CFLRP Project Name (CFLR#): Missouri Pine-Oak Woodlands Restoration Project CFLN20
National Forest(s): Mark Twain National Forest

1. Executive Summary

Briefly summarize the top ecological, social, and economic accomplishments your CFLRP project participants are most proud of from FY22 and any key monitoring results. This is a space for key take-home points (< 200 words).

Since 2012, this project has been front and center to meeting the Forest Plan goal of restoring Missouri's natural communities, especially shortleaf pine habitats. This effort would not be possible without support from our collaborative partners. It has developed around the conservation efforts for one of the most biologically diverse ecosystems in the State of Missouri. This project contributed significantly to our local communities by providing jobs and income related to the States timber and forestry industry through timber sales and other vegetation management contracts. It has also gone a long way to reducing hazardous fuels while also emulating the historical fire regime of the Missouri Ozarks. This proposal also aligns with the Mark Twain National Forest's Five-year Strategic Plan, particularly two of our goal areas. The first being, Success through Collaboration; Leverage capacity to sustain our communities and fulfill our mission and the second, Stewardship of Our Natural Resources; Lead conservation of natural resources in the Ozarks. While the enclosed proposal documents the success of our original proposal within the Missouri Pine-Oak Woodlands landscape, it has also provided us the opportunity, by utilizing timber sale revenues, to increase the pace and scale of restoration across not just it the Missouri Pine-Oak Woodlands Restoration Project area, but across the Forest. Since 2012, we have almost doubled our annual timber volume sold and prescribed burning acres. We are also especially proud that the result of all the hard work in the CFLR landscape has culminated in the reintroduction of the Brown-headed nuthatch which was extirpated from Missouri approximately 100 years ago.

2. Funding

CFLRP and Forest Service Match Expenditures

Fund Source: CFLN and/or CFIX Funds Expended	Total Funds Expended in Fiscal Year 2022
CFLN22	$155,036.73
CFLN21	$23,200.00
CFLN2020	$34,544.19
TOTAL	$212,780.92

This amount should match the amount of CFLN/CFIX dollars spent in the FMMI CFLRP expenditure report. Include prior year CFLN dollars expended in this Fiscal Year. CFLN funds can only be spent on NFS lands.

Fund Source: Forest Service Salary and Expense Match Expended	Total Funds Expended in Fiscal Year 2022
CFSE22	$176,034.47
TOTAL	$176,034.47

This amount should match the amount of matching funds in the FMMI CFLRP expenditure report for Salary and Expenses. Staff time spent on CFLRP proposal implementation and monitoring may be counted as CFLRP match – see Program Funding Guidance.

Fund Source: Forest Service Discretionary Matching Funds	Total Funds Expended in Fiscal Year 2022
NFHF	$16,918.00
CFKV2019	$165,546.00
CFKV2016	$43,629.30
TOTAL	$226,093.30*

*The total Forest Service Match captured in the FMMI expenditure database was $209,175.30. Per the Program Funding Guidance, federal dollars spent on non-NFS lands may be included as match if aligned with CFLRP proposal implementation.

Partner Match Contributions[1]

Fund Source Partner Match	In-Kind Contribution or Funding Provided?	Total Estimated Funds/Value for FY22	Description of CFLRP implementation or monitoring activity	Where activity/item is located or impacted area
UNIVERSITY OF MISSOURI SUPPLEMENTAL PROJECT AGREEMENT 22-CS-11090500-040	In-kind contribution	$746.00	Monitoring of Brown-headed Nuthatch Re-Introduction Populations	National Forest System Lands
Pheasants Forever, Inc/Quail Forever – Scenic River Invasive Species Partnership 22-PA-11090500-034	In-kind contribution	$10,857.60	Conduct Non-Native and Invasive Species (NNIS) treatments along right-of-ways within the CFLRP area.	National Forest System Lands Other lands within CFLRP landscape:
Missouri Department of Conservation -CHI Vegetation Monitoring 21-PA-11090500-027	In-kind contribution	$10,270.00	Conduct Community Health Assessments on restored Pine-Oak woodlands	National Forest System Lands Other lands within CFLRP landscape:
WATERSHED COMMITTEE OF OZARKS INC, 22-PA-11090500-046	In-kind contribution	$7,190.00	Invasive Plant Treatment	National Forest System Lands
TOTALS	Total In-Kind Contributions: $29,063.60 Total Funding: $0			

Total partner in-kind contributions for implementation and monitoring of a CFLR project across all lands within the CFLRP landscape.

Goods for Services Match

Service work accomplishment through goods-for services funding within a stewardship contract (for contracts awarded in FY22)	Totals
Total revised non-monetary credit limit for contracts awarded in FY22	$0
Revenue generated through Good Neighbor Agreements	$0

"Revised non-monetary credit limit" should be the amount in the "Progress Report for Stewardship Credits, Integrated Resources Contracts or Agreements" as of September 30. Additional information on the Progress Reports available in CFLR Annual Report Instructions. "Revenue generated from GNA" should only be reported for CFLRP match if the funds are intended to be spent within the CFLRP project area for work in line with the CFLRP proposal and work plan.

3. Activities on the Ground

FY 2022 Agency Performance Measure Accomplishments[2] - Units accomplished should match the accomplishments recorded in the Databases of Record. Please note any discrepancies.

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[1] Addresses Core Monitoring Question #13

[2] This question helps track progress towards the CFLRP projects lifetime goals outlined in your CFLRP Proposal & Work Plan. Adapt table as needed.

