Missouri Department of Conservation
Bat Habitat Conservation Plan
FY23 Annual Report

Implementation, Compliance, and Effectiveness for Activities
Under HCP Permit Number ESPER0035352

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EXECUTIVE SUMMARY

Overview of HCP Annual Report

This annual report is provided by the Missouri Department of Conservation (MDC) to meet the annual reporting requirement as described in HCP Section 6.3.3. The report describes MDC's Bat Habitat Conservation Plan planning and implementation activities conducted during the second reporting timeframe (July 1, 2022-June 30, 2023), compliance and effectiveness monitoring activities, and the results of the compliance and effectiveness monitoring during the initial reporting timeframe.

The goals of the annual report are to demonstrate to the USFWS and citizens of Missouri that the MDC Bat HCP is being implemented properly, and to demonstrate the effectiveness of the conservation plan. If any implementation problems have occurred, they are disclosed with a description of corrective measures planned or measures that have been taken to address the problems. This report also identifies any responses to changed circumstances and adaptive management during the reporting period.

Implementation Updates

This report describes progress towards each of the Biological Goals and Objectives outlined in the Bat HCP. Implementation progress updates of particularly note during the FY23 reporting period include:

- Developed and implemented Regional HCP Implementation Workshops (see Staff Implementation Training in Section 1).
- Completion of Priority Bat Management Zone (PBMZ) Management Plan templates specific to each covered tree-roosting species, to facilitate development of PBMZ Management Plans for each PBMZ by June 30, 2024 (see Objective 3.3 in Section 5).
- Initiated PBMZ Monitoring: Acoustic surveys were conducted in 5 of the 6 northern long-eared bat PBMZs during summer 2023 (see Status and Trend Monitoring in Section 5).

Calculated Take and Non-Take Effects

The Bat HCP covers the incidental take of five listed or otherwise at-risk bat species in Missouri. While the Department affords protections against the impacts of covered activities for all five species, calculated take from these activities only applies to bats listed under the Endangered Species Act during the reporting period. Furthermore, no incidental take of gray bat from covered activities on covered lands was anticipated in the Bat HCP. Therefore, the take of covered species was only calculated for the Indiana bat (MYSO) and the northern long-eared bat (MYSE) for the FY23 reporting period. The effects of the covered activities on the two non-listed species (i.e., little brown bat and tricolored bat) are quantified and described separately. During this reporting period, total calculated

non-take effects for little brown bats and tricolored bats was **7,493 acres** and **7,544 acres** respectively. This represents ~**41% of the annual estimated effects for little brown bats** and ~**40% of the annual estimated effects for tricolored bats**, during the reporting period. During this reporting period, total calculated take for Indiana bats and northern long-eared bats was **7,678 acres** and **7,403 acres** respectively. This represents ~**49% of the annual estimated take of Indiana bats**, and ~**40% of the annual estimated take of northern long-eared bats**, during the reporting period.

Conservation Strategy

Incidental take is fully offset by implementation of the conservation measures described in the HCP, including the following during the FY23 reporting period:

- Sustainable management of **30,342 acres** of forest, woodland, and glade habitat managed by MDC in compliance with all measures described in the HCP.
- Sustainable management of **59,180 acres** of open lands managed by MDC in compliance with all measures described in the HCP.
- Completion of **42,550 acres** of prescribed burns statewide on MDC-managed lands in compliance with all measures described in the HCP, of which 19,382 acres occurred within forest, woodland, and glade habitat.
- Enhancement of **5,794 acres** of habitat within Priority Bat Management Zones in compliance with all measures described in the HCP.
- Delivery of **126 education and outreach programs, articles, and news releases** pertaining to forestry, bats, and WNS.

Adaptive Management and Changed Circumstances

During this reporting period MDC had no problems related to implementation of the HCP or compliance with the measures, terms and conditions of the HCP to report. There are no changed circumstances to report during this reporting period, and no changes to the adaptive management program, monitoring program or research program. No amendments to the Biological Opinion associated with the HCP were made during this reporting period.

ACKNOWLEDGEMENTS

We would like to begin by thanking the following contributors to this report, including the members of the HCP Implementation Team, and all those who have contributed to the success of the Bat Habitat Conservation Plan (HCP) in Missouri.

HCP Implementation Team: Kelly Rezac, Tony Elliott, Jordan Meyer, Rich Blatz, Chris Newbold, Laura Ruman, Lisa Potter, Lin Kuhn, Jordyn Hammel, and Benjamin Tjepkes.

Supporting MDC Staff: Alex Prentice, Ben Webster, Chris Scheppers, Craig Hesselbein, Craig Scroggins, Dyan Pursell, Adrienne Dykstra, George Kipp, Kannon John, Nick Schulte, Kolt Johnston, Heather Feeler, Holly Dentner, Angela Sokolowski, John Lisek, John Thomas, Julie Fleming, Kyle Jansky, Lasya Venigalla, Mark Roberts, Nima Zamanzadeh, Seth Barrioz, Steve Helton, Nicholas Sievert, and Brigid Niemeyer.

Special thanks to all Regional Resource Management Branch and Community and Private Lands Conservation Branch staff for their work to implement the habitat management objectives in compliance with the HCP and report their management activities accurately and in a timely manner.

We are grateful to all those who have contributed to the success of the HCP, and we hope that this report provides a useful overview of the progress and effectiveness of the HCP in protecting and conserving covered bat species in Missouri.

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List of Abbreviations

Table 1: List of acronyms and initialisms used throughout this report.

Acronym	Description
BBT	Bat Buffer Tool
BBU	Bat Biological Use
BMP	Best Management Practice
BO	Biological Opinion
CPLC	Community and Private Land Conservation (Branch)
ESA	Endangered Species Act
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
LKM	Lime Kiln Mine
LMS	Learning Management System
MDC	Missouri Department of Conservation
MIFPC	Missouri Invasive Forest Pest Council
MYLU	Myotis lucifugus (little brown bat)
MYSE	Myotis septentrionalis (northern long-eared bat)
MYSO	Myotis sodalis (Indiana bat)

Acronym	Description
NEPA	National Environmental Policy Act
NLCD	National Land Cover Dataset
PBMZ	Priority Bat Management Zone
PESU	Perimyotis subflavus (tricolored bat)
PTH	Professional Timber Harvester (training)
RRM	Regional Resource Management (Branch)
SBD	Statewide Bat Database
SDE	Spatial Database Engine
SMZ	Streamside Management Zone
SOCC	Species of Conservation Concern
SSA	Species Status Assessment
TSI	Timber Stand Improvement
USACE	United State Army Corp of Engineers
USFWS	United State Fish and Wildlife Service
WNS	White-Nose Syndrome

INTRODUCTION

Overview of HCP

The Missouri Department of Conservation (hereafter MDC, or the Department) developed the Bat Habitat Conservation Plan (hereafter MDC Bat HCP, Bat HCP, or HCP) under Section 10(a)(1)(B) of the federal Endangered Species Act (ESA). The MDC Bat HCP protects five listed or otherwise at-risk bat species while allowing specific, covered activities to occur. These activities consist mainly of MDC sustainable forestry and habitat management actions as well as public access and asset management.

MDC manages land for the purpose of promoting fish and wildlife habitat, enhancing and maintaining forest health, and providing recreational opportunities. Lands covered by this HCP are those owned and/or managed by MDC. Additionally, private landowners participating in MDC cost-share programs may elect to participate in the HCP and receive coverage under the HCP if they agree to follow all HCP requirements.

The MDC Bat HCP was permitted on February 23, 2022, and the permit expires on February 23, 2072.

The following species are covered under the MDC Bat HCP and are reported on in this report:

- **Indiana bat** *(Myotis sodalis)*
- **Gray bat** *(Myotis grisescens)*
- **Northern long-eared bat** *(Myotis septentrionalis)*
- **Little brown bat** *(Myotis lucifugus)*
- **Tricolored bat** *(Perimyotis subflavus)*

Purpose of this Report

This annual report is provided to meet the annual reporting requirement as described in HCP Section 6.3.3. Planning and implementation activities, compliance and effectiveness monitoring activities, and the results of the compliance and effectiveness monitoring during the second reporting timeframe (July 1, 2022 – June 30, 2023) are provided in this document.

The goals of the annual report are to demonstrate to the USFWS and citizens of Missouri that the MDC Bat HCP is being implemented properly, and to demonstrate the effectiveness of the conservation plan. If any implementation problems have occurred, they will be disclosed with a description of corrective measures planned or measures that have been taken to address the problems. The reports will also identify responses to changed circumstances and adaptive management.

Document Structure

Section 1: Approach and Baseline Calibration describes how MDC approached initial HCP implementation and the required reporting elements contained herein. Also included are the results of the environmental baseline calibration completed by the Department to align initial reporting metrics with conditions at the time of HCP permitting.

Section 2: Non-Take Effects on Covered Species quantifies and describes the extent of non-take effects from covered activities on each of the non-listed covered species. Calculated effects, in acreage, for each type of modeled habitat and occupancy type is provided. The number of buildings demolished during the reporting period is also included in this section.

Section 3: Take of Covered Species quantifies and describes the extent of take for each covered species resulting from covered activities. Calculated take, in acreage, for each type of modeled habitat and occupancy type is provided.

Section 4: Monitoring Program describes conservation measures implemented during the reporting period in relation to the biological goals and objectives outlined in HCP Section 5.2. Results of status and trends monitoring and WNS monitoring, as outlined in HCP Section 5.2.2, are also included in this section.

Section 5: Adaptive Management and Changed Circumstances describes any circumstances for which adaptive management actions were necessary during the reporting period and how those management actions were implemented. Descriptions of any changed or unforeseen circumstances occurring during the reporting period are also included in this section.

Section 6: Changes and Amendments describe any administrative changes or amendments completed during the reporting period.

Section 7: References provides a listing of the sources cited throughout this annual report.

Appendices provide information and supplementary document attachments for this annual report.

Minimum Reporting Requirements

The Bat HCP (Section 6.3.3) and ITP (Permit Condition T) outline several minimum annual reporting requirements for the Missouri Department of Conservation. *Table 2* provides a roadmap to where these specific elements are located within this document.

Table 2: Crosswalk table describing the location of annual reporting requirements in this document.

Requirement	Requirement Description	Applicable Sections
A. Covered Activities	Description of covered activities implemented during the reporting year as well as cumulative total (i.e., from the start of the permit term). This will include:	See below for specific sections.
	Prescribed fire—Acres of prescribed fire, including the location and acres of burning in modeled habitat for covered bats when bats are present.	Section 2 and Section 3
	Tree removal—Total acres of all tree removal, including location; acres of extensive versus limited removal; and the acres of harvest in modeled seasonal habitat (see Bat HCP Appendix A, Species Accounts) during times of year when bats are present.	Section 2 and Section 3
	Buildings demolished—Number of structures demolished.	Section 2
	Locations of newly acquired land.	Section 4
B. Calculated Acreage of Take	Calculated acreage of take for each type of modeled habitat (i.e., summer habitat, fall/spring habitat) by occupancy type (high, medium, and low, if modeled) when bats are present. • Caps for take are based on the total spring/fall and total summer acres of habitat affected when bats are present. • Acres of occupied habitat affected by the implementation of covered activities will be tracked annually. • The total amount of take (cumulatively over the permit term) cannot be exceeded, without a permit amendment.	Section 3
C. Instances of Individual Take	Documentation of any known instances of take of individual covered bats.	Section 3
D. Adaptive Management Changes	Description of any changes in HCP implementation resulting from the adaptive management process during the reporting year, as applicable. This description will include the information that triggered the adaptive management process, the rationale for the planned responses, and the results of any applicable monitoring actions. Summary of surveys conducted through the monitoring program for the reporting year including description of surveys conducted, protocols used, survey results, and discussion of each survey identifying any issues, limitations, and implications (e.g., the identification of any new subterranean habitat or roost trees). (This element can be provided in a separate monitoring report.)	Section 5

Requirement	Requirement Description	Applicable Sections
E. Monitoring and Research Program Changes	Discussion of possible changes to the monitoring and research program based on interpretation of monitoring results and research findings, if applicable.	Section 4
F. WNS Impact	Assessment of the annual and cumulative impact of white-nose syndrome (WNS) (see Section 6.4.2.2, White-Nose Syndrome). This will include copies of reports or publications from MDC about WNS and covered bats released over the reporting year and the total number of hibernacula surveyed (including both known and potential habitat for covered species).	Section 4
G. Changed Circumstances	Documentation of any changed circumstances described in Section 6.4.2, Changed and Unforeseen Circumstances, that were triggered during the reporting year, if applicable. If any such circumstances were triggered, the report shall also include any responses implemented (i.e., remedial measures) and resulting monitoring.	Section 5
H. Responses to Changed Circumstances	If changed circumstances were triggered in prior years, documentation of on-going responses to those past changed circumstances in the current reporting year, and the on-going results of remedial measures.	Section 4
I. Administrative Changes and Amendments	Any administrative changes or amendments during the reporting year (see Section 6.4.3, Modifications to the Plan and/or Permit(s)).	Section 6
J. New Programs on Other Nonfederal Lands	Description of any new programs implemented on other nonfederal lands that received take coverage under the HCP.	Not applicable for this reporting period.

