

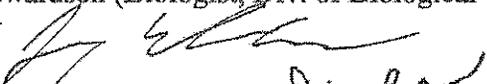
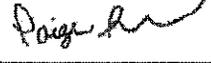
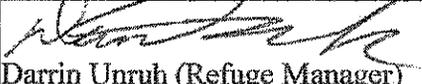
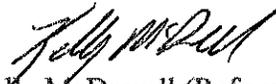
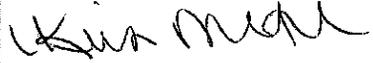
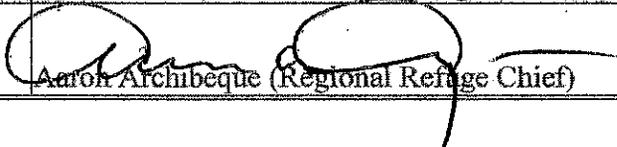
Inventory and Monitoring Plan
for
Deep Fork National Wildlife Refuge

September 2014

I. Signatures

Inventory and Monitoring Plan

For: Deep Fork National Wildlife Refuge

Action	Signature /Printed Name	Date
Prepared By:	Jeremy Edwardson (Biologist, Div. of Biological Sciences)  Paige Schmidt (Zone Biologist) 	6/10/2014
Submitted By:	 Darrin Unruh (Refuge Manager)	6/12/14
Reviewed By:	 Kelly McDowell (Refuge Area Supervisor)	6/16/2014
Reviewed By:	 Kris Metzger (Regional I&M Coordinator)	6/25/2014
Reviewed By:	 Grant Harris (Chief, Div. of Biological Sciences)	8/13/14
Approved By:	 Aaron Archibeque (Regional Refuge Chief)	9/15/14

Deep Fork National Wildlife Refuge
Inventory and Monitoring Plan

August 2014

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II. Introduction

This Inventory and Monitoring Plan (IMP) is prepared to document the inventory and monitoring surveys that will, or could be conducted at Deep Fork National Wildlife Refuge (NWR) from 2014 through 2029, or until the Refuge Comprehensive Conservation Plan (CCP) or Habitat Management Plan (HMP) is revised.

Deep Fork NWR is located largely in the floodplain of the Deep Fork of the North Canadian River, commonly known as the Deep Fork River. Deep Fork NWR was authorized in 1992, under the authorities of Emergency Wetlands Resources Act of 1986, Migratory Bird Conservation Act of 1929, and Migratory Bird Hunting Stamp Act of 1934. These funds were designated to purchase Deep Fork NWR lands in order to protect valuable freshwater wetlands and wildlife habitats by preserving an important tract of bottomland forest and wetland ecosystems for the benefit of waterfowl, other migratory birds, and other fish and wildlife species native to the area. Currently, the Refuge is composed of 9,748 acres, with an acquisition boundary totaling 18,350 acres. Historically, the bottomland hardwood forest community of the Deep Fork River was a complex, diverse, and interrelated association of plants and animals, created and maintained by periodic flooding and fire. However, years of development and habitat alteration by humans have significantly modified the dynamic and pristine floodplain ecosystem. Today, Refuge lands are a mixture of regenerating bottomland forest, drained and natural wetlands, agricultural lands (mostly pastureland and pecan orchards), and some upland prairie and cross timber ecosystems. Given time, protection, and proper management, the Refuge bottomlands should regain much of the character of a mature riparian forest. This would include a diverse assemblage of plants and animals representative of these vanishing habitats. Eighty-five percent of the bottomland hardwood forests that drain the Mississippi River watershed have been lost. Deep Fork NWR and surrounding Wildlife Management Areas (WMA) (Deep Fork WMA, Okmulgee WMA, and Eufaula WMA), collectively protect the largest and healthiest remaining tracts of bottomland hardwood forests in the Deep Fork River watershed, and the flora and fauna it supports.

By compiling an IMP, the Refuge is able to prioritize surveys to ensure that quality biological work will be conducted. This IMP serves as a summary of projects that are currently being conducted, or expected to be conducted as resources become available, and ranked in a manner that is most beneficial to the Refuge and surrounding landscapes. The Project Leader may change a refuge IMP either by amending or revising it. An IMP should be amended when the status of a survey protocol is changed to "Approved," a new version replaces an approved survey protocol or a more appropriate protocol for a survey is developed or becomes available. No additional approvals are needed for amending an IMP. Refuge and I&M staff record changes to the IMP by updating PRIMR and entering the amended version in ServCat, the Service Catalog (<https://ecos.fws.gov/ServCat/Portal>). An IMP should be revised when an emerging natural resource problem requires a new survey, the Project Leader selects a new survey to conduct that was not on the original survey list, or the Project Leader wants to remove a selected survey from an IMP. The IMP does not have to be revised if a selected survey is not conducted in a particular year. Revision of an IMP does require additional reviews and approval.

