



Inventory and Monitoring Plan

Whittlesey Creek National Wildlife Refuge





Brook Trout Pair. (Photo credit: Anna Varian, USFWS)

January 2016



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Signature Page¹

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Introduction

This Inventory and Monitoring Plan (IMP) documents the inventory and monitoring surveys that will be conducted at Whittlesey Creek National Wildlife Refuge from 2015 through 2030, 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 CCP (2015) and HMP (2006) 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. This IMP was developed according to the Inventory and Monitoring (I&M) policy (701 FW 2) for the National Wildlife Refuge System.

Whittlesey Creek NWR was established in 1999 to protect, restore, and manage coastal wetland, floodplain forest, and spring-fed stream habitat in Bayfield County near Ashland, WI. Whittlesey Creek NWR is part of a large wetland and floodplain complex on the south shore of Lake Superior. The U.S. Fish and Wildlife Service currently owns 304 acres in fee title out of 540 acres authorized along lower Whittlesey Creek and 47 acres of easements out of 1,260 acres authorized in the 12,000-acre Whittlesey Creek watershed. Restoration of coaster brook trout, an ad fluvial (lake-run) brook trout native to Lake Superior, is a high priority for Whittlesey Creek NWR, U.S. Fish and Wildlife Service and its partners. Once abundant, only remnant populations of coaster brook trout remain. Migratory birds and many other fish and wildlife species also benefit from protection and restoration of stream, wetland, and forest habitat on Whittlesey Creek NWR and throughout the watershed. This IMP focuses on the watershed-wide restoration, enhancement and protection project area.

Methods

Station staff generated a list of extant and anticipated surveys. This extensive list was later refined to exclude general observations (reconnaissance) of refuge resources that do not require protocols or data management. The remaining 18 surveys were then assigned a priority score using 13 pre-defined criteria (Appendix A). Priority scores were used to assign each survey to one of three groups that defined the status of the surveys (Appendix B).

Prioritizing and Selecting Surveys

The priority ranking of surveys was determined during a one-day meeting at Whittlesey Creek NWR on September 23, 2014. Refuge Wildlife Biologist Mike Mlynarek met with Region 3 Inventory and Monitoring Coordinator Dr. Melinda Knutson to prioritize the surveys. Background information for each survey was summarized in advance by the Wildlife Refuge Biologist and briefly discussed prior to prioritizing the surveys. The 13 criteria, assignment rules, weighting and score calculation process followed the Criteria for Prioritizing Surveys

Entered into the PRIMR Database² (Appendix A). The Whittlesey Creek Refuge staff made all decisions required to produce the survey priority scores (Appendix B).

Estimating Capacity

A cost-benefit analysis (Appendix C) was performed to maximize the value of the selected surveys, given staffing and budget constraints. Selecting only surveys that can be conducted with anticipated resources should lead to high quality surveys, e.g., commitment to all components of conducting a survey (planning, administration, implementation, data analysis and archiving, reporting and feedback to management).

In the cost-benefit analysis, the value (i.e., benefit) of a selected survey was estimated from the priority score from the SMART ranking process, adjusted for frequency over the life of the IMP. The adjustment helps to identify low frequency surveys with high cost efficiencies (for example, one-time inventories). To determine a cost constraint, the staffs responsible for completing natural resource surveys were asked to estimate the portion of their time in a typical year dedicated to activities associated with conducting surveys: data analysis and summary, data management, monitoring, research, and supervision. The time dedicated to surveys was converted to weeks. The time required to implement an annual iteration of a survey was also estimated using past experiences with established protocols or anticipated commitment for protocols that have yet to be developed. Estimated annual costs for implementing surveys are documented in Appendix D.

Results: Selected Surveys

The prioritization and cost-benefit analysis were used in deliberative selection of surveys to be completed over the life of the IMP. In addition to the priority scores, the level of effort required to complete a survey was considered in the selection process. Selected surveys include surveys identified for completion with FY2015 levels of staffing and support (Table 1). The list of surveys selected for implementation with existing resources represents a commitment to implementation by refuge staff. Changes in available capacity, CCP objectives, HMP objectives, or other factors that alter the list of selected surveys through addition or removal of selected surveys will trigger a revision of this IMP (701 FW 2) and updates to the PRIMR database.

