Great River & Clarence Cannon National Wildlife Refuges Inventory and Monitoring Plan

May 2013

Cover Photo: Clarence Cannon NWR. Photo by Mick Hanan, U.S. Fish and Wildlife Service .

Great River and Clarence Cannon National Wildlife Refuges Inventory and Monitoring Plan[1]

I. Signatures

Action	Signature /Printed Name	Date
Prepared By:	Mick Hanan (I&M Refuge Biologist)	5/7/13
Submitted By:	Jason Wilson (Project Leader)	5/7/2013
Reviewed By:	Kevin Foerster (Refuge Supervisor)	5/8/13
Reviewed By:	Melinda Knutson (Regional I&M Coordinator)	5/9/13
Reviewed By:	Pat Heglund (Regional Refuge Biologist/DBR Division Chief)	5/9/13
Approved By:	Charlie Blair (Regional Chief)	5/9/13

[1] Version dated 31 January 2013

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II. Plan

A. Introduction

The mission of the Service, the mission of the National Wildlife Refuge System (NWRS), the refuge purpose, and a variety of management strategies drives the need for inventory and monitoring efforts at individual refuges. Management decisions are made at a variety of scales. In an effort to answer the questions that arise at these management scales; monitoring efforts must also be conducted at similar scales. Many surveys are conducted at refuges to attribute to a monitoring effort at the regional, flyway, or national scale. These surveys are important to continue so that information needs are met to develop the "big picture." Monitoring is needed at the refuge to evaluate habitat strategies, techniques, and land use practices as discussed in the Habitat Management Plan (HMP). When possible surveys should be scalable to provide information at the refuge management unit level and attribute to the largest scale possible. Information collected can provide early warning of problems in the systems and/or a foundation for future management decisions. This information can also provide measures of accountability and assist in prioritization of resources. Service policy on refuges (701 FW 2) is to (1) collect baseline information on plants, fish, and wildlife, (2) monitor, as resources permit, critical parameters and trends of selected species and species groups on and around Service units, and (3) base management on biologically and statistically sound data derived from such inventory and monitoring. When operating with limited budgets and personnel, the monitoring program on refuges should focus on a few reliable surveys designed to evaluate and improve specific management actions.

In order to prioritize inventory and monitoring efforts, management concerns were developed during the HMP process. This plan is a step-down from the HMP and the timeline of this document should correspond with the life span of the HMP. The goal of this plan is to set direction for inventory and monitoring at the station to evaluate habitat and corresponding wildlife use to management strategies and techniques. Focal species were identified through the Mark Twain Complex Comprehensive Conservation Plan (CCP) and further modified in the HMP to better fit the goals and objectives of Great River and Clarence Cannon NWRs. The HMP has designated priority habitats and resources of concern to guide the implementation of inventory and monitoring efforts to complete all aspects of the principles that drive SHC. SHC incorporates five key principles in an ongoing process that changes and evolves over time to insure we are putting the right conservation in the right places at the right time. The following is a list of those principles and the steps to accomplish each principle in relation to Great River and Clarence Cannon NWRs:

- ***Biological planning (setting targets)***
  - Mark Twain National Wildlife Refuge Complex CCP
- ***Conservation Design (developing a plan to meet the goals)***
  - Great River and Clarence Cannon HMP
- ***Conservation Delivery (implementing the plan)***
  - Habitat management strategies and techniques set forth in Great River and Clarence Cannon HMP put into motion
- ***Monitoring and Adaptive Management (measuring success and improving results through informed delivery)***
  - Great River and Clarence Cannon IMP

- ***Research (increasing our understanding)***
  - Great River and Clarence Cannon IMP & cooperative research opportunities with other agencies and universities

Guilds at Great River and Clarence Cannon NWRs include shorebirds, marshbirds, waterfowl, grassland birds, and forest birds. The resources to be inventoried and monitored are laid out in the resources of concern from the HMP. Focal species should be used to represent a suite or guild of species and relate species use to these resources. Habitats at Great River and Clarence Cannon NWRs, according to habitat classifications use designations developed by Nelson (2005), include large riverine, marsh riverine wetland, marsh riverine wetland (moist-soil units), shrub swamp riverine wetland, mesic bottomland forest, wet bottomland forest, riverfront forest, mesic bottomland woodland, wet-mesic bottomland woodland, wet-mesic bottomland prairie, and wet bottomland prairie. Surveys conducted should be developed to assess management techniques and strategies for providing these habitats and use of these habitats by focal species identified in the HMP as resources of concern. Stratified surveys should be conducted in these habitats for species of concern related to habitat stratification. When possible, survey techniques should be standardized for compatibility across a variety of scales.

Long-term databases from monitoring activities for many years are highly valuable but timelines for monitoring needs should be established and revisited to refrain from becoming something that is done because it has always been done in the past. If information obtained from monitoring is no longer needed then monitoring activities should cease. When possible, monitoring efforts should cooperate with partner agencies and inventories completed by other agencies should be used for data needs instead of developing new surveys.

This plan documents the inventory and monitoring surveys that will be conducted at Clarence Cannon and Great River National Wildlife Refuges from 2013 through 2028, or until the refuge's Comprehensive Conservation Plan (CCP) and Habitat Management Plan (HMP) are revised. The majority of surveys considered in this plan address resource management objectives identified in the HMP (2012) for this refuge. Other surveys are a continuation of past monitoring conducted for the purpose of understanding long-term trends in specific resources or are part of regional and national survey efforts. Great River and Clarence Cannon NWRs were established as stopover points for migratory birds with an emphasis on waterfowl and other waterbirds (see HMP for purpose statements). Thus, the focus of monitoring efforts is to assess the response of various guilds of migratory avian species to management of habitats at the Refuges.

B. Methods and rationale used to develop the inventory and monitoring plan, prioritize, and select surveys

Structured decision making was used to identify what is to be monitored and thresholds to trigger management action. An objective hierarchy (Appendix A) was used to display this step-down process from HMP objectives to measureable attributes and thresholds. An influence diagram (Appendix A) was used to depict interactions between objectives, decisions, chance happenings, and ultimate outcomes. Surveys were entered into the Service's Planning and Review of I&M

activities on Refuges [PRIMR] database (Appendix B) and were then ranked using a Simple Multi-Attribute Ranking Technique (SMART tool).

Station staff generated a list of anticipated surveys to gather information on refuge resources. These surveys were then assigned a priority score using 17 pre-defined criteria (Appendix B). Priority scores were used to assign the survey to one of three tiers that ranked the surveys. Tier 1 surveys are the highest priority and are projected to be completed with existing staff and resources. Tier 2 surveys are ranked as second priority or are high priority surveys that will require an increase in operational resources (staff or funding). Tier 3 surveys are lower priority surveys or surveys that are projected to require a major reallocation of operational resources.

The priority ranking of surveys was determined during a one-day (February 2012) meeting at Great River NWR office. Project Leader Jason Wilson, Wildlife Refuge Specialist Candace Chambers, and I&M Refuge Biologist Mick Hanan, met with Region 3 Zone Biologists Sean Blomquist and Brian Loges to prioritize, and select the surveys. Background information for each survey was summarized in advance by the I&M Refuge Biologist and briefly discussed prior to prioritizing the surveys. The 17 criteria, assignment rules, weighting and score calculation process followed a draft version of the *Criteria for Prioritizing Surveys Entered into the PRIMR Database* (Appendix B). The Refuge staff made all decisions required to produce the survey priority scores (Appendix C) and assign surveys to tiers (Tables 1-3). This meeting was the first such meeting conducted in Region 3 and nationally and served as a beta test of the process. Refinements were made to the process based on lessons learned during the meeting.

C. Narratives of Selected Surveys

The prioritization process identified 7 surveys to be completed for the duration of this Inventory and Monitoring Plan (IMP) (Tables 1 and 2). Narratives justifying each survey selected for implementation are provided in Appendix D, Survey Profiles.

Table 1. Surveys That Can Be Conducted With Current Resources

The surveys in this section are needed to support high priority station HMP objectives, national survey efforts or other high priority plans (e.g. Recovery Plans), to evaluate the effectiveness of major or costly management actions, or to assess and address major threats to the biological integrity, diversity, or environmental health of the refuge. To properly design the top 3 surveys annually, collect data, enter data into the proper database, analyze data, report on the findings, and archive the report adds up to around 775 hours annually. Considering all other duties assigned to a biologist there is little time to conduct other surveys without additional staff and/or resources. The other four surveys chosen to be implemented/continue take little staff time or financial obligation.

Name	Priority	Rationale
• Integrated Waterbird Management and Monitoring	1.1	This survey collects habitat and bird use information to assess waterbird management as described in the Refuge's purpose, CCP, and HMP. This is a time-consuming and costly survey but is important to the successful management of the Refuge.
• Invasive Species and moist soil management vegetation monitoring	1.2	This survey addresses one of the major threats facing the refuge – invasive plants. This information is important for the Refuge to assess the success of a large percentage of management actions at the Refuge. When combined with information on bird use collected through IWMM and Marshbird Monitoring the data from this survey can provide information to use SHC to better manage for the purpose and objectives of the Refuge.
• National Marsh Bird Monitoring and Research Program	1.3	This survey addresses bird use information to assess waterbird management as described in the Refuge's purpose, CCP, and HMP. When combined with information collected on habitat through IWMM and Vegetation Monitoring the data from this survey can provide information to use SHC to better manage for the purpose and objectives of the Refuge.
• FWS Mid-Winter Waterfowl Survey	4.1	Inexpensive, small staff time contribution, contributes to landscape scale objectives
• Audubon Christmas Bird Count	4.2	Inexpensive, small staff time contribution, contributes to landscape scale objectives
• North American Amphibian Monitoring Program	4.3	Inexpensive, small staff time contribution, contributes to landscape scale objectives
• FWS Duck Banding	4.4	Inexpensive, small staff time contribution, contributes to landscape scale objectives

Table 2. Surveys to be Conducted with Expected Additional Resources

None

D. List of Future (Unselected) Surveys

Six other surveys (listed below) were included in the prioritization process but not selected for implementation. Resources for conducting these surveys were not immediately available and not expected during the life of the IMP. One survey (sediment deposition) is not being considered for implementation at this time.