III. Methods

Refuge surveys and monitoring plans that are currently taking place, planned, expected, or desired were compiled for evaluation and prioritization. All surveys were listed in a Planning and Review of Inventory and Monitoring Activities on Refuges (PRIMR; <https://ecos.fws.gov/primr/index.gsp>) database in order of initial preference by Darrin Unruh (Refuge Manager) and Paige Schmidt (Zone Biologist). All surveys in PRIMR were reevaluated and ranked on October 29 – 30, 2013 (Table 1), by Darrin Unruh, Paige Schmidt, and Jeremy Edwardson (Division of Biological Sciences Biologist). Survey ranking consisted of 17 criteria outlined in the Simple Multi-Attribute Rating Technique (SMART) tool without formal use of the tool (Appendix A). Staff then collectively went through each survey to form consensus with regards to ranking; however, final ranks were made by Darrin Unruh.

All surveys were placed into one of two main categories: selected or non-selected. Selected surveys were either Current or Expected. Current surveys were those that are highest priority I&M projects for the Refuge, and are currently conducted and have sufficient support for completion. These surveys are the most applicable to Refuge goals and objectives. In addition, they were likely to assist many partners of the Refuge and provide assistance in landscape management. Expected surveys are not yet started but are expected to begin within the life of the IMP as the resources necessary to complete these surveys are presumed available. Non-selected surveys represent work that has been completed, is not expected to meet National I&M policy goals of protocol development, data analysis and reporting, or are surveys conducted to assist cooperators with data collection, but where the cooperator isn't expected to develop a protocol or provide information to the Refuge. High priority surveys that need significant additional resources, conceptual development to provide objectives linked to management priorities or efforts, and/or partner development and contribution also were not selected. We listed these non-selected surveys as Future and ranked them sequential to selected surveys with the hope that support would occur at some time during the lifespan of the IMP. As a result, the Future category of non-selected surveys will be addressed as resources or opportunities become available (i.e., assistance with protocol development, data management, and analysis at the landscape, regional, national, or international levels), not necessarily in the order ranked. During discussions of selection and ranking, some surveys moved from the Expected category to either Current or Non-selected depending on Refuge requirements and capacity. In addition, some surveys that were not listed within PRIMR were added during the final selection and ranking process.

Staff time for selected surveys were estimated based on the amount of time spent to plan, collect, analyze and use data (i.e., development of habitat management prescriptions). Costs were estimated by evaluating potential contracts, equipment, and travel accommodations that could be required each year.

A key component of the IMP development process involved creation of a Condition Summary Table (similar to the vital signs table developed by National Park Service). Inventory and monitoring activities that were included in the Condition Summary Table were efforts needed to inform management, preferably in a quantifiable structured manner. In evaluating inventory and monitoring efforts for inclusion in the Condition Summary Table, the following criteria were used: (1) Need/potential to inform major management actions; (2) Refuge purpose; (3) threats to Refuge

purpose, focal species, or species of concern; (4) major contributions of the Refuge to species or landscape conservation; and, (5) critical information gaps concerning natural resource status that are needed to inform management.

IV. Results

Following the selection and ranking process, 9 surveys were included in Deep Fork NWR's IMP; six in the Current category and 3 in the Expected category (Table 1). Ten surveys listed in PRIMR were not-selected. Selected surveys are in Table 1, followed by narratives for each survey. We estimated it would take approximately 830 staff time hours to conduct the selected surveys within a year.

Table 1. Selected surveys.

Deep Fork National Wildlife Refuge Organization #: FF02RKDF00

Survey Priority ⁰	Survey ID Number ¹	Survey Name ² / Type ³	Survey Status ⁴	Mgmt. Obj. Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Annual Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol Citation ¹²	Protocol Status ¹³
1	FF02RKDF00-005	Forest Health, Inventory, and Monitoring (CB)	Current	N/A	Entire station	FWS: 0.06	\$1,000	Spring and Summer/ Recurring -- every year	2014- Indefinite	Paige Schmidt, Zone Biologist	(none)	Initial Survey Instructions
2	FF02RKDF00-003	Development of a Vegetation Map (CI)	Expected	N/A	Entire station	FWS: 0.05	\$3,000	As soon as possible/ Occurs one time only	2015- 2016	Paige Schmidt, Zone Biologist	(none)	Initial Survey Instructions
3	FF02RKDF00-010	Breeding Landbird Survey (M)	Expected	N/A	Entire station	FWS: 0.05	\$3,000	Spring/ Recurring -- every year	2015- Indefinite	Paige Schmidt, Zone Biologist	(none)	Initial Survey Instructions
4	FF02RKDF00-004	Fire Effects Monitoring (CM)	Current	N/A	Entire station	FWS: 0.03	\$1,000	variable/ Recurring -- every year	2014- Indefinite	(none)	(none)	Initial Survey Instructions
5	FF02RKDF00-020	Inventory and Monitoring of Oil and Gas Development (CM)	Current	N/A	Entire station	FWS: 0.01, Other: 0.03	\$1,000	Any time/ Sporadic or Ad Hoc	2014- Indefinite	Darrin Unruh, Refuge Manager	(none)	Initial Survey Instructions

