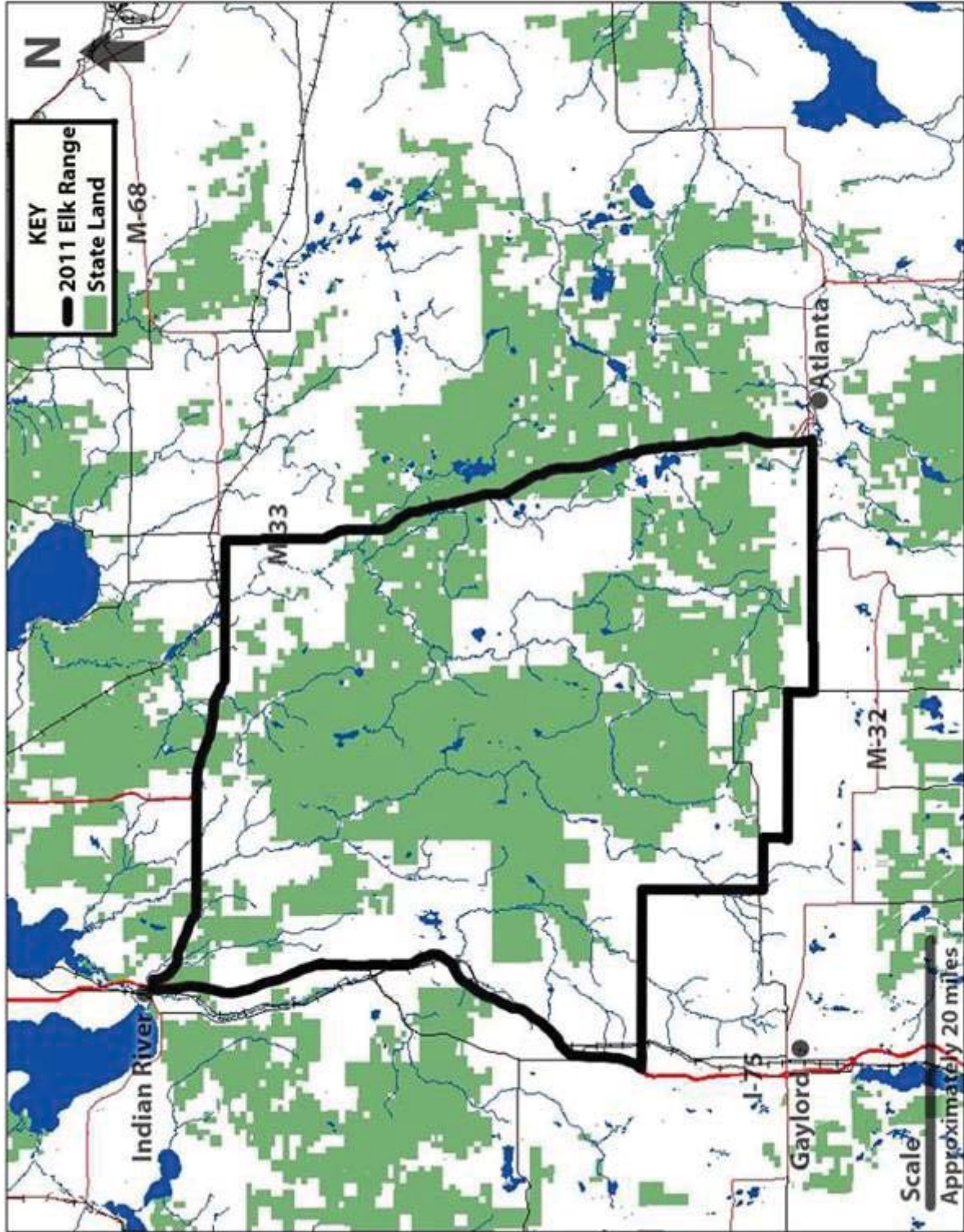


Figure 6. 2011 Michigan elk management area

3.3 Tribal Involvement in Elk Management

Tribal concerns are a significant factor in shaping elk management recommendations and the Department is obligated to consult with the Tribes. The Department must exercise its elk management authority in a way that does not infringe upon treaty rights and responsibilities. The Tribes in the 1836 treaty-ceded area participated in discussions with the Department concerning elk management. The Little Traverse Bay Bands, Grand Traverse Band and The Great Lakes Indian Fish and Wildlife Commission, on behalf of the Bay Mills Indian Community, submitted written responses to the EMAT report. Many of their concerns related to operational elk management rather than strategic direction and we intend to address those concerns outside of this strategic plan.

