



Missouri Department of Conservation Bat Habitat Conservation Plan FY22 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 initial reporting timeframe (February 23-June 30, 2022), 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.

Baseline Updates and Initial Implementation

This first annual report serves to establish or update multiple baselines that will be used to monitor HCP implementation and effectiveness throughout the remainder of the 50-year reporting period. Baselines metrics were updated or established for the following:

- Updated the Land Cover source data to the 2019 National Land Cover Dataset.
- Established baseline dataset for MDC owned and managed lands.
- Updated fall/spring habitat source data.
- Established biological baseline: baseline population estimates for each of the five covered species based on the most recent hibernacula counts available as of June 2022.

Emphasis during this initial reporting period focused on development of HCP implementation resources including guidelines and training for MDC staff, development of reporting tools, and data compilation and management. Initial planning and preparation for the Priority Bat Management Zone (PBMZ) acoustic surveys, to begin in summer 2023, also took place during this reporting period. This report describes progress towards each of the Biological Goals and Objectives outlined in the Bat HCP.

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 FY22 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.

Because this initial reporting period is limited to the first partial year (i.e., 4 months) of HCP implementation, both estimated take of listed species and estimated effects on non-listed species were prorated to account for the shorter reporting timeframe. During this reporting period, total calculated non-take effects for little brown bats and tricolored bats was **2,593 acres** and **2,593 acres** respectively. This represents **~38% of the annual estimated effects for little brown bats** and **~38% of the annual estimated effects for tricolored bats**, during a 4-month period. During this reporting period, total calculated take for Indiana bats and northern long-eared bats was **2,592 acres** and **2,593 acres** respectively. This represents **~50% of the annual estimated take of Indiana bats**, and **~42% of the annual estimated take of northern long-eared bats**, during a 4-month period.

Conservation Strategy

Incidental take is fully offset by implementation of the conservation measures described in the HCP, including the following during the FY22 reporting period:

- Sustainable management of **25,622 acres** of forest and woodland habitat managed by MDC in compliance with all measures described in the HCP.
- Sustainable management of **7,715 acres** of open lands managed by MDC in compliance with all measures described in the HCP.
- Completion of **30,106 acres** of prescribed burns statewide on MDC-managed lands in compliance with all measures described in the HCP.
- Enhancement of **359 acres** of habitat within Priority Bat Management Zones in compliance with all measures described in the HCP.
- Delivery of **94 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. One minor amendment to the Biological Opinion associated with the HCP was made during this reporting period to clarify that projects undertaken by MDC in compliance with the HCP do not require further consultation for bats by the U.S. Fish and Wildlife Service.

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, Theresa Hyland, Katherine Ward, and Benjamin Tjepkes.

Supporting MDC Staff: Alex Prentice, Ben Webster, Chris Scheppers, Craig Hesselbein, Craig Scroggins, Dyan Pursell, George Kipp, Heather Feeler, Holly Dentner, John Lisek, John Thomas, Jordyn Hammel, Julie Fleming, Kyle Jansky, Lasya Venigalla, Mark Roberts, Nima Zamanzadeh, Reese Worthington, Ryan Jones, Sarah Guardia, Seth Barrioz, and Steve Helton.

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	Acronym	Description
BBT	Bat Buffer Tool	NEPA	National Environmental Policy Act
BBU	Bat Biological Use	NLCD	National Land Cover Dataset
BMP	Best Management Practice	PBMZ	Priority Bat Management Zone
BO	Biological Opinion	PESU	Perimyotis subflavus (tricolored bat)
CPLC	Community and Private Land Conservation (Branch)	PTH	Professional Timber Harvester (training)
ESA	Endangered Species Act	RRM	Regional Resource Management (Branch)
HCP	Habitat Conservation Plan	SBD	Statewide Bat Database
ITP	Incidental Take Permit	SDE	Spatial Database Engine
LKM	Lime Kiln Mine	SMZ	Streamside Management Zone
LMS	Learning Management System	SOCC	Species of Conservation Concern
MDC	Missouri Department of Conservation	SSA	Species Status Assessment
MIFPC	Missouri Invasive Forest Pest Council	TSI	Timber Stand Improvement
MYLU	Myotis lucifugus (little brown bat)	USACE	United State Army Corp of Engineers
MYSE	Myotis septentrionalis (northern long-eared bat)	USFWS	United State Fish and Wildlife Service
MYSO	Myotis sodalis (Indiana bat)	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. The report describes MDC's HCP planning and implementation activities conducted during the initial reporting timeframe (February 23 – June 30, 2022), 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 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 describes 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	<p>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.</p> <ul style="list-style-type: none"> • 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.	Not applicable for this reporting period.
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.	Not applicable for this reporting period.
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 of Initial HCP Implementation

The effective date for the Bat HCP, February 23, 2022, initiated the start of the initial reporting period for the Department. 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 met monthly during the first year of implementation and plans to meet on an as-needed basis for the next year of implementation.