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6	FF02RKDF00-016	White-tailed deer Survey (M)	Current	N/A	Entire station	FWS: 0.07	\$1,000	biannual surveys, annual harvest data/ Recurring -- every two years	2011-Indefinite	Jeremy Edwardson, Biologist	(none)	Initial Survey Instructions
7	FF02RKDF00-024	Water Resource Inventory and Assessment (CI)	Current	N/A	Entire station	FWS: 0.01	\$500	Occurs one time only	2014-2016	Peter Burck, Hydrologist	(none)	Initial Survey Instructions
8	FF02RKDF00-012	American Burying Beetle Survey (CM)	Current	N/A	Multiple management units: Refuge lands that meet habitat requirements of American Burying Beetle	FWS: 0.02	\$1,000	Summer/ Recurring -- every year	2014-Indefinite	Darrin Unruh, Refuge Manager	(none)	Initial Survey Instructions
9	FF02RKDF00-025	Quantification of Waterfowl Habitat (M)	Expected	N/A	Entire station	FWS: 0.06	\$500	Recurring -- every decade	2016-2017	(none)	(none)	Initial Survey Instructions

0: The rank for each survey listed in order of priority (e.g., numeric, tiered, alpha-numeric, or combination of these).

1: A unique identification number consisting of: [station organization code]-[sequential number].

2: Short titles for the survey name, preferably the same names in station work plans.

3: Type of survey (I=Inventory, CI=Coop Inventory, BM=Baseline Monitoring, CB=Coop Baseline Monitoring, M=Monitoring to Inform Management, CM=Coop Monitoring to Inform Management, R=Research, CR=Coop Research).

4: Surveys planned for the lifespan of this IMP (e.g., Current, Expected,).

5: The management plan and objectives that justify the described survey.

6: Station management unit names, entire station, or names of other landscape units included in the survey.

7: Estimates of Service (FWS) and non-Service (Other) staff time needed to complete the survey.

8: Average annual operations costs for conducting the survey (e.g., equipment, contracts, travel) not including staff time.

9: Timing and frequency of survey field activities.

10: The years during which the survey has been or will be conducted.

- 11: Name and position of the Survey Coordinator for each survey.
- 12: Title, author, and version of the survey protocol (if there is no protocol to cite, enter None).
- 13: Stage of approval (Initial Survey Instructions, Complete Draft, In Review, or Approved) of the survey protocol.

A. Narratives of Selected Surveys

1. Forest Health, Inventory, and Monitoring (FF02RKDF00-005)

This survey will serve as an inventory and monitoring project by determining current health and condition of forest resources on the Refuge and establish permanent plots to monitor and evaluate the response of forests to management. Bottomland hardwood forests are exceptional for high biological productivity and species diversity. They are under threat from many factors including urbanization, clearing for agriculture, and flooding from water impoundments. The remaining bottomland hardwood forests require special management and restoration to preserve their value to society. The Refuge was established to protect some of the last remaining contiguous tracts of bottomland hardwood forests in Oklahoma and also supports upland forests that protect the watershed. These forests are an important resource for a variety of species including breeding and migrating birds. This project will also use data collected throughout the Deep Fork River watershed to determine forest health, structure, and composition at a landscape scale and could guide management of Refuge forests. This survey supports the core Refuge purpose of conserving habitat for migratory birds and will guide the development of potential Refuge management practices. Findings will be used to guide Strategic Habitat Conservation (SHC) at Deep Fork NWR and surrounding Wildlife Management Areas. This survey will determine desired conditions (Appendix B) to be used in development of a Forest Management Plan and a decision support tool which will compare current to desired conditions and prescribe appropriate management actions. Funds were obtained to conduct a landscape scale inventory and assessment of upland and bottomland hardwood forests of the Deep Fork River watershed in collaboration with Oklahoma State University (OSU), and Oklahoma Department of Wildlife Conservation (ODWC). Cost of the initial project is \$103,000 for the first two years, and funds have already been allocated. Follow up monitoring is estimated at \$1,000 per year. This survey aids with CCP Goal 2 of Protection, restoration, and maintenance of the Bottomland Hardwood Forest Community. This survey was selected over others because it ties directly to the station mission and the Refuge has

Population/Community of interest: Bottomland and upland forests throughout the Deep Fork River watershed.

Partnerships/Cooperators/Linkages: This project is being conducted in collaboration with Oklahoma State University Department of Natural Resource Ecology and Management, ODWC.