The major strategic concern of the Tribes is the distribution of elk. Those that provided input would like to see the area that elk occupy increased where habitat is suitable for them. This is consistent with other Tribal efforts and the Tribes' stated desire to restore as many wildlife species to their original range as possible. The range delineated in this plan does not reflect this and in fact reduces the size of the designated elk management area. This reduction in size is due to the lack of social acceptance of elk outside of their traditional range, disease management concerns and economic considerations for both private landowners affected by elk and the Department. While this plan guides activities for a 10-year period, a major change in conditions during this period could lead to changing one or more goals outlined in the plan. A significant change in social acceptance, a lack of disease concerns and development of practical strategies to mitigate the negative economic concerns related to elk outside of the core range would allow the Department to consider expanding the elk management area.

The Department will consult with Tribes at least once annually concerning elk management direction. A meeting with the tribes should follow the January population survey and should include discussions of operational details necessary to achieve both State and Tribal objectives. We hope that part of this consultation will include sharing resources to address these agreed upon actions as the goals, strategies and actions in this plan are taken from a strategic level to an operational one.

4. ELK MANAGEMENT GOALS, STRATEGIES, AND ACTIONS

Goal 1. Manage for a Sustainable Elk Population in Balance with the Habitat

Elk are highly adaptable animals and exist in a variety of habitats from Ontario to Arizona. They are primarily grazers and browsers and do best in a landscape with a significant proportion of open or early successional vegetation types (Beyer 1987). Elk habitat selection can depend on a number of factors including food availability, social factors, and a need for cover related to thermoregulation, predator avoidance or calving. There is seasonal variation in habitat use driven in large part by food but also by the other factors listed. Aspen is a common forest type in the landscape occupied by elk in Michigan and one of their preferred foods. Management of aspen is integral to

management of elk. Elk will use hard mast when available and frequently use openings, for either grazing or social reasons. Elk also prefer planted and fertilized areas, whether they are food plots on state land or private agricultural operations.

Managers of elk must consider their large home ranges. Different research projects in Michigan have looked at elk home range use (Ruhl 1984, Beyer 1987, Walsh 2007) and have found that the average home range of a bull is about 35 square miles and of a cow is about 23 square miles. Home ranges of individual elk are highly variable and range from 2 to 100 square miles.

Large concentrations of elk feeding in an area can affect forest regeneration, especially if the elk use an individual stand or group of adjacent stands for a period of years (Campa et al. 1993). Over-browsing can lead to conversion of a preferred type for elk, such as aspen, to one that is less preferred, such as white pine. Stand conversion will also affect other wildlife species; some positively, some negatively. Significant areas of stand conversion might affect state forest land management goals and could reduce the capacity of the land to sustain elk in the long term. On private lands, relatively small areas of stand conversion can affect a landowner's management goals. Elk exploiting agricultural areas will have a negative effect on crop production and could affect an individual's ability to continue farming for income. The presence of elk, a large herbivore that may congregate in groups, will make some changes to the landscape imminent. The Department will manage elk such that the abundance and distribution of elk is balanced with other ecological and social needs. This goal aligns with GPS Objective 1.1, 1.3, 1.4, 1.5, 2.1, and 2.3.