Core Restoration Treatments	Agency Performance Measure	NFS Acres	Non-NFS Acres	Total Acres
Hazardous Fuels Reduction (acres) in the Wildland Urban Interface	FP-FUELS-WUI (reported in FACTS)[3]	9,912	0	9,912
Hazardous Fuels Reduction (acres) in the Wildland Urban Interface - COMPLETED	FP-FUELS-WUI-CMPLT (reported in FACTS)[4]	9,912	0	9,912
Hazardous Fuels Reduction (acres) outside the Wildland Urban Interface	FP-FUELS-NON-WUI (reported in FACTS) [3]	15,374	0	15,374
Hazardous Fuels Reduction (acres) outside the Wildland Urban Interface - COMPLETED	FP-FUELS-NON-WUI-CMPLT (reported in FACTS) [4]	16,614	0	16,614
Prescribed Fire (acres)	Activity component of FP-FUELS-ALL (reported in FACTS)	22,045	NPS -13,229 MDC – 6,874 LAD – 2,951 TNC - 530	45,629
Invasive Species Treatments (acres) - Noxious weeds and invasive plants	INVPLT-NXWD-FED-AC (reported in FACTS)[3]	179	MDC -60 LAD - 24	262
Wildlife Habitat Restoration (acres)	HBT-ENH-TERR (reported in WIT)	7,440	0	7,440
Water or Soil Resources Protected, Maintained, or Improved (acres)	S&W-RSRC-IMP (reported in WIT)	772	0	772
Stand Improvement (acres)	FOR-VEG-IMP (reported in FACTS)	534	LAD - 30	564
Reforestation and revegetation (acres)	FOR-VEG-EST (reported in FACTS)	1,621	0	1,621
Forests treated using timber sales (acres)	TMBR-SALES-TRT-AC (reported in FACTS)	1,524	LAD – 5,000	6,524
Acres covered by stewardship contracts/agreements	STWD-CNTRCT-AGR-AC (reported in TIM)	1076.4	0	1,076.4
Acres treated annually to sustain or restore watershed function and resilience	WTRSHD-LDSCP-RSTR-ANN (computed)	9773.7	0	9,773.7

Reflecting on treatments implemented in FY22, if/how has your CFLRP project aligned with other efforts to accomplish work at landscape scales?

There were no appreciable cross-boundary efforts in FY22. The Missouri Department of Conservation (MDC) has completed their Landscape Scale Restoration grant from the Forest Service State and Private Forestry awarded in 2020 for the Heart of the Ozarks Landscape Scale Restoration Project. The following restoration work is being currently being implemented on State and Private lands within the Current River COAs with this LSR grant; forest stand improvements on glades and woodlands on 1,000 acres; invasive species treatments on 160 miles of transportation corridors; and numerous Forest Stewardship Plans developed on private lands and additional conservation practices in the Current River Hills Priority Forest Landscape which the Missouri Pine-Oak Woodland Restoration Project fall within. A complete project brief and list of accomplishment can be found here. Additionally, feral hog removal occurred in collaboration

[3] For service contracts, the date accomplished is the date of contract award. For Force Account, the date accomplished is the date the work is completed

[4] New Agency measure reported in FACTS when completed

with the Missouri Feral Hog Elimination Partnership, resulting in 1,369 hogs removed on all ownerships within the CFLRP landscape in 2022.

4. Restoring Fire-Adapted Landscapes and Reducing Hazardous Fuels

Narrative Overview of Treatments Completed in FY22 to restore fire-adapted landscapes and reduce hazardous fuels, including data on whether your project has expanded the pace and/or scale of treatments over time, and if so, how you've accomplished that – what were the key enabling factors?

We accomplished a zone wide record number of acres in FY22 including 21,608 acres within CFLR. This is due to the use of Wyden authority with private land partners through agreements which have allowed the relocation of fire lines to county roads or private pastures or other features increasing safety and reducing environmental impacts. Funding from CFLR has allowed the purchase of a few additional UTVs over time which ensure safer implementation of landscape scale burns. The use of helicopters for aerial ignition for these larger landscapes has been very important and kept us successful with timing of our ignitions to achieve restoration objectives during peak burn window. As far as scale and cost reduction, the helicopter used for aerial ignition not only allows us to achieve restoration objectives by being able to complete these large landscape burns within just a few hours of the peak burn day window, they also greatly reduce cost per acre since fewer people are needed since the interior ignition is done by helicopter. This also greatly reduces risk and smoke exposure to firefighters since they are not having to go interior. It also reduces smoke impacts overall to the public since these landscape burns are accomplished very timely during peak windows, thereby avoiding going late into the evening or night when smoke conditions can be problematic.

If a wildfire interacted with a previously treated area within the CFLRP boundary:

- From FTEM (can be copied/summarized): Did the wildfire behavior change after the fire entered the treatment? Yes
- From FTEM (can be copied/summarized): Did the treatment contribute to the control and/or management of the wildfire? Yes
- From FTEM (can be copied/summarized): Was the treatment strategically located to affect the behavior of a future wildfire? Yes
- Please describe if/how partners or community members engaged in the planning or implementation of the relevant fuels treatment. Did treatments include coordinated efforts on other federal, tribal, state, private, etc. lands?

In this project area, we have had good response from the public to help with treating the landscape across boundary lines (public/private). Using Wyden agreements, we have now treated over 3,000 acres of this landscape on private property. Cross boundary treatments will help the control of wildfires and overall improvement of the ecosystem on this landscape. Overall improvement would be treating continuous parcels of land with the same treatments or prescription to help enhance the ecological functions on that landscape. There are also similar treatments being completed on federal, state, and private lands located within the project watershed. The forest has full suppression responsibility over the lands in the project area, so we have used fuel treatment units to help develop plans for wildfire response. The significant findings are that the treatment either slowed or arrested the spread of the wildfire.