The process identified 12 surveys that can be completed with current staffing levels and budget for the duration of this IMP (Table 1). An estimated annual work schedule for selected surveys is shown in Appendix E, and non-selected surveys are listed in Appendix F. Survey names were updated after the ranking exercise based on national and regional lists of standardized names and available protocols. A Refuge Condition Summary, a reporting tool to summarize status, trends, and desired conditions of the selected surveys, is provided in Appendix G. Environmental Action Statement requirements are addressed in Appendix H.

² Planning and Reporting Inventory and Monitoring at Refuges (PRIMR) Database (<https://ecos.fws.gov/primr/index.gsp>). A database developed by the I&M initiative that describes and archives the surveys conducted on refuges, and which is also used to generate summaries for an IMP.

The refuge CCP identified four priority habitats and 10 priority species associated with these habitats.

Whittlesey Creek NWR Priority Resources of Concern; Table 3-1 in CCP (2015):

<i>Priority species</i>	<i>Priority habitats</i>			
	Coldwater stream	Lowland forest/shrub	Riparian forest	Coastal Wetland
Coaster brook trout	x			
Wood turtle	x		x	
Water shrew	x			
Northern waterthrush		x		
Northern black currant		x		
Marsh horsetail		x		
Veery		x	x	
Black duck				x
Common mudpuppy				x
Sora rail				x

This IMP focuses effort on monitoring attributes of coldwater streams, lowland forest/shrub, and riparian forest. Resources are not currently available to monitor all priority habitats and species.

List of Selected Surveys and Rationale for Selection

Survey Name	Rationale
Fish Index	This annual index station electro-fishing survey is used to assess the objective of establishing 25 spawning pairs of brook trout exhibiting a migratory life history by 2030. The survey also provides diversity and abundance data for salmonids, with additional metrics collected for brook trout.
Comprehensive Fish Survey	This watershed-wide electro-fishing survey is conducted sporadically and is used to assess the objective of establishing 25 spawning pairs of brook trout exhibiting a migratory life history by 2030. It also provides diversity and abundance data for salmonids, with additional metrics collected for brook trout.
Brook Trout PIT Tag Stations	PIT tag station data document brook trout migration. It is used to assess the objective of establishing 25 spawning pairs of brook trout exhibiting a migratory life history by 2030.

Restore Fish	This annual index station electro-fishing survey assesses population dynamics pre- and post-installation of large wood for in-stream habitat restoration and enhancement. It also provides diversity and abundance data for salmonids, with additional metrics collected for brook trout.
Macroinvertebrate Monitoring	This index station survey documents aquatic macroinvertebrate population diversity and abundance pre- and post-installation of large wood for in-stream habitat restoration and enhancement.
Stream Habitat Monitoring	This index station survey provides qualitative and quantitative ratings for evaluating fish habitat. The survey is designed to monitor long-term effects of in-channel and terrestrial habitat restoration and enhancement.
Stream Gage Station Monitoring	Long-term hydrograph and rainfall data are used in the sediment transport model that helps guide restoration project engineering and design. Data are used to assess the objective of 20% reduction in flood peaks for 2 yr. and 10 yr. flood recurrence intervals by 2036.
Whittlesey Creek Sediment Transport Study	This is a predicative model that screens habitat restoration and enhancement scenarios to determine impacts on sediment balance and is used for project engineering and design. The current sediment transport model will need to be revised as conditions in the watershed change and as new predictive tools and techniques become available.
Photo Stream	This photo point survey provides chronological visual documentation of changes to fish habitat, channel morphology, erosion and sedimentation, typically in stream reaches with in-channel woody debris additions or bank and bluff stabilization.
Point Count Breeding Bird Survey	This survey provides a long-term breeding bird record to document population changes as habitat restoration and enhancement progress. The data may also document effects related to climate change.
Shorebird Survey	The refuge provides important migratory bird stopover habitat along Lake Superior. This survey provides a long-term record to document population changes as habitat restoration and enhancement progress.
Migratory Waterfowl Survey	The refuge provides important migratory bird stopover habitat along Lake Superior. This survey provides a long-term record to document population changes as habitat restoration and enhancement progress.