Strategy 1.1 Focus habitat management efforts within the elk management area where the benefits are greatest and will have the greatest impact

Action 1.1.1 Forest management

Large blocks of land must be available for habitat management for elk because elk have large home ranges. The designated elk management area (Figure 6) includes the Pigeon River Country State Forest Management Unit and parts of the Atlanta and Gaylord Forest Management units. There are also two large private inholdings that total nearly 40 square miles and numerous smaller ones. The Pigeon River Country Concept of Management has well defined goals for elk and the Department will apply these goals to the entire elk management area. These goals include: 1) maintain 6-7% as grass and upland brush types; 2) manage the forest to maintain the proportion of aspen at the same level (no net loss of aspen); 3) maintain mast production by red, white, northern pin oak and beech and increase production if silviculturally appropriate; 4) to manage for mixed pine stands using natural regeneration that promotes both coniferous and deciduous species. Managers must also be cognizant of the total amount of all early successional vegetation types and make efforts to provide a consistent amount of this feature over the decades. If we achieve these goals, then aspen in a variety of age classes, would represent 26% of the forest cover type in the area, grass and upland brush types would increase from 5% to 6-7%, hard mast producing trees would be maintained or increased and pine will be

managed by using natural regeneration to promote mixed coniferous and deciduous stands.

Action 1.1.2 Opening management

Managed openings (planted, mowed or burned) are highly preferred by elk and affect elk distribution on a landscape scale (Beyer and Haufler 1994). They are also focal points for elk viewing. The acreage of managed openings on state land within the elk range should be about 1,000 acres/year which is near the same level as the last 10 years. Distribution of managed openings across the elk range will be as even as possible considering ecological conditions but will also address smaller scale opportunities or concerns. Maintaining this level of effort will require continued coordination between the Department and local, state and national conservation partners interested in elk management. The Department may manage openings outside of the primary elk range to draw elk away from where they may be causing damage to private land and to make them more available to hunters.

Action 1.1.3 Private land management

Maintaining both large and small private in-holdings within the elk range in a forested state is beneficial to the Department's management of elk as well as other wildlife. The Department will make efforts to communicate the range of conservation options available to private landowners, from technical assistance concerning food plot establishment and timber management to conservation easements, and facilitate their implementation. Private landowners within the elk range will be able to access information concerning elk management to help meet their management objectives. Currently, the Department meets once a year with representatives from Canada Creek Ranch to talk about elk regulations. This type of meeting will continue and could include other landowners. In cases where the private landowner may be a willing seller, the parcels within the elk range should be top priority for acquisition. Conservation organizations such as the Rocky Mountain Elk Foundation and the Little Traverse Conservancy have been partners in these types of efforts in the past and we will maintain or improve these relationships.

Strategy 1.2 Monitor elk numbers, distribution and habitat

Action 1.2.1 Monitor elk numbers and distribution using best available methods

Elk numbers are currently estimated using a fixed wing aerial survey corrected with a sightability model. This survey method was developed and tested through a collaborative research project with MSU (Walsh 2007). This biennial survey provides a population estimate with 95% confidence limits, typically plus or minus 25%. The survey was completed in 2010 for about \$9,000 in flight costs and took 40 person days. This survey uses scientifically tested methods and statistical techniques and provides adequate estimates of population size to guide elk management actions.

The elk population goal range established in 1988 of 800-900 elk is not appropriate today. This goal was set when aspen cutting on state land was near its peak, before the Department found tb to be sustaining itself in the white-tailed deer population and when

the sensitivity to agricultural damage and concerns over elk-vehicle collisions were much lower than they are today. The area delineated for elk management in 1988 was 820 square miles. The area proposed in this plan is 471 square miles. An inherent assumption of the goal set in 1988 and carried forward with this plan is that elk distribution is reasonably even across the elk management area with only a small minority of animals spending a significant amount of time outside of this area.