Name	Priority	Rationale
• Elevation Data	2.1	Elevation data are needed to provide baseline data and to coincide with data analysis and modeling for other surveys. Currently, this information is available and stored on the server at the station for all three divisions of Great River NWR but is not available for Clarence Cannon NWR. This survey is a secondary priority tier because of the high cost of the data. LiDAR data are being collected across the nation. Therefore, if this survey is conducted by another agency or interest group the station may only need to acquire the information after it has been processed.
• Grassland Bird Inventory	3.1	Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.
• Bat Presence Inventory - Automated Recording Device	3.2	Indiana bat presence data are a high priority but costly. Data collection using automated recording units allows staff to collect a large amount of data with little effort and in a short amount of time. Analysis of recorded data to identify species is improving but can be costly.
• Forest Bird Presence Inventory	3.3	Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.
• Forest Inventory	3.4	Forest inventory data are costly and time consuming to collect. Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.
• Pollinator Monitoring	5.1	Does not address current CCP or HMP objectives.
• Sediment Deposition Monitoring	Not ranked	Sediment deposition arises from sources outside the refuge and is therefore outside the local manager's control. Opportunities may exist to work with partners and adjacent landowners to address this problem in the future. The U.S. Army Corps of Engineers (USACE) is currently exploring the potential to implement an enhancement project (HREP) that would reduce sedimentation to the refuge and will conduct surveys applicable to Goal 4 Objective B.

III. Summary Tables

Table 3. Summary of Prioritized Surveys. Blue shading indicates surveys selected for implementation 2013—2028.

Station Name: Clarence Cannon National Wildlife Refuge **Cost Center Code: FF03RCAN00**

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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	FF03RCAN00-013	Integrated Waterbird Management and Monitoring (IWMM) Surveys	M	Current	HMP / 1.C, 7.B, 1.B, 3.C, 3.D, 7.D, 1.A	Multiple management units: MSUs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, Goose Pasture, Big Pond, Supply Pond, Rabourn Slough, Buttonbush Pond, Crane Pond, Rabbit Ears, Display Pond	FWS: 0.06, Other: 0.23	$1,500.00	Weekly to bi-weekly August to June/ Recurring -- every year	2010-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
2	FF03RCAN00-025	Invasive Species and Moist-Soil Management Vegetation Monitoring	M	Current	HMP / 7.A, 3.B, 1.C, 1.B, 3.C, 3.F, 3.D, 1.A	Multiple management units: MSUs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, Goose Pasture, Big Pond, Supply Pond, Rabourn Slough, Buttonbush Pond, Crane Pond, Rabbit Ears, WM-1, F-14, 14A, 14B, 14C, 15, 16, and 25.	FWS: 0.08, Other: 0.05	$0.00	August-September/ Recurring -- every year	2012-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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]
3	FF03RCAN00-009	National Marsh Bird Monitoring and Research Program	CM	Current	HMP / 1.C, 7.B, 1.B, 3.C, 3.D, 7.D, 1.A	Multiple management units: MSUs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, Goose Pasture, Big Pond, Supply Pond, Rabbit Ears	FWS: 0.06	$0.00	April 15-June 31 with surveys occurring 3 times throughout the spring early summer in accordance with the national protocol./ Recurring -- every year	2003-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
4	FF03RCAN00-026	Elevation Data	I	Future	HMP / 5.B, 2.B, 4.B, 7.D, 7.A, 1.C, 5.A, 7.B, 1.B, 3.C, 2.A, 3.D, 1.A	Entire station	FWS: 0.06	$10,000.00	Occurs one time only	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
5	FF03RCAN00-027	Grassland Bird Inventory	BM	Expected	HMP / 5.B, 3.B, 7.B, 3.A, 3.C, 7.D	Entire station	FWS: 0.03, Other: 0.11	$1,500.00	May-July/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions 1.0 Melinda G Knutson; Nick P Danz; Todd W Sutherland; Brian R Gray	National Approved
6	FF03RCAN00-028	Bat Presence Inventory - Automated Recording Device	I	Future	HMP / 5.B, 7.B, 2.B, 2.A, 7.D	Entire station	FWS: 0.01	$15,000.00	June-July/ Occurs one time only	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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]
7	FF03RCAN00-029	Forest Bird Presence Inventory	BM	Expected	HMP / 5.B, 3.B, 7.B, 3.A, 3.C, 7.D	Entire station	FWS: 0.03, Other: 0.11	$1,500.00	June-July/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions 1.0 Melinda G Knutson; Nick P Danz; Todd W Sutherland; Brian R Gray	National Approved
8	FF03RCAN00-030	Forest Inventory	CB	Future	HMP / 7.A, 5.B, 5.A, 2.B, 2.A, 7.D	Entire station	FWS: 0.02, Other: 0.02	$6,500.00	Summer/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
9	FF03RCAN00-021	FWS Mid-Winter Waterfowl Survey	CB	Current	HMP / 7.B, 7.D	Entire station	FWS: 0.01	$0.00	One day during a two week window in the beginning of January/ Recurring -- every year	1964-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
10	FF03RCAN00-022	Audubon Christmas Bird Count	CB	Current	HMP / 5.B, 7.B, 7.D	Entire station	FWS: 0.0, Other: 0.01	$0.00	One day annually/ Recurring -- every year	2001-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
11	FF03RCAN00-016	North American Amphibian Monitoring Program (States)	CB	Current	HMP / 1.C, 7.B, 1.B, 3.C, 3.D, 7.D, 1.A	Entire station	FWS: 0.02	$0.00	Three surveys are conducted in the spring and summer with the first between Mar. 8-Apr. 7, the second between Apr. 22 - May 22, and the third between Jun. 7-July 7./ Recurring -- every year	1995-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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]
12	FF03RCAN00-014	FWS Duck Banding	CM	Current	HMP / 5.B, 7.B, 7.D	Multiple management units: MSU 9 and Raebourn Slough; usually just MSU 9	FWS: 0.01, Other: 0.01	$0.00	September/ Recurring -- every year	2002-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
13	FF03RCAN00-031	Pollinator Monitoring	BM	Future	HMP / 7.A, 5.B, 7.B	Entire station	FWS: 0.01, Other: 0.06	$10,000.00	May to September/ Recurring -- every year	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(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, Future).
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 (1 work year = 2080 hours = 1 FTE).
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: Scale of intended use (Local, Regional, or National) and stage of approval (Initial Survey Instructions, In Development, In Review, or Approved) of the survey protocol

Station Name: Great River National Wildlife Refuge **Cost Center Code: FF03RGRR00**

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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	FF03RGRR00-028	Integrated Waterbird Management and Monitoring (IWMM) Surveys	M	Current	HMP / 3.D, 7.D, 1.A, 7.B, 3.C, 1.C, 1.B	Multiple management units: Cattail Marsh, Upper Swan Lake, Lower Swan Lake, Rick's Unit, Shoveler Marsh, and Hanei Marsh	FWS: 0.06, Other: 0.23	$1,500.00	Weekly to bi-weekly August to June/ Recurring -- every year	2010-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
2	FF03RGRR00-030	Invasive Species and Moist-Soil Management Vegetation Monitoring	M	Current	HMP / 3.D, 3.B, 1.A, 3.F, 7.A, 3.C, 1.C, 1.B	Multiple management units: Cattail Marsh, Lower Cattail Marsh, Shoveler Marsh, Hanei Marsh, Flake Hole, 3, 12, 14A, 14B, 14C, 14D, Rick's Unit (15A), and 19.	FWS: 0.08, Other: 0.05	$0.00	August-September/ Recurring -- every year	2012-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
3	FF03RGRR00-029	National Marsh Bird Monitoring and Research Program	CM	Current	HMP / 3.D, 7.D, 1.A, 7.B, 3.C, 1.C, 1.B	Multiple management units: Cattail Marsh, Upper Swan Lake, Lower Swan Lake, Rick's Unit, Shoveler Marsh, and Hanei Marsh	FWS: 0.02	$0.00	April 15-June 31 with surveys occurring 3 times throughout the spring early summer in accordance with the national protocol./ Recurring -- every year	2003-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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]
5	FF03RGRR00-031	Grassland Bird Inventory	BM	Future	HMP / 3.B, 5.B, 7.D, 3.A, 7.B, 3.C	Entire station	FWS: 0.03, Other: 0.11	$1,500.00	May-July/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions 1.0 Melinda G Knutson; Nick P Danz; Todd W Sutherland; Brian R Gray	National Approved
6	FF03RGRR00-032	Bat Presence Inventory - Automated Recording Device	I	Future	HMP / 5.B, 7.B, 2.B, 2.A, 7.D	Entire station	FWS: 0.03	$15,000.00	June-July/ Occurs one time only	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
7	FF03RGRR00-039	Forest Bird Presence Inventory	BM	Future	HMP / 5.B, 3.B, 7.B, 3.A, 3.C, 7.D	Entire station	FWS: 0.03, Other: 0.11	$1,500.00	June-July/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	Landbird Monitoring Protocol for the U.S. Fish and Wildlife Service, Midwest and Northeast Regions 1.0 Melinda G Knutson; Nick P Danz; Todd W Sutherland; Brian R Gray	National Approved
8	FF03RGRR00-035	Forest Inventory	CB	Future	HMP / 5.A, 2.B, 2.A, 5.B, 7.D, 7.A	Entire station	FWS: 0.07, Other: 0.06	$6,500.00	Summer/ Recurring -- every five years	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority[0]	Survey ID Number[1]	Survey Name[2]	Survey Type[3]	Survey Status[4]	Mgmt. Objective 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]
9	FF03RGRR00-038	FWS Mid-Winter Waterfowl Survey	CB	Current	HMP / 7.B, 7.D	Entire station	FWS: 0.01	$0.00	One day during a two week window in the beginning of January/ Recurring -- every year	2011-Indefinite	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
10	FF03RGRR00-037	Audubon Christmas Bird Count	CB	Current	HMP / 5.B, 7.B, 7.D	Entire station	FWS: 0.0, Other: 0.01	$0.00	One day annually/ Recurring -- every year	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(none)	Initial Survey Instructions
13	FF03RGRR00-036	Pollinator Monitoring	BM	Future	HMP / 5.A, 7.B, 7.A	Entire station	FWS: 0.01, Other: 0.175	$20,000.00	May to September/ Recurring -- every year	Future/TBD-Future/TBD	Mick Hanan, Wildlife Biologist	(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, Future).
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 (1 work year = 2080 hours = 1 FTE).
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: Scale of intended use (Local, Regional, or National) and stage of approval (Initial Survey Instructions, In Development, In Review, or Approved) of the survey protocol..