- What resource values were you and your partners concerned with protecting or enhancing? Did the treatments help to address these value concerns? Restoration of open and closed woodland communities for wildlife and ecological integrity and function.

- How are planned treatments affected by the fire over the rest of the project? Was there any resource benefit from the fire that was accomplished within the CFLRP footprint or is complementary to planned activities? All planned activities on meeting the goals and objective of
- What is your key takeaway from this event – what would you have done differently? What elements will you continue to apply in the future? Continue with prescribed fire and silvicultural treatments.

FY22 Wildfire/Hazardous Fuels Expenditures

Category	Expenditure
FY22 Wildfire Preparedness*	$44,200
FY22 Wildfire Suppression**	$250,499
FY22 Hazardous Fuels Treatment Costs (CFLN, CFIX)	$36,600
FY22 Hazardous Fuels Treatment Costs (other BLIs)	$100,000

* Include base salaries, training, and resource costs borne by the unit(s) that sponsors the CFLRP project. If costs are directly applicable to the project landscape, describe full costs. If costs are borne at the unit level(s), describe what proportions of the costs apply to the project landscape. This may be as simple as Total Costs X (Landscape Acres/Unit Acres).
** Include emergency fire suppression and BAER within the project landscape.

How may the treatments that were implemented contribute to reducing fire costs? If you have seen a reduction in fire suppression costs over time, please include that here. (If not relevant for this year, note "N/A")

The RX burn units with established lines help reduced the amount of time for building containment lines. This will help with the cost for repair/rehab post fire, also. Due to reduction in fire behavior in the treatment units less resources are needed to manage wildfires.

5. Additional Ecological Goals

Narrative Overview of Treatments Completed in FY22 to achieve ecological goals outlined in your CFLRP proposal and work plan. This may include, and isn't limited to, activities related to habitat enhancement, invasives, and watershed condition.

The area is prioritized in our Land Management Plan as Priority landscape per Forest Plan 1.1and 1.2 Ecosystem Restoration Areas and designated State Conservation Opportunity Area for Forest/Woodlands and Glades. The area is currently identified on the Forest Wildfire Risk Map found in the Appendix of the Land Management Plan.

In 2022 the 22,045 acres of prescribed fire; 1,524 acres of timber removal and 534 acres of silviculture treatments all contributed restoring pine and pine-oak communities to a mosaic of open to closed woodlands of 30 to 90 basal area which contribute toward restoring structure and composition of older woodland stands. As demonstrated at numerous restoration sites across the Ozarks the result of opening up overstory canopy and the application of prescribed fire results in a diverse understory of forbs and graminoids. As described previously this strategy fits within the State's Comprehensive Conservation Strategy along with various partners goals such as the CHJV and NWTF along with National Forests in Arkansas.

6. Socioeconomic Goals

Narrative overview of activities completed in FY22 to achieve socioeconomic goals outlined in your CFLRP proposal and work plan.

The Missouri Pine-Oak Restoration Project is slated for implementation across 126 thousand acres within the Mark Twain National Forest (MTNF). This area corresponds to about 8% of MTNF. About $20 million will be invested to implement the project with one half funded through the CFLRP national fund and the other half through the Knutson-

Vandenberg Fund and nongovernmental sources. The $20 million invested on MTNF-CFLRP implementation over the 2012-2019 period are expected to support an average of 141 jobs, generate $33.7 million in labor income and contribute $44.2 million in added value to the regional 9-county economy. Merchantable tree volume at the end of this period is expected to exceed the initial amount by 14% although growth in timber volume will be lower than if the MTNF-CFLRP had not been implemented. Given the size and scope of the MTNF-CFLRP there were no sizeable or discernable negative effects to the local wood products industry although impacts on industry segments will need further evaluation.

Results from the Treatment for Restoration Economic Analysis Toolkit (TREAT). For guidance, training, and resources, see materials on Restoration Economics SharePoint.[5] After submitting your data entry form to the Forest Service Washington Office Economist Team, they will provide the analysis results needed to respond to the following prompts.

- Percent of funding that stayed within the local impact area: 45 %

Contract Funding Distributions Table ("Full Project Details" Tab):

Description	Project Percent
Equipment intensive work	22%
Labor-intensive work	17%
Material-intensive work	61%
Technical services	0%
Professional services	0%
Contracted Monitoring	0%
TOTALS:	100%

Modelled Jobs Supported/Maintained (CFLRP and matching funding):

Jobs Supported/Maintained in FY 2022	Direct Jobs (Full & Part-Time)	Total Jobs (Full & Part-Time)	Direct Labor Income	Total Labor Income
Timber harvesting component	3	4	120,760	138,939
Forest and watershed restoration component	2	4	72,128	141,613
Mill processing component	3	5	124,894	194,722
Implementation and monitoring	5	5	41,914	45,898
Other Project Activities	0	0	0	0
TOTALS:	12	18	359,697	521,172

Were there any assumptions you needed to make in your TREAT data entry you would like to note here? To what extent do the TREAT results align with your observations or other monitoring on the ground?

The inputs used in generating the number and/or percentages for CFLN and all matching funds are derived from WorkPlan and expenditure reports (transaction register). Product distributions were generated from TIMs cut and sold report. Results of TREAT analysis is as expected.

Please provide a brief description of the local businesses that benefited from CFLRP related contracts and agreements, including characteristics such as tribally owned firms, veteran-owned firms, women-owned firms, minority-owned firms, and business size.[6]

For resources, see materials here (external Box folder).