The goal moving forward should be a blend of optimizing elk numbers to allow the greatest social and economic benefits while still addressing potential disease issues and managing the impact of elk on vegetation and private landowners. The goal should also be reflective of our ability to measure change within the elk herd. A goal of 500-900 animals is realistic as far as our ability to stay within the boundaries outlined above. Five hundred elk would be the lowest number of elk on the landscape since 1983. At this population level, hunting and viewing opportunities would decline from current levels and the impact of elk on forest regeneration would be minimal. If elk were evenly distributed across the core range there would be very little agricultural or forest regeneration damage. We will manage for elk numbers near the lower end of the range when there are significant disease issues, forest regeneration issues and damage to private land agricultural crops. Conversely, we will manage the population for the higher end of the range if none of these issues are significant. When managing near the top of the range, hunting opportunity will be similar to 2010-2011 levels (around 200 state permits annually) and if elk were more concentrated in the elk management area viewing opportunities will be greater. Putting effort into all of the strategies in this plan will help to raise the ecological and social capacity of the area for elk. If these capacities increase over the period of this plan, we may be able to raise the population goal. However, if the Department is not able to achieve all or some of the strategies, the goal range may stay the same or be lowered.

The current aerial survey gives one measure of distribution of elk in January. Distribution is also measured in the fall and early winter by hunter reports of elk seen and taken during the hunting periods. Distribution information gathered by less formal reports to Wildlife Division personnel from private landowners and other agency personnel may happen throughout the year. Biologists compile and assess this information annually. We will assess the number of elk, damage complaints, information from vegetation surveys that are part of the normal state forest operations inventory and distribution information to help make annual harvest recommendations. The Department will evaluate new survey methods and measures of distribution for feasibility and effectiveness as they become available.

Action 1.2.2 Use annual inventory data to determine habitat status of primary range

The presence of elk on the landscape will have consequences on some vegetative communities. Elk herding behavior and use of an area for a period of years can and will have an impact on vegetation composition, structure and potentially plant nutritional qualities (Campa et al. 1992). Evaluation of long-term and short-term forest vegetation data collected on state land as part of the annual operations inventory will determine whether we have met the goals for range composition and whether there is evidence that

elk are causing significant change to the habitat. The Department will investigate and implement methods to determine whether there are significant impacts on other wildlife species from elk and to measure habitat attributes on private and public lands over a long time period if feasible.

Strategy 1.3 Monitor elk herd health

Action 1.3.1 Measure elk health parameters

Diseases that may impact Michigan's elk herd include, but are not limited to, tb, chronic wasting disease (CWD) and cerebrospinal nematodiasis (brainworm). Michigan's elk herd is exposed to white-tailed deer and to a much smaller degree, livestock operations. Currently, the Department tests all elk for tb that are killed during the annual hunts. Animals killed by autos, accidents or poaching are also checked for tb if possible. The Department also culls animals showing abnormal behavior and checks these animals for tb, CWD and brainworm. Through 2010, we have tested 2,669 elk for tb. Five elk have tested positive and none have been positive since 2006. No elk have been found with CWD and 1-2 animals with brainworm are recovered each year.

The most likely source of exposure for contagious disease transmission is shared feeding sites or bait piles with white-tailed deer (O'Brien et al 2006). The risk of contagious disease to the elk herd is high because elk spend much of their time in groups and there is a high degree of interchange among groups. Establishment of a disease such as tb or CWD could affect a significant part of the herd as well as other animals, both domestic and wild, that may come into contact with elk. Disease monitoring in elk will continue at the current level and will be evaluated annually and modified as necessary to maintain an effective program.

Goal 2. Use Hunting as the Primary Method to Control Elk Numbers, Herd Composition and Distribution

Hunting is an effective wildlife management technique for controlling both numbers and distribution of game animals. Hunting is also an important recreational opportunity and a Michigan elk hunt is likely to be a once in a lifetime event that is highly valued by Michigan hunters. For hunting to be effective and enjoyable it takes communication among the hunter, the Department, private landowners and elk hunting guides. More positive interaction among these groups will result in an elk hunt being more successful as a management tool and more satisfying to the hunter. This goal aligns with GPS Objective 1.1, 1.3, 1.4, and 4.1.