Protocol status: The site-specific protocol for this survey is under development in cooperation with our partners.

2. Development of a Vegetation Map for Deep Fork NWR (FF02RKDF00-005)

Development of a vegetation map would serve as a baseline vegetation map throughout the Refuge. Baseline biological data, including maps of Refuge vegetation is essential, but currently unavailable. This information would be used to assist in development of study designs and site-specific protocols. The vegetation map would also be used to identify potential vegetation successional stages. In addition, vegetation maps would aid with planning of monitoring and management for both wintering and nesting birds. The link to Refuge management objectives is that the survey relates to CCP Goal 6, Objective A: Map and monitor Refuge ecosystems. Development of a comprehensive vegetation map was selected over others, because it provided baseline information for current and future surveys.

Population/Community of interest: All Refuge ecosystems.

Partnerships/Cooperators/Linkages: Gulf Coast Prairie Landscape Conservation Cooperative (GCP LCC) and their “Common Ground” Landcover Classification project to create a vegetation map of Oklahoma at a scale useful for refuges and other publicly owned land. Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC). Similar efforts could encompass neighboring WMAs in the Deep Fork River Watershed.

Protocol status: No protocol is available but methodology would follow standards being developed by Region 2 Division of Biological Sciences.

3. Breeding Landbird Survey (FF02RKDF00-010)

This survey entails annual monitoring to quantify trends of breeding birds throughout the Refuge. The suite of species detected in these bird surveys informs management regarding the composition and structure of ecosystems within each management unit. This information feeds back into management decisions for ecosystem management actions. The variety of bird habitats found within the Refuge support an abundant and diverse bird community. Interspersion of varying vegetation types on the Refuge provide habitat for many species of migrating and resident birds. The data provided can be used to evaluate current condition of focal species indicators (Appendix B) relative to desired conditions. Establishing bird surveys also will provide techniques to evaluate phenology of breeding birds in relation to climate change. In addition to refining on-site habitat management objectives, this survey supports the CCP Goal 3, Objective B, Strategy 5: Conduct annual breeding bird surveys to determine species composition and population trends on the Refuge as indicators of habitat quality. This survey was selected over others because breeding birds are a main group of species that utilize the Refuge, and little information is known about them at Deep Fork NWR.

Population/Community of interest: Neotropical migrants and resident birds that breed within Refuge lands.

Partnerships/Cooperators/Linkages: Oaks and Prairies Joint Venture (OPJV), GCP LCC, GCPO LCC, potential linkage with neighboring WMAs, Oklahoma Ornithological Society, and local Audubon Societies.

Protocol status: A site-specific protocol is needed.

4. Fire Effects Monitoring (FF02RKDF00-004)

This monitoring will capture fire effects from prescribed fires. This data will be used to refine fuel models and to evaluate ecosystems' response to fire treatments and climate change. Development of additional objectives and monitoring plans, such as photo points, will be established to evaluate efficacy of fire used for wildlife habitat management and to assess current versus desired conditions for focal habitat indicators (Appendix B) maintained by fire management. Implementing fire effects monitoring is dependent on the fire management plan, which mostly calls for 3 year rotations, but are currently at 5 years with additional lengthening of the fire return interval likely due to budget constraints. Fire effects monitoring will be conducted in cooperation with biological and fire personnel. This monitoring approach supports the CCP Goal 2, Objective C, Strategy 5: Treat upland prairies with prescribed burns to control brush and reestablish native grasses and forbs that are adapted to fire. This monitoring plan was chosen over others, because of the varying responses ecosystems have to fire.

Population/Community of interest: All Refuge lands with fire management activities.

Partnerships/Cooperators/Linkages: Deep Fork NWR is part of a wildland urban interface with neighboring WMAs and several towns and surrounding communities (e.g., Okmulgee, Schuler, Dewar, Morris, Henryetta, etc.). The Refuge works cooperatively with these municipalities and their fire departments to reduce the threat of fire to their communities and natural resources; North Texas Oklahoma Fire Management Office, Regional Fire Ecologist, Oklahoma State University, Oaks and Prairies JV, Okmulgee County Burn Association, ODWC.

Protocol status: Initial survey instructions for monitoring first order fire effects are in development by the Regional Fire Ecologist, but a site-specific protocol is needed.

5. Inventory and Monitoring of Oil and Gas Development (FF02RKDF00-020)

This survey will serve as an inventory of all existing wells and as a monitoring effort to ensure the health of the Refuge and surrounding ecosystems. There are an estimated 700 abandoned oil and gas wells throughout the Refuge and locations, former ownership, and status are not currently known for many. Abandoned wells are not maintained, and thus are likely to leak and pose a threat to natural resources, particularly contamination of ground and surface water. This survey would locate and geospatially document all wells. This data would also be used to establish ground water monitoring wells for early detection and rapid response of spills followed by appropriate monitoring. Furthermore, known locations for these structures will provide safer work conditions during routine management activities (e.g., driving, wildfire response, etc.). This survey was selected to assist with CCP Goal 6, Objective C: Prepare and implement a monitoring plan for environmental quality on the Refuge. The survey was selected over others, because the potential impact active and inactive wells can have on Refuge ecosystems and because support is being provided by Regional Office and Headquarters.