Staff Implementation Resources

The HCP Implementation Team began preparing for HCP implementation several months before the HCP was permitted. Preparation included the development of reference materials and training resources for MDC staff. These ensured that affected staff, including habitat and infrastructure management staff, had the knowledge and resources necessary to implement the HCP and comply with the avoidance and minimization measures described in the HCP. Resources were made available to staff prior to the HCP effective date and updated accordingly (see [Appendix A, Staff Resources for HCP Implementation](#)).

Resources for Public Lands Staff: *MDC Bat HCP Implementation Guidelines for MDC-Managed Lands*, *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) were made available through an SDE connection, and instructions for accessing and using these layers were 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 (see *Appendix B, Bat Buffer Tool (BBT) Development*).

Staff Implementation Training

The HCP Implementation Team developed and delivered HCP Implementation Training for MDC staff. Two live 3-hour training sessions were offered in January via WebEx. The second session was recorded and made available through the Department's Learning Management System (LMS). The new HCP training was communicated to all staff through email and through the employee newsletter. The HCP Implementation Team worked with Branch Leadership to identify the positions for which HCP Training should be required, and those for which it was recommended. No staff were excluded from the opportunity to receive training.

All staff responsible for planning or conducting habitat management or infrastructure management activities on MDC land or private land were required to complete HCP training. For those positions for which HCP training was required, the course was added as a required training in the LMS. This ensured that those staff and their supervisors were aware of the training requirement, knew how to access the training, and could track whether they had taken the training. To meet the training requirement, staff could either attend one of the two live WebEx trainings or watch the recorded training; supervisor approval was required to watch the recorded version rather than attend the live training, and the deadline for completing the recorded training was March 15, 2022. Most staff required to take the training participated in one of the two live training sessions. The recorded training, or an updated version thereof, will continue to be available through LMS. When staff are hired into any position for which HCP training is required, the course will automatically be added to their training requirements in LMS, to be completed within the first 6 months of hiring. Topics covered in the HCP Training include:

- Purpose and Benefits of the HCP
- Life history and ecology of covered bat species
- HCP Compliance and Implementation Guidelines for MDC-managed lands
- How to access and use the HCP Maps and Bat Buffer Tool
- Private Land HCP Implementation Guidelines
- Compliance Monitoring and Reporting
- Effectiveness Monitoring

- Resources available to staff, including contacts for the HCP Implementation Team

The HCP Implementation Team serves as resources to all staff for responding to questions and concerns regarding the HCP. Many questions were received in the first few months of implementation. Therefore, the HCP Team developed and maintained a Frequently Asked Questions (FAQs) document which was updated frequently and made available to all staff via SharePoint.

The HCP Implementation Team developed a SharePoint site accessible to all MDC staff containing HCP implementation resources. The link to this SharePoint site was included in each of several emails distributed to MDC habitat management staff during the reporting period to share updated HCP information, resources and reminders. Posted resources include:

- HCP Guidelines for MDC lands and for private lands, as listed above
- HCP FAQs
- The PowerPoint slides used in HCP Training
- 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

Reporting Period

Several objectives in the HCP have deadlines phrased in terms of HCP implementation year (e.g., "Update MDC's WNS action plan by year 5"). To clarify deadlines and to synchronize with the annual reporting period (i.e., state fiscal year, July 1 – June 30), MDC decided to align HCP implementation years with fiscal years as well.

Aligning the HCP implementation year with the state fiscal year greatly simplifies budgeting, accomplishment tracking and reporting as well. The HCP was permitted on February 23, 2022. Therefore, HCP Implementation year 1 will be defined as State fiscal year 2023 (July 1, 2022 – June 30, 2023). All tasks that have a deadline of "by year 1" will be completed by June 30, 2023 and reported in that year's annual report. One result of this is that the final year of the HCP, year 50, will only be a partial year (~ 8 months). However, the HCP does not include any deadlines beyond year 10, other than recurring objectives such as surveys that must be performed every 5 or 10 years, so we don't anticipate any problems with having a short final year.

Although the first reporting period (i.e., February 23, 2022 – June 30, 2022) is only a partial year that occurs before the beginning of year 1 of implementation as defined here, this report does include progress reports for tasks scheduled to be completed in year 1.

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) 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.
- 4) The data were transformed and aggregated to produce the quantification of metrics. This included grouping data by activity type and location, for covered activities and the amount of take, then summing the amount for each group.
- 5) 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.
- 6) 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.
- 7) 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 will be 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 FY22 in preparation for HCP implementation, as well as the current FY23 budget for hourly labor and expenses pertaining to HCP implementation. The FY23 budget was approved by the Commission in May 2022.