Strategy 2.1. Facilitate positive interactions among hunters, the Department, private landowners and hunting guides

Action 2.1.1 Address private landowner conflicts with elk

Hunting has been, and will remain, the primary tool used to address landowner conflicts with elk but it need not be the only one. Timely response to private land concerns and having a suite of tools available to address concerns will be beneficial to both the

landowner and the Department. The Department will provide information concerning elk behavior, harassment techniques, habitat manipulation, fencing options and hunting to private landowners. Assistance in implementing these tools will also be an option. An incremental approach of applying tools will be used that will depend on the severity and frequency of the conflicts, whether the conflict is within the elk management area or outside of it, and the duration of the problem. The Department will monitor the number, scale and intensity of landowners' concerns with elk to determine if tools and strategies concerning elk distribution are successful. Increasing social tolerance for elk by responding promptly to landowners' concerns may allow the Department to manage for more elk on the landscape, providing more positive social and economic benefits.

Out of season lethal removal of elk is a tool used when the Department determines that no other options are available or will be effective. The Department will apply lethal control measures in instances involving suspected disease, severely injured animals or in urgent situations where an elk threatens health, safety or welfare of citizens or livestock. All lethal control actions will be by Department personnel or their authorized representatives and not through the issuance of landowner kill permits.

Action 2.1.2 Continue and improve interactions between the Department and elk guides

The relationship between the Department and elk hunting guides has, until recently, been very informal. The Department provides hunters a list of guides and any person who is interested in guiding is on the list. Guides have varying degrees of knowledge about elk, the area elk occupy and the Department's goals and objectives concerning elk management. Some guides use private land only, some guide only on state land and most use both. The relationship between guides and the Department is changing because the State now requires elk guides to register in order to guide hunters on state land. Elk guides play an important role in the hunt by managing hunters for private landowners who are absent or unable to manage hunters on their own and providing knowledge to hunters who have a variety of hunting abilities and skills.

There is a significant amount of informal interaction between guides and Department personnel throughout the year, especially during the elk hunt periods. The only formal interaction is at an annual or biennial meeting held before the elk hunt to discuss rule changes and management direction. Attendance by guides to this meeting is voluntary. Additional interaction between the Department and guides will help facilitate the guides' understanding of Department goals and help the Department understand the guides' perspective about how to achieve those goals. The Department will assess opportunities for both formal and informal interaction between Department personnel and guides annually and will improve interactions when feasible.

Action 2.1.3 Increase hunter education efforts

Currently, the Department provides hunters with a packet of written information concerning the elk hunt and they are required to attend a two hour orientation on the day before the elk hunt. Hunters are from all over the state of Michigan and have varying levels of information concerning the Department's management objectives for elk, elk

ecology, elk hunting and the area. Success rates for elk hunters in Michigan have been very high. Kill rates in the December hunt have generally varied between 80 and 90 percent. Most hunters know someone who has had an elk license or participated in a hunt in the past and expect that they too will enjoy this high level of success. However, as elk numbers have come down many hunters are finding elk hunting more challenging than they expect. The Department will work with conservation partners to increase hunter's knowledge concerning Michigan elk behavior and elk hunting strategies. Providing this and other relevant information to help a hunter have realistic expectations would be beneficial to the hunter, the Department and the private landowner who is using hunting as a management tool.

Goal 3. Enhance Public Understanding of Elk Management in Michigan

Hunters and landowners within or near the elk range have special needs for information concerning elk and their needs are addressed in the goals above. Other individuals have different needs. Increasing general knowledge and appreciation for elk and the landscape they live in would be beneficial to elk management and would also increase the public's understanding and awareness of wildlife management and Wildlife Division programs. This goal aligns with GPS Objective 1.1, 3.1, 4.1, 4.5, 5.1, 5.2, 6.1, and 7.2.

Strategy 3.1 Coordinate with partners to develop and implement an elk communication strategy to ensure consistent and accurate information is available to the public concerning elk management.