Population/Community of interest: All ecosystems within the Refuge

Partnerships/Cooperators/Linkages: Oklahoma Conservation Commission (OCONS), Oklahoma Department of Environmental Quality (ODEQ, jurisdictional authority in Oklahoma), Oklahoma Ecological Survey Field Office (ESFO), Regional and Headquarters Oil and Gas Coordinators, Region 6 Environmental Protection Agency.

Protocol status: No site-specific protocol is currently available.

6. White-tailed Deer Survey (FF02RKDF00-016)

Periodic monitoring and evaluation of white-tailed deer (*Odocoileus virginianus*) populations on the Refuge is needed to determine herd health and/or abundance. Results will be used by the Refuge Manager to determine if changes in white-tailed deer hunting are warranted as determined by the desired condition of the indicators (e.g., abundance, doe to fawn ratio, sex ratio, and genetic diversity) for this focal species (Appendix B). White-tailed deer hunting provides recreational opportunities for the public and is a compatible use for the Refuge. Further, two major highways bisect the Refuge and deer vehicle collisions are a frequent occurrence and pose a public safety issue without appropriate population control. White-tailed deer populations on the Refuge and throughout the state of Oklahoma are abundant and without management, could potentially degrade integrity of Refuge resources. Herd health assessments and genetic studies could also be used to determine if an expansion of Refuge hunt programs are warranted. The link to Refuge management objectives is that the survey assists CCP Goal 4, Objective A: Maintain the white-tailed deer population density. This monitoring survey was selected over others, because of the high interest from the public, and potential of negative vegetation response from overpopulation of deer.

Population/Community of interest: White-tailed deer population and habitats within and near the Refuge boundary.

Partnerships/Cooperators/Linkages: Southeast Cooperative Wildlife Disease Study, ODWC, Quality Deer Management Association, hunters within the public.

Protocol status: A site-specific protocol using a camera survey is in draft. It is expected that the Southeast Cooperative Wildlife Disease Study out of the University of Georgia will have methods that could serve as a survey protocol framework for a herd health assessment. Use of genetic tests to evaluate genetic diversity of white-tailed deer would need to be tested.

7. Water Resource Inventory and Assessment (FF02RKDF00-024)

A water resource inventory and assessment (WRIA) will identify threats to the quality and quantity of Refuge waters and identify additional monitoring needs. Sufficient water quality and quantity are necessary to maintain the bottomland hardwood forest and the wildlife it supports. River flows also provide important nesting and foraging habitat for migratory waterbirds, and habitat for numerous freshwater mussel species. Commercial, agricultural, and municipal releases of point source and non-point source discharges all potentially affect water quality and quantity. Monitoring of contaminants on the Refuge would help identify potential problems as they occur, and allow environmental cleanup before concentrations reach critical levels. Determination of contaminant levels in Refuge streams prior to serious contaminant spills would establish baseline data that could be used to compare conditions of this vital rate indicator (Appendix B) before and after spills occur. Such information is invaluable in determining the extent of damage and cleanup costs. This inventory assists the Refuge with their CCP Goal 4, Protection and enhancement of Refuge habitat to sustain healthy populations of native fish and wildlife in addition to migratory birds. This survey was selected over others because WRIAs are identified as an important component of the I&M initiative (Operational Blueprint, Task 2a, USFWS 2010).

Population/Community of interest: Water resources within Deep Fork River watershed

Partnerships/Cooperators/Linkages: U.S Fish and Wildlife Region 2 Water Resources Division, Oklahoma Water Resources Board (OWRB), Oklahoma ESFO, OCONS, ODWC, ODEQ.

Protocol status: No site specific protocol is available, WRIA is in progress through Region 2 Division of Water Resources, and results would be leveraged to determine additional information needs and appropriate monitoring strategies.

8. American Burying Beetle (FF02RKDF00-012)

American burying beetle (ABB; *Nicrophorus americanus*) surveys determine if the federally listed beetle is present on Refuge lands and affected by management actions. Presence/absence surveys are a requirement of Section 7 consultation for the Endangered Species Act. The Refuge has known occurrences of ABB 2.4 kilometers from Refuge lands, and puts the Refuge within the ABB known distribution range. This survey is linked to Refuge management objectives in the CCP Goal 5, Objective B: Determine if other federally-listed species or species of State concern are found on the Refuge. The survey was selected over other surveys because of a legal obligation, and possibility of ABB occurrence on the Refuge, which could alter management actions.