Table 4. Estimated Annual Budget for Implementing the IMP. FTE expense calculated at an annual cost of $100,000 and seasonal expense calculated at an annual cost of $40,000 with a maximum annual hours of 2,080.

Survey	Priority	Staff Time (hours) FTE/Seasonal	Expenses	Total Cost	Status
IWMM	1.1	260/936	$3,000	$33,500	Current
Inv. Species and Moist-Soil Mgmt Veg. Monitoring	1.2	345/208	$0	$20,586	Current
National Marsh Bird Monitoring and Research Program	1.3	168/0	$0	$8,077	Current
Elevation Data	2.1	118/0	$10,000	$15,673	Future
Grassland Bird Inventory	3.1	128/450	$3,000	$17,808	Expected
Bat Presence Inventory - ARU	3.2	80/0	$30,000	$33,847	Future
Forest Bird Presence Inventory	3.3	128/450	$3,000	$17,808	Expected
Forest Inventory	3.4	191/166	$13,000	$30,164	Future
FWS MWW Survey	4.1	13/0	$0	$625	Current
Audubon Christmas Bird Count	4.2	2/0	$0	$96	Current
North American Amphibian Monitoring Program	4.3	33/0	$0	$1587	Current
FWS Duck Banding	4.4	10/0	$0	$500	Current
Pollinator Monitoring	5.1	62/465	$40,000	$52,307	Future
				Estimated Current Budget	**$64,971**

Table 5. Annual Calendar of Survey Activities

PRIORITY	SURVEY IDENTIFICATION NUMBER	SURVEY NAME	FREQ. OF SURVEY	JAN[1]		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
1.1	FF03RGRR00-001	Integrated Waterbird Management and Monitoring	Annual	F	F	F	F	F	F	F	F	F	F	F A	F A			P	P	F	F	F	F	F	F	F	F
				F	F	F	F	F	F	F	F	F	F	R	R			F	F	F	F	F	F	F	F	F	F
1.2	FF03RGRR00-002	Invasive Species and Moist-soil Management Vegetation Monitoring	Annual			R												P		F	F					A	A
																				F	F						
1.3	FF03RGRR00-003	National Marsh Bird Monitoring and Research Program	Annual/Bi-Annual			P						F	F			A	A										
										F	F	F	F			R											
4.1	FF03RGRR00-009	FWS Mid-Winter Waterfowl Survey	Annual	F R																							
4.2	FF03RGRR00-010	Audubon Christmas Bird Count	Annual																								
																										P F	
4.3	FF03RGRR00-011	North American Amphibian Monitoring Program Survey	Annual						F					F													
											F						R										
4.4	FF03RGRR00-012	FWS Duck Banding	Annual																	F	F R						
																			P								

[1]Identify Survey Activity: P=Planning (Design and training), F=Field Work, A=Analysis, R=Reporting (Includes Reporting and Archiving)

Table 6. Estimated multi-year work schedule, 2013-2017.

Protocol	2013	2014	2015	2016	2017
All Surveys are conducted annually	X	X	X	X	X

IV. Revising the IMP

The IMP will be revised according to the I&M Policy and as CCP and HMP plans are modified (see Revision Signature Page, Appendix D). Amendments related to the assignment of new or updated protocols without changes to the ranked survey list will not require signatures. Revisions requiring a reevaluation of ranked surveys (survey additions or removals) will require signatures from refuge staff, Regional I&M staff, Regional Refuge Biologist/Natural Resources Division Chief (Figure 3), but not the Refuge Supervisor or Regional Chief of Refuges.

V. References

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VI. Appendices

Appendix A. Objective Hierarchy and Influence Diagram

This appendix contains additional information beyond the standard IMP that is pertinent for the station to transparently identify the monitoring needs of the refuge. In some instances it was necessary to take the objectives from the HMP a step further to identify qualitative measurable attributes and thresholds that would trigger management action; therefore, an objective hierarchy was created to follow the objective from the station purpose and responsibility to the ending attribute or threshold. This hierarchy does not replace any objectives from the HMP but further refines them for the needs of this plan. An influence diagram depicts management techniques available to achieve objectives and the chance happenings influencing the outcomes of those techniques. Refuge staff will need to rely on information from other agencies and sources to make management decisions for those habitats that are not included in the list of implemented surveys.

National Wildlife Refuge System Fundamental Goal – To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Station Fundamental Goal – To the best of our ability, restore function of refuge lands to conditions that existed prior to recent human disturbance.

Fundamental Goal – Maximize biological integrity, diversity, and environmental health of resources

Fundamental Objective 1 – Maximize quality and diversity of habitats

Means Objective 1.1.0 – Maximize quality of wetland and aquatic habitats

Means Objective 1.1.1 – Provide a diversity of water regimes

Measurable Attribute 1.1.1 A – Provide temporary, seasonal, semi-permanent, and permanently flooded wetlands in leveed areas.

- 3 year average (+/- 10%) of ≥ 2,835 acres seasonal/temporary
- 3 year average (+/- 10%) of ≥ 291 acres semi-permanent
- 3 year average (+/- 10%) of ≥ 55 acres permanently flooded
- Begin monitoring using GIS tools in 2013 and continue to monitor for the lifetime of the HMP

Measurable Attribute 1.1.1 B – Provide isolated backwater and ephemeral wetlands in unleveed areas

- 3 year average (+/- 10%) of ≥ 62 acres
- Begin monitoring using GIS tools in 2013 and continue to monitor for the lifetime of the HMP

Measurable Attribute 1.1.1 C – Provide contiguous backwater and side channel habitat in unleveed areas

- 3 year average (+/- 10%) of ≥ 2,093 acres
- Begin monitoring using GIS tools in 2013 and continue to monitor for the lifetime of the HMP

Means Objective 1.1.2 – Sustain to increase species diversity and quality of annual and perennial vegetation in moist soil units (MSUs)

Measurable Attribute 1.1.2. A – Index of species diversity

- Relative cover and frequency for an "Importance Value"
- Begin monitoring using invasive species and moist-soil management vegetation monitoring and/or IWMM in 2013 and continue to monitor for the lifetime of the HMP
- Species Richness Threshold – ≥ 8 Species
- Diversity Threshold – 30/70 ratio of annuals and perennials

*(Apply mgmt action if outside any of the thresholds)

Measurable Attribute 1.1.2. B – Importance Value can be combined with a categorical measure for plant quality (0-3 or non, low, medium, high)

- Index of quality plants
- Begin monitoring using invasive species and moist-soil management vegetation monitoring and/or IWMM in 2013 and continue to monitor for the lifetime of the HMP
- Quality Threshold – Combined value score of ≥ 3.5

*(Apply mgmt action if outside any of the thresholds)

Means Objective 1.1.3 – Minimize nuisance species

Measurable Attribute 1.1.3. A – Index of species diversity

- Relative cover and frequency for an "Importance Value"
- Begin monitoring using invasive species and moist-soil management vegetation monitoring and/or IWMM in 2013 and continue to monitor for the lifetime of the HMP
- Nuisance Species Threshold – Use NRCS 2007 publication.
    - Aster (*Symphyotrichum spp*.) – ≤ 20% Cover
    - American Lotus (*Nelumbo lutea*) – ≤ 5% Cover
    - Boneset (*Eupatorium serotinum*) – ≤ 20% Cover
    - Broomsedge (*Andropogon virginicus*) – ≤ 30% Cover
    - Threesquare Bulrush (*Scirpus americanus*) – ≤ 40% Cover
    - Burreed (*Sparganium americanum, S. androcladum, S. eurycarpum*) – ≤ 50% Cover
    - Buttonbush (*Cephalanthus occidentalis*) – ≤ 20% Cover (Except in backwater slough areas)
    - Cattail (*Typha spp*.) – ≤ 20% Cover
    - Cocklebur (*Xanthium strumarium*) – ≤ 10% Cover
    - Goldenrod (*Solidago spp*.) – ≤ 20% Cover
    - Knotgrass (*Paspalum distichum*) – ≤ 5% Cover
    - Morning Glory (*Ipomoea spp*.) – ≤ 15% Cover
    - Pigweed (*Amaranthus spp*.) – ≤ 40% Cover
    - Common Ragweed (*Ambrosia artemisiifolia*) – ≤ 25% Cover
    - Redvine, Ladies' Eardrops, Buckwheat Vine (*Brunnichia cirrhosa*) – 10% Cover
    - Common Reed, Phragmites (*Phragmites australis*) – ≤ 5% Cover
    - Rose Mallow (*Hibiscus moscheutos* and *H. laevis*) - ≤ 10% Cover
    - Rushes (*Juncus spp*.) – ≤ 40% Cover
    - Sedges (*Carex spp*.) – ≤ 65% Cover
    - Sesbania, Hemp Sesbania, Coffeeweed (*Sesbania macrocarpa*) – ≤ 5% Cover
    - Perennial Smartweeds (*Polygonum spp*.) – ≤ 30% Cover
    - Spatterdock, Yellow Cowlily (*Nuphar luteum*) – ≤ 5% Cover
    - Large Spikerush (*Eleocharis spp*. except *Eleocharis obtuse*) – ≤ 10 % Cover
    - Sumpweed, Annual Marshelder (*Iva annua*) – ≤ 10% Cover
    - Swamp Milkweed (*Asclepias incarnate*) – ≤ 20% Cover
    - White Sweetclover (*Melilotus alba*) – ≤ 70% Cover
    - Teaweed, Prickly Sida, Prickly Mallow, Prickly Fanpetals (*Sida spinosa*) – ≤ 10% Cover
    - Trumpet Creeper (*Campsis radicans*) – ≤ 5% Cover
    - Water Primrose, Primrose Willows, Seedboxes (*Ludwigia spp*.) – ≤ 20% Cover
    - Willows (*Salix spp*.) – ≤ 10% Cover