Table 3: FY22 expenses and FY23 budget for hourly positions pertaining to HCP implementation.

Staff Position	Description	FY22 Expenses	FY23 Budget
Bat Survey Coordinator	Coordinates PBMZ surveys in coordination with Bat Ecologist. Hires and leads crew of seasonal technicians to conduct PBMZ acoustic surveys.	\$ 34,387	\$ 35,680
Assistant Wildlife Diversity Coordinator	Assists with HCP accomplishment tracking, reporting, and implementation efforts.	\$ -	\$ 47,628
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.	\$ -	\$ 7,246
Total Amount for Hourly Labor		\$ 34,387	\$ 90,554

Source: Internal MDC RAPTOR Budget Management System - 2022

Table 4: FY22 expenses and FY23 budget pertaining to PBMZ monitoring efforts.

Budget Item	Description	FY22 Expenses	FY23 Budget
Supplies & Equipment	ANABAT Swift acoustic bat detectors, accessories, and license for acoustic analysis program.	\$ 38,420	\$ 28,990
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).	\$ -	\$ 5,040
Total Amount for PBMZ Monitoring		\$ 38,420	\$ 34,030

Source: Internal MDC RAPTOR Budget Management System - 2022

Baseline Calibration

Development of the Bat HCP spanned several years and involved recurring communication and data transfer between the Department and other involved entities. MDC provided data in the form of batch deliverables and other source information were attained as they were available. This method allowed for the processing of HCP elements, but also created an intrinsic delay between environmental conditions during HCP development and final permitting.

To appropriately reflect the conditions on the February 23, 2022 permit date, the Department updated several baseline metrics. While these baseline values differ from those presented in the Bat HCP, they do not impact the allowances outlined in the ITP. This update process purely allows MDC to have an accurate reference baseline for reporting purposes. The following baseline metrics were updated by MDC during the initial reporting period and will serve as the reference point for subsequent reporting terms (see [Appendix C, Baseline Calibration](#) for details):

1 - Land Cover Source Data

The 2011 National Land Cover Dataset (NLCD) was used throughout the final Bat HCP. This dataset was the most up to date NLCD version available for Missouri during HCP development. The 2019 NLCD became available in June 2021, during the later stages of HCP approvals.

MDC updated the baseline HCP land cover using the 2019 NLCD dataset to better align the HCP baseline conditions with the environmental conditions at the time of HCP permitting.

2 - MDC Lands Boundary Data

The shapefile containing MDC-managed lands referenced while developing the Bat HCP was the most updated version at that time. MDC actively updates property boundary spatial information periodically as lands are invested and divested over time.

MDC updated the baseline dataset for MDC-managed lands to better align the HCP baseline conditions with the environmental conditions at the time of HCP permitting.

3 - Fall/Spring Habitat Source Data

The hibernacula data informing fall/spring habitat for covered species in the Bat HCP were derived from several sources, including MDC-internally and externally maintained data. MDC continually updates hibernacula spatial information via the Natural Heritage Database for internal consultation and use. Some hibernacula points have since been reviewed by MDC and edited to reflect either a more accurate geographic location or a better-informed species occurrence.

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.

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 FY22 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 initial 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 **2,593 acres** and **2,593 acres** respectively (see [Table 5](#)). Note that estimated amounts were prorated to account for the shorter reporting timeframe during this initial year of HCP implementation. A detailed breakdown of all non-take effects on covered species is available in [Appendix D: 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 FY22 reporting period.

Covered Species		MDC Lands		Other Nonfederal Lands		Annual Total
		Summer	Fall/Spring	Summer	Fall/Spring	
MYLU	Actual	2,512	67	14	0	2,593
	Estimated	2,784	734	3,139	155	6,812
PESU	Actual	2,512	67	14	0	2,593
	Estimated	2,784	847	3,139	147	6,917

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 thru June 30 and fall/spring values include activities from April 1 thru April 30.
 All reported values have been rounded to nearest whole number.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 GIS Layers

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

The total calculated non-take effects on little brown bat was **2,593 acres** during the FY22 reporting period. Most effects occurred on MDC lands and all covered activities occurring in summer on MDC lands occurred in high occupancy regions. Non-take effects of little brown bats on other non-federal lands only occurred during the summer in high level occupancy levels.

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 habitats¹ between February 23, 2022 and June 30, 2022.

Modeled MYLU Occupancy	Prescribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat ²	0	0	67	67
Summer Habitat ²	1,346	43	1,123	2,512
<i>High Occupancy</i>	1,346	43	1,123	2,512
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on MDC Lands	1,346	43	1,190	2,579
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat ²	0	0	0	0
Summer Habitat ²	0	0	14	14
<i>High Occupancy</i>	0	0	14	14
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on Other Nonfederal Lands	0	0	14	14
Total Take on Covered Lands	1,346	43	1,204	2,593

¹ Preferred habitats include forest, woodland, and glade cover types.