Section 1:
APPROACH AND BASELINE CALIBRATION

This section:

- ✓ Describes how the Department approached the initial year of HCP implementation.
- ✓ Describes how the Department compiled the required reporting elements contained herein.
- ✓ Provides the results of the environmental baseline calibration completed by the Department.

Approach to HCP Implementation

This section provides information on the Department's actions to carry out the directives of the HCP.

HCP Implementation Team

As outlined in *HCP Section 6.3.1.3*, oversight of the Department's implementation of the Bat HCP is carried out by an internal HCP Implementation Team. This inter-branch team is comprised of MDC staff with appropriate expertise representing each Branch of the Department responsible for one or more aspects of HCP implementation. The team provides support for and oversees all elements of the HCP for the Department, including the development of this annual report. The HCP Implementation Team meets several times annually on an as-needed basis.

Staff Implementation Resources

The HCP Implementation Team develops and maintains reference materials and training resources for MDC staff to facilitate implementation of the HCP. Resources developed or updated since the previous report was submitted are included in Appendix A – Staff Resources for HCP Implementation.

Resources for Public Lands Staff: *MDC Bat HCP Implementation Guidelines for MDC-Managed Lands (updated August 2023)*, *HCP Bat-Friendly Burn Addendum*, and *How to Connect to HCP layers in ArcMap*.

Resources for Private Lands Staff: *MDC Bat HCP Implementation Guidelines for Private Lands*, *Bat HCP Avoidance and Minimization Measures Planning Worksheet*, *HCP Bat Friendly Burn Addendum for Private Lands*, and *How to Connect to HCP layers in ArcMap*.

Additionally, the HCP-related GIS layers (i.e., Bat Buffer Tool, BBT) are made available through an SDE connection, and instructions for accessing and using these layers are included in staff guidelines and trainings. These layers included: known roost tree buffers, PBMZ boundaries, priority hibernacula buffers, hibernacula noise minimization buffers, cave buffers, and Sodalis Nature Preserve buffer.

Staff Implementation Training

The HCP Implementation Team developed and recorded HCP Implementation Training for MDC staff in 2022. This recorded training is available through the Department's Learning Management System (LMS). HCP Training is required for key positions identified by Branch Leadership in coordination with the HCP Implementation Team. When staff are hired into any position for which HCP training is required, the course is automatically added to their training requirements in LMS, to be completed within the first 6 months of hiring. No staff are excluded from the opportunity to receive training.

During FY23 the HCP Implementation Team developed Regional HCP Workshops, which are customizable workshops held in-person in any MDC Region upon request. The Implementation Team developed a topic menu (see Appendix A) which included topics in two categories: HCP Implementation Training, and Interactive Workshops. The HCP Implementation Training topics include all topics covered in the recorded HCP Implementation Training, and Regions may request to include any or all of these topics in their Regional Workshop. If all HCP Implementation Training topics are included in the workshops, then all staff attending that portion of the workshop receive credit for meeting the HCP Implementation Training requirements. The Interactive Workshops are designed to be more hands-on, problem-solving opportunities, question-and-answer sessions, or in-field experiences focused on specific aspects of HCP implementation, including management and monitoring. Workshops are led by HCP Implementation Team members with expertise in the specific topics selected. During FY23, HCP Regional Workshops were provided in Central Region and Ozark Region. Both workshops were very well attended and productive; participants asked smart questions that we were able to effectively work through together. Many of these questions led to updates to other resources including the FAQs and the Implementation Guidelines for MDC lands. These workshops also served as an opportunity to invite Regional input into HCP implementation tools and processes that are still in development or being improved, including improvements to the Public Lands Data Entry tool, wildfire reporting guidelines for wildfires occurring in HCP buffers, and the PBMZ Management Plan template. Additional workshops were held in early FY24 in Southwest and St. Louis Region, and will be described in the FY24 annual report.

The HCP Implementation Team serves as resources to all staff for responding to questions and concerns regarding the HCP. The HCP Team developed and maintains a Frequently Asked Questions (FAQs) document which is updated as needed and made available to all staff via SharePoint.

The HCP Implementation Team maintains a SharePoint site accessible to all MDC staff containing HCP implementation resources. Posted resources include:

- HCP Guidelines for MDC lands and for private lands, as listed above
- HCP FAQs
- The PowerPoint slides used in HCP Training, including HCP Regional Workshops
- Instructions for accessing Performance Reporting applications

- The SDE files containing the HCP maps, and instructions for connecting to the HCP layers in ArcMap
- Video recordings of trainings, including HCP Training and Behave Scorch Model Training (for reference in applying the Bat-Friendly Burn Addendum).
- The final HCP and appendices

Data Sources & Storage

HCP implementation and reporting requirements necessitate the maintenance of structured data stores that house all HCP-related data. The Department continued use of or developed the following databases to satisfy these requirements:

Statewide Bat Database – Creation of MDC's Statewide Bat Database (SBD) began in 2017 with the objective of providing a comprehensive record of all bat observations that occur within the state. The SBD consists of a Microsoft Access database stored on MDC internal servers, where tiered relationship tables contain data on survey site locations, visit information (e.g., types of surveys) at those locations, and the captures/observations made during those visits. This data location was used as the source for all metrics relying on bat capture/observations.

Internal Geodatabases – Geospatial information and staff survey data pertaining to elements of this report were housed in server-based, ESRI ArcGIS enterprise geodatabases. This configuration allowed the Department to incorporate spatial information into staff reporting tools and streamlined data accessibility. This data location was used as the source of covered activities, land boundaries, standardized land cover, and seasonal bat habitat spatial information.

Missouri Natural Heritage Database – The Department continues to maintain a structured Natural Heritage Database (NHD) to track species and natural communities of conservation concern within Missouri. Included in this database are the ecological occurrence records of known captures, roosts, and hibernacula of imperiled bat species. The NHD remains the primary reference source for updated roost and hibernacula records for HCP implementation and reporting. This data location was used as the source of known roost tree and hibernacula spatial information for all covered species.

SharePoint Document Library – All data and processing information pertaining to the elements of this report were archived using a Microsoft SharePoint document library, a cloud-based file management tool. This library is accessible only by designated staff and will serve as the archive system for all internally maintained HCP reporting information. This location was used as the destination for all archived data and reporting information.

Data Processing

HCP reporting requirements commit the Department to quantifying and summarizing several key metrics related to HCP implementation and monitoring, such as the amount of covered activities

implemented in each reporting period. The data processing steps taken to produce the quantification of these, and other metrics, followed this general workflow:

1) Raw data were extracted from the applicable MDC database or compiled through other means, then archived in the appropriate document library or processing geodatabase.
2) The data were cleaned and validated to ensure that all records were complete, representative, and accurate. Any invalid data were removed from the dataset or clarified with data stewards and replaced accordingly.
3) The land cover data was updated to the 2021 NLCD, which was the most recent available in our system at the time of processing. This represents the most reliable and up to date information available, however it does cause discrepancies in area for changes in managed land cover (Starting Acreage + Added - Divested). Differences are attributable to both actual land that was purchased or divested and changes in classification of MDC owned lands (either because land cover actually changed between time periods or due to differences in how the algorithm classified certain areas) between the previously utilized 2019 NLCD and the current 2021 NLCD. While this causes discrepancies in change over time, it is the best way to accurately represent the current balance of land cover across MDC lands.
4) Any required spatial operations, such as the intersection of covered activities with land cover layer information, were completed in a desktop GIS software while ensuring uniformity in all projected coordinate systems.
5) The data were transformed and aggregated to quantify the various metrics used in this report. This included grouping data by activity type and location, for covered activities and the amount of take, then summing the amount for each group.
6) The resulting data were analyzed, tabulated, and visualized using appropriate mapping and graphical methods. This included generating summary statistics and creating plots such as bar charts and maps to visualize the distribution of the covered activities and the amount of take.
7) The results of the analysis were reviewed and validated by appropriate HCP Implementation Team experts, and any necessary corrections or adjustments were made to the data.
8) Final data were fully completed with documentation and metadata, then loaded to a secure SharePoint archive document library.

Overall, the data processing steps taken to produce the quantification of take and other metrics were designed to ensure that the data was accurate, reliable, and presented in a clear manner.

HCP Costs and Funding

In *HCP Section 7.2 Funding Assurance*, MDC committed to "incorporate in its annual budget request to the legislature a budget that will be adequate to fulfill its obligations under the MDC Bat HCP, including all costs identified in Section 7.1, Cost to Implement the Habitat Conservation Plan." MDC

further agreed to "provide to the USFWS evidence of both (1) their annual budget requests to the legislature and (2) that the legislature has appropriated sufficient funding to implement this HCP."

Most of the Biological Goals and Objectives are continuations of MDC's regular, ongoing activities designed to accomplish the goals and objectives described in the Strategic Plan, in some cases with modifications to better incorporate the objectives of the HCP into the Department's management approaches. As such, there is no additional cost to implement them, as is indicated in Table 7-2 of the HCP, in which costs were estimated for new commitments only. In most cases, the cost of new commitments is primarily redirection of time of existing staff. In such cases, nothing was added to the Department's budget to meet the new commitment, but rather staff time was redirected from other activities to meet the new commitment. Therefore, the budget items reported here pertain only to new budget requests directly related to HCP implementation, primarily for PBMZ monitoring activities.

One new full-time hourly position was created, Assistant Wildlife Diversity Coordinator, whose primary focus during FY23 was HCP implementation and annual report development, including the geospatial analyses required for the take analysis. With this position focusing on HCP implementation and reporting activities during most of FY23, the cost of this position is also included in this year's report.

Tables 3 and 4 summarize expenditures incurred during FY23 pertaining to HCP implementation, as well as the FY24 budget for hourly labor and expenses pertaining to HCP implementation. The FY24 budget was approved by the Commission in May 2023. FY23 expenditures for supplies, equipment and in-state travel (Table 4) were substantially less than the amount budgeted (see FY22 annual report) primarily because several purchases made late in the fiscal year (May and June) were paid from the FY24 budget rather than the FY23 budget.

Table 3: FY23 expenses and FY24 budget for hourly positions pertaining to HCP implementation.

Staff Position	Description	FY23 Expenses	FY24 Budget
Bat Survey Coordinator	Coordinates PBMZ surveys in coordination with Bat Ecologist. Hires and leads crew of seasonal technicians to conduct PBMZ acoustic surveys.	$35,353	$37,436
Assistant Wildlife Diversity Coordinator	Assists with HCP accomplishment tracking, reporting, and implementation efforts.	$39,995	$42,062
Resource Science Aides	Two seasonal technicians to deploy acoustic detectors for PBMZ monitoring, download and save recorded files, and conduct initial sorting/screening of data.	$4,567	$20,400

Total Amount for Hourly Labor	$79,915	$99,898

Source: Internal MDC RAPTOR Budget Management System - 2023

Table 4: FY23 expenses and FY24 budget pertaining to PBMZ monitoring efforts.