Population/Community of interest: Refuge lands that meet habitat requirements of American burying beetle.

Partnerships/Cooperators/Linkages: Oklahoma ESFO

Protocol status: Surveys follow peer-reviewed protocol established by Ecological Services Division: U.S. Fish and Wildlife Service. 2013. DRAFT American Burying Beetle (*Nicrophorus americanus*) Range Wide Presence/Absence Live-trapping Survey Guidance. This protocol can be found at the following address:

<<http://www.fws.gov/southwest/es/oklahoma/documents/abb/surveying%20final/abb%20rangewide%20presenceabsence%20live-trapping%20survey%20guidance2013.pdf>>

9. Quantification of Waterfowl Habitat (wintering energetics) availability (FF02RKDF00-025)

This survey will quantify and monitor waterfowl habitat within the Refuge. Deep Fork NWR was established to protect and enhance wildlife habitat, specifically bottomland forests, for migratory birds. Measuring energetic carrying capacity of waterfowl habitat is arguably the best method of quantifying Refuge contributions for migrating and wintering waterfowl, and it will allow the Refuge to express its contributions in a regional context. Techniques to measure energetic capacity for most, if not all, ecosystems on the Refuge are readily available; moreover, suitable energetic carrying capacity values exist in published literature for many waterfowl habitats available on the Refuge. Waterfowl carrying capacity objectives from the Oaks and Prairies Joint Venture have not been developed for this Refuge and are needed to determine if Deep Fork NWR is meeting its purpose to provide adequate habitat for migratory and resident waterfowl. This survey is linked to Refuge management objectives found in Goal 3 of the CCP: To protect and enhance migratory bird habitat. It was selected over others because the Refuge was established for the purpose of preservation of bottomland hardwood ecosystems and wildlife, including migratory waterfowl, and to assist in wetland and waterfowl management.

Population/Community of interest: Waterfowl habitats within the Refuge

Partnerships/Cooperators/Linkages: Migratory Bird Management Office (MBMO), OPJV, ODWC, Ducks Unlimited.

Protocol status: No site-specific protocol or survey protocol framework is available, but methodology is available from which to develop a protocol.

B. Surveys Not Selected

Future surveys:

10. Baseline Herpetofauna Inventory (FF02RKDF00-008)

Reptiles and amphibians have been suffering from declining populations due to habitat loss, degradation, climate change, and fragmentation. A baseline inventory of the Refuge's herpetofauna has not been conducted. The alligator snapping turtle (*Machrochelys temminckii*), a state species of special concern that has experienced recent drastic declines, has been documented on the Refuge, but its current distribution and status on the Refuge is unknown. A decline in all freshwater turtle species of eastern Oklahoma was recently documented and the cause has not been determined. Further, ranges of other state species of special concern, such as the Northern scarlet snake (*Cemophora coccinea copei*) encompass the Refuge, but presence cannot be determined without baseline surveys. This information would be used to determine if management actions should be implemented to protect and enhance habitats for these species and other herpetofauna. This inventory would assist with CCP Goal 4, Objective C: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit nongame species and Goal 5 Objective B: Determine if other federally-listed species or species of State concern are found on the Refuge. This survey was selected over others, because reptiles and amphibians are sensitive both to climate change and habitat management.

Population/Community of interest: All ecosystems and herpetofauna within the Refuge

Partnerships/Cooperators/Linkages: ODWC

Protocol status: No site-specific protocol is currently available.

11. Swamp Rabbit Surveys (FF02RKDF00-006)

This survey would monitor swamp rabbits (*Sylvilagus aquaticus*) throughout the Refuge. Swamp rabbits only occur in bottomland hardwood vegetation communities. As such, their habitat's reduction and fragmentation parallels that of the bottomland hardwoods they inhabit. Anecdotal accounts of swamp rabbit numbers indicate population declines on the Refuge. Furthermore, ODWC has identified swamp rabbits as a species of greatest conservation need within herbaceous wetlands throughout the Cross Timbers ecoregion of Oklahoma. Surveys of swamp rabbits would document their current population status and distribution within the Refuge, be used to determine causes for declines if present, and would also be used to evaluate the efficacy of management actions if implemented. The link to Refuge management objectives is that the survey assists CCP Goal 4, Objective B: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit small game species. This survey was selected over others because of the status of the species and that they are heavily targeted during open Refuge hunting seasons.

Population/Community of interest: Swamp rabbits and their habitats within the Refuge.

Partnerships/Cooperators/Linkages: ODWC, Oklahoma State University

Protocol status: No site specific protocol is currently available.