² Reported summer values include activities from May 1 thru June 30 and fall/spring values include activities from April 1 thru April 30. All reported values have been rounded to nearest whole number.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 GIS Layers

Calculated Non-Take Effects on Tricolored Bat (PESU)

The total calculated non-take effects on tricolored bats were **2,593 acres** during the FY22 reporting period. Most effects occurred on MDC lands and all covered activities occurring in summer on MDC lands that impacted the non-take effect calculations for tricolored bats occurred in high occupancy regions. Non-take effects of tricolored bats on other non-federal lands only occurred during the summer in high level occupancy levels.

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 habitat¹ between February 23, 2022 and June 30, 2022.

Modeled PESU Occupancy	Prescribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat ²	0	0	67	67
Summer Habitat ²	1,346	43	1,123	2,512
<i>High Occupancy</i>	1,346	43	1,123	2,512
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on MDC Lands	1,346	43	1,190	2,579
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat ²	0	0	0	0
Summer Habitat ²	0	0	14	14
<i>High Occupancy</i>	0	0	14	14
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on Other Nonfederal Lands	0	0	14	14
Total Take on Covered Lands	1,346	43	1,204	2,593

¹ Preferred habitats include forest, woodland, and glade cover types.

² Reported summer values include activities from May 1 thru June 30 and fall/spring values include activities from April 1 thru April 30. All reported values have been rounded to nearest whole number.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 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 FY22 reporting period, MDC removed a total of **30 structures** on MDC-managed lands statewide (see [Appendix E: Structures Demolished](#)). Included in this count are the demolition of privies, garages, 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 the FY22 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 FY22 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 **2,592 acres** and **2,593 acres** respectively. These amounts are well under the annual estimate of take presented in the HCP for both species (see [Table 8](#) below). Note that estimated amounts were prorated to account for the shorter reporting timeframe during this initial year of HCP implementation. A detailed breakdown of all calculated take of covered species during the FY22 reporting period is provided in [Appendix F: 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. For take on other non-federal lands, the same covered activities, adding up to 14 acres, impacted take for both species.

The TRIM Program supported the removal of 24 high-risk trees >9 inches DBH in five parks in the St. Louis metro area. The predominant cover type for these parks is developed, although portions of some parks are in a forest and woodland cover type. Trees removed consisted of ash (18), oak (3), maple (1), willow (1) and mulberry (1). Because of the small number of trees removed, primarily in non-preferred landcover types, the impact of this activity is reported as 1 acre of take.

Table 8: Calculated take (in acres managed) of covered bat species from covered activities occurring in preferred habitat¹ between February 23, 2022 and June 30, 2022.

Covered Species		MDC Lands		Other Nonfederal Lands		Annual Total	Permit Total ²
		Summer	Fall/Spring	Summer	Fall/Spring		
MYSO	Actual	2,511	67	14	0	2,592	2,592
	Estimated	2,432	543	2,808	77	5,194	779,100
MYSE	Actual	2,512	67	14	0	2,593	2,593
	Estimated	2,784	764	3,139	138	6,138	920,750

¹ Preferred habitats include 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 thru June 30 and fall/spring values only include take during April 1 thru April 30.

Values rounded to nearest whole number.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 GIS Layers

Calculated Take of Indiana Bat (MYSO)

On MDC Lands, prescribed fire was the dominant management activity causing take of Indiana bats (see [Table 9](#)). Limited tree removal was the only covered activity conducted during fall/spring. Most management occurred in medium occupancy zones. Take of Indiana bats on other non-federal lands only occurred during the summer in medium level occupancy levels.

Table 9: Calculated take (in acres managed) of Indiana bats from covered activities occurring in preferred habitat¹ between February 23, 2022 and June 30, 2022.

Modeled MYSO Occupancy	Prescribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	0	0	67	67
Summer Habitat	1,345	43	1,123	2,511
<i>High Occupancy</i>	572	4	119	695
<i>Medium Occupancy</i>	773	8	869	1,650
<i>Low Occupancy</i>	0	31	135	166
Total Take on MDC Lands	1,345	43	1,190	2,578
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	0	0	0	0
Summer Habitat	0	0	14	14
<i>High Occupancy</i>	0	0	0	0
<i>Medium Occupancy</i>	0	0	14	14
<i>Low Occupancy</i>	0	0	0	0
Total Take on Other Nonfederal Lands	0	0	14	14
Total Take on Covered Lands	1,345	43	1,204	2,592

¹ Preferred habitats include forest, woodland, and glade cover types.