Budget Item	Description	FY23 Expenses	FY24 Budget
Supplies & Equipment	ANABAT Swift acoustic bat detectors, accessories, and license for acoustic analysis program.	$1,846	$8,000
In-State Travel	In-State Travel costs for Bat Survey Coordinator and 2 seasonal technicians to conduct PBMZ surveys during May-June 2023 (expenses during July-August 2023 and May-June 2024).	$1,536	$15,500
	Total Amount for PBMZ Monitoring	$3,382	$23,500

Source: Internal MDC RAPTOR Budget Management System - 2023

Section 2:
NON-TAKE EFFECTS ON COVERED SPECIES

This section:

- ✓ Quantifies and describes the extent of non-take effects from covered activities on each of the covered species not listed under the Endangered Species Act.
- ✓ Provides the calculated effects, in acreage of habitat managed or converted, for each type of modeled habitat and occupancy type.
- ✓ Provides the number of buildings demolished during the reporting period.

Purpose of Non-Take Effects Reporting

The Bat HCP covers the incidental take of five listed or otherwise at-risk bat species in Missouri. While the Department affords protections against the impacts of covered activities for all five species, calculated take from these activities only applies to bats listed under the Endangered Species Act during the reporting period. Therefore, the take of covered species was only calculated for the Indiana bat (MYSO) and the northern long-eared bat (MYSE) for the FY23 reporting period. See *Section 3* for take calculations for these listed covered species during this reporting period.

This section provides a quantification of the effects of covered activities on the two non-listed species (i.e., little brown bat and tricolored bat) during the FY23 HCP reporting period. Though the modeling process is the same between non-take and take calculations, the effects listed in this section are not considered take and do not apply towards the take cap described in the Department's incidental take permit (ITP). Non-take effects, similar to take, is provided in the form of acres of bat habitat in which covered activities were conducted during times of the year when bats are present.

Summary of Non-Take Effects on Covered Species

During this reporting period, total calculated non-take effects for little brown bats and tricolored bats was **7,493 acres** and 7,544 **acres** respectively (see *Table 5*). A detailed breakdown of all non-take effects on covered species is available in *Appendix B: Non-Take Effects on Covered Species*.

Table 5: Calculated non-take effects (i.e., acres of habitat managed within modeled bat habitat) on non-listed, covered bat species during the FY23 reporting period.

Covered Species		MDC Lands		Other Nonfederal Lands		Annual Total (FY23)	Permit Total
		Summer	Fall/Spring	Summer	Fall/Spring		
MYLU	Actual	4,290	709	2,240	254	7,493	10,086
	Estimated	6,961	2,935	7,848	621	18,365	18,365
PESU	Actual	4,290	802	2,240	212	7,544	10,137
	Estimated	6,961	3,387	7,848	589	18,785	18,785

Actual = calculated non-take effects for reporting period, estimated = average annual estimate from 50-year permitted take cap.
Reported summer values include activities from May 1 through August 31 and fall/spring values include activities from September 1 through October 31 and April 1 through April 30.
All reported values have been rounded to nearest whole number.
Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Calculated Non-Take Effects on Little Brown Bat (MYLU)

The total calculated non-take effects on little brown bat was **7,493acres** during the FY23 reporting period. Most effects occurred on MDC lands. During summer, non-take effects occurred entirely within high occupancy regions, as most of Missouri is considered high occupancy for little brown bats. Prescribed fire and limited tree removal made up the vast majority of non-take effects, with only a small amount of extensive tree removal occurring.

Table 6 provides the breakdown of bat habitat converted or managed by MDC during this reporting period. Note that all calculations only include covered activities that occurred in modeled MYLU habitat during times of the year when bats are present.

Table 6: Calculated non-take effects on little brown bats (in acres of bat habitat converted or removed) occurring in preferred habitats[1] between July 1, 2022 and June 30, 2023.

Modeled MYLU Occupancy	Presribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	366	0	343	709
Summer Habitat	1,737	138	2,415	4,290
High Occupancy	1,737	138	2,415	4,290
Medium Occupancy	0	0	0	0
Low Occupancy	0	0	0	0
Total Take on MDC Lands				**4,999**
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	215	2	37	254
Summer Habitat	1,422	4	813	2,240
High Occupancy	1,422	4	813	2,240
Medium Occupancy	0	0	0	0
Low Occupancy	0	0	0	0
Total Take on Other Nonfederal Lands				**2,494**
Total Take on Covered Lands				**7,493**
Permitted Annual Take for MYLU				**18,365**

[1] Preferred habitat includes forest, woodland, and glade cover types.

[2] Reported summer values include activities from May 1 through August 31 and fall/spring values include activities from September 1 through October 31 and April 1 through April 30.

All reported values have been rounded to nearest whole number.

Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Calculated Non-Take Effects on Tricolored Bat (PESU)

The total calculated non-take effects on tricolored bats were **7,544acres** during the FY23 reporting period. Most effects occurred on MDC lands. During summer, non-take effects occurred entirely in high occupancy regions, as most of Missouri is considered high occupancy for tricolored bats. Prescribed fire and limited tree removal made up the vast majority of non-take effects, with only a small amount of extensive tree removal occurring.

Table 7 provides the breakdown of bat habitat converted or managed by MDC during this reporting period. Note that all calculations only include covered activities that occurred in modeled PESU habitat during times of the year when bats are present.

Table 7: Calculated non-take effects (in acres converted or removed) on tricolored bats from covered activities in preferred habitat[1] between July 1, 2022 and June 30, 2023.

Modeled PESU Occupancy	Presribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	366	0	436	802
Summer Habitat	1,737	138	2,415	4,290
High Occupancy	1,737	138	2,415	4,290
Medium Occupancy	0	0	0	0
Low Occupancy	0	0	0	0
Total Take on MDC Lands				**5,092**
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	173	2	37	212
Summer Habitat	1,422	4	813	2,240
High Occupancy	1,422	4	813	2,240
Medium Occupancy	0	0	0	0
Low Occupancy	0	0	0	0
Total Take on Other Nonfederal Lands				**2,452**
Total Take on Covered Lands				**7,544**
Permitted Annual Take for PESU				**18,785**

[1] Preferred habitat includes forest, woodland, and glade cover types.

[2] Reported summer values include activities from May 1 through August 31 and fall/spring values include activities from September 1 through October 31 and April 1 through April 30.

Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Buildings Demolished

HCP Sections 2.3.4.3 and 4.3.2.1 outline the Department's ability and need to demolish existing structures, such as those on newly acquired parcels. MDC primarily removes unneeded or otherwise unsuitable structures for the safety of visitors and staff. The take associated with the demolition of structures, along with vehicle operation, is considered negligible and is not included in *Section 3*.

During the FY23 reporting period, MDC removed a total of **26 structures** on MDC-managed lands statewide (see *Appendix C: MDC Structures Demolished*). Included in this count are the demolition of privies, garages, barns, storage sheds, and other dwellings that were located on MDC lands.

Section 3:
TAKE OF COVERED SPECIES

This section:

- ✓ Quantifies and describes the extent of take for each listed covered species resulting from covered activities during this reporting period.
- ✓ Provides the calculated take, in acreage, for each type of modeled habitat and occupancy type.

Purpose of Calculated Take Reporting

The Bat HCP commits the Department to detailing all reported take of covered species resulting from covered activities on covered lands during each reporting period. In this report, as is outlined in Chapter 4 of the Bat HCP, the acres of bat habitat in which covered activities were conducted is used as a surrogate metric to quantify take.

As mentioned in *Section 2*, the effects of covered activities implemented only applies to the take calculations of covered species listed under the ESA during the reporting period. Additionally, no take is anticipated for gray bats from covered activities. Therefore, the take of covered species was calculated for the Indiana bat (MYSO) and the northern long-eared bat (MYSE) for the FY23 reporting period. See *Section 2* for non-take effects on non-listed covered species during this reporting period.

Reported Individual Take

The Bat HCP requires MDC to detail all individual take of covered species during activities not covered by the Bat HCP. These incidents are reported to the MDC Wildlife Diversity Coordinator or Bat Ecologist through the proper channels.

During this reporting period, there were **no occurrences of individual take reported**.

Summary of Calculated Take of Covered Species

During this reporting period, total calculated take for Indiana bats and northern long-eared bats was **7,678 acres** and **7,403 acres** respectively. These amounts are well under the annual estimate of take presented in the HCP for both species (see *Table 8* below). A detailed breakdown of all calculated take of covered species during the FY23 reporting period is provided in *Appendix D: Take of Covered Species*.

Covered activities on MDC lands and those occurring during summer accounted for the majority of take for both species during this reporting period.

Table 8: Calculated take (in acres managed) of covered bat species from covered activities occurring in preferred habitat[1] between July 1, 2022 and June 30, 2023.

Covered Species		MDC Lands		Other Nonfederal Lands		Annual Total (FY23)	Permit Total
		Summer	Fall/Spring	Summer	Fall/Spring		
MYSO	Actual	4,290	936	2,240	212	7,678	10,270
	Estimated	6,081	2,171	7,021	308	15,581	15,582
MYSE	Actual	4,290	661	2,240	212	7,403	9,996
	Estimated	6,961	3,054	7,848	552	18,415	18,415

[1] Preferred habitat includes forest, woodland, and glade cover types.

[2] Estimated values in the permit total column are the total permitted take cap for each species.

Actual = calculated take for reporting period, estimated = average annual take estimated from 50-year permitted take cap.

Reported summer values only include take during May 1 through August 31 and fall/spring values only include take during September 1 through October 31 and April 1 through April 30.

Values rounded to neatest whole number.

Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Calculated Take of Indiana Bat (MYSO)

On both MDC Lands and other non-federal lands, prescribed fire and limited tree removal were the dominant management activities causing take of Indiana bats and take occurred primarily during the summer (see *Table 9*). On MDC lands most management occurred in medium occupancy zones, whereas on other non-federal lands management was more evenly distributed between the high and medium occupancy zones, with some occurring in low occupancy zones.

Table 9: Calculated take (in acres managed) of Indiana bats from covered activities occurring in preferred habitat[1] between July 1, 2022 and June 30, 2023.

Modeled MYSO Occupancy	Presribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	548	0	388	936
Summer Habitat	1,737	138	2,415	4,290
High Occupancy	0	6	542	548
Medium Occupancy	1,347	121	1,680	3,148
Low Occupancy	390	10	193	594
Total Take on MDC Lands				**5,226**
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	173	2	37	212
Summer Habitat	1,422	4	813	2,240
High Occupancy	744	0	346	1,090
Medium Occupancy	506	0	344	850
Low Occupancy	172	4	122	299
Total Take on Other Nonfederal Lands				**2,452**
Total Take on Covered Lands				**7,678**
Permitted Annual Take for MYSO				**15,582**

[1] Preferred habitat includes forest, woodland, and glade cover types.
Reported summer values only include take during May 1 through August 31 and fall/spring values only include take during September 1 through October 31 and April 1 through April 30.
Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Calculated Take of Northern Long-eared Bat (MYSE)

On MDC Lands, prescribed fire and limited tree removal were the dominant management activities causing take of northern long-eared bats (see *Table 10*). On both MDC lands and other non-federal lands, take occurred primarily during the summer, and most management occurred in high occupancy zones, which comprises much of the state.

Table 10: Calculated take (in acres managed) of northern long-eared bats from covered activities occurring in preferred habitat[1] between July 1, 2022 and June 30, 2023.