*Indicators used in spring to determine need for management technique prior to flood-up in fall.

Measurable Attribute 1.1.3. B – Percent invasive/nuisance species.

- Relative cover and frequency for an "Importance Value"
- Maintain invasive below 5% relative cover and frequency per management unit (0.1 Importance Value)
- Begin monitoring using invasive species and moist-soil management vegetation monitoring and/or IWMM in 2013 and continue to monitor for the lifetime of the HMP

Means Objective 1.2.0 – Maximize quality of forested habitats

Means Objective 1.2.1 – Maximize block size and spatial distribution of floodplain forest along river corridor

Measurable Attribute 1.2.1 A – Provide corridors and contiguous blocks of floodplain forest habitats

- Maintain 3 year average (+/- 10%) of ≥ 8,651 acres of floodplain forest along river corridor
- Restore 676 acres (35 Acres Cattail Marsh of Delair Division) of floodplain forest along river corridor
  - By 2027

Means Objective 1.2.2 – Maximize structural (age and species) diversity of floodplain forest

Measurable Attribute 1.2.2 A – Index of diversity for 1,680 acres existing forest

- Use forest inventory techniques to assess forest on refuge lands
  - Inventory every 5 – 10 years

Measurable Attribute 1.2.2. B – Index of diversity for 1,173 (405 acres GTR 7 to MSU 9 at Clarence Cannon NWR) acres of reforestation

- Use forest inventory techniques to assess forest on refuge lands
  - Inventory every 5 – 10 years

Measurable Attribute 1.2.2. C – Percent invasive species.

- Maintain below 5% relative cover and frequency per management unit

Means Objective 1.3.0 – Maximize quality and diversity of other natural terrestrial habitats

Means Objective 1.3.1 – Sustain to increase quality and area of native grassland/wet meadow complexes

Measurable Attribute 1.3.1. A – Index of species diversity

- Relative cover and frequency for an "Importance Value"
- Importance Value can be combined with a categorical measure for plant quality
- Thresholds for nuisance species in moist soil units pertain to grassland/wet-meadow complexes
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Measurable Attribute 1.3.1. B – Percent invasive species.

- Relative cover and frequency for an "Importance Value"
- Maintain average below 5% relative frequency per management unit
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Measurable Attribute 1.3.1 C – 3 year average (+/- 10%) of 1,010 acres (including 146 acres at Delair Division and 605 acres at Clarence Cannon NWR for levee maintenance) of grassland habitat

- Area calculated from GIS coverage layer
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Measurable Attribute 1.3.1 D – 3 year average (+/- 10%) of 685 acres of wet meadow habitat

- Relative cover and frequency for an "Importance Value"
- Importance Value can be combined with a categorical measure for plant quality
- Area calculated from GIS coverage layer
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Means Objective 1.3.2 – Sustain to increase quality and area of shrub/scrub habitat

Measurable Attribute 1.3.2 A – 3 year average (+/- 10%) of 299 acres

- Area calculated from GIS coverage layer
- Relative cover and frequency for an "Importance Value"
- Importance Value can be combined with a categorical measure for plant quality
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Means Objective 1.3.3 – Minimize coverage of agricultural row crops

Measurable Attribute 1.3.3 A – 3 year average ≤ 850 acres

- Area calculated from GIS coverage layer
- Begin monitoring in 2013 and continue to monitor for the lifetime of the HMP

Means Objective 1.4.0 – Maximize water quality

Means Objective 1.4.1 – Sustain to reduce sedimentation

Measurable Attribute 1.4.1. A – Sediment loading

- Maintain a 5 year average with a stable to downward trend
- Ability to manage sediment loading is outside the feasibility of refuge staff; therefore, no monitoring will be conducted.

Means Objective 1.4.2 – Sustain to reduce contaminants

Measurable Attribute 1.4.1. A – Parts per million

- Maintain a 5 year average with a stable to downward trend
- Ability to manage contaminants is outside the feasibility of refuge staff; therefore, no monitoring will be conducted.

Fundamental Objective 2 – Maximize migratory bird and threatened and endangered species use

Means Objective 2.1.0 – Sustain to increase use of wetland habitats by waterbirds, fish, and other wetland dependent species

Measurable Attribute 2.1.0 A – Waterfowl use days per IWMM Unit

- Mallard, blue-winged teal, wood duck, lesser scaup, canvasback
- Inventory in fall 2010/Spring 2011 using IWMM and continue to monitor for the lifetime of the HMP

Measurable Attribute 2.1.0 B – Shorebird use days per IWMM Unit

- Pectoral sandpiper, buff-breasted sandpiper
- Inventory in fall 2010/Spring 2011 using IWMM and continue to monitor for the lifetime of the HMP

Measurable Attribute 2.1.0 C – Marshbird use days per IWMM Unit where capable and trend for entire refuge

- American bittern, Virginia rail, sora, king rail
- Inventory in Spring 2013 using National Marsh Bird Monitoring and Research Program protocol and continue to monitor for the lifetime of the HMP

Means Objective 2.2.0 – Sustain to increase use of forested habitats by neotropical birds and bats

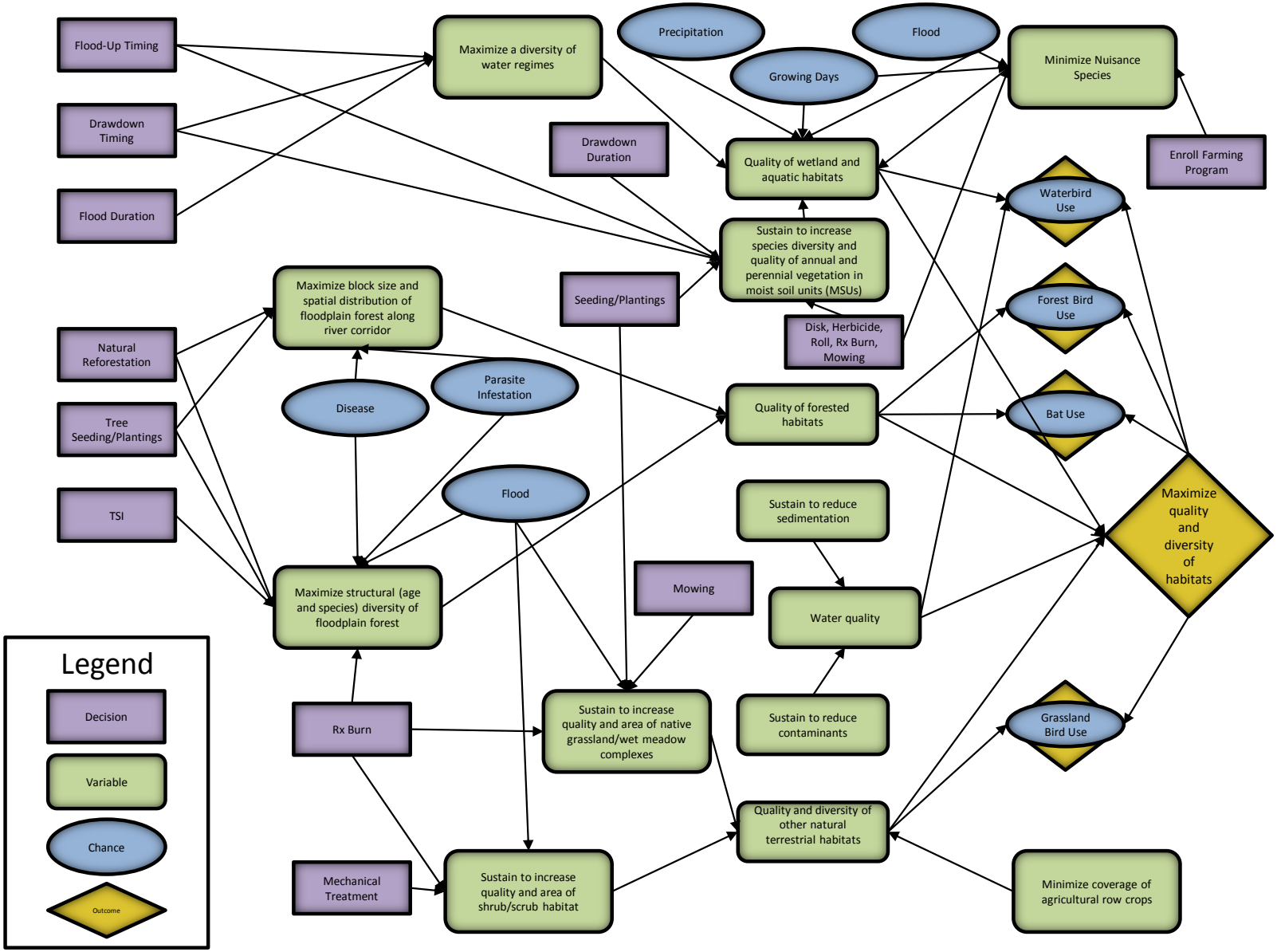
Measurable Attribute 2.3.0 A – Trends in bird numbers for neotropical forest birds