[5] Addresses Core Monitoring Question #7
[6] Addresses Core Monitoring Question #8

Since 2013 – 2021, there has been 138 contracts totaling over $8 million dollars for invasive species treatments, timber marking, tree planting, timber stand improvement and road maintenance and improvement work associated with restoration and management activities in the MoPWR project area. Most of this contract work went to local contractors either in the eight-county area or to contracting firms within the state. The economic and social goal is to continue to maximize the number of contracts available to local timber, wood product and natural resource management companies. Some of these contractors are veteran and women owned firms, although the total number is not known.

7. Wood Products Utilization

Timber & Biomass Volume Table[7]

Performance Measure	Unit of measure	Total Units Accomplished
Volume of Timber Harvested TMBR-VOL-HVST	CCF	24,548.28
Volume of timber sold TMBR-VOL-SLD	CCF	33,547.31
Green tons from small diameter and low value trees removed from NFS lands and made available for bio-energy production BIO-NRG	Green tons	173.859

Reviewing the data above, do you have additional data sources or description to add in terms of wood product utilization (for example, work on non-National Forest System lands not included in the table)?

No

8. Collaboration

Please include an up-to-date list of the core members of your collaborative if it has changed from your proposal/work plan (if it has not changed, note below).[8]

For detailed guidance and resources, see materials here. Please document changes using the template from the CFLRP proposal and upload to Box. Briefly summarize and describe changes below.

Collaborative Member/Partner Name	Organizational Affiliation
Kyle Brazil	Central Hardwoods Joint Ventures
Dan Dey, Research Forester	US Forest Service, Northern Research Station
Frank Thompson, Research Wildlife Biologist	US Forest Service, Northern Research Station
Mike Stambaugh, Associate Research Professor, Consortium Lead	Oak Woodland and Forest Fire Consortium
Megan Buchanan, Resource Science Field Station Supervisor	Missouri Department of Conservation
Nathan Muenks, Natural Resources Planning Section Chief	Missouri Department of Conservation
Neal Humke, Land Stewardship Coordinator	L.A.D. Foundation
John Burk, NWTF State Biologist	National Wild Turkey Federation
Joe Alley, State Forester	Natural Resource Conservation Service

9. Monitoring Process

Briefly describe your current status in terms of developing, refining, implementing, and/or reevaluating your CFLRP monitoring plan and multiparty monitoring process.

Brown-headed Nuthatch Monitoring: Biologist from the Forest Service, University of Missouri and Missouri Department of Conservation conducted 11 monthly surveys of Brown-headed Nuthatch (BHNH) between January and November

[7] Addresses Core Monitoring Question #10
[8] Addresses Core Monitoring Question #11

2022. Each survey consisted of 80 playback surveys at grid points across the CFLRP landscape where BHNH were translocated (Figure 1). We also resighted individual's color bands to estimate survival. This resulted in a total of 880-point surveys and 126 nuthatch detections in 2022. From 2020 to present we have conducted a total of 1,593 points surveys (Figure 2). We measured site characteristics around each grid point in fall 2021, including canopy cover, hardwood and pine basal area, and snag characteristics. We plan to use these count and vegetation data in estimate abundance, occupancy, and habitat use and in an integrated population model to project population trend. During March, April, and May 2022 we also searched for and monitored nests. We found and 4 nests, 3 of which fledged young. A manuscript with analysis and findings from monitoring immediate survival after translocation in 2020 and 2021 is currently in review for publication in a peer-reviewed journal.

Figure 1 BHNH Monitoring Points

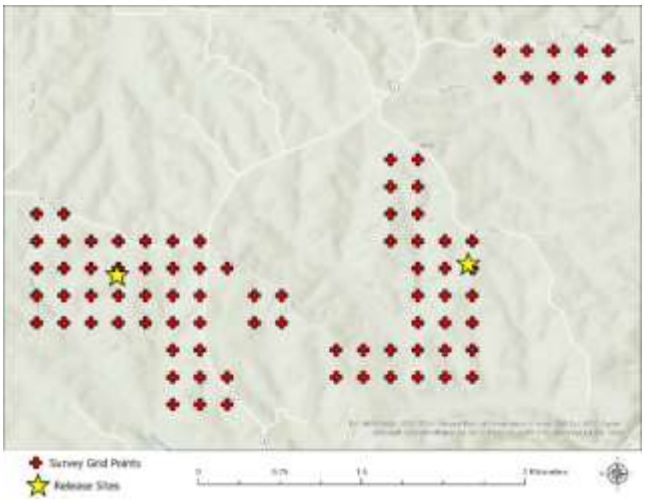
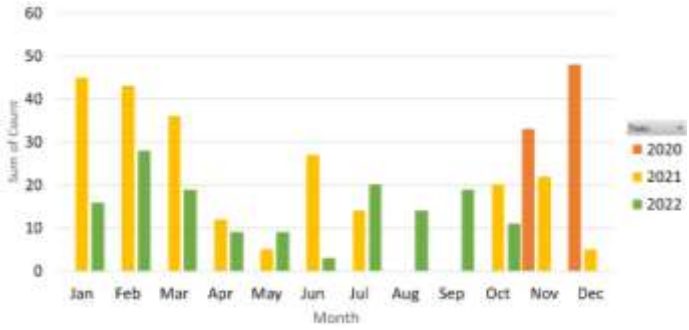


Figure 2 Total detections of BHNH - 12/2022 - 10/2022



Vegetation Monitoring: To meet the Common Monitoring Strategy core CFLRP indicator ecological departure metric, the Collaborative plans to implement Community Health Index (CHI) monitoring.