Modeled MYSE Occupancy	Presribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	366	0	295	661
Summer Habitat	1,737	138	2,415	4,290
High Occupancy	1,737	138	2,284	4,159
Medium Occupancy	0	0	131	131
Low Occupancy	0	0	0	0
Total Take on MDC Lands				**4,951**
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	173	2	37	212
Summer Habitat	1,422	4	813	2,240
High Occupancy	1,422	4	813	2,240
Medium Occupancy	0	0	0	0
Low Occupancy	0	0	0	0
Total Take on Other Nonfederal Lands				**2,452**
Total Take on Covered Lands				**7,403**
Permitted Annual Take for MYSE				**18,415**

[1] Preferred habitat includes forest, woodland, and glade cover types.
Reported summer values only include take during May 1 through August 31 and fall/spring values only include take during September 1 through October 31 and April 1 through April 30.
Sources: Internal MDC HCP Reporting Survey - 2023, HCP Bat Modeled Habitat GIS Layers, NLCD 2021 GIS Layers

Section 4:
MONITORING PROGRAM

This section:

- ✓ Describes conservation measures implemented during the reporting period in relation to the biological goals and objectives outlined in HCP Section 5.2.
- ✓ Provides the results of status and trends monitoring and WNS monitoring, as outlined in HCP Section 5.2.2.

Purpose of Monitoring Program Reporting

The Bat HCP requires monitoring of MDC's compliance with the permitted terms and the effectiveness of conservation strategy elements implemented throughout the 50-year permit term. MDC carried out several monitoring actions during this reporting period in accordance with the Bat HCP and ITP.

Compliance (implementation) monitoring verifies that MDC is implementing the terms of the Bat HCP and ITP while sustaining an authorized level of incidental take. This report documents management activities implemented during this permit period that are associated with MDC's stated conservation strategy.

Effectiveness monitoring evaluates whether the effects of implementing the conservation strategy are consistent with the assumptions and predictions made when the HCP was developed and approved. This report documents the effects of implemented conservation measures and results of MDC's status and trends monitoring.

As outlined in HCP Section 5.5.2, there are several questions relevant to MDC's conservation strategy and associated monitoring program of those actions:

1) Is MDC complying with the terms of the HCP (e.g., gates/fences are maintained at entrances to prioritized subterranean habitat; avoidance measures are implemented; communication plans are developed and used)?
2) What is the status (approximate number and distribution) of the covered species in Missouri and within PBMZs? (This will include an assessment of the effect of WNS on the populations.)
3) Are objectives to maintain and/or enhance roosting and foraging habitat (e.g., Objectives 1.3, 2.2, 3.1, 3.2, 3.3, and 4.2) creating the desired conditions (e.g., number of roost trees)?
4) Are bat management zones (Objective 4.2) and PBMZs (Objective 3.3) protecting vulnerable bat populations?

Biological Goals and Objectives Monitoring

The Bat HCP outlines the Department's conservation strategy to fully offset any effects of covered activities on covered species over the permit period (see HCP Section 5.5). Biological goals and objectives form the basis of the Department's strategy, providing measurable benchmarks and actionable tasks to implement the HCP.

Objective 1.1: Sustainably manage 700,000 acres of forest, woodlands, and glades across MDC lands beginning in year 1 and continuing through the permit term.

This objective commits the Department to maintaining and sustainably managing 700,000 acres of forest and woodlands on MDC lands throughout the entire permit period.

Forest, Woodlands, and Glades Managed by MDC ----------

In pursuit of this objective, MDC sustained expected levels of forest management practices as part of normal operations in FY23. MDC staff reported **30,342 acres** of habitat management activities within forested cover types on MDC-managed lands during this reporting period (see *Appendix E: Management of Forest/Woodlands and Open Lands*).

The updated MDC land ownership baseline (see *Baseline Calibration in Section 1*) serves as the reference for any reportable land acquisitions and disposals. Total forest/woodlands either owned or managed by MDC in FY22, when the baseline was established, was 744,007 acres. During FY23, MDC acquired 8,704 acres of forest/woodlands and divested 539 acres of forest/woodlands. Total forest/woodlands either owned or managed by MDC equaled **750,040 acres** at the end of the reporting period, which surpasses the 700,000-acre benchmark outlined in the HCP. The discrepancy of 2,132 acres can be accounted for by considering inherent error in GIS processing. The accuracy of this statewide data is found to be 99.8%, well within the accepted industry standard of 95%.

Objective 1.2: Sustainably manage over 200,000 acres of ecologically appropriate open habitats across MDC lands beginning in year 1 and continuing throughout the permit term.

This objective commits the Department to maintaining 200,000 acres of open lands on MDC lands throughout the entire permit period, namely through continued habitat management practices and acquisitions of land categorized as open lands.

Open Lands Managed by MDC ----------

In pursuit of this objective, MDC sustained existing open land management practices as part of normal operations in FY23. MDC staff reported **59,180 acres** of habitat management activities

occurring on open land cover on MDC-managed lands during this reporting period (see *Appendix E: Management of Forest/Woodlands/Glades and Open Lands*).

Total open lands either owned or managed by MDC in FY22, when the baseline was established, was 206,603 acres. During FY23, MDC acquired 441 acres of open lands and divested 449 acres of open lands. Total open lands either owned or managed by MDC equaled **206,896 acres** at the end of the reporting period, which surpasses the 200,000-acre benchmark outlined in the HCP. The discrepancy of 293 acres can be accounted for by considering inherent error in GIS processing. The accuracy of this statewide data is found to be 99.9%, well within the accepted industry standard of 95%.

Objective 1.3: Conduct prescribed burning in forests and woodlands each year to increase native biological diversity and enhance forest regeneration, wildlife habitats, and ecological community types that benefit bats.

This objective commits the Department to implementing 10,000 acres of prescribed fire each year on MDC lands in areas that would benefit bats at the stand and landscape level.

Implementation of Prescribed Burning

In pursuit of this objective, MDC sustained expected levels of prescribed burning practices as part of normal operations in FY23. MDC staff reported **42,550 acres** of prescribed burns statewide on MDC-managed lands during this reporting period. **19,382 acres** of burning operations occurred within forest, woodland, and glade cover types (see *Table 11*). Prescribed fire operations were conducted within modeled habitats for every covered species and were distributed throughout the plan area (see *Appendix F: Prescribed Fire Operations Conducted on MDC Lands*).

Table 11: Acres of prescribed fire conducted in forests, woodlands, and glades on MDC lands during the FY23 reporting period.

Seasonality Based on Bat Activity:	Summer [1]	Fall/Spring [2]	Non-active [3]	Year Total
Acres Burned:	1,218	6,649	11,515	19,382

[1] Summer = May 1 through August 31 for all covered bat species.
[2] Fall/Spring = September 1 through October 31 and April 1 through April 30 for all covered bat species.
[3] Non-active = November 1 through March 31 for all covered bat species.
Sources: Internal MDC HCP Reporting Survey – 2023, Bat HCP GIS Layers, 2021 NLCD

Objective 2.1: Promote bat-friendly management practices on private and other nonfederal land in the plan area.

This objective commits the Department to promoting bat-friendly management practices on private lands, including integrating applicable information into existing technical assistance and outreach programs. Details regarding work towards these commitments are outlined below.

Update and Promotion of the Missouri Forest Management Guidelines ----------

No updates were made to the Missouri Forest Management Guidelines during this reporting period, but plans are in place to begin development in the next several years.

Development and Implementation of a Communication Plan ----------

No developments were made to the Communication Plan during this reporting period, but plans are in place to begin development in the next several years with completion scheduled before year 5.

Outreach Related to Bats, Forestry, and WNS ----------

The Department is dedicated to providing education and outreach that aligns with current best management practices and Bat HCP directives. In this reporting period, MDC provided bat-related outreach (i.e., on topics including bats, forest management, and white-nose syndrome) to the public through a variety of venues and media forms (see *Table 12*).

For example: the Sept/Oct 2022 edition of *Xplor* included an article entitled "Going Batty"; gray bats were highlighted in the Species of Conservation Concern section of the September edition of *Missouri Conservationist*; several Discover Nature and regional nature education programs featured content on bat ecology; and a variety of MDC news releases and social media posts covered information on bat-related conservation. Additionally, there were 14 posts about bats on social media throughout the fiscal year; examples included bat survey information, a video on dealing with bats, Halloween fun, and much more. Bats were also included in the MDC Wild Webcast on Winter Survival on December 14, and on Birds, Bees and Butterfly Weed on April 7. The Nature Boost podcast has an episode on Bats for October as well (episode 33).

Table 12: Public outreach related to forestry, bats, and WNS by MDC during the FY23 reporting period.

Outreach Category	Count
Popular Science Articles – Missouri Conservationist, Xplor Magazine	10
MDC News Releases – Statewide and regional news releases, MDC in the News, etc.	55
Social & Other Multi-Media – Facebook, Instagram, podcasts, books, etc.	20
Programs & Workshops – Discover Nature programs, partner workshops, etc.	41
Total Outreach Efforts	**126**

Source: Internal MDC Communications Branch Databases - 2023

Financial and Technical Assistance Provided to Private Landowners ----------

Private landowners who participate in Missouri cost share programs have the opportunity to participate in the HCP and apply conservation measures for bats, thereby achieving landscape conservation above and beyond state-owned lands. Working forests and woodlands maintain bat habitat on the landscape by reducing the chance for land conversion (i.e., natural to developed land) and provide opportunities for MDC and cooperating nonfederal landowners to apply conservation measures described in this HCP to avoid and minimize impacts and to enhance preferred habitats of covered bat species. Collectively, these programs help ensure that forested lands in Missouri remain forested.

MDC provides technical assistance and financial support to nonfederal landowners seeking to implement forest management activities. These programs provide landowners with financial compensation in return for implementing forest management and prescribed burning practices. Program participants implement the bat conservation measures associated with Objectives 3.1, 3.2, and 5.1 as described in this plan. This objective will provide high-quality habitat supporting bats and other wildlife by extending the expertise of MDC's professional staff beyond MDC-owned or administered lands. This is the most direct means of ensuring the maintenance and management of natural habitats on other nonfederal lands throughout Missouri.

Table 13: Financial assistance provided to other non-federal landowners for LCAP practices covered under the Bat HCP on other non-federal lands during the FY23 reporting period.

LCAP Practice	Count	Amount Paid
Down Tree Structure	1	$120.00
Chainsaw/Hack & Squirt/Basal Bark Applic.	113	$179,782.00
Crop Tree Release	5	$1,009.85
Firebreak Construction- Dozer	6	$31,057.20
Linear Tree Row Removal for Grassland Birds	9	$20,137.50
Management of Ash Trees	3	$ 49,214.50
Permanent Forest Openings for Wildlife	2	$4,500.00
Prescribed Burning: Woodland/Glade/Savanna <15ac	83	$40,100.00
Prescribed Burning: Woodland/Glade/Savanna >15ac	55	$42,221.50
Removal of Critical Risk Trees	5	$ 38,755.20
Temporary Forest Openings for Wildlife	4	$2,065.00
Woody Edge Development - Downed Tree Structures	1	$150.00
Woody Edge Development (Edge Feathering)	19	$5,634.10
Total Financial Assistance Provided	306	$414,746.85

Source: Internal MDC Community & Private Lands Conservation Branch Database - 2023

Cost-Share Implementation Process:

MDC private land staff or conservation partners complete the below Planning and Certification processes for each habitat practice funded through the Missouri state cost-share program, specifically the Landowner and Community Assistance Program (LCAP).

Cost-Share Allocation (Planning Phase):

1. Site – Specific Management Plan Created
2. Plan Map Created
3. Heritage Review Completed
4. Associated Job Sheets Completed
5. If landowner chooses to receive HCP coverage, the *Bat HCP Avoidance and Minimization Measures Planning Worksheet* is completed.