- Bald Eagle, Cerulean Warbler, Red-shouldered Hawk, Yellow-billed Cuckoo, Indiana Bat
- Begin inventory June 2013 and continue to monitor for the lifetime of the HMP

Means Objective 2.3.0 – Sustain to increase use of grassland habitats by grassland birds, waterfowl, and marshbirds

Measurable Attribute 2.2.0 A – Trends in bird numbers for neotropical grassland birds

- Blue-winged teal, American bittern, mallard, pectoral sandpiper, grasshopper sparrow
- Begin inventory June 2013 and continue to monitor for the lifetime of the HMP


Flood-Up Timing
Drawdown Timing
Flood Duration
Maximize a diversity of water regimes
Precipitation
Flood
Growing Days
Minimize Nuisance Species
Drawdown Duration
Quality of wetland and aquatic habitats
Enroll Farming Program
Waterbird Use
Sustain to increase species diversity and quality of annual and perennial vegetation in moist soil units (MSUs)
Maximize block size and spatial distribution of floodplain forest along river corridor
Seeding/Plantings
Forest Bird Use
Disk, Herbicide, Roll, Rx Burn, Mowing
Natural Reforestation
Parasite Infestation
Disease
Quality of forested habitats
Bat Use
Tree Seeding/Plantings
Flood
Sustain to reduce sedimentation
Maximize quality and diversity of habitats
TSI
Mowing
Maximize structural (age and species) diversity of floodplain forest
Water quality
Legend
Decision
Variable
Chance
Outcome
Rx Burn
Sustain to increase quality and area of native grassland/wet meadow complexes
Sustain to reduce contaminants
Grassland Bird Use
Quality and diversity of other natural terrestrial habitats
Mechanical Treatment
Sustain to increase quality and area of shrub/scrub habitat
Minimize coverage of agricultural row crops

Appendix B. Simple Multi-Attribute Ranking Technique (SMART tool) Ranking Criteria

The following 17 criteria were weighted by refuge staff at Great River / Clarence Cannon NWRs (relative values in parentheses with highest values representing criteria that are most important to refuge staff) and used to rank surveys through a Simple Multi-Attribute Ranking Technique (SMART tool). One additional criterion, Baseline Data, was included in the earlier draft ranking criteria used for beta testing at this station but was dropped from the final set.

1) **Station purpose (9.1):** Does the survey provide information to evaluate whether or not the station is achieving one or more Comprehensive Conservation Plan (CCP), Habitat Management Plan (HMP), or other management plan objectives directly related to its purpose(s)?
Note: A survey addressing wilderness character addresses purpose for a refuge with proposed or designed wilderness.
    1. No
    2. Yes

2) **Other legal mandates (8.2)**: Does the survey provide information to evaluate whether or not the station is achieving one or more CCP, HMP, or other management plan objectives directly related to legal mandates besides refuge purposes such as Biological Integrity, Diversity and Environmental Health (BIDEH); NWR Resources of Concern (e.g., migratory birds, species listed under the federal Endangered Species Act, anadromous fishes, marine mammals); and maintaining water rights?
Note: For BIDEH, only consider surveys addressing the highest measure of biological integrity on a refuge which is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions (see 601 FW 3.10). Example: Because 99% of the wet prairie habitat has been lost throughout the Willamette Valley of western Oregon, remnant prairie on WL Finley NWR represents the highest order of BIDEH on the refuge where habitat monitoring is a priority survey.
    1. No
    2. Yes

3) **High-priority management actions (9.1)**: Does the survey inform whether or not the station is achieving one or more CCP, HMP, or other management plan objectives involving high-priority management actions conducted by the station staff?
For example, if conducting wetland management actions requires considerable station staff time and funding annually, then surveys that track response of vegetation and waterfowl to those wetland management actions could be considered a high priority.
    1. No
    2. Yes

4) **Controversy (9.1)**: Does the survey support decision making to assess a suspected or known controversial refuge management action or refuge use?
Note: These terms are defined in the appendix. Examples of suspected or known controversial refuge management actions include mammalian predator control and use of pesticides. Examples of suspected or known controversial refuge uses (recreational and economic) are establishing new close areas from waterfowl hunting, use of genetically modified crops, and livestock grazing.
    1. No
    2. Yes

5) **Known or suspected threats (6.6):** 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?

Examples of known or suspected threats include the following: proposed water withdrawal within the station's watershed, a new invasive species, impacts of proposed development, and combinations of threats like increased fire cycles promoting invasive species.

1. The survey does not address threat(s).
2. Low: The survey potentially informs 1 of 3 factors (duration, cost, or effect on resources).
3. Medium: The survey potentially informs 2 of 3 factors (duration, cost, or effect on resources).
4. High: The survey potentially informs all 3 factors (duration, cost, and effect on resources).

6) **Baseline data:** Does survey provide baseline data for future monitoring?
   1. No
   2. Yes
7) **Species or vegetation community non-federal listing status (6.4)**: Is the species or vegetation community (the focus of the survey) 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)?
   Note: Federally listed species are accounted for under criterion #2 so they should not be considered here. Example: Survey to inventory small mammals on the refuge where one or more of the species likely or suspected to be found is state or globally listed. Surveys of abiotic factors affecting state listed or globally ranked species should be considered under this criterion. Example: Monitoring water quality parameters in refuge wetlands inhabited by state-listed aquatic birds to assess potential effects to avian species.
   1. Not listed
   2. State listed or ranked by state's natural heritage program
   3. Globally listed

8) **FWS priorities (6.8):** 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) or the national I&M initiative (e.g., phenology)?
   Examples: North American Breeding Bird Survey, Woodcock Singing Ground Counts, North American Amphibian Monitoring Program, Mid-Winter Waterfowl Survey, and Circumpolar Biodiversity Monitoring Network are surveys which are priorities for regional or national FWS programs.
   1. No
   2. Yes

9) **Survey coverage for species or vegetation community (3.5):** 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?
   Example 1: 75% of Laysan Albatross population nest on Midway NWR. Conducting a survey to monitor the breeding population size on the refuge would cover >25% of the entire species' population.
   Note: Surveys of abiotic factors affecting these species or vegetation communities should also be considered for this criterion. Example 2: 60% of the wintering waterfowl in the Pacific Flyway use wetlands in the Central Valley of California including the San Luis NWRC. Monitoring water levels by reading staff gauges weekly from October to March in managed wetlands is an important abiotic survey to indicate if there are sufficient acres of suitable foraging habitat to support 60% of the wintering waterfowl.
   1. Survey covers <1% of the species' or communities' population/range
   2. Survey covers 1-10% of the species' or communities' population/range
   3. Survey covers 11-25% of the species' or communities' population/range
   4. Survey covers >25% of the species' or communities' population/range

9) **Survey utility (7.3)**: How many station CCP, HMP, or other management plan objectives can be evaluated by the survey?
   Examples: A survey of staff gauge readings for water levels in representative units can be used to evaluate a range of wetland habitat objectives including seasonal, emergent, and permanent types. An Early Detection Rapid Response survey can be used to detect the presence of highly invasive plant species in multiple refuge habitats.
   1. Does not address an objective

2. Addresses 1 objective
3. Addresses 2 objectives
4. Addresses 3 or more objectives

10) **Survey leveraging (6.2)**: Is the survey conducted (integrated) with one or more other surveys?
Example 1: There are surveys that must be conducted in conjunction with each other in order to fully evaluate the status and trends of the target resource and its habitat. Example: The landbird point count protocol requires habitat parameters to be collected in conjunction with avian data. Example 2: Habitat parameters and avian population counts are collected for the Integrated Waterbird Management and Monitoring project.
    1. Survey is not integrated with other surveys
    2. Survey is integrated with 1 other survey
    3. Survey is integrated with >1 other surveys

11) **FWS Partners (5.9)**: Does the survey address high or medium priorities of relevant Landscape Conservation Cooperatives (LCC), state agencies, or conservation partners?
    1. Does not address a management priority identified by FWS partners (e.g., LCC, state agency).
    2. Addresses a management priority identified by 1 FWS partner (e.g., LCC, state agency).
    3. Addresses a management priority identified by 2 FWS partners (e.g., LCC, state agency).
    4. Addresses a management priority identified by ≥3 FWS partners (e.g., LCC, state agency).

12) **Survey spatial context (1.2)**: At what scale does the survey most benefit the science information needs required for resource management?
Note: Only surveys with a standard protocol and established systems of data management and analysis are scored higher than a 1.
    1. Small scale: Applicable to only 1 station.
    2. Medium scale: Applicable to a smaller group of stations or single complex.
    3. Large scale: Applicable to multiple stations/complexes across an entire ecoregion, LCC, or region.
    4. Continental scale: Component of a large landscape level survey (e.g., North American Breeding Bird Survey, Woodcock Singing Ground Counts, North American Amphibian Monitoring Program, and Circumpolar Biodiversity Monitoring Network).

13) **Survey duration (0.1)**: Over what time scale will the objective(s) addressed by the survey need to be evaluated?
Long-term surveys will need to be consistently implemented over multiple generations of the species or successional stages of habitat to evaluate achievement of objective(s).
    1. Short-term: 1-15 years
    2. Long-term: >15 years.