Reported summer values only include take during May 1 thru June 30 and fall/spring values only include take during April 1 thru April 30. Values rounded to nearest whole acre.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 GIS Layers

Calculated Take of Northern Long-eared Bat (MYSE)

On MDC Lands, prescribed fire was the dominant management activity causing take of northern long-eared bats (see *Table 10*). Limited tree removal was the only tree removal conducted during fall/spring and the major source of take between the two categories of tree removal. Most management occurred in summer high occupancy zones for this species. Take of northern long-eared bats on other non-federal lands only occurred during the summer in high level occupancy levels.

Table 10: Calculated take (in acres managed) of northern long-eared bats from covered activities occurring in preferred habitat¹ between February 23, 2022 and June 30, 2022.

Modeled MYSE Occupancy	Prescribed Fire	Tree Removal		Total
		Extensive	Limited	
MDC Activities on MDC Lands				
Fall/Spring Habitat	<1	0	67	67
Summer Habitat	1,346	43	1,123	2,512
<i>High Occupancy</i>	1,346	43	1,123	2,512
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on MDC Lands	1,346	43	1,190	2,579
MDC Activities on Other Nonfederal Lands				
Fall/Spring Habitat	0	0	0	0
Summer Habitat	0	0	14	14
<i>High Occupancy</i>	0	0	14	14
<i>Medium Occupancy</i>	0	0	0	0
<i>Low Occupancy</i>	0	0	0	0
Total Take on Other Nonfederal Lands	0	0	14	14
Total Take on Covered Lands	1,346	43	1,204	2,593

¹ Preferred habitats include forest, woodland, and glade cover types.

Reported summer values only include take during May 1 thru June 30 and fall/spring values only include take during April 1 thru April 30. Values rounded to nearest whole acre.

Sources: Internal MDC HCP Reporting Survey - 2022, HCP Bat Modeled Habitat GIS Layers, NLCD 2019 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 the 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 and woodlands 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 Managed by MDC -----

In pursuit of this objective, MDC sustained expected levels of forest management practices as part of normal operations in FY22. MDC staff reported **25,622 acres** of habitat management activities within forested cover types on MDC-managed lands during this reporting period (see *Appendix G: Management of Forest/Woodlands and Open Lands*).

The Department does not have any invested or divested forest/woodland parcels to report during this reporting period. The updated MDC land ownership baseline (see *Baseline Calibration in Section 1*) will serve as the reference for any reportable land acquisitions and disposals. Total forest/woodlands either owned or managed by MDC equaled **744,007 acres** at the end of the reporting period (see *Appendix C: Baseline Calibration*), which surpasses the 700,000-acre benchmark outlined in the HCP.

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 FY22. MDC staff reported **7,715 acres** of habitat management activities occurring on open land cover on MDC-managed lands during this reporting period (see *Appendix G: Management of Forest/Woodlands and Open Lands*).

Total open lands either owned or managed by MDC equaled **206,603 acres** at the end of the reporting period (see [Appendix C: Baseline Calibration](#)), which surpasses the 200,000-acre benchmark outlined in the HCP.

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 FY22. MDC staff reported **30,106 acres** of prescribed burns statewide on MDC-managed lands during this reporting period. **21,812 acres** of burning operations occurred within forest and woodland 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 H: Prescribed Fire Operations Conducted on MDC Lands](#)).

Table 11: Acres of prescribed fire conducted in forests and woodlands on MDC lands during the FY22 reporting period.

Seasonality Based on Bat Activity:	Summer ¹	Fall/Spring ²	Non-active ³	Year Total
Acres Burned:	1,346	4,578	15,888	21,812

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 – 2022, Bat HCP GIS Layers, 2019 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 “Get Outside” sections in the April 2022 and May 2022 editions of *Missouri Conservationist* featured phenological information on bat activity; 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.

Table 12: Public outreach related to forestry, bats, and WNS by MDC during the FY22 reporting period.

Outreach Category	Count
Popular Science Articles – Missouri Conservationist, Xplor Magazine	5
MDC News Releases – Statewide and regional news releases, MDC in the News, etc.	4
Social & Other Multi-Media – Facebook, Instagram, podcasts, books, etc.	16
Programs & Workshops – Discover Nature programs, partner workshops, etc.	69
Total Outreach Efforts	94

Source: Internal MDC Communications Branch Databases - 2022

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 FY22 reporting period.

LCAP Practice	Count	Amount Paid
300.A.1.g – Chainsaw/Hack & Squirt/Basel Bark Applic.>600TPA removed	1	\$ 847.50
900.C.8 – Removal of High-risk Trees	2	\$ 19,900.00
Total Financial Assistance Provided	3	\$ 20,747.50

Source: Internal MDC Community & Private Lands Conservation Branch Database - 2022

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 (see *Appendix A*).
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 (see *Appendix A*).
7. Then an *LCAP Cost Share Request and Agreement* is Completed and Signed by participating landowner. (see *Appendix A*). 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 FY22 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 I: 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 FY22 reporting period.