6. If landowner chooses to receive HCP coverage, the *HCP Bat Friendly Burn Plan Addendum for Private Land* is completed if applicable to the site-specific management plan.
7. Then an *LCAP Cost Share Request and Agreement* is Completed and Signed by participating landowner. At this time, the participating landowner chooses whether to receive HCP coverage or decline HCP coverage. If HCP coverage is declined, the landowner will be required to follow the USDA Natural Resources Conservation Service Bat Habitat Conservation Priorities in Missouri Guidelines which are designed to result in no take of bat species.

Practice Completion/Certification Process:

After the landowner completes the practice, MDC staff complete the below certification process for each funded practice.

1. Update Plan Map w/ Completed Dates.
2. Complete certification of completed practice to ensure practice followed practice specifications.
3. Confirm HCP avoidance and minimization requirements and conservation measures were followed during practice check out.

Annual HCP Practice Review Process

MDC Bat HCP Monitoring Requirements: Coordinated by the Community and Private Land Unit Supervisors (CPLC), the Regional Coordination Team (i.e., regional management) members shall randomly spot-check at least 5% of the completed forestry or prescribed burn projects completed for LCAP participants covered under the MDC HCP incidental take permit. Spot checks must verify that all HCP-applicable prescriptions were included within the site-specific management plan and those actions were followed and are/will be maintained for the life of the agreement.

Failure of a landowner to be in compliance, or to regain compliance, with the terms of the Cost-Share Request/ Agreement will result in contract termination and prorated repayment. Landowners who default on the Cost-Share Request/ Agreement will have that default documented in their case file and may not be eligible for future participation in MDC cost-share programs as per the determination of the project planner and the CPLC Unit Supervisor.

RCTs shall annually submit to the CPLC LCAP Coordinator a summary of reviewed/evaluated projects by June 30th following the most recently completed fiscal year. For LCAP participants receiving coverage under the MDC Bat HCP: Failure to comply with the HCP requirements included within the site-specific plan, will constitute a violation of the LCAP Agreement. If a violation occurs, CPLC Unit Supervisors or identified RCT member, will notify the participant with a noncompliance letter within 30 days of detection of violation. The letter will include the actions necessary for the

landowner/participant to bring the site back into compliance within a specific timeframe. All violations must be reported to the CPLC LCAP Program Manager and MDC Wildlife Diversity Coordinator immediately. Remedial actions and implementation deadlines will vary depending on the nature of the violation and should be determined in consultation with the MDC Wildlife Diversity Coordinator and CPLC LCAP Program Manager. Participant noncompliance results in an automatic suspension of the incidental take exemption extended to the participant under the MDC HCP.

Objective 3.1: Minimize impacts and improve habitat for covered bats by implementing roost tree retention guidelines in all forest habitat on covered lands.

This objective commits the Department to the roost tree retention guidelines outlined in the HCP on all covered lands in the plan area and to detailing all timber harvests conducted on covered lands.

Implementation of Roost Tree Retention Guidelines

The roost tree retention guidelines described in the HCP for Objective 3.1, including Table 5-2, are included in *HCP Implementation Guidelines for MDC Lands* and the *MDC Bat HCP Implementation Guidelines for Private Lands* (see *Appendix A: Staff Resources for HCP Implementation*). These HCP guidelines were provided to MDC habitat management and private lands staff prior to the HCP being permitted and have been retained in all updates to the guidelines (see *Staff Implementation Resources in Section 1*). The roost tree retention guidelines are consistent with MDC's Missouri Forest Management Guidelines, which MDC has implemented since 2014.

Timber Harvests on MDC Lands and Other Nonfederal Lands

Timber harvests were administered by MDC throughout the plan area during the FY23 reporting period. *Table 14* details the amount (in acres) of timber harvests completed on MDC lands during this reporting period, presented by the type of harvest prescription and the time of year the harvest was completed. All timber harvests conducted on MDC lands, including the MDC management area where the harvest occurred, is detailed in *Appendix G: Timber Harvests on MDC Lands*.

No reportable timber harvests involving the definitive sale of felled timber were conducted on other nonfederal lands during this reporting period.

Table 14: Acreage of timber harvests conducted on MDC lands during the FY23 reporting period.

Harvest Prescription		Time of Year			
		Summer	Fall/Spring	Inactive	Total
Extensive Prescription	Regenerate Oak-Clearcut	6	12	18	**37**
	Regenerate Oak-Shelterwood	132	119	100	**350**
	Regenerate Pine-Clearcut	0	0	18	**18**
Limited Prescription	Mechanical Treatment-Commercial	0	0	65	**65**
	Intermediate Cut	548	123	554	**1,225**
	Intermediate Cut followed by TSI	225	193	348	**766**
	Unevenaged Mgmt.-Commercial Sale	1,278	526	1,076	**2,880**
Total Extensive		138	131	136	**405**
Total Limited		2,052	843	2,043	**4,937**
Total on MDC Lands		2,190	974	2,179	**5,342**

[a] Timber stand improvement (TSI) may or may not include the sale of felled timber. However, this metric was included due to the inclusive nature of timber harvest reporting by MDC staff.
Note: These calculations do not include all covered tree removal implemented during the reporting year as some prescriptions are not involved in the sale of removed timber.
All reported values have been rounded to the nearest whole number.
Source: Internal MDC HCP Reporting Survey – 2023

Objective 3.2: Protect all known roost trees using 150-foot buffer.

This objective commits the Department to maintaining an updated database of known bat roosts and afford protections to those roosts using management restrictions within biologically appropriate buffers on MDC lands and other non-federal lands during times of year when bats are present.

Implementation of 150-ft Roost Tree Buffers

MDC continues to maintain a structured Natural Heritage Database (NHD) to track species and natural communities of conservation concern (SOCC) within Missouri. Included in this database are

the ecological occurrence records of known captures, roosts, and hibernacula of imperiled bat species.

To best inform department staff decisions and to avoid and minimize impacts to covered species hibernacula and roost trees, geospatial reference layers referred to as the HCP Bat Buffer Tool (BBT) were developed. The BBT consists of shapefiles generated from applying buffers to NHD bat records with Bat Biological Use codes (BBUs) corresponding to either hibernacula or maternity roost trees. Buffers were applied to the records in relation to activities covered under the HCP and their radii to the relevant BBU types. The BBT will be updated at least on an annual basis as new records are added to the NHD (see *Table 15*). No roosts were added to, or removed from, the BBT during this reporting period.

MDC staff have been trained to check the BBT before conducting covered actions and management plans as part of the initial HCP Implementation roll out. A recording of the training is available on demand to all MDC staff through the department's learning management system (see *Staff Implementation Training in Section 1*).

Table 15: Roosts retained, added, and removed from the HCP Bat Buffer Tool (BBT) during the FY23 reporting period.

Counts of Roosts in BBT	MYSO	MYSE	MYLU	PESU
Roosts From Prior Year	386	49	10	2
Roosts Added in Reporting Period	0	0	0	0
Roosts Removed[a] in Reporting Period	0	0	0	0
Total Roosts Included in FY23 BBT	**386**	**49**	**10**	**2**

[a] Roost records removed from the Bat Buffer Tool reference information, not necessarily removed from the landscape.
Source: MDC Bat Buffer Tool - 2022

Practice Certification on Other Non-federal Lands

Practice certification will be completed on 100% of private lands enrolled in an MDC forestry cost-share program prior to the financial reimbursement of a landowner. During a practice check-out, MDC staff will confirm that HCP avoidance and minimization requirements and conservation measures were followed, including compliance with the 150-foot buffer for known roost trees. The practice certification process is described under *Objective 2.1* above. Practice certification was completed for all projects listed under *Objective 3.1* above.

CPLC Regional Supervisors or a designated MDC administrator will complete spot-check monitoring on 5% of the completed practices each year. This review process will always include at least a 1-year time lag following practice completion due to the functional timeline in the private lands reporting.

For example, the required 5% spot-check monitoring for practices completed in FY22 will be completed during July-August 2023. The Annual HCP Practice Review process is described under *Objective 2.1* above.

Timber Sales on MDC Lands

All timber sales administered by MDC staff are monitored for retention, buffer, and seasonal avoidance compliance through the timber sale administration process. Timber sales are used to implement forest management prescriptions which are designed to accomplish the forest and woodland management objectives for each area. All timber sales administered by MDC staff are monitored for retention, buffer, and seasonal avoidance compliance through the timber sale administration process. Roost tree retention and appropriate buffers are incorporated into timber sale planning as management prescriptions are developed and during timber marking, prior to the sale being sold. MDC Foresters determine which trees to cut, and which to retain, based on the management prescription, and ensure that all forest management BMPs, including the tree retention and buffer guidelines described in the Bat HCP, are followed when making this determination.

Trees to be cut and trees to be retained (leave trees) are clearly and distinctively marked. The timber sale contract clearly describes the tree marking for cut trees and for leave trees to ensure the contractor understands which trees should be cut and which should be left (see *Box 1*).

Box 1. Timber Sale Contract Language describing how trees are marked:

The Buyer agrees to cut only those trees marked or designated as follows: Trees marked for cutting are marked with orange paint. Leave trees are marked with blue paint. Sale boundaries including clearcuts, stream side management zones, buffer zones, individual stand boundaries, are marked with red.

The contract then specifies marking guidelines and describes any special instructions on what to cut or leave. Other contract clauses pertaining to BMP's that impact bats that may be included in the contract include:

- *The Buyer shall carry out operations in such a manner as to cause the least damage to the remaining trees and improvements. The Timber Sale Administrator may terminate any part OR all of the Buyer's operations if, in the Timber Sale Administrator's opinion, the operations are detrimental to the forest, land, or watershed or to the best interests of the state of Missouri.*

- *Buyer shall keep ponds and stream courses within the sale area clear of debris resulting from harvesting operations. When the flow of a natural stream course is diverted as a result of the Buyer's operations, such flow shall be restored to the natural course as soon as practicable and prior to any major runoff event.*

- *The Buyer shall refrain from conducting any operations on any areas maintained by the Seller as a wildlife food plot, pond, Natural Area, Streamside Management Zones (SMZ), or other buffer zones or reserve strips unless specifically authorized in writing by the Timber Sale Administrator.*

- *All Best Management Practices shall be followed in accordance with the current Missouri Watershed Protection Practices guide.*

Seasonal avoidance compliance is assured through specific clauses within MDC's timber sale contract. There are three separate seasonal avoidance clauses specific to the HCP buffers impacting the timber sale, covering hibernacula buffers, maternity roost tree buffers, and PBMZ buffers. The clause pertaining to known bat maternity roost trees, which is included in every timber sale contract that includes stands intersecting a maternity roost tree buffer, is as follows:

- *This sale contains cutting date restrictions due to endangered bat species maternity roost. In addition to Article V. 5.18, the buyer will conduct no felling activity during the periods of April 1- August 31 within a 150-foot radius of the maternity roost. Maternity roost buffer has been identified both on the ground and on the timber sale map. Avoid felling any trees into the 150-foot buffer if possible. Other harvesting activities are permitted during this time except as prohibited in Article V. 5.18.*

MDC Timber Sale Administrators then regularly inspect ongoing timber sales for contract compliance. These field visits are documented using a timber sale inspection form, which becomes a permanent part of the timber sale documentation. Best management practices (BMPs) such as retention and buffers are inspected by Timber Sale Administrators to ensure contract compliance. Any infraction is documented within the timber sale inspection form.

Objective 3.3: Establish priority bat management zones (PBMZs) to protect bats and promote high-quality bat habitat in areas of known or potential bat activity.

This objective commits the Department to establishing a minimum of 28,000 acres of Priority Bat Management Zones (PBMZs), 7,000 acres for each of the four tree-roosting covered species.

Establishment of Priority Bat Management Zones ----------

At the time the HCP was permitted, MDC had established 31 PBMZs totaling 28,613 acres. No changes were made to PBMZ delineations during this reporting period.