12. Monitoring Wetland Management (FF02RKDF00-015)

This survey serves as a technique to monitor wetlands and management implications. The Refuge was established via the Emergency Wetland Resource Conservation Act and provides many acres of wetland ecosystems. In ephemeral and oxbow wetlands, numerous management strategies exist to maintain and enhance these communities, including disking and brush management to set back succession and control invasive species. Surveys will be implemented to determine if these actions have met objectives and maintained or improved carrying capacity of these wetlands for wintering and migrating waterfowl. This monitoring program would assist with CCP Goal 4, Objective C: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit nongame species and CCP Goal 3: To protect and enhance migratory bird habitat. This survey was selected over others in order to evaluate responses of wetland management techniques and to ensure wetlands remain healthy.

Population/Community of interest: Wetland ecosystems throughout the Refuge.

Partnerships/Cooperators/Linkages: MBMO, OPJV, Ducks Unlimited, ODWC

Protocol status: No site-specific protocol or survey protocol framework is available but methodology is available from which to develop a protocol. Similar protocol development efforts are underway at Sequoyah and Washita NWRs.

13. Furbearer Surveys (FF02RKDF00-026)

These surveys would serve as a baseline inventory of furbearers and provide ongoing monitoring if population management is implemented. Furbearer surveys conducted prior to Refuge establishment indicated populations within the Deep Fork River watershed are among the highest in the State. Numerous furbearer species are mesopredators and can have significant effects on populations of trust resources, including nesting birds. Further, beavers can greatly influence distribution and frequency of flooding events and effects on bottomland hardwood forests, of which the Refuge was established to protect. Disease outbreaks, including distemper, have been documented on the Refuge, and along with rabies, pose a public health threat. Furbearer surveys would be used to determine the status of populations on the Refuge. They will also aid in determining if additional management is warranted and the efficacy if implemented. The link to Refuge management objectives is that the survey assists CCP Goal 4, Objective B: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit small game species. This survey was selected over others to monitor and manage furbearers and the potential impacts they can have on ecosystems.

Population/Community of interest: All ecosystems and furbearer populations within the Refuge.

Partnerships/Cooperators/Linkages: ODWC, Oklahoma Furbearers Alliance

Protocol status: No site-specific protocol is available.

14. Baseline Inventory and Monitoring of Bats (FF02RKDF00-013)

This survey would provide a baseline inventory and monitoring program of bats that may be found on the Refuge. Deep Fork NWR was established to protect bottomland hardwood forests and protects many acres of this ecosystem. In addition, there are abandoned coal mines found within the Refuge. These sites provide roosting and foraging habitats for many bat species, however, a baseline inventory has not been conducted. As such, this information would be used for development of habitat management actions to protect and improve roosting and foraging habitat for bats and to determine the efficacy of those actions, if implemented. This survey would assist with CCP Goal 4, Objective C: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit nongame species. This survey was selected over others because of global bat population declines, and that baseline population data for bat species within the Refuge is unknown.

Population/Community of interest: All roosting and nesting bat habitats within the Refuge.

Partnerships/Cooperators/Linkages: Ozark Plateau NWR and staff (which was established to protect federally list cave species), ODWC

Protocol status: No site-specific protocol is currently available.

15. Turkey Survey (FF02RKDF00-017)

This survey would provide baseline monitoring of turkey (*Meleagris gallopavo*) populations within the Refuge. A periodic survey of turkey populations is needed to determine relative abundance. Results will be used by Refuge staff to determine if changes in turkey hunting are warranted. Data will be used to justify continuation and potential expansion of spring turkey hunts that provide recreational opportunities for the public and is a compatible use for the Refuge. The link to Refuge management objectives is that the survey assists CCP Goal 4, Objective B: Restore and maintain bottomland forest, wetlands, and uplands on the Refuge to benefit small game species. This survey was selected over others due to the potential to expand hunt programs and to evaluate effect of Refuge hunts on this species.

Population/Community of interest: Turkey habitat and populations within the Refuge

Partnerships/Cooperators/Linkages: ODWC, National Wild Turkey Federation, other refuges within region that conduct turkey hunts.

Protocol status: No site-specific protocol is currently available.

Other/completed/not supported surveys:

Swainson's warbler (*Limnothlypis swainsonii*) surveys – This survey was not selected as it is expected that this species would be detected during breeding bird surveys if present on the Refuge. If Swainson's warbler was present and chosen as a focal species for development of forest management actions, an additional survey would be added if needed.

Point source contamination – This survey was considered due to concerns regarding prior discharges from the Okmulgee Sewage Treatment Facility and CPKelco plants. However, this survey was not selected because prior discharges did not fall under the Refuge or USFWS jurisdiction. As such, monitoring would fall under the jurisdictions of ODEQ and ODWC.

Wood duck (*Aix sponsa*) nest success – This survey was not selected because data is not currently being used by the Refuge or being requested by MBMO.

Baseline botanical inventory and plant collection – This survey was not selected because this is an I&M funded project that will be completed in FY14.