CHI protocol will be developed and applied to groupings of Ecological Landtypes (ELT) that have similar environmental characteristics. The protocols focus on identification of stand-level ecological health indicators (i.e., structure and composition) specific to each ELT group. Documented items include the presence of characteristic and conservative plant and wildlife species, canopy cover, proportion of hardwoods vs. shortleaf pine in the stand, stand stocking, large tree retention, pine and oak regeneration and recruitment, and presence of degrading factors. Historic compositional and structural characteristics will be used as references to assess current conditions and degree of vegetation departure. Once data has been collected for a given stand, it will be assigned scores and, when summed, given a conversation rank.

This ranking is tested against all other areas sampled, and as the dataset grows, so does the accuracy of the individual rankings.

In 2020, eighteen assessments were completed and another 26 have been completed in 2022. The pine-oak woodland assessment protocol has been finalized and is currently being used in the field. In collaboration with the MDC, we have hired an intern to assist in protocol development, data collection and analysis summaries of CHI monitoring. We are currently working of aggregating data and working toward doing a comparison to reference site once they are fully described. A full report of the FY2020 – FY2021 CHI monitoring within the CFLRP project area will be completed in February 2023. Below is a summary of data collected in 2022, more extensive data is available upon request.

Site Name	Unit ID	Total # of matrix plant species hits:	Total # of conservative plant species hits:	% canopy closure:	TOTAL CHI SCORE
Pineknot	45	70	19	72.0	64.3
Pineknot	11	61	22	50.0	57.5
Pineknot	35	62	22	72.5	55.6
Pineknot	34	63	16	57.3	51.7
Pineknot	32	63	16	61.9	51.7
Pineknot	43	61	13	63.8	51.5
Pineknot	22	68	16	78.3	51.3
Pineknot	26	62	14	74.7	49.1
Pineknot	39	56	13	76.3	48.6
Pineknot	25	54	12	76.7	48.1
Pineknot	14	71	16	50.3	47.9
Fremont	1	69	23	68.8	47.6
Pineknot	36	54	14	74.8	47.3
Pineknot	28	42	12	72.0	41.1
Fremont	4	48	6	86.3	40.1
Pineknot	44	42	13	75.3	39.4
Pineknot	37	63	11	76.8	36.8
Pineknot	24	30	7	80.3	36.4
Pineknot	29	39	4	77.5	35.0
Fremont	7	41	6	86.8	33.3
Pineknot	30	37	5	80.8	31.9
Pineknot	40	36	4	81.0	31.9
Pineknot	47	40	4	78.4	31.4
Pineknot	41	41	5	76.8	29.4
Pineknot	15	25	5	74.2	27.4
Pineknot	23	32	4	78.8	25.9

10. Conclusion

Describe any reasons that the FY 2022 annual report does not reflect your proposal or work plan. Are there expected changes to your FY 2023 plans you would like to highlight?

Optional Prompts

FY 2022 Additional Accomplishment Narrative and/or Lessons Learned Highlights

Media Recap

Fire Science Interpretive Signs: Cane Ridge Pinery - Oak Fire Science
https://www.ksmu.org/post/dozens-more-brown-headed-nuthatches-reintroduced-missouri#stream/0

https://www.allaboutbirds.org/news/brown-headed-nuthatches-return-to-missouris-ozark-mountains-after-100-years/
https://mdc.mo.gov/magazines/conmag/2021-04/squeak-back
U.S. Forest Service - Mark Twain National Forest | Facebook
U.S. Forest Service - Mark Twain National Forest | Facebook
Mark Twain National Forest - News & Events (usda.gov)
Northern Research on Twitter: "Meet super scientist Frank R. Thompson, a research wildlife biologist with a passion for conservation of songbirds and other wildlife. https://t.co/IOloIgg5ko https://t.co/hybNlvxohw" / Twitter
https://www.facebook.com/fsresearch/videos/353039813271013/

Signatures

- Recommended by (Project Coordinator(s)): /s/ Brian Davidson
- Approved by (Forest Supervisor(s)): /s/A. Dawn Laybolt
- Draft reviewed by (collaborative representative): /s/ Frank R Thompson, Research Biologist, Northern Research Station

Attachment: CFLRP Common Monitoring Strategy Core Questions

The 2021 cohort will complete the common monitoring strategy questions in FY22. CFLRP projects awarded in 2022 (2012 extensions and new projects) will be required to respond to these questions starting in FY23.

The CFLRP common monitoring strategy is designed to reflect lessons learned from the first ten years of the program, expand monitoring capacity, and improve landscape-scale monitoring. It is intended to strike a balance between =y implementing restoration treatments and monitoring progress prior to the common monitoring strategy. This effort may not capture the progress of every project over its lifetime but provides an opportunity for all projects to take a step together in a unified monitoring approach.

- Question 1: "What is the reduction in fuel hazard based on our treatments?"
- Question 2: "What is the effect of the treatments on moving the forest landscape toward a more sustainable condition?"
- Question 3: "What are the specific effects of restoration treatments on the habitat of at-risk species and/or the habitat of species of collaborative concern across the CFLRP project area"
- Question 4: "What is the status and trend of watershed conditions in the CFLR area, with a focus on the physical and biological conditions that support key soil, hydrologic and aquatic processes?"
- Question 5: "What is the trend in invasive species within the CFLRP project area?"
- Question 6: "How has the social and economic context changed, if at all?"
- Question 7: "How have CFLRP activities supported local jobs and labor income?"
- Question 8: "How do sales, contracts, and agreements associated with the CFLRP affect local communities?"
- Question 9: "Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally?"
- Question 10: "Did CFLRP increase economic utilization of restoration byproducts?"
- Question 11: "Who is involved in the collaborative and if/how does that change over time?"
- Question 12: "How well is CFLRP encouraging an effective and meaningful collaborative approach?"
- Question 13: "If and to what extent have CFLRP investments attracted partner investments across the landscapes?"