Enhancement Actions Implemented Within All PBMZs ----------

In addition to the avoidance and minimization measures practiced within PBMZs, these areas are managed specifically to benefit the designated target species. *Table 16* below details all these habitat enhancement actions implemented across all PBMZs within the FY23 reporting period. See *Appendix H: Habitat Enhancements on Priority Bat Management Zones* for a detailed tabulation of these

management actions. Note that habitat enhancement actions applicable to this objective include both covered activities and activities that are not covered (e.g., woody cover control), which does not remove trees greater than 9 inches in diameter.

Table 16: Amount of habitat improvement (in acres) occurring within all PBMZs during the FY23 reporting period.

Target Species	PBMZ Location	Prescribed Burn	Forest Mgt: Limited	Forest Mgt: Extensive	Early Successional Habitat Mgt	Early Successional Mgt – WCC	Natural Community Restoration	Water Mgt	Chemical Treatment	ISM	Food Plot	Total
Indiana Bat	Deer Ridge CA	204	0	0	0	0	0	0	0	0	0	**204**
	Duck Creek CA (Dark Cypress Unit)	0	0	0	25	50	0	386	0	0	40	**501**
	Dupont Reservation CA	0	0	0	0	0	0	0	0	0	0	**0**
	Heath (Charlie) Mem CA	0	0	0	0	0	0	0	0	0	0	**0**
	Weldon Spring CA	0	0	0	0	0	0	0	16	31	30	**77**
	Poosey CA	1236	143	33	0	60	12		75	108	0	**1,667**
	Rebel's Cove CA	0	0	0	16	0	0	0	0	0	4	**20**
	Union Ridge CA	312	0	0	0	0	0	0	0	0	0	**312**
Little brown bat	Big Creek CA	0	0	0	0	0	0	0	28	65	0	**92**
	Dunn Ford Access	0	0	0	0	0	0	0	0	0	0	**0**
	Mule Shoe CA	376	14	0	45	0	0	0	0	0	0	**436**
	Nodaway County CL	0	0	0	18	0	0	0	0	219	0	**237**
	Schell-Osage CA	449	0	0	164	18	0	0	24	24	30	**709**
	Monkey Mountain CA	0	0	0	0	0	0	0	189	0	0	**189**
	Stockton Lake ML	357	0	0	0	0	0	0	0	0	0	**357**

	Sunbridge Hills	0	0	0	0	0	0	0	0	0	0	**0**
	Truman Reservoir ML (Deepwater Creek)	93	0	0	0	0	0	0	0	0	0	**93**
	Yellow Creek CA	0	0	0	0	0	0	0	0	0	0	**0**
Northern long-eared bat	Brickyard Hill CA	0	0	0	0	0	0	0	0	0	4	**4**
	Current River CA	0	161	0	0	0	0	0	0	0	0	**161**
	Fort Crowder CA	0	0	0	0	0	0	0	0	0	0	**0**
	Bicentennial CA	0	0	0	0	0	0	0	0	0	0	**0**
	Ketcherside Mountain CA	130	0	0	0	0	0	0	0	0	0	**130**
	Sunklands Conservation Area	0	0	0	0	0	0	0	0	0	0	**0**
Tri-colored bat	August A. Busch Jr. Memorial Wetlands at Four Rivers CA	0	0	0	0	0	0	0	0	0	0	**0**
	Bushwhacker Lake CA	0	0	0	0	0	0	0	0	0	44	**44**
	Caney Mountain CA	427	0	0	0	0	0	0	0	0	100	**527**
	Roaring River CA	0	0	0	0	0	0	0	0	0	0	**0**

	Schell-Osage CA	0	0	0	0	0	0	0	19	0	0	**19**
	Sunklands Conservation Area		94	15	0	0	0	0	0	0	0	**110**
	Truman Reservoir ML (Sac Osage)	0	0	0	0	0	0	0	0	0	0	**0**

All reported values have been rounded to the nearest whole number.

Source: Internal MDC HCP Reporting Survey - 2023

PBMZ Management Plans

To facilitate this, a management plan will be drafted by year 2 of plan implementation and will describe how the PBMZs will be managed to create conditions beneficial to each target species. MDC has aligned HCP implementation years with State fiscal years (see *Reporting Period in Section 1*); as such, year 2 of plan implementation is State FY24. Therefore, PBMZ management plans will be completed and approved for each PBMZ no later than June 30, 2024.

During this reporting period, the HCP Implementation Team completed development of the PBMZ management plan templates based on the guidance provided in the HCP, particularly the species-specific habitat conditions described in *HCP Appendix F, PBMZ Future Desired Conditions*. Template components include:

- Statement of Purpose of PBMZs
- Desired Future Conditions (DFC) including roosting habitat, foraging habitat and available drinking water, specific to the target bat species
- Current resource conditions including condition of forest and woodland communities, condition of open lands and an inventory of water resources
- Other important natural features and resources within the PBMZ that should be considered in the management plan, such as Natural Areas, sensitive natural communities (e.g., caves, fens), and the presence of other Species of Conservation Concern (SOCC)
- Management approach
- Monitoring approach, including the forest inventory schedule, post burn or treatment evaluation, etc.
- Timetable for completing planned management and monitoring

Separate templates were developed for each of the four target bat species, so that the DFC section of the template is specific to that PBMZ's target species (*Appendix I, PBMZ Management Plan Templates*).

Finalized templates were distributed to each of the area managers responsible for managing a PBMZ in July 2023. Managers were asked to complete each section of the template and submit the draft plan to the HCP Implementation Team for review. The HCP Implementation Team, including the Bat Ecologist, will review each PBMZ management plan to ensure that it meets the requirements described in *HCP Appendix F* (or the most current available information on summer habitat requirements for that species). The draft PBMZ management plan must also be reviewed and approved by the District Supervisor, Regional Resource Management Supervisor, and Regional Administrator. PBMZ Management Plans for each PBMZ must be completed and approved by June 30, 2024.

Although PBMZ Management Plans have not yet been developed, management actions continue to be performed within PBMZs in accordance with the current Area Management Plan for the

Conservation Area, and in compliance with the avoidance and minimization measures required for PBMZs. *Table 16* lists the management actions that took place within PBMZs during this reporting period. More detailed information can be found in *Appendix H: Habitat Enhancements on Priority Bat Management Zones*.

Objective 4.1 Assess and, if necessary, improve 10 entrances to known subterranean habitat on MDC lands annually beginning in year 1 and continuing for the duration of the permit term.

This objective commits the Department to assessing, documenting, monitoring, and maintaining entrances to subterranean habitat for covered species on MDC lands throughout the permit period.

Assessment of Known Subterranean Habitat on MDC Lands ----------

In pursuit of this objective and other objectives under Biological Goal 4, the Department began compiling a list of all known caves on MDC lands during the FY22 reporting period. Data compilation included using existing records on the status of cave entrances and entrance barriers to prepare for field visits. Cave entrance information will be gathered as part of routine bat hibernacula, cave management, and HCP-related surveys by MDC staff or contributing partners (e.g., Cave Research Foundation). Data collected for each cave will consist of bat species present, individual number of bats observed, gate status (i.e., gated, fenced, or not protected), gate issues, obstructions to entrance, breach risk (including breach history), potential for human disturbance, and ease of access.

Data from these field assessments will be reported to the MDC Bat Ecologist and incorporated into a designated "Cave File" for each cave and updated with each subsequent visit. These data will later be integrated into the Statewide Bat Database for expedited reporting and monitoring needs. Entrance barrier assessments will occur at least once every five years.

Objective 4.2: Implement bat management zones around known entrances to subterranean habitat.

This objective commits the Department to maintaining 20-acre management buffers and biologically appropriate management restrictions around all identified caves on MDC lands, with harvest restrictions also applicable around Sodalis Nature Preserve.

Establishment of 20-acre Bat Management Zones on MDC Lands ----------

In anticipation of HCP permitting, the Department developed preliminary 20-acre bat management zones around all known hibernacula located on MDC lands. These data were then incorporated into the Bat Buffer Tool upon permitting as a reference for field management staff. As described in HCP Section 5.2.2.2, Biological Goal 4, these buffers designate areas managed for old-growth conditions and restrict tree removals and prescribed fire operations between March 15 and April 30 and

September 15 and October 31. In addition, activities within 0.25 mile of all hibernacula are limited to reduce the potential for noise or other disturbance during the winter season. At high priority hibernacula for covered species, harvest activities are restricted in the spring and fall within five miles. Within the ten-mile buffer established for Sodalis Nature Preserve, harvest activities are limited to the winter. Details regarding these restrictions were provided to all appropriate public lands staff through the HCP Implementation Resources documents (see *Staff Implementation Resources in Section 1*).

The initial rollout of the Bat Buffer Tool for the FY22 reporting period included a total of 155 hibernacula reference locations on MDC owned and managed lands; this number did not change in FY23. Appropriate management restrictions were implemented within the hibernacula buffers during the reporting period by field staff in accordance with the HCP based on this reference tool.

In addition to these conservation measures, the Department will continue to develop and maintain a comprehensive record of HCP-relevant data on all known hibernacula across the Plan area. This listing will include any known current habitat conditions within all 20-acre bat management zones and the desired future conditions for each area. During the FY23 reporting period, the Department developed an internal workflow to track habitat enhancement actions and monitoring of all 20-acre bat management zones in accordance with the commitments outlined in the HCP Section 5.2.2.2.

Objective 4.3: Maintain physical barriers at subterranean sites on MDC lands over the course of the permit term and gate additional sites as needed.

This objective commits the Department to installing and/or maintaining cave entrance barriers on MDC lands when biologically beneficial, and on other non-federal lands when practically feasible, based on a prioritized list.

Maintenance of Physical Barriers at Known Subterranean Site on MDC Lands ----------

The Department began developing a prioritized list of caves on MDC lands in the FY22 reporting period based on the information procured in support of Objective 4.1. Entrance assessment information from field site visits beginning in FY23 will supplement this prioritization. Maintenance activities and/or installation of barriers will then be implemented based on identified needs throughout the permit period.

MDC did not construct new cave gates on any MDC properties during the FY23 reporting period.

Objective 5.1: Implement bat-friendly management measures within burn plans beginning year 1 of the plan.

This objective commits the Department to developing guidelines for burn plans in preferred bat habitat on covered land and submit them to the USFWS by the end of implementation year 1.

Development of Bat-Friendly Burn Guidelines ----------

Because the requirements for Bat-Friendly Burn Guidelines, particularly regarding the requirement to limit scorch height in preferred habitat during times when bats may be present, were new; draft guidelines were piloted during Year 1 of HCP implementation. The approach was to develop draft guidelines that staff were required to implement during the first year, and to ask staff to provide feedback that could be used to improve and clarify the guidelines by the end of year 1. The draft guidelines were revised based on staff feedback during FY22, but no changes were made in FY23. Therefore, the Bat HCP Burn Guidelines for Public Lands and for Private Lands included in Appendix A of the FY22 report continued to be used throughout FY23. The Bat-Friendly Burn Addendum for MDC lands and for private lands were also posted on the HCP Resources SharePoint site accessible to all staff.

Objective 5.2: Implement bat-friendly construction and demolition measures throughout the permit area.

This objective commits the Department to implementing seasonal guidelines on tree removal associated with road and trail construction, the maintenance of speed limits, investigation into additional speed restrictions near hibernacula, and bat-friendly demolition practices by implementation year 3, which will be State fiscal year 2025 (see *Reporting Period in Section 1*).

Implementation of Bat-Friendly Guidelines for Construction and Demolition ----------

No progress was made on this objective during the current reporting period, as transitioning to HCP implementation phase and work on objectives with earlier deadlines were higher priority tasks. Furthermore, completion of Objective 5.3 will help inform development of the guidance for this objective. The *HCP Implementation Guidelines for MDC lands* include guidance for facility maintenance and development, including tree removal guidelines, which will be applied to the development of roads, trails, and fire lines in the interim.

Objective 5.3: Provide training to new MDC staff to recognize and avoid potential roost trees.

This objective commits the Department to providing bat-specific training (e.g., recognition and avoidance of potential roost trees) to all relevant Department positions, including new staff as part of the on-boarding process.