Harvest Prescription		Time of Year			
		Summer	Fall/Spring	Inactive	Total
Extensive Prescription	Regenerate Oak-Clearcut	31	6	41	78
	Regenerate Oak-Shelterwood	12	27	94	133
	Regenerate Pine	0	0	0	0
	Regenerate Pine-Shelterwood	0	0	0	0
Limited Prescription	Intermediate Cut	13	0	113	126
	Intermediate Cut followed by TSI	0	0	236	236
	Timber Stand Improvement (removing trees 9" DBH or greater) ^a	65	25	56	146
	Unevenaged Mgmt.-Commercial Sale	1,019	273	1,270	2,562
Total Extensive		43	33	135	211
Total Limited		1,097	298	1,675	3070
Total on MDC Lands		1,140	331	1,810	3,281

^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 – 2022

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 (see *Appendix B: Bat Buffer Tool Development*). Buffers were applied to the records in relation to covered activities 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*).

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 FY22 reporting period.

Counts of Roosts in BBT	MYSO	MYSE	MYLU	PESU
Roosts From Prior Year	-	-	-	-
Roosts Added in Reporting Period	386	49	10	2
Roosts Removed ^a in Reporting Period	0	0	0	0
Total Roosts Included in FY22 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 (see [Appendix N: 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 FY22 reporting period. See *Appendix J: 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 FY22 reporting period.

Management Action	Time of Year			
	Summer	Fall/Spring	Inactive	Total
Extensive Tree Removal – Regenerate Oak-Shelterwood	0	8	0	8
Limited Tree Removal – Intermediate Cut	0	0	4	4
Limited Tree Removal – Individual Tree Removal	0	<1	13	14
Limited Tree Removal – Unevenaged Mgmt-Commercial Sale	0	0	<1	<1
Limited Tree Removal – Woody Cover Control	30	0	0	30
Prescribed Fire	0	102	200	302
Totals (acres)	30	111	218	359

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

Source: Internal MDC HCP Reporting Survey - 2022

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 developed a process for the development, review and finalization of PBMZ management plans. The first step is to develop a PBMZ management plan template 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 may include:

- Purpose of the PBMZ
- Desired Future Conditions (DFC) including roosting habitat, foraging habitat and available drinking water
- 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 will be developed for each of the four target bat species, so that the DFC section of the template will include only information for that PBMZ's target species. Each of the four templates will be reviewed by one or more MDC Regional Resource Management (RRM) staff responsible for managing a PBMZ for that species, to invite regional feedback on the structure and format of the templates. The HCP Implementation Team will consider feedback provided during regional review and edit the templates as appropriate.

Once the templates have been approved by both the HCP Implementation Team and Regional staff, the appropriate species template will be distributed to each of the area managers responsible for managing a PBMZ for that species. Managers will be 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.

Progress during this reporting period was limited to developing the approach described above. During the first half of FY23, a sub-team of the HCP Implementation Team has developed a draft

PBMZ Management Plan template for the Indiana bat. This draft has been reviewed by the HCP Implementation Team and is currently being reviewed by regional staff responsible for managing an Indiana bat PBMZ. Once the Indiana bat PBMZ Management Plan template has been finalized, templates for the remaining three species will be developed and reviewed.

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 J: 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 (see *Appendix K: Cave Monitoring Record Template*) 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 (see *Appendix B: Bat Buffer Tool Development*) 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. 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 FY22 reporting period, the Department began developing 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.

Though MDC did not construct new cave gates on any MDC properties during the FY22 reporting period, the Department did provide technical assistance and financial support for a USFWS priority cave gating project on private land in Camden County.

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 -----

The requirements for these guidelines, particularly regarding the requirement to limit scorch height in preferred habitat during times when bats may be present, were new; although the 2016 Bat Guidelines includes measures for minimizing potential take within hibernacula buffers during spring and fall, those Guidelines didn't include a specific scorch height limitation. Therefore, the HCP Implementation Team decided to use Year 1 of HCP Implementation as a pilot year for the development and testing of the bat-friendly burn guidelines. 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 HCP Implementation Team drafted the bat-friendly burn guidelines in the months before the HCP was permitted, with review by targeted MDC management staff. The team coordinated with the MDC Fire Program Supervisor to design the guidelines to be incorporated into MDC's burn plan template as an addendum. The Fire Program Supervisor distributed the Bat-Friendly Burn Addendum to MDC staff along with the Burn Plan Template in January 2022. Additionally, the Fire Program Supervisor included training on the Bat-Friendly Burn Addendum in a presentation to all staff in February 2022. The Private Land Program Supervisor coordinated with Community and Private Lands Conservation (CPLC) Branch staff to develop a modified version of the Bat-Friendly Burn Guidelines for application on private lands. 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.