14) **Cost of data collection, analysis, and reporting (8.6)**: 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?
Note: Surveys that require novel techniques, many repeated visits or large numbers of staff will likely be more expensive to implement. Similarly, surveys that require assistance for the development of protocols and analysis of data will be more costly. Conversely, if a standardized protocol, database, analysis, and/or reporting system are available, then the costs of implementing such a survey may be much lower than if these elements must be designed and tested upfront.
    1. High: >5% of annual funding or staff time for the refuge biological program dedicated for the survey
    2. Medium: 1-5% of annual funding or staff time for the refuge biological program dedicated for the survey
    3. Low: 0.1- 1% of annual funding or staff time for the refuge biological program dedicated for the survey
    4. Very Low: <0.1% of annual funding or staff time dedicated for the refuge biological program dedicated for the survey

15) **Data analysis (6.6)**: Are the survey data analyzed?
Note: The frequency and intensity of management is dependent upon station objectives. In some cases, surveillance monitoring is appropriate given active management is not anticipated for the foreseeable future. In contrast, targeted monitoring may be needed to maintain certain habitats (e.g., moist-soil wetlands) that require considerable, annual management activities to achieve desired conditions.
    1. Low: Study design does not allow data to be readily analyzed.
    2. Medium: Data can/have been analyzed on infrequent basis.
    3. High: Data can/have been analyzed on regular intervals.

16) **Data use (8.6)**: Are the survey results reported and used to inform current and future management decisions?
Note: See description from criterion #15.
    1. Low: Study design does not allow results to be readily reported. Therefore, results are not used in resource management decisions.
    2. Medium: Results can/have been reported, but these results have not been used to guide management at the station, regional, or larger landscape levels.
    3. High: Currently reported on regular intervals and used to inform management at the station, regional, or larger landscape levels.

Criteria	Station-specific weight
Station purpose	11.3
Other legal mandates	11.3
Large investment in management actions	11.3
Survey leveraging	10.2
Data use	10.2
Data analysis	10.2
Known or suspected threats	5.7
FWS priorities	5.7
Survey utility	5.7
Survey coverage for species or vegetation community	5.7
Baseline data	3.4
Survey spatial context	2.2
Controversy	1.7
Species or vegetation community non-federal listing status	1.7
Survey duration	1.1
Cost of data collection, analysis, and reporting	1.1
FWS Partners	1.1

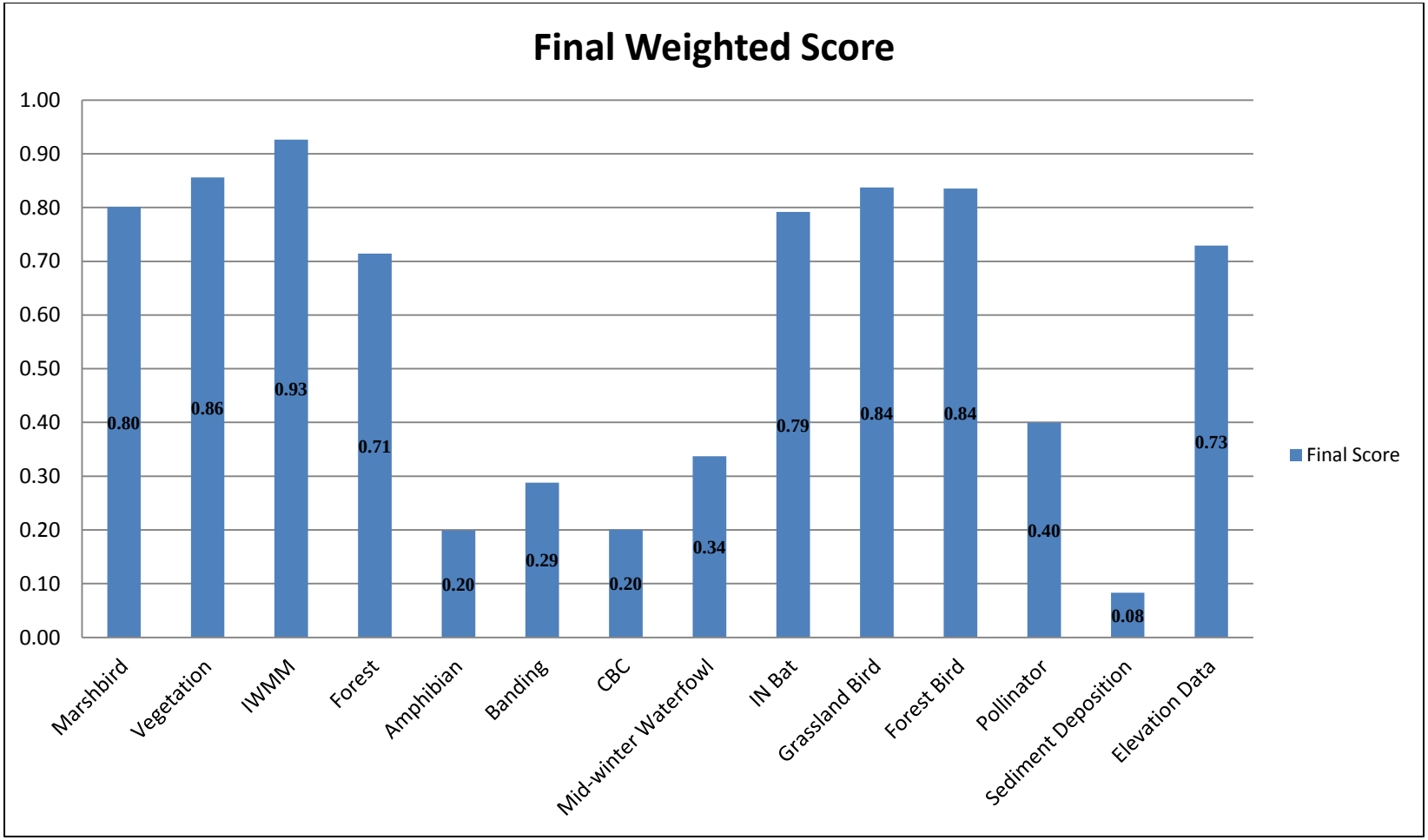
*Station specific weights calculated out of a possible 100.

Appendix C. Survey Priority Ranking from SMART Tool

Scores and ranks used to clarify the importance of surveys planned at Great River and Clarence Cannon National Wildlife Refuge. Final scores were the culmination of evaluation of 17 criteria for each survey (Appendix A) and weighting value for each criteria determined by refuge staff. Scores were then ranked by assigning an integer value 1—13. Surveys were assigned a Tier based on perceived ability to conduct the surveys in addition to staff agreed upon priorities.

No.	Survey	Final Score	Score Rank	Priority	Tier[a]	Status
1	IWMM	0.926	1	1	1	Current
2	Invasive Species and Moist-soil Management Vegetation Monitoring	0.856	2	2	1	Current
3	National Marsh Bird Monitoring and Research Program	0.801	5	3	1	Current
4	Elevation Data	0.729	7	4	2	Future
5	Grassland Bird Inventory	0.837	3	5	3	Future
6	Bat Presence Inventory - Automated Recording Device	0.792	6	6	3	Future
7	Forest Bird Presence Inventory	0.835	4	7	3	Future
8	Forest Inventory	0.714	8	8	3	Future
9	FWS Mid-Winter Waterfowl Survey	0.337	10	9	1	Current
10	Audubon Christmas Bird Count	0.201	12	10	1	Current
11	North American Amphibian Monitoring Program	0.199	13	11	1	Current
12	FWS Duck Banding	0.288	11	12	1	Current
13	Pollinator Monitoring	0.400	9	13	3	Future

[a] Tier 1--The highest priority surveys that the Project Leader estimates can be conducted with existing staffing and resources.
Tier 2--Surveys that the Project Leader sees as second priority for the station (a), or high priority surveys that would require an increase in operational resources (b).
Tier 3--Lower priority surveys that are currently being conducted (a) or are anticipated but would require the major reallocation of staff and resources (b)


Final Weighted Score
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.80
0.86
0.93
0.71
0.20
0.29
0.20
0.34
0.79
0.84
0.84
0.40
0.08
0.73
Marshbird
Vegetation
IWMM
Forest
Amphibian
Banding
CBC
Mid-winter Waterfowl
IN Bat
Grassland Bird
Forest Bird
Pollinator
Sediment Deposition
Elevation Data
Final Score

Appendix D. Survey Profiles

Table 7.1 Waterbird Monitoring

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Integrated Waterbird Management and Monitoring (IWMM)
Survey Id Number: FF03RCAN00-013 and FFO3RGRR00-028	**Survey Priority:** 1
Survey Type: Cooperative Monitoring to Inform Management	**Implemented:** Yes ☑ No ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 1.A, 1.B, 1.C, 3.C, 3.D, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assess waterbird use (Bird Use Days) of wetland habitats during non-breeding periods. Weekly to biweekly from August-June on an annual basis. Waterbird estimates from individual surveys will be used to generate area adjusted use-day estimates for management units. Bird observations are whole area estimates. Habitat condition is documented through estimates and direct measurements of a variety of parameters at the management unit level: ice cover, disturbance, flood regime, water depth, and vegetation.

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to evaluate effectiveness of management techniques to provide suitable habitat for waterbird species. The relationship between unit specific habitat condition and bird-use will be informed by the surveys. Ultimately the trade-offs between various management approaches will be evaluated through predictive models to ensure the adequacy of habitats for the waterbird groups identified in the CCP and HMP goals and objectives (HMP table 4-2). This is a time-consuming and costly survey but is important to the successful management of the Refuge.

Justification for Selection: Why was this survey selected over others?