Integration of Bat-Specific Training

Guidance on recognition of Indiana bat and northern long-eared bat roost was developed by MDC staff in 2016 and included in MDC staff trainings and resources associated with the Bat Management Guidelines followed by MDC until the HCP was permitted. To meet HCP Objective 5.3, the HCP Implementation Team is building on the previous guidelines to develop written guidance on roost tree identification for all four tree-roosting covered species, as well as on conducting emergence counts. This guidance will be incorporated into other relevant guidance documents and training materials as appropriate, including the HCP Implementation Training that is mandatory for MDC staff responsible for habitat management or other tree removal (see *Staff Training and Implementation Resources in Section 1*). This is intended to be a living document, which will be updated as new information becomes available, particularly for the more understudied species.

Roost tree identification guidelines were drafted during the FY23 reporting period but have not been finalized. Very limited information is available on roost tree preferences, particularly for tricolored bat and little brown bat. Additional data and resources are expected to become available during FY24 that may be helpful in informing these guidelines, including final Species Status Assessments for little brown bat. To meet this objective in FY23, bat roost tree descriptions and photos were added to the Bat Ecology portion of the HCP Implementation Training slides, which are used during HCP Regional Workshops and HCP Implementation Training.

Objective 5.4: Incorporate bat-friendly best management practices (BMPs) into the Professional Timber Harvester (PTH) training.

This objective commits the Department to developing bat-friendly best management practices and integrating those BMPs into the Professional Timber Harvester (PTH) training.

Integration of Bat-Friendly BMPs into PTH Training

No progress was made on this objective during the current reporting period, as transitioning to HCP implementation phase and work on objectives with earlier deadlines were higher priority tasks. The HCP Implementation Team has scheduled work on this objective for implementation year 2 (FY24).

Objective 6.1: Update MDC's WNS action plan by year 5.

This objective commits the Department to developing an updated and publicly available Statewide WNS Action Plan by implementation year 5.

Updates to the State WNS Action Plan

In April 2010, MDC issued a White-nose Syndrome (WNS) action plan for MDC-managed properties (Missouri Department of Conservation 2010). This plan guides the MDC response to WNS and provides a publicly available resource that educates readers about WNS and practices used to prevent its spread. In the HCP, MDC committed to developing an updated WNS action plan by year 5, which will be State fiscal year 2027 (see *Reporting Period in Section 1*).

No progress was made on this objective during the current reporting period, as transitioning to HCP implementation phase and work on objectives with earlier deadlines were higher priority tasks.

Objective 6.2: Collaborate with researchers to identify ways to ameliorate the impacts of WNS through treatment or habitat management.

This objective commits the Department to providing technical assistance and collaborative efforts in the pursuit of lessening the impact of WNS on all bat species, including those covered under the HCP.

WNS Research and Collaboration Efforts

The Department is working with Dr. Joseph Hoyt and Dr. Kate Langwig from Virginia Tech University on two research projects pertaining to this objective. The first project involves pairing cave microclimate data with hibernacula counts to study the effects of white-nose syndrome (WNS) on bat survivorship. The second project involves studying the persistence of tri-colored bats in response to WNS exposure over the course of a winter season; MDC surveyed two caves, Hunter's Cave, and Rocheport Cave, taking 30 swabs per visit to study the presence of WNS. The MDC also collected cave water and guano samples for Dr. Marc Johnson from the University of Missouri, who is researching the diversity of bat and cave viruses in response to SARS-CoV-2 and other human-wildlife health interactions.

Status and Trends Monitoring

Covered Bat Populations Monitoring

In HCP Section 5.5.2.1, MDC committed to compiling current data on the numbers and distribution of covered species at the time of HCP permitting, to be used as a baseline of the status of all covered species and associated modeled habitat at the beginning of the permit term, and as a reference point for future status and trends monitoring. Population numbers are updated annually and compared to this baseline. Current data on the population size of covered species, based on the results of the most recent hibernacula counts, is summarized in *Table 18* (see *Section 5*).

Updated distribution data are provided to the USFWS and to MDC staff in the form of ArcGIS shapefiles. Hibernacula data were updated during 2022 and used to inform an updated fall/spring habitat layer for covered species (see *Baseline Calibration* in Section 1). Records of summer captures and known roost trees are updated at least annually in the Natural Heritage Database and in the HCP GIS layers. No updates were made to modeled summer habitat for any species.

White-Nose Syndrome Monitoring

HCP Section 5.5.2.2 and Section 5.4.1 describe the goals, triggers, and approach for WNS adaptive management monitoring. The base monitoring protocol consists of acoustic monitoring of all PBMZs every 10 years on a rotational cycle. Once a species trips a WNS adaptive management trigger, all PBMZs for that species must be monitored through acoustic surveys within 5 years of those surveys beginning. In the adaptive management protocol, where the target species is detected, mist-netting and radio telemetry to identify roost locations will be performed the following summer.

PBMZ Monitoring

The first season of PBMZ acoustic surveys was conducted in summer 2023 (*Appendix J: Acoustic Bat Surveys on PBMZs– Summer 2023 Progress Report*). Because the WNS adaptive management threshold has only been met for Northern long-eared bats (MYSE), survey efforts targeted the six PBMZs designated for MYSE. Acoustic surveys were completed in five of the six MYSE PBMZs. The final MYSE PBMZ, at Sunklands CA, is planned to be completed in summer 2024. Completing surveys for all northern long-eared bat PBMZs within the first 2 years will allow us to shift focus towards the next bat species for which the WNS Adaptive Management threshold is triggered within 2-3 years, expediting completion of PBMZ surveys for triggered species. Acoustic surveys were also completed in Nodaway County Community Lake which is classified as a Little Brown Bat PBMZ. This PBMZ was prioritized for completion in 2023 due to its proximity to a wind energy facility.

Acoustic data collected during summer 2023 were processed using Kaleidoscope and are being manually vetted as needed. For any PBMZs on which MYSE calls are confirmed, mist net surveys will be conducted during summer 2025.

Changes to Monitoring and Research Program

No changes to the monitoring and research program are planned. Currently, the WNS trigger has been met for only one species, the northern long-eared bat (see *Table 17 in Section 5*). Therefore, the PBMZ acoustic monitoring surveys will prioritize completion of the final northern long-eared bat PBMZ in summer 2024.

Section 5:
ADAPTIVE MANAGEMENT AND CHANGED CIRCUMSTANCES

This section:

- ✓ Describes any circumstances that made adaptive management actions necessary during the reporting period and how those management actions were implemented.
- ✓ Provides descriptions of any changed or unforeseen circumstances occurring during the reporting period.

Adaptive Management

The Bat HCP provides a structure for implementing an adaptive management program to address uncertainty in conditions throughout the 50-year permitting timeframe. The program allows for flexibility should monitoring reveal that specific habitat objectives proposed in the conservation strategy are not being met or should additional or different management measures not identified in the HCP be shown to be more effective in achieving biological goals and objectives (see HCP Section 5.4).

Any applicable changes in HCP implementation resulting from the adaptive management process during the reporting year are documented in the following sections. *Table 17* provides an overview of any changes or responses reported for the reporting period.

Table 17: Overview of adaptive management measures and whether a change occurred, or a response trigger was reached during the FY23 reporting period.

Adaptive Management Measures	Changes or Response Reported
White-Nose Syndrome	Yes[a]
Climate Change Adaptation	No
Addition and Subtraction of Subterranean Habitat and Maternity Colonies	No
Changes to Prescribed Burning Regulations	No
Addition and Subtraction of Priority Bat Management Zones	No

Source: Internal MDC Statewide Bat Database - 2023

[a] Population-based adaptive management trigger for northern long-eared bats was met before HCP permitting.

White-Nose Syndrome

The adaptive management program for WNS accelerates the frequency of PBMZ monitoring for species considered affected using the general concept of WNS "impact triggers", such that if a species meets the WNS-affected trigger, PBMZs for that species will be prioritized for surveys the following summer season, unless a 10-year survey was completed the year before, so that PBMZ boundaries can be revised and PBMZ locations can be moved to more effectively protect known maternity colonies (see HCP Section 5.4.1). WNS adaptive management triggers are based on the results of winter hibernacula counts.

Table 18: Population estimates for covered species at the end of the reporting period and whether a white-nose syndrome trigger was met for each species.

Covered Species	Baseline Population	Current Population	% Change	Met Trigger
Gray bat (MYGR)	5454,396	541,518	-2.32%	-
Trigger: When population estimate falls below 10,000 in 75% of gray bat hibernacula.	-	-	-	No
Little brown bat (MYLU)	671	629	-6.26%	-
Trigger: When population estimate falls below 350 across 12 reference sites.	-	-	-	No
Northern long-eared bat (MYSE)	13	12	-7.69%	-
Trigger: 90% decline.	-	-	-	Yes[a]
Indiana bat (MYSO)	219,291	219,291	0.0%	-
Trigger: Number of occupied caves decreases by 60% (35 surveyed since 2017).	-	-	-	No
Trigger: When population estimate for LKM falls below 80,000.	-	-	-	No
Tri-colored bat (PESU)	2,105	1,647	-21.76%	-
Trigger: When population estimate falls below 1,400 across 40 reference sites.	-	-	-	No

Source: Internal MDC Statewide Bat Database – 2022

[a] Population-based adaptive management trigger was met before HCP permitting.

Current data on the population size of covered species, based on the results of the most recent hibernacula counts, is summarized in *Table 18*. During the winter FY23 hibernacula survey season, survey efforts are prioritizing reference sites for tricolored bat and little brown bat that have not been surveyed in two or more years, as well as Indiana bat hibernacula with outdated survey data.

Climate Change Adaptation

Current data on the population size of covered species, based on the results of the most recent hibernacula counts, is summarized in *Table 18* above. This year's report serves to establish the baseline population estimate for each species (see *Covered Bat Populations Monitoring in Section 4*). Winter hibernacula surveys are expected to detect any shifts in hibernacula use within Missouri. Summer habitat use will be monitored through PBMZ surveys (see HCP Section 5.5.2.2). New maternity colonies and bat occupancy may also be detected by other research or survey efforts conducted by MDC or other entities. MDC will respond to any changes in hibernacula use or the discovery of new summer roosts, including maternity colonies, as described in HCP Section 5.4.3.

Addition and Subtraction of Subterranean Habitat and Maternity Colonies

During this reporting period, MDC updated the baseline dataset for fall/spring habitat for covered species to better align the HCP baseline conditions with the environmental conditions at the time of HCP permitting (see *Baseline Calibration in Section 1*).

No new hibernacula or maternity colonies were discovered during the FY23 reporting period. No maternity roost trees were confirmed to be destroyed or inactive during the FY23 reporting period.

Changes to Prescribed Burning Regulations

The Department is committed to notifying the USFWS within 6 months of any new laws enacted that foreseeably might have a negative impact on MDC's ability to complete prescribed fire throughout the plan area.

There were no new laws or regulations enacted during this reporting period that would impact the Department's ability to conduct prescribed fire at levels described in the Bat HCP. MDC staff reported **45,806 acres** of prescribed fire management on MDC lands in the FY23 reporting period (see *Objective 1.3 in Section 4*).

MDC will monitor all applicable regulation changes and notify the USFWS accordingly.

Addition and Subtraction of Priority Bat Management Zones

Objective 3.3 provides for the protection of a portion of known summer maternity roost trees as well as suitable roost habitat during maternity and pupping season (i.e., April 1 to August 31). As described in that section, PBMZ boundaries are drawn in consideration of factors such as known maternity roost trees, maternity roost density, bat range and distribution within the state, and MDC conservation priorities. Over time, it is expected that the geographic locations of important summer roosting habitat will shift as more data become available. As a result, it is expected that there will be a need to shift the location of PBMZs. PBMZs will be considered for re-delineation every 10 years, or sooner in the case of PBMZs for WNS affected species, in coordination with USFWS (see HCP Section

5.4.5). PBMZ review and re-delineation will be informed by PBMZ surveys as well as other research or survey efforts conducted by MDC or other entities (see HCP Section 5.4.1). No changes were made to PBMZs during the FY23 reporting period.