The tables in the section below are copy/pasted from the suggested monitoring tracking templates to help organize data across CFLRP projects. Adapt the reporting tables as needed to align with regional monitoring indicators.

Monitoring Question #1: "What is the reduction in fuel hazard based on our treatments?" (Reported Annually)

For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

Fire intensity (predicted flame lengths) from IFTDSS - Flame Length Condition Classes – Project Scale

IFTDSS Auto-97th percentile flame length output	1 - 4 ft. flame lengths	*>4 - 8 ft. flame lengths*	*>8 - 11 ft. flame lengths*	*>11 - 25 ft. flame lengths*	*>25 ft. flame lengths*
Initial landscape model (Baseline under CMS)	517,789	49343	5477	4868	401

IFTDSS Auto-97th percentile flame length output	1 - 4 ft. flame lengths	*>4 - 8 ft. flame lengths*	*>8 - 11 ft. flame lengths*	*>11 - 25 ft. flame lengths*	*>25 ft. flame lengths*
Area treated in FY22	14,879	2,304	4	0	0

Briefly describe monitoring results in table above – include an interpretation of the data provided and whether the indicator is trending toward or away from desired conditions for your landscape. If the data above does not accurately reflect fire and fuel hazard on your landscape please note and provide context. While generally smaller flame lengths are desirable, this isn't the case in all ecosystems – please note if this applies.

Monitoring Question #2: "What is the effect of the treatments on moving the forest landscape toward a more sustainable condition?" (Reporting frequency determined by Regional indicator)

For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

If Region is reporting on indicator 2 (acres burned by wildfire and by prescribed burning annually), fill in this table:

Report in acres and % of total project area	**Fire Regime *I***
Suppression only fires	243 (0.1%)
Fires managed for multiple resource objectives	0
Prescribed Fire	43,998 (35%)
Total Acres Burned	44,241 (35%)
Natural Range of Variation (NRV)	0
Departure	0

Briefly summarize how your landscape has departed from historic ecological conditions including disturbance.

Briefly describe monitoring results – include an interpretation of the data provided above, and whether the indicator is trending toward or away from desired conditions for your landscape (including resiliency to future disturbances and climate projections). If the data above does not accurately reflect condition on your landscape, please note and provide context.

Monitoring Questions #3: "What are the specific effects of restoration treatments on the habitat of at-risk species and/or the habitat of species of collaborative concern across the CFLRP project area?" (Reporting frequency determined by Regional indicator)

For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

If reporting on indicator 3 (wildlife populations and/or diversity indicators), fill in this table:

Wildlife Species Name(s)	Indicator and Unit of Measure	Target Range	Value in Initial Year of CMS*	Value in Next Reporting Year of CMS* N/A in 2022	Desired or Undesired Change? N/A in 2022	Percent Change N/A in 2022	Acres of Habitat Treated to Improve this Indicator
1. Brown-headed nuthatch	Number of birds on project area	No data	0 prior to Aug 2020	54/20	N/A	>100	67,192
2. Eastern Whip-poor-will	Total birds detected on 385 survey points	No data	534 in 2014-2015	N/A	N/A	No data	No data
3. Chuck-wills-widow	Total birds detected on 385 survey points	No data	186 in 2014-2015	N/A	N/A	No data	No data
4. Blue-winged warbler	Total detections on 247 points	No data	5 in 2013	19 in 2020	N/A	280.0	67,192
5. Eastern towhee	Total detections on 247 points	No data	38 in 2013	34 in 2020	N/A	-10.5	67,192
6. Prairie warbler	Total detections on 247 points	No data	73 in 2013	77 in 2020	N/A	5.5	67,192
7. Red-headed woodpecker	Total detections on 247 points	No data	50 in 2013	46 in 2020	N/A	-8.0	No data
8. Summer tanager	Total detections on 247 points	No data	50 in 2013	66 in 2020	N/A	32.0	67,192
9. Yellow-breasted chat	Total detections on 247 points	No data	145 in 2013	104 in 2020	N/A	-28.3	67,192

Acres of Habitat Treated to Improve this Indicator – Is subject to change as further refinement is completed

For the table or table(s) above:

Briefly interpret the monitoring results in the table above, including whether the indicator is trending toward or away from desired conditions for your landscape.

- Prior to August 2020 there were no brown-headed nuthatches on project area. In August 2020 and 2021 46 and 56 birds, respectively, were translocated here. A population projection model based on observed survival and reproduction rates indicates there are likely 54 birds alive in the area. The number of birds known alive on project area based on resighting is approximately 20 in 2022.
- Eastern Whip-poor-will surveys conducted in 2014-2015. Follow up survey will be conducted in 2023-2024. Habitat analyses based on 2014-2015 surveys indicates positive response to burning and thinning (see Thompson, F. R. III, M. C. Roach, and T. W. Bonnot. 2022. Woodland restoration and forest structure affect nightjar abundance in the Ozark Highlands. Journal of Wildlife Management 1–15. https://doi.org/10.1002/jwmg.22170).
- Chuck-wills-widow surveys conducted in 2014-2015. Follow up survey will be conducted in 2023-2024. Habitat analyses based on 2014-2015 surveys indicates positive response to burning and thinning (see Thompson, F. R.

III, M. C. Roach, and T. W. Bonnot. 2022. Woodland restoration and forest structure affect nightjar abundance in the Ozark Highlands. Journal of Wildlife Management 1–15. https://doi.org/10.1002/jwmg.22170).