The survey has high utility by documenting both habitat condition and waterbird use of the wetland and open water habitats addressed in Goal 1 of the CCP and HMP. Management decisions are made at the unit level and are based largely on vegetation composition, however the collective of all decisions influence the ability of the refuge as a whole to meet HMP and CCP goals. IWMM operates at the unit level but the decision support can be applied at larger scales for unit complexes, refuges, refuge complexes, and regions.

Partners and Cooperators:

USGS, Chicago Botanic Garden, Ducks Unlimited

Date of Last Interium or Summary Report:

Program level project status report: Fall 2012, station generated report: Spring 2013.

Estimated Annual Costs

Wildlife Biologist	$12,500
Biotech (117 days)	$18,000
Supplies	$ 3,000
Total	$33,500

Table 7.2 Vegetation Monitoring

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Invasive Species / Moist-Soil Mgmt Vegetation Monitoring
Survey Id Number: FF03RCAN00-025 and FF03RGRR00-030	**Survey Priority:** 2
Survey Type: Monitoring to Inform Management	**Implemented:** Yes ☑ No ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 1.A, 1.B, 1.C, 3.B, 3.C, 3.D, 3.F, 7.A

What is measured? Describe the sampling frame and sample units.

Plant species composition – relative cover and frequency – August and September.

We will assess vegetation composition and structure annually in September. A stratified random location will be determined for 25 meter transects. Sample locations will be stratified according to Nelson (2005) Communities. Sample locations will also be taken in areas within the refuge that management techniques or strategies were used to manipulate the herbaceous vegetative response as well as adjacent to for comparison. A visual estimate of cover method will be used to estimate up to four dominant species and their contribution within 10 centimeters along either side of the transect line.

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to evaluate effectiveness of management techniques to control invasive species, specifically reed canary grass, and evaluate effectiveness of management techniques on maintaining early successional habitat in moist soil units. Analysis will likely be limited to nonparametric techniques for comparing the means in terms of structural parameter of interest (percent cover, frequency, and importance values) for areas with varying histories (M-W-U test, ANOVA). Analysis will determine management effectiveness of various techniques, timing, and intensity. An importance value will be assigned to each plant species by strata. This information will provide high utility for informing management of habitat conditions. This survey can also be coupled with other surveys to inform wildlife response to habitat management.

Justification for Selection: Why was this survey selected over others?

This survey was selected over other surveys because of the utility of the information collected in this survey to inform management decisions. This survey addresses one of the major threats facing the refuge – invasive plants. This information is important for the Refuge to assess the success of a large percentage of management actions at the Refuge. When combined with information on bird use collected through IWMM and Marshbird Monitoring the data from this survey can provide information to use SHC to better manage for the purpose and objectives of the Refuge.

Partners and Cooperators:

This survey will be refuge based. Some cooperation with private landowners may be explored in cooperation with the Integrated Waterbird Management and Monitoring (IWMM) survey conducted in the confluence area of Missouri to test the effectiveness of the current vegetation protocol for IWMM. This survey will be coordinated with other refuges, especially those managing for moist soil habitats. Results will assist the manager in decision making. Significant portions of the sampling design and methodology are taken from the Grassland Monitoring Team Standardized Monitoring Protocol (Vacek et al. 2011).

Date of Last Interium or Summary Report:

Station generated report: Spring 2013.

Estimated Annual Costs

Wildlife Biologist	$16,586
Biotech (26 days)	$ 4,000
Supplies	$ 0
Total	$20,586

Table 7.3 Marshbird Monitoring

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** National Marsh Bird Monitoring and Research Program
Survey Id Number: FF03RCAN00-009 and FF03RGRR00-029	**Survey Priority:** 3
Survey Type: Cooperative Monitoring to Inform Management	**Implemented:** Yes ☑ No ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 1.A, 1.B, 1.C, 3.C, 3.D, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assess marshbird trends of wetland habitats at the refuge/individual management unit scales using call back surveys. April 15-May 31 on an Annual/Biannual basis.

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to determine if management is providing habitat for breeding and migrating marshbird species. Trends in marshbirds overtime will indicate if marshbird use of the refuge and individual units increases or decreases with applied management actions.

This survey addresses bird use information to assess waterbird management as described in the Refuge's purpose, CCP, and HMP. When combined with information collected on habitat through IWMM and Vegetation Monitoring the data from this survey can provide information to use SHC to better manage for the purpose and objectives of the Refuge.

Justification for Selection: Why was this survey selected over others?

This survey was selected over other surveys because of the utility of the information collected in this survey to inform management decisions. This survey is a nationally recognized protocol for sampling marshbirds. Marshbirds are a subset of waterbirds that are not easily sampled through other techniques and highly important to the purpose and mission of the Refuge.

Partners and Cooperators:

This survey will be refuge based in its infancy. Some cooperation with private landowners may be explored in the confluence area of Missouri to understand the private land management contribution to the flyway scale. This survey will be coordinated with other refuges, with the hope that it can be extrapolated to partners across the country. Results will assist the manager in his decision making.

This survey should contribute to any state, regional, and national efforts to monitor marshbirds when feasible. At the current time, a coordinated effort across U.S. Fish and Wildlife Service NWRS Region 3 is exploring the possibility to assess populations and habitat at a regional and eventually flyway and national scale.

Date of Last Interium or Summary Report:

Station generated report: Spring 2013.

Estimated Annual Costs

Wildlife Biologist	$ 8,077
Biotech (0 days)	$ 0
Supplies	$ 0
Total	$ 8,077

Table 7.4 Elevation Data Inventory

Station Name: *CLARENCE CANNON NWR*	**Survey Name:** Elevation Data Inventory
Survey Id Number: FF03RCAN00-026	**Survey Priority:** 4
Survey Type: Inventory	**Implemented:** Yes ☐ No ☑

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 1.A, 1.B, 1.C, 2.A, 2.B, 3.C, 3.D, 4.B, 5.A, 5.B, 7.A, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

Collect 6 inch contour elevation data for all refuge units. LIDAR has been collected for all Great River NWR divisions. Gather and/or prepare data collected through LIDAR or ground collection methods using RTK units for modeling use at all divisions.

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to provide baseline elevation for Clarence Cannon NWR in order to better analyze data for other surveys and management needs. This survey will provide baseline elevation data to use in modeling efforts, analysis, and assessment of management at the refuge. This can be used with all aspects of SHC to better complete numerous objectives outlined in the HMP.

Justification for Selection: Why was this survey selected over others?

Elevation data are needed to provide baseline data and to coincide with data analysis and modeling for other surveys. Currently, this information is available and stored on the server at the station for all three divisions of Great River NWR but is not available for Clarence Cannon NWR. This survey is a secondary priority tier because of the high cost of the data. LiDAR data are being collected across the nation. Therefore, if this survey is conducted by another agency or interest group the station may only need to acquire the information after it has been processed.

Partners and Cooperators:

This survey will be refuge based. Partners such as Ducks Unlimited and U.S. Army Corps of Engineers may cooperate with this.

Date of Last Interium or Summary Report:

Station generated report: TBD

Estimated Total Costs

Wildlife Biologist	$ 5,673
Biotech (0 days)	$ 0
Supplies	$10,000
Total	$15,673

Table 7.5 Grassland Bird Inventory

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Grassland Bird Inventory
Survey Id Number: FF03RCAN00-027 and FF03RGRR00-031	**Survey Priority:** 5
Survey Type: Baseline Monitoring	**Implemented:** Yes ☐ No ☑
What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other? HMP Objectives 3.A, 3.B, 3.C, 5.B, 7.B, 7.D	
What is measured? Describe the sampling frame and sample units. We will assess presence of birds in grassland habitats. One division of Great River or Clarence Cannon will be surveyed each year for four years. June – July	
Rationale: What is the purpose of the survey? How will it improve management? This survey will be conducted to evaluate use of grassland and moist soil habitats by bird species. Little is known about species use in grassland and moist soil habitats on the refuge. This survey may lead to a survey to assess management techniques in grassland habitats. If richness and diversity are low more in depth investigation of habitat structure will assess health of the habitat and may trigger a management response by changing grassland management techniques and/or frequency. Analysis will provide presence information of various species. Species richness and diversity will be determined from outputs.	
Justification for Selection: Why was this survey selected over others? Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.	
Partners and Cooperators: This survey will be refuge based with protocols developed from previous research using point count methods (Landbird Monitoring Protocol Framework Knutson et al. 2008 v.2).	
Date of Last Interium or Summary Report: Station generated report: TBD	
Estimated Annual Costs	
Wildlife Biologist	$ 6,154
Biotech (56 days)	$ 8,654
Supplies	$ 3,000
Total	$17,808

Table 7.6 Bat Presence Inventory - Automated Recording Device

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Bat Presence Inventory – Automated Recording Device
Survey Id Number: FF03RCAN00-028 and FF03RGRR00-032	**Survey Priority:** 6
Survey Type: Inventory	**Implemented:** Yes ☐ No ☑

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 2.A, 2.B, 5.B, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assess presence of bats in forested habitats. One division of Great River or Clarence Cannon will be surveyed each year for four years. June – July

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to evaluate use of forested habitats by bats with focus on Indiana bats. Little is known about species use in the forested habitats of the refuge. This survey may lead to a survey to assess management techniques in forested habitats. If abundance is low, more in depth investigation of habitat structure will assess health of the habitat and may trigger a management response of increased use of forest management techniques. Analysis will provide presence information of Indiana bats and other bats. Species richness and diversity will be determined from outputs.

Justification for Selection: Why was this survey selected over others?

Indiana bat presence data are a high priority but costly. Data collection using automated recording units allows staff to collect a large amount of data with little effort and in a short amount of time. Analysis of recorded data to identify species is improving but can be costly.