Changed Circumstances

If changed circumstances were triggered in prior years, documentation of on-going responses to those past changed circumstances in the current reporting year, and the on-going results of remedial measures will be reporting in this element of the report.

Additional Species Listed

If a non-covered species associated with habitat on covered lands is proposed for listing, becomes a candidate for listing, or is emergency-listed under the ESA, the Department will coordinate with the USFWS and implement avoidance measures to avoid take of the new species. This may include an assessment of the presence of suitable habitat on covered lands and the identification and implementation of reasonable measures to avoid take of the new species. If MDC wishes to proceed with activities that will cause take of the new species, they can begin the process to amend the HCP incidental take permit to include these species or apply for a new and separate permit. In most cases, permit amendments to include additional covered species require amendment to the HCP and the permit, and would require the USFWS to re-initiate Section 7 consultation and conduct supplemental National Environmental Policy Act (NEPA) work. The agencies will implement interim take avoidance guidelines for the species until the permit amendment is finalized or an alternate permit is issued.

During this reporting period, the following changes were made to the list of endangered, threatened, candidate or proposed species occurring in Missouri:

- Northern long-eared bat: reclassified from threatened to endangered.
- Big Creek Crayfish and St. Francis River Crayfish were listed as Threatened on May 30, 2023. Final Critical Habitat was published on April 27, 2023.
- Western fanshell was listed as Threatened on July 27, 2023, with Critical Habitat.
- Alligator snapping turtle: proposed threatened, but the listing did not go into effect during this reporting period
- Tricolored Bat: proposed Endangered, but the proposed listing did not go into effect during this reporting period

The two bat species are covered in the MDC Bat HCP. MDC regularly undertakes Section 7 consultation for all activities supported by Federal funding or permit. For all projects in which western fanshell, Big Creek crayfish, or St. Francis River crayfish may be in the action area, Section 7 consultations have determined that covered activities are not likely to adversely affect these species.

MDC finds no need to amend this HCP in response to any changes made to the list of endangered, threatened, candidate or proposed species occurring in Missouri during this reporting period.

White-Nose Syndrome

WNS is addressed as part of adaptive management rather than a changed circumstance. and remedial actions were not developed for WNS as these are addressed in HCP Section 5.4.1.

Wildfire

The Department has committed to implementing conservation measures to protect roost trees and hibernacula on covered lands. If a wildfire occurs on covered lands, MDC will conduct a post-fire assessment to determine the potential impact of each fire on covered bat species and their habitat (HCP Section 6.4.2.3). If the assessment indicates a degradation in habitat quality, the Department will develop a site-specific plan outlining rehabilitation needs. This plan may include the use of short-term measures, such as the installation of bat boxes or the creation of snags in adjacent stands, as well as longer-term management efforts, such as forest restoration or timber management, to restore suitable habitat for covered bat species.

Wildfires occurring on MDC lands during the FY22 reporting period were not included in the FY22 annual report due to unanticipated challenges associated with exporting data from the MDC Fire Reporting application in a format that allows proper geospatial analysis. Therefore, wildfire data from both the initial FY22 reporting period, and from FY23, are included in this FY23 report.

During the FY22 reporting period (February 23, 2022 – June 30, 2022), reported wildfires occurred within one Priority Bat Management Zone (PBMZ) at Big Creek CA, a little brown bat PBMZ (Table 19). This 140-acre wildfire impacted 0.33 acres of the PBMZ (<1%). Therefore, wildfires did not have a significant impact on the habitat quality or suitability of any PBMZs during the FY22 reporting period. No known roost trees on MDC lands were impacted by wildfires during the FY22 reporting period, but the wildfire at Big Creek CA did impact a northern long-eared bat maternity roost tree on MO DNR lands adjacent to the CA, which was identified via radio telemetry in 2013. The tree was identified as a shagbark hickory. No hibernacula buffers on MDC land were impacted by wildfires during the FY22 reporting period. See *Appendix K: Record of Wildfire Occurrence within Bat Buffers on MDC Land* for additional information.

Table 19: Wildfire's within PBMZs during the FY22 – FY23 reporting periods.

PBMZ	Target Species	Date	Total Acres Burned	Acres Burned within PBMZ	PBMZ Acreage	Percent of PBMZ Impacted
Big Creek CA*	MYLU	2022-04-10	140	0.33	246.44	0.134%
Fort Crowder CA	MYSE	2022-11-19	2.64	0.55	1086.17	0.051%
Truman Reservoir ML (Deepwater Creek)	MYLU	2023-02-06	0.86	0.59	916.18	0.065%
Heath (Charlie) Memorial**	MYSO	2023-04-29	19.92	0.01	373.85	0.003%
Sunbridge CA	MYLU	2023-05-04	36	36	241.23	14.92%

* The Wildfire at Big Creek CA also impacted a roost tree outside of the PBMZ on adjacent Missouri DNR land.
** The Wildfire at Heath also impacted a MYSO roost tree found in 2010, which may have been a male roost.

During FY23, wildfires occurred within three PBMZs (Table 19). With the exception of Sunbridge, these wildfires were relatively small, each impacting less than 1 acre (<0.1%) of each PBMZ. The wildfire at Sunbridge was larger, affecting about 15% of the PBMZ, but the intensity and impact of this wildfire were similar to what would be targeted during a prescribed burn, and produced no mortality on trees larger than 9 inches DBH. Therefore, while there may have been short-term impacts to bats present during the time of the wildfire, the long-term effects on habitat quality and suitability are likely positive.

The wildfire at Heath Memorial also impacted an Indiana bat roost. This roost was identified in 2010 as a live hickory tree, and may have been a male roost rather than a maternity roost. This was the only known roost tree located within an area in which wildfires were reported during FY23. The area manager reported that the wildfire impacting Heath Memorial was very low intensity, with flame heights less than one foot. A few trees were felled and some snags may have been destroyed, but impact to the PBMZ was very minimal. Wildfires did not have a significant effect on habitat quality or suitability within any PBMZs during FY23.

Table 20: Wildfires occurring within hibernacula buffers during FY23.

CA	Date	Hibernacula Buffers Impacted	Species	BBU	Total Acres Burned	Acres Burned within Buffer
Rocky Creek CA	2023-04-16	Powder Mill Creek Cave	MYSO	1	1.68	1.42
		Martin Cave (Martin No. 1 Cave), Shannon County	MYSO	1		
		Rocky Creek (Bloom Creek) CA - Powder Mill Creek Cave	MYSE	3		
		Martin Cave	MYGR	5		
Sunklands CA	2023-04-18	Bat Cave Shannon County	PESU	19	43.72	41.29
			MYGR	5		
			MYSO	1		
		Mose Prater Cave (Chimney Cave)	MYSO	1		
			MYGR	5		

Two wildfires impacted multiple hibernacula buffers during April 2023 (Table 20). A 1.68-acre wildfire at Rocky Creek CA impacted 1.42 acres of MDC land within 4 overlapping hibernacula buffers. Because of the small size of this wildfire, impacts to the quality or suitability of habitat within the buffer were determined to be minimal. A 43.72 acre wildfire at Sunklands CA impacted 41.29 acres of MDC land within the overlapping hibernacula buffers associated with Bat Cave Shannon and Mose Prater Cave. The area impacted was approximately 3.5 miles from Bat Cave Shannon, which was closer to the impacted area than Mose Prater Cave. Fire intensity was described as moderate at the time staff arrived but may have been more intense initially given the number of acres burned. The impacted area was within a shelterwood treatment composed primarily of young trees with little overstory. Some snags were likely destroyed and replaced with new snags. Approximately 6 snags were felled to create a fireline during the wildfire response. Overall, impact of this wildfire on habitat quality and suitability is expected to be minimal, and no changes to the management plan were determined to be needed.

The HCP Team continues to make progress in developing staff guidance for conducting post-wildfire evaluations to determine the extent to which the affected forest has retained suitable habitat features such as snags, tree species and canopy; and for the development of site-specific plans outlining any rehabilitation needs. Guidance is being developed in coordination with regional management staff. Information gained from informal assessments of wildfire impact during FY23 will be used to inform this guidance. Once finalized, this guidance will be distributed to MDC regional management staff and incorporated into HCP Training materials.

Climate Change

The Department has committed to addressing the potential impacts of climate change on covered bat species. Climate change has the potential to alter conditions for covered bats through several mechanisms, including changes in the insect prey base, forest structure and composition, and the suitability of hibernacula. MDC will monitor the impacts of climate change on covered bat species and their habitat and will implement contingency measures as necessary to address any negative effects. This may include increased monitoring, research, and management actions to minimize the impacts of climate change on covered species. MDC will also work closely with the USFWS and other partners to develop and implement effective strategies for addressing the impacts of climate change on covered bat species and their habitat.

Climate change is considered a foreseeable event that affects the environment in the plan area. While it is included as a changed circumstance, it is addressed as part of the conservation strategy, and measures to address climate change will be implemented through the adaptive management program (HCP Section 5.4.2).

Forest Pests, Disease, Invasive Plant Species

Forest structure, function, and diversity are threatened by forest pests, pathogens, and nonnative invasive plant species. When a species or pathogen has been recognized as potentially destructive to the natural ecosystem, the Missouri Invasive Forest Pest Council (MIFPC), a collaboration of state agencies (including MDC) and the University of Missouri, assesses the potential threats of invasive forest insects and diseases and prepares responses to those threats as described in HCP Section 6.4.2.6.

The Department works to prevent the spread of invasive species through existing forest management efforts, including those for the emerald ash borer, Asian long-horned beetle, spongy moth, pine shoot beetle, oak wilt, hypoxylon canker, oak decline, rapid white oak mortality, and butternut canker disease. MDC also monitors and assesses the impacts of invasive species on covered lands. If the impacts are found to be significant, MDC will develop a plan to remediate the affected area, and will report any possible impacts to bat roosting habitat. MDC will also implement and support research on the impacts of climate change on invasive species, and will coordinate with other agencies to address these impacts.

No new significant infestations of new forest pests, diseases, or invasive plants species were detected during this reporting period. More information is available in the Missouri Forest Health Highlights annual updates available online at https://mdc.mo.gov/trees-plants/forest-care/forest-health-news.

Species Delisting

If a covered species becomes delisted during the permit term of the HCP, MDC will coordinate with the USFWS to evaluate and identify which elements of the HCP and permit are no longer necessary

to maintain the delisting status of the species. With the concurrence of the USFWS, any elements deemed unnecessary will no longer be required. MDC will continue to implement elements deemed necessary by the USFWS to maintain the delisting status. All mitigation for take of the delisted species incurred up until the time of delisting must be implemented in accordance with the terms of the HCP and permit. Funding assurances will no longer be required by MDC for the delisted species after delisting for any mitigation not deemed necessary to maintain the species delisting, including all monitoring, all changed circumstances, and all adaptive management.

No covered species were delisted during this reporting period.

Section 6:
CHANGES AND AMENDMENTS

This section:

✓ Describes any administrative changes or amendments during the reporting period.

Changes and Amendments

No administrative changes or amendments were made to the HCP or the associated Biological Opinion during this reporting period.

Section 7:
REFERENCES

ICF. 2021. *Bat Habitat Conservation Plan*. Draft. January 2022. (ICF 714.17) 10 South Broadway, Suite 570 St. Louis, MO 63102 USA.

Missouri Department of Conservation. 2010. *White-Nose Syndrome Action Plan*. Missouri Department of Conservation, Jefferson City, Missouri. 47 pp.

Missouri Department of Conservation. 2014. *Missouri Forest Management Guidelines: Voluntary Recommendations for Well-Managed Forests*. Missouri Department of Conservation, Jefferson City, Missouri. 236 99.