- Reported here are simple total numbers of detections from 247 survey points across the project area which can be confounded by year and observer effects and whether a point received management or not. Furthermore, regional trends for the state and region are negative for these species, and this needs to be considered in analyses. Ongoing analyses are underway to appropriately analyze these data and report trends and response to restoration efforts. Roach et al. (2019) reported on these data for 2013-2015 and showed positive responses to fire and/or thinning for all these species (Roach, Melissa C.; Thompson, Frank R.; Jones-Farrand, Todd. 2019. Effects of pine-oak woodland restoration on breeding bird densities in the Ozark-Ouachita Interior Highlands. Forest Ecology and Management. 437: 443-459. https://doi.org/10.1016/j.foreco.2018.12.057).

Acres of Habitat Treated to Improve this Indicator

Does your CFLRP project have additional wildlife-related monitoring results to summarize and interpret? If so, please provide that here.

Not currently.

Monitoring Question #4: "What is the status and trend of watershed conditions in the CFLRP area?" (Reported every 5 years)

For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

Summary of Watershed Condition Scores for the priority subwatersheds within CFLRP boundary:

Priority Subwatershed Name and 12-digit HUC	Affected by Treatment, Disturbance Events, or Both?	Date Before Treatment and/or Disturbance Event	Watershed Condition Score in Initial Year of CMS*
Headwaters Big Barren Creek - 110100080605	Commercial Harvest = 3,413 Non-Commercial Silviculture =2,193 Prescribed Fire = 55,697 acers (Initial and maintenance), Road Closures = 30 miles	2011 – 2022 (past CFLRP treatment activities)	Functioning Properly (1.5)
Big Barren Creek - 110100080606	Non-commercial Silviculture = 449 Commercial Harvest = 2,512 Prescribed Fire = 7,173	2011-2022 (past CFLRP treatment activities)	Functioning at Risk (1.8)

Watershed Condition Score averaged across priority subwatersheds within CFLRP boundary:
Aquatic Physical (Weighted 30%)

Indicator Number	Indicator Name	Average Indicator Value	Date
1	Water Quality	1	2022
2	Water Quantity	2.5	2022
3	Aquatic Habitat	2	2022

Aquatic Biological (Weighted 30%)

Indicator Number	Indicator Name	Average Indicator Value	Date
4	Aquatic Biota	1	2022
5	Riparian/Wetland Vegetation	2	2022

Terrestrial Physical (Weighted 30%)

Indicator Number	Indicator Name	Average Indicator Value	Date
6	Roads & Trails	2	2022
7	Soils	1	2022

Terrestrial Biological (Weighted 10%)

Indicator Number	Indicator Name	Average Indicator Value	Date
8	Fire Regime or Wildfire	2.5	2022
9	Forest Cover	1	2022
10	Rangeland Vegetation	2	2022
11	Terrestrial Invasive Species	2	2022
12	Forest Health	1	2022

Briefly interpret the monitoring results in the table above, including whether the indicator is trending toward or away from desired conditions for your landscape. If the data above does not accurately reflect watershed condition on your landscape, please note that and provide context.

There are two priority watersheds within the CFLRP project area: Big Barren Creek (26,321 acres, 70% of Watershed) and Headwaters of Big Barren Creek (26,321 acres, 89% of Watershed). Both have a watershed condition rating of 1 – Functioning. Water Quality is Functioning at Risk due to past land management practices and current agricultural practices. Headwaters Big Barren Creek watershed condition rating remained the same score of 1.5. The watershed condition rating is currently 1.8, a decrease slightly compared to the 2010 assessment rating of 1.6. These changes are due collecting and analyzing on the ground conditions. At the time of the 2010 assessment was no information collected on channel condition and aquatic species presence. Please refer to the FY2021 Watershed Restoration Action Plan for more details.

Does your CFLRP project have additional watershed condition-related monitoring results to summarize and interpret? If so, please provide that here.

Due to public concerns that prescribed burning was negatively impacting water quality through increased soil erosion while increasing flood frequency due to the removal of leaf litter and ground vegetation cover, the MTNF partnered with Missouri State University's Ozark Environmental and Water Resources Institute (OEWRI) to conduct monitoring studies which assessed soil, sediment, channel, and flooding conditions to better understand the effects of forest management on water quality and flooding. The 2015, 2016 and 2018 monitoring showed no clear negative effects of prescribed burning. Overall, results of the monitoring studies support the conclusion that prescribed fire does not negatively affect soil and vegetation characteristics that effect runoff rates. In some cases, burned areas had soil organic matter and bulk density values that should result in higher rates of infiltration than unburned forest soils. Results of this monitoring study can be found at: https://oewri.missouristate.edu/big-barren-creek-watershed-monitoring.htm

In regard to local residents concerns regarding flooding in the Big Barren watershed as a result of MTNF management activities. OEWRI completed a study that analyzed the historical rainfall in the Big Barren Creek Watershed from 1955-2015. From 2005-2014, total annual rainfall increased about 7% over the previous 20 years (1985-2004). These data suggest over the last 10 years the Big Barren Creek watershed has experienced a relatively wet period compared to the previous 50 years. Analysis of the 60-year rainfall record in 5-year intervals shows that high magnitude rainfall events appear to be occurring more frequently over the last decade. Intense rainfall events have increased in frequency over the past decade as shown in other studies in the Midwest. It is highly probable that more intense storms and climate change in general is contributing to the hydrologic problems observed in the Big Barren Creek watershed including the

increased frequency of flooding. Results of this study can be found at https://oewri.missouristate.edu/Assets/OEWRI/Final_Report_2016_BigBarrenCreek_Rainfall.pdf

Monitoring Question #5: "What is the trend in invasive species within the CFLRP project area?" (Reported Annually)

For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

Treatment data for priority invasive species:

Common Name	Treatment Action	Acres Treated[1]	Acres Monitored	Avg. "Percent Efficacy"	Acres Restored[2]	Response of Desirable Species[3]
Autumn Olive	Herbicide - Foliar	178	178	85	178	N/A- Powerline with native cover
Feral Hog 154 hogs removed on NFS lands	Traps/Shooting	772	47,160 acres HUC12 Monitored	N/A	N/A	N/A

[1] "Treated" is defined as prevented, controlled or eradicated.