Partners and Cooperators:

This survey will be refuge based with protocols developed from previous research using automated recording devices.

Date of Last Interium or Summary Report:

Station generated report: TBD

Estimated Annual Costs

Wildlife Biologist	$ 962
Biotech (0 days)	$ 0
Supplies	$15,000
Total	$15,962

Table 7.7 Forest Bird Presence Inventory

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Forest Bird Presence Inventory
Survey Id Number: FF03RCAN00-029 and FF03RGRR00-039	**Survey Priority:** 7
Survey Type: Baseline Monitoring	**Implemented:** Yes ☐ No ☑

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 2.A, 2.B, 5.B, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assess presence of birds in forested and shrub/scrub habitats. One division of Great River or Clarence Cannon will be surveyed each year for four years. June – July

Rationale: What is the purpose of the survey? How will it improve management?

This survey will be conducted to evaluate use of forested habitats by neotropical birds. Little is known about species use in the forested habitats of the refuge. This survey may lead to a survey to assess management techniques in forested habitats. If abundance is low more in depth investigation of habitat structure will assess health of the habitat and may trigger a management response of increased use of forest management techniques. Analysis will provide presence information of forest birds. Species richness and diversity will be determined from outputs.

Justification for Selection: Why was this survey selected over others?

Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.

Partners and Cooperators:

This survey will be refuge based with protocols developed from previous research using point count methods (Landbird Monitoring Protocol Framework Knutson et al. 2008 v.2).

Date of Last Interium or Summary Report:

Station generated report: TBD

Estimated Annual Costs

Wildlife Biologist	$ 6,154
Biotech (56 days)	$ 8,654
Supplies	$ 3,000
Total	$17,808

Table 7.8 Forest Inventory

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Forest Inventory
Survey Id Number: FF03RCAN00-030 and FF03RGRR00-035	**Survey Priority:** 8
Survey Type: Cooperative Baseline Monitoring	**Implemented:** Yes ☐ No ☑
What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other? HMP Objectives 2.A, 2.B, 5.A, 5.B, 7.A, 7.D	
What is measured? Describe the sampling frame and sample units. We will assess health and structure of forested habitats on the refuge. May – September (every 5 years)	
Rationale: What is the purpose of the survey? How will it improve management? This survey will be conducted to evaluate species composition, age structure, and overall health of the forested habitats on the refuge. USACE has been doing this on the lands we manage under their ownership. We could expand this to all divisions of Great River and Clarence Cannon NWR. Analysis will provide an index of forest health. This can be used with wildlife response data to determine if further/different management techniques should be implemented.	
Justification for Selection: Why was this survey selected over others? Forest inventory data are costly and time consuming to collect. Without further resources and/or additional staff the Refuge cannot accomplish this type of survey.	
Partners and Cooperators: This survey will be refuge based with protocols developed from previous research to assess forest health.	
Date of Last Interium or Summary Report: Station generated report: TBD	
Estimated Annual Costs Wildlife Biologist $ 9,183 Biotech (21 days) $ 7,981 Supplies $13,000 Total $30,164	

Table 7.9 FWS Mid-Winter Waterfowl Survey

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Mid-Winter Waterfowl Survey
Survey Id Number: FF03RCAN00-021 and FF03RGRR00-038	**Survey Priority:** 9
Survey Type: Cooperative Baseline Monitoring	**Implemented:** **Yes** ☑ **No** ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

Waterfowl observed on the refuge will be counted for one day during a two week window in early January.

Rationale: What is the purpose of the survey? How will it improve management?

This survey is part of a larger effort to estimate wintering populations of waterfowl in the U.S. This survey will have no bearing on refuge management decisions other than the count can be conducted using protocols from our IWMM survey which will lead to management decisions. Objectives for this survey are set at a continental scale.

Justification for Selection: Why was this survey selected over others?

Inexpensive, small staff time contribution, contributes to landscape scale objectives.

Partners and Cooperators:

This survey is cooperative with the Migratory Bird Division of the U.S. Fish & Wildlife Service.

Date of Last Interium or Summary Report:

Program level project status report: February 2013, station generated report: NA

Estimated Annual Costs

Wildlife Biologist	$ 625
Biotech (0 days)	$ 0
Supplies	$ 0
Total	$ 625

Table 7.10 Audubon Christmas Bird Count

Station Name: *CLARENCE CANNON NWR*	**Survey Name:** Audubon Christmas Bird Count
Survey Id Number: FF03RCAN00-022	**Survey Priority:** 10
Survey Type: Cooperative Baseline Monitoring	**Implemented:** Yes ☑ No ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 5.B, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assist The Audubon Society in the annual Christmas bird count on Clarence Cannon. December

Rationale: What is the purpose of the survey? How will it improve management?

It is important to conduct this survey because it is part of a national effort to assess movements and wintering population status across the country. This will not need refuge staff involvement. No analysis will be done at the station. Objectives for this survey are set at a national scale.

Justification for Selection: Why was this survey selected over others?

Inexpensive, small staff time contribution, contributes to landscape scale objectives.

Partners and Cooperators:

This survey is a cooperative effort with the local chapter of the Audubon Society.

Date of Last Interium or Summary Report:

Program level project status report: January 2013, station generated report: January 2013

Estimated Annual Costs

Wildlife Biologist	$	96
Biotech (0 days)	$	0
Supplies	$	0
Total	$	96

Table 7.11 Amphibian Monitoring

Station Name: *CLARENCE CANNON NWR*	**Survey Name:** North American Amphibian Monitoring Program Frog Survey
Survey Id Number: FF03RCAN00-016	**Survey Priority:** 11
Survey Type: Cooperative Baseline Monitoring	**Implemented:** Yes ☑ No ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 1.A, 1.B, 1.C, 3.C, 3.D, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assess presence of amphibians in wetland habitats. Mar.8 – Apr.7, Apr.22 – May 22, Jun.7 – Jul. 7

Rationale: What is the purpose of the survey? How will it improve management?

Monitoring completed to attribute to USGS North American Amphibian Monitoring Program. No analysis will be completed at the station. Objectives for this survey are set at a national scale.

Justification for Selection: Why was this survey selected over others?

Inexpensive, small staff time contribution, contributes to landscape scale objectives.

Partners and Cooperators:

This survey is done in cooperation with USGS to contribute to a national monitoring effort. There is no station-specific application at this time because it does not fit into our habitat management information needs but the possibility exists to use the information collected for a station specific analysis.

Date of Last Interium or Summary Report:

Program level project status report: July 2013, station generated report: NA

Estimated Annual Costs

Wildlife Biologist	$ 1,587
Biotech (0 days)	$ 0
Supplies	$ 0
Total	$ 1,587

Table 7.12 FWS Duck Banding

Station Name: *CLARENCE CANNON NWR*	**Survey Name:** FWS Duck Banding
Survey Id Number: FF03RCAN00-014	**Survey Priority:** 12
Survey Type: Cooperative Monitoring to Inform Management	**Implemented:** **Yes** ☑ **No** ☐

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 5.B, 7.B, 7.D

What is measured? Describe the sampling frame and sample units.

We will assist Missouri Department of Conservation in their effort to reach their yearly quota of banded wood ducks. September

Rationale: What is the purpose of the survey? How will it improve management?

It is important to conduct this survey because it is part of a national and flyway effort to band and collect data about wood ducks to assess movements and population status. This is also a great way for public involvement at the refuge. No analysis will be done at the station.

Justification for Selection: Why was this survey selected over others?

Inexpensive, small staff time contribution, contributes to landscape scale objectives.

Partners and Cooperators:

This survey is a cooperative effort with MDC that has many partners all over the continent including USFWS, USGS, and CWS. It will follow standard operating procedures for waterfowl banding.

Date of Last Interium or Summary Report:

Program level project status report: NA, station generated report: NA

Estimated Annual Costs

Wildlife Biologist	$ 500
Biotech (0 days)	$ 0
Supplies	$ 0
Total	$ 500

Table 7.13 Pollinator Monitoring

Station Name: *GREAT RIVER AND CLARENCE CANNON NWRs*	**Survey Name:** Pollinator Monitoring
Survey Id Number: FF03RCAN00-031 and FF03GRR00-036	**Survey Priority:** 13
Survey Type: Baseline Monitoring	**Implemented:** Yes ☐ No ☑

What specific management (Station) objective does the survey support? Is the objective derived from CCP, Interim Objectives, HMP, or other?

HMP Objectives 5.B, 7.A, 7.B

What is measured? Describe the sampling frame and sample units.

This survey would assess species presence and diversity for pollinators within refuge lands. April - September

Rationale: What is the purpose of the survey? How will it improve management?

This survey would add knowledge to assess biological integrity, diversity, and environmental health for the Refuge. A species list and assessment of diversity will be the analysis for this survey.

Justification for Selection: Why was this survey selected over others?

This survey does not address current CCP or HMP objectives or purpose of the refuge. This survey is relatively inexpensive to conduct field procedures and collect data but without further resources and/or additional staff to identify species, analyze, and assess the data the Refuge cannot accomplish this type of survey.

Partners and Cooperators:

This survey will need to be cooperative to effectively implement the survey.

Date of Last Interium or Summary Report:

Program level project status report: TBD, station generated report: TBD

Estimated Annual Costs

Wildlife Biologist	$ 2,980
Biotech (45 days)	$ 9,327
Supplies	$40,000
Total	$52,307

Appendix E. Revision Signature Page

Inventory and Monitoring Plan Revision
For: Great River / Clarence Cannon National Wildlife Refuges

Action	***Signature /Printed Name***	***Date***
Survey list and priority changed:		
Submitted By:	Refuge Manager/Project Leader	
Reviewed By:	Regional I&M Coordinator	
Approved By:	Regional Refuge Biologist/Division Chief	