Training on application of the Bat-Friendly Burn Guidelines was included in the HCP Training provided to MDC staff (see *Staff Implementation Training in Section 1*). During the training the HCP

Team explained that the current Bat-Friendly Burn Addendum was a pilot product; staff were required to follow the guidelines in the Addendum but were also invited to provide feedback. We specifically requested feedback on any challenges staff encountered in attempting to implement the guidelines in specific situations, as well as any confusing aspects of the guidelines and suggestions for improving clarity.

The HCP Implementation Team responded to several questions during the reporting period, and occasionally assisted staff with using the SCORCH module in Program BEHAVE to determine how to adjust the burn plan to meet the scorch limitation requirements. The HCP Bat Friendly Burn Addendum was amended in August 2022 to improve clarity regarding the dates in which the scorch height limitation should be applied within priority hibernacula buffers. The amended HCP Bat Friendly Burn Addendum was distributed to staff in September 2022, and this amended version is included in *Appendix A: Staff Resources for HCP Implementation*.

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 will build 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.

Progress during this reporting period focused primarily on compiling and reviewing available information on roost tree preferences for the four covered tree-roosting species. Information was drawn primarily from the species accounts within the HCP, and the final or draft Species Status Assessments (SSAs) available for northern long-eared bat, tricolored bat, and little brown bat. Additional information, including photographs of roost trees in Missouri, was obtained from training materials previously developed by MDC, and from recent research projects including the Summer Habitat Use and Roost Ecology for Tricolored Bat, Little Brown Bat, and Northern Long-eared Bat Project conducted in partnership with Pittsburg State University.

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. The MDC is also planning to take 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. In addition, MDC surveyed three caves, Hunter's Cave, Rocheport Cave, and Rutherford Cave, taking 30 swabs per visit to study the presence of viruses.

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. In future reporting periods, population numbers will be 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*). These data will serve as the baseline population estimate for each species for the duration of the permit term. Since this year's report serves to establish the baseline, the numbers for "Current Population" and "Baseline Population" in *Table 18* are identical. In future years, "Current Population" values will be updated based on the results of survey and monitoring effort.

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

Progress during this reporting period was limited to planning for the first PBMZ survey season, which will begin in May 2023. Before the HCP was permitted, the HCP Implementation Team developed a comparison of the estimated cost of conducting PBMZ surveys internally through additional hourly labor, versus hiring an external contractor to conduct the PBMZ surveys. The cost comparison was based on the understanding that the WNS Adaptive Management trigger would be met for northern long-eared bats, such that all northern long-eared bat PBMZs must be surveyed within the first six years of implementation (including one year for planning and contract bidding as needed). We also

assumed that one additional species would meet the WNS Adaptive Management trigger within 1-2 years of the HCP being permitted. The results of the cost comparison indicated that performing the PBMZ surveys internally would be substantially more cost-effective. Therefore, the HCP Implementation Team developed a recommendation to conduct the PBMZ surveys internally by hiring seasonal technicians to conduct surveys under the direction of the Bat Survey Coordinator (a long-term, full-time hourly position previously responsible for coordinating the Systematic Bat Survey conducted during 2015-2018) and in coordination with the Bat Ecologist. This recommendation was approved before the HCP was permitted, and PBMZ survey expenses, including hourly labor and additional acoustic equipment, were included in the FY23 budget (see *HCP Costs and Funding in Section 1*).

Progress during this reporting period (March – June 2022) focused primarily on procuring additional acoustic equipment and software, and initial planning for the summer 2023 field season. The goal is to complete acoustic surveys in all six northern long-eared bat PBMZs during summer 2023 if possible, though work may carry over into summer 2024. Completing surveys for all northern long-eared bat PBMZs within the first 1-2 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. If any northern long-eared bats are detected during acoustic surveys, mist net surveys will be conducted within those PBMZs during the following summer. Because additional seasonal technicians, with a different skillset, will be needed to conduct mist-net surveys, mist-net surveys will be performed the summer after a positive acoustic detection. In this way results from each summer's surveys will be used to develop the survey plan and budget for the following summer.

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 begin with northern long-eared bat PBMZs in summer 2023.

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 FY22 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 - 2022

^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)	541,518	541,518	0.0%	-
Trigger: When population estimate falls below 10,000 in 75% of gray bat hibernacula.	-	-	-	No
Little brown bat (MYLU)	671	671	0.0%	-
Trigger: When population estimate falls below 350 across 12 reference sites.	-	-	-	No
Northern long-eared bat (MYSE)	13	13	0.0%	-
Trigger: 90% decline.	-	-	-	Yes ^a
Indiana bat (MYSO)	219,360	219,360	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)	2,144	2,144	0.0%	-
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](#). Site-specific data informing these values are available in [Appendix L: WNS Reference Hibernacula](#). This year’s report serves to establish the baseline population estimate for each species. 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 FY22 reporting period. No maternity roost trees were confirmed to be destroyed or inactive during the FY22 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 **30,106 acres** of prescribed fire management on MDC lands in the FY22 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 FY22 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:

- Western fanshell (*Cyprogenia aberti*): proposed threatened with Section 4(d) rule on March 3, 2022

MDC regularly undertakes Section 7 consultation for all activities supported by Federal funding or permit. For all projects in which western fanshell may be in the action area, Section 7 consultations have determined that covered activities are not likely to jeopardize this proposed species. Based on the results of Section 7 consultations for 11 other mussel species currently listed as threatened or endangered in Missouri, which have never reached a determination of “may affect, likely to adversely affect”, MDC does not anticipate that future planned activities will be determined to adversely affect western fanshell.