[2] Agency performance accomplishment code INVPLT-INVSPE-REST-FED-AC, which is calculated in FACTS.

[3] "Desirable Species" includes everything that is not an undesirable species or bare ground. If not monitored, write N/A.

For reporting on plot-based field monitoring, please include a summary of the results here:

- **Briefly interpret the monitoring results in the table above, including whether the indicator is trending toward or away from desired conditions for your landscape.** The most serious invasive species locally are sericea lespedeza, beefstake, callery pear, spotted knapweed and Japanese stiltgrass. These are pervasive along roadsides throughout the project area and are poised to spread throughout Ozark woodlands in the absence of the highly competitive and resilient grass-forb groundcover associated with higher-quality restored pine and oak woodlands. Since 2012, CFLRP funding has allowed the Forest to completed 3,146 acres of invasive plant inventory and treated 5,489 acres. In FY2023 the Forest is updating efficacy monitoring and invasive plant inventory.
- **Does your CFLRP project have additional invasives-related monitoring results to summarize and interpret?** No

The following questions apply across the topics addressed across Questions 1-5:

- Are there accomplishments towards long-term goals which may not be reflected in short-term monitoring? Are there short-term treatments that work towards long-term goals which may be reflected adversely in short-term monitoring? Briefly summarize short- & long-term tradeoffs of your landscape treatments and goals.

Monitoring Questions #6: "How has the social and economic context changed, if at all?" (Reported **every 5 years)**

Describe the current social and economic context for your CFLRP landscape. For detailed guidance, training, and resources, see corresponding reporting template here. Use it to respond to the following prompts:

Indicators	Response for Initial Year of Common Monitoring Strategy	Notes (Optional)
"Population" most recent year available (tab 1, Forest Service report)	99,050	Ripley, Shannon, Wayne, Reynolds, Butler, and Oregon Counties

Indicators	Response for Initial Year of Common Monitoring Strategy	Notes (Optional)
"Percent of total, race & ethnicity" most recent year available (tab 11, Forest Service report)	White alone – 93,234 Black or African American - 2,395 American Indian - 782 Hispanic ethnicity - 2,032 Non-Hispanic Ethnicity - 98,207	Ripley, Shannon, Wayne, Reynolds, Butler, and Oregon Counties
"Unemployment rate" most recent year available (tab 1, Forest Service report)	6.5%	Ripley, Shannon, Wayne, Reynolds, Butler, and Oregon Counties
"Per capita income" most recent year available (tab 1, Forest Service report)	$38,648	Ripley, Shannon, Wayne, Reynolds, Butler and Oregon Counties
"Wildfire Exposure, % of Total, Homes" most recent year available (see Wildfire Risk report)	Homes Directly Exposed – 73.7% Homes Indirectly Exposed – 24.10% Homes Not Exposed – 2.1%	Ripley, Shannon, Wayne, Reynolds, Butler, and Oregon Counties

Provide a brief, narrative context for the data provided above, including any other key socioeconomic conditions to highlight for your landscape. If the data above does not accurately reflect socioeconomic conditions in/around your landscape please note and provide context.

Would you expect CFLRP activities to impact directly or indirectly any of these social and/or economic conditions? To respond to stakeholders' concerns, the Mark Twain National Forest commissioned an economic analysis of the project. The results showed that the $20 million investment spanning the Missouri Pine-Oak Woodlands Restoration Project 2012 to 2019 was expected to support 138 jobs annually and generate an eight-year total of $34 million in labor income. Moreover, there would be an additional $10 million in value added as workers spent wages on food, entertainment, fuel, housing, and other items that would help the expenditures on forest management to ripple through the local economy (Song and Aguilar 2015). The net result was approximately $2.20 of local economic activity for every dollar invested in the project.

Does your CFLRP project have additional socioeconomic monitoring results to summarize and interpret?

No

Based on the information reported, (and any other relevant monitoring information and discussion), what (if any) actions or changes are you considering?

- None at this time

Monitoring Questions #7 & #8

Covered earlier in annual report template

Monitoring Questions #9 "Did CFLRP maintain or increase the number and/or diversity of wood products that can be processed locally?" (Reported every 5 years)

Data will be provided to 2021 cohort projects in FY23 to address this question – responses in FY22 are optional. If your CFLRP project has data available about the current timber harvest by county and/or product, the number of active processing facilities in the area, or other data about forest products infrastructure please provide here.

Monitoring Questions #10 & #11

Covered earlier in annual report template

Monitoring Questions #12: "How well is CFLRP encouraging an effective and meaningful collaborative approach?" (In FY22, Northern Blues only – reported every 2-3 years)

For detailed guidance, training, and resources, see corresponding reporting template here. Please upload your completed assessment summary provided by the Southwestern Ecological Restoration Institutes here and use it to respond to the prompts below:

- Reflecting on the summary provided, do you have any additional context for the results to share?
- Do you have any feedback about the assessment process?
- What have you done, or plan to do, in response to the challenges, needs, and recommendations identified in the collaboration assessment? Please provide up to 3 specific actions.
- What types of support or guidance do you need to address any of the challenges, needs, and recommendations identified in the collaboration assessment?

Monitoring Question #13

Covered earlier in annual report template