V. Appendix A. Simple Multi-Attribute Rating Technique (SMART tool) criteria used to prioritize surveys

- 1) **Station purpose:** Does the survey provide information to evaluate if the station is achieving its purpose(s)?
- 2) **Other legal mandates:** Does the survey provide information to evaluate whether or not the station is addressing legal mandates besides refuge purposes such as Biological Integrity, Diversity, and Environmental Health (BIDEH); NWR Resources of Concern (e.g., migratory birds, anadromous fishes, marine mammals); maintaining water rights; and compatibility of refuge uses especially wildlife-dependent recreation?
- 3) **Large investment in management actions:** Does the survey inform whether or not the station is achieving one or more CCP, HMP, or other management plan objectives involving management actions requiring substantial expenditure of funding and staff time?
- 4) **Controversy:** Does the survey support decision making to assess a suspected or known controversial refuge management action, refuge use, or species?
- 5) **Known or suspected threats:** Will the survey provide information to potentially reduce the duration of the threat(s) to the station, cost to the station due to those threat(s), or effect station resources of concern due to those threat(s) during the current or future CCP planning cycles?
- 6) **Baseline data:** Does the survey provide high-priority information that contributes to baseline data needs?
- 7) **Species or vegetation community with a listing status:** Is the species or vegetation community (the focus of the survey) federally listed under ESA, state listed (threatened or endangered only), ranked by the state's natural heritage program (S1 or S2 rank only), globally ranked by NatureServe (G1 or G2 rank only), or globally listed on the IUCN Red List of Threatened Species (Critically Endangered, Endangered, or Vulnerable only)?
- 8) **FWS priorities:** Does the survey provide information that directly contributes to evaluating the status and trends of resources that are a priority for the NWRS or other FWS regional or national program (e.g., Migratory Birds, Fisheries, T&E species, Water Resources/Hydrology) or the national I&M initiative (e.g., phenology, baseline inventories, water quality)?
- 9) **Survey coverage for species or vegetation community:** What proportion (%) of the species' (sub) population or vegetation communities' geographic range under U.S. jurisdiction will be covered by the survey on the station?
- 10) **Survey utility:** How many station CCP, HMP, or other management plan objectives can be evaluated by the survey?
- 11) **Survey leveraging:** Is the survey conducted or integrated with one or more other surveys? Applies to multiple stations and/or on/off refuge property.
- 12) **FWS partners:** Does the survey address high or medium priorities of relevant Landscape Conservation Cooperatives (LCC), state agencies, or other conservation partners?
- 13) **Cooperative surveys:** At what scale does the survey most benefit the science information needs required for resource management?
- 14) **Survey duration:** Over what time scale will the objective(s) addressed by the survey need to be evaluated?

- 15) **Cost of data collection, analysis, and reporting:** What is the cost (e.g., staff time, contractor cost, equipment, sample analysis/processing, annual funding) for survey design, implementation, data management, data analysis, and reporting?
- 16) **Data analysis:** Are the survey data analyzed for use at the station level?
- 17) **Data use:** Are the survey results reported and used to inform current and future management decisions?

Deep Fork NWR - Condition Summary Table



Resource Category	Vital Sign	Indicator	Current Condition	Desired Condition	Within Desired Condition?
Focal Species	white-tailed deer	abundance		TBD	TBD
		sex/age ratio		TBD	TBD
		genetic diversity		TBD	TBD
	American burying beetle	presence/absence	Present on 50% of survey area	TBD	TBD
	landbirds, migratory and upland (breeding)	species richness and diversity		TBD	TBD
		density (key species e.g., Blue-gray Gnatcatcher, Yellow-billed Cuckoo, Indigo Bunting, Northern Bobwhite)		TBD	TBD
Focal Habitats	bottomland hardwood forest	oak regeneration		TBD	TBD
		tree species composition (diversity, richness, evenness)		TBD	TBD
		basal area		TBD	TBD
		vegetation structure		TBD	TBD
	post oak savannah	vegetation structure		TBD	TBD
		canopy cover		TBD	TBD
		woody vegetation encroachment (i.e., area of plum, winged elm)		TBD	TBD
	native grassland	woody vegetation encroachment (i.e., area of plum, winged elm)		TBD	TBD
		herbaceous vegetation to brush ratio		TBD	TBD
		Vegetation coverage (% cool season grass: % warm season grass: % forbes)		TBD	TBD
	Deep Fork river	Water quality (focus on nutrients levels shown to effect native freshwater mussels)		TBD	TBD

yellow highlighted cells are Oaks and Prairies JV priorities

TBD = to be determined

Column Headings and Priority as determined by Inventory and Monitoring Plan.

Vital Rate = Measure of vital rate
Indicator = The natural or abiotic resource for which the refuge is managed
Current Condition = The feature monitored to assess success of resource management
Desired Condition = Values obtained from surveys that measure the indicator