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 did occur on some MDC lands during the FY22 reporting period. Wildfires are reported using the MDC Fire Reporting application. We have encountered an unanticipated challenge with exporting data from this application in a suitable format that facilitates proper geospatial analysis to determine whether any wildfires occurred within PBMZs, maternity roost buffers, or hibernacula buffers. To avoid further delays in providing this report, we plan to include wildfire information for both FY22 and FY23 in the FY23 annual report.

The HCP Team is in the process of 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 will be developed in coordination with regional management staff. 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.
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Amended Biological Opinion

The Biological Opinion (BO) associated with this HCP was amended on June 28, 2022, to clarify that projects undertaken by MDC in compliance with the HCP do not require further consultation for bats by the U.S. Fish and Wildlife Service (see [Appendix M: Biological Opinion Amendment for MDC Bat HCP](#)).

This clarification, and the amended BO, were provided to the U.S. Army Corps of Engineers (USACE), to resolve a question as to whether MDC projects that include a USACE nexus (e.g., those requiring a Clean Water Act, Section 404 permit review process) are subject to additional consultation for bats under the Endangered Species Act (ESA). By providing the BO amendment letter the USFWS clarified the projects undertaken by MDC under the HCP do not require further consultation for bats under the ESA.

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 pp.

Appendix A:

STAFF RESOURCES FOR HCP IMPLEMENTATION

Includes:

- ✓ MDC Bat HCP Implementation Guidelines for MDC-Managed Lands
 - ✓ HCP Bat-Friendly Burn Addendum
 - ✓ How to Connect to HCP layers in ArcMap
 - ✓ MDC Bat Habitat Conservation Plan Implementation Guidelines for Private Lands
 - ✓ Bat HCP Avoidance and Minimization Measures Planning Worksheet
 - ✓ HCP Bat Friendly Burn Addendum for Private Land
 - ✓ LCAP Cost Share Request and Agreement Form
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Appendix B:

BAT BUFFER TOOL (BBT) DEVELOPMENT

Includes:

- ✓ Bat Buffer Tool (BBT) Development for the FY22 Reporting Period
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Appendix C:

BASELINE CALIBRATION

Includes:

- ✓ Initial Environmental Baseline Update Report
-

Appendix D:

NON-TAKE EFFECTS ON COVERED SPECIES

Includes:

- ✓ Record of Non-Take Effects on Covered Species During the FY22 Reporting Period
-

Appendix E:

MDC STRUCTURES DEMOLISHED

Includes:

- ✓ Record of Structures Demolished During FY22 Reporting Period
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Appendix F:

TAKE OF COVERED SPECIES

Includes:

- ✓ Record of Calculated Take of Covered Species During the FY22 Reporting Period
-

Appendix G:

MANAGEMENT OF FOREST/WOODLANDS & OPEN LANDS

Includes:

- ✓ Record of Forest, Woodland, and Open Lands Management During the FY22 Reporting Period
-

Appendix H:

PRESCRIBED FIRE OPERATIONS CONDUCTED ON MDC LANDS

Includes:

- ✓ Record of Prescribed Burns on MDC Land During the FY22 Reporting Period
-

Appendix I:

TIMBER HARVESTS ON MDC LANDS

Includes:

- ✓ Record of Timber Harvests on MDC Lands During FY22 Report Period
-

Appendix J:

HABITAT ENHANCEMENTS ON PRIORITY BAT MANAGEMENT ZONES

Includes:

- ✓ Record of Management Activities on PBMZs During the FY22 Reporting Period
-

Appendix K:

CAVE MONITORING RECORD TEMPLATE

Includes:

- ✓ Cave File template
-

Appendix L:

WNS REFERENCE HIBERNACULA

Includes:

- ✓ Record of WNS Reference Hibernacula for the FY22 Reporting Period
-

Appendix M:

BIOLOGICAL OPINION AMENDMENT FOR MDC BAT HCP

Includes:

- ✓ Biological Opinion Amendment for MDC Bat HCP
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Appendix N:

TIMBER SALE INSPECTION FORM

Includes:

- ✓ MDC Official Timber Sale Inspection Form
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