Action 3.1.1 Maintain or increase viewing opportunities on public land

Managing for a "viewable" elk herd has been an important part of prior management plans for elk and will remain as one of the prime considerations in elk management. While viewing a wild animal is never guaranteed, information about how and when to have the greatest chance to see or hear an elk in a wild setting would be beneficial to many people. Working with conservation partners, the Department will provide information to facilitate successful viewing and will designate viewing sites and will make their locations known through printed materials and the internet. The viewing sites will provide information to the public and solicit feedback on elk management. Mature bulls are the most popular with the viewing public and while no formal objective has been defined for bull-to-cow ratio in the Michigan herd, it is believed that about 60 bulls to 100 cows is most desirable. This is about twice as many bulls to 100 cows as are in many western herds. Managing for this ratio will provide a larger herd with lower recruitment that provides good opportunity to view mature bull elk.

Action 3.1.2 Support educational opportunities for staff and partners related to elk and elk management

The Department will promote staff and volunteer participation in the work duties related to elk, particularly the elk hunt, to inform people of the Department's goals and objectives concerning elk management. Department staff and partners will also use more formal training opportunities such as workshops and conferences as well as informal presentations at local civic groups or hunter banquets to exchange information. The

Department will review opportunities for education annually and will implement feasible options with the help of conservation partners.

Action 3.1.3 Ensure stakeholder engagement related to elk management decisions are considered and outcomes are communicated

Most partner and stakeholder input into elk management is informal and is not tallied or formally recognized. There is an annual survey of elk hunters and everyone has the ability to communicate with the NRC. The Department will develop feasible and effective methods to record elk management input from a variety of stakeholders. A record of input received will be part of an annual report of elk management presented to the NRC and made available to the public. The annual report will also relate results of surveys, the hunts and identify potential management opportunities. The Department will review opportunities for input annually and will implement feasible options with the help of conservation partners.

Action 3.1.4 Measure economic and social factors related to elk

Social acceptance of wildlife is a key factor for successful wildlife management. The Department, working with other partners, will determine what data are available or should be collected to determine negative and positive effects that elk have on the local and regional economy. This information will inform management decisions concerning the number and distribution of elk. Measurement of positive economic effects may include number of visitors to the area to view elk and the number of hunters. Negative effects may include the number and severity of crop damage complaints. These numbers should not be compared against each other but rather used to look for long-term trends that may improve operational management.

Management direction (i.e. number and distribution of elk and bull-to-cow ratios) will be evaluated to see if different management practices are effective at reducing social conflict or increasing the positive social value of elk.

5. PLAN MONITORING AND REVIEW

Regular communication among the Department, the Tribes, stakeholder groups, and the general public will allow interested parties to monitor progress made toward implementation of this plan. It will also provide opportunities for the Department to receive input on specified management issues. The Department will prepare an elk status report each year that will be presented to the Tribes in the 1836 treaty-ceded area, the NRC and made available to the public on the Department's website. Progress toward addressing specific operational issues and success of the strategic goals identified in this plan will be assessed using an adaptive approach to management.

Elk abundance and distribution and the attitudes of Michigan's residents are likely to continue to change through time. To address ecological, social and regulatory shifts in a timely manner, the Department will review and update this plan at 10 year intervals. The

plan revision process will include review of the best available scientific information and substantial involvement by the Tribes, affected stakeholder groups and the general public.

6. FUNDING

Costs of elk management are associated with salaries, wages, contracts, travel, equipment, and information and education materials. Funding has come from the Game and Fish Protection Fund and its sub-funds which are largely derived through the sale of hunting and fishing licenses. Expenditures for elk management have been significant for the Department and our partners. Given persistent management needs, these costs are expected to increase.

While sportspersons and other management partners have provided much of the funding for elk management they currently represent only a small proportion of Michigan's residents. If the number of sportspersons continues to decline the contributions from these groups may fall short of the management needs in the future. Successful efforts to obtain funding from alternative sources could spread the financial support for elk management among a greater variety of stakeholder groups who are impacted by elk. Such an approach could help sustain the required levels of funding, and it could provide the general public with a greater stake and interest in elk management. The Department, and everyone who has an interest in elk in Michigan, should pursue alternative funding sources for wildlife management.

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