Table 1. Surveys selected for conduct at Whittlesey Creek National Wildlife Refuge 2015—2030.

Survey Priority ¹	Survey ID Number ² (FF03RWI T00-)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
1.01	012	Fish Index (CM)	Current	HMP / Pg. 39	Regional	FWS: 0.02	\$100	Sept./ Recurring - - every year	2001- Indefinite	Henry Quinlan, USFW Biologist	(none)	Initial Survey Instructions
1.02	013	Comprehensive Fish Survey (CM)	Current	HMP / Pg. 39	Regional	FWS: 0.02	\$100	Sept./ Sporadic or Ad Hoc	1977- Indefinite	Henry Quinlan, USFW Biologist	(none)	Initial Survey Instructions
1.03	014	Brook Trout PIT Tag Stations (CM)	Current	HMP / Pg. 39	Regional	FWS: 0.01	\$50	Continuous/ Recurring - - every year	2000- Indefinite	Henry Quinlan, USFW Biologist	(none)	Initial Survey Instructions
1.04	006	Restore Fish (CM)	Current	HMP / Pg. 39	Regional	FWS: 0.08	\$250	May, July/ Recurring - - every year	2011- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.05	016	Macroinvertebrate Monitoring (M)	Current	HMP / Page 39	Regional	FWS: 0.04	\$100	Summer/ Recurring - - every two years	2013- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.06	004	Stream Habitat Monitoring (M)	Current	HMP / Page 39	Regional	FWS: 0.12	\$500	Summer/ Recurring - - every year	2005- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.07	003	Stream Gage Station Monitoring (CM)	Current	HMP / Page 39	Regional	FWS: 0.01	\$2,000	Continuous/ Recurring - - every year	1999- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.10	002	Whittlesey Creek Sediment Transport Study (CM)	Current	HMP / Pg. 39, 45	Regional	FWS: 0.08	\$250	Year Round/ Recurring - - every decade	2007- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions

1.13	015	Photo Stream (BM)	Current	HMP / Pg. 39	Regional	FWS: 0.01	\$100	Spring, Summer, Fall/ Sporadic or Ad Hoc	2000- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.17	010	Point Count Breeding Bird Survey (CB)	Current	HMP / Pg. 39	Regional	FWS: 0.02	\$250	Spring/ Sporadic or Ad Hoc	1999- Indefinite	Mike Mlynarek, Refuge Biologist	(none)	Initial Survey Instructions
1.18	011	Shorebird Survey (CB)	Current	CCP / 1-2	Entire station	FWS: 0.01	\$100	Spring, Fall/ Recurring - - every year	2000- Indefinite	Ted Koehler, USFW Biologist	(none)	Initial Survey Instructions
1.19	008	Migratory Waterfowl Survey (CB)	Current	CCP / 1-2	Regional	FWS: 0.01	\$100	Spring, Fall/ Sporadic or Ad Hoc	2000- Indefinite	Ted Koehler, USFW Biologist	(none)	Initial Survey Instructions

¹ The rank for each survey listed in order of priority (e.g., numeric, tiered, alpha-numeric, or combination of these).

² A unique identification number consisting of refuge code-computer assigned sequential number. Refuge code comes from the FBMS cost center identifier.

³ Short titles for the survey name, preferably the same name used in refuge work plans. Also include the PRIMR code for survey type in parentheses. These are: Inventory (I), Cooperative Baseline Monitoring (CB), Monitoring to Inform Management (M), Cooperative Monitoring to Inform Management (CM), Research (R), and Cooperative Research (CR).

⁴ Selected surveys planned for the lifespan of this IMP (i.e., Current, Expected).

⁵ The management plan and objectives that justify the selected survey.

⁶ Refuge management unit names, entire refuge, or names of other landscape units included in 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 Estimates of average annual operations cost for conducting the survey during the years it is conducted (e.g., equipment, contracts, travel) but not including staff time.

⁹ Timing and frequency of survey field activities.

¹⁰ The years during which the survey is conducted.

¹¹ The name and position of the survey coordinator (the Refuge Biologist or other designated Service employee) 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 (Site-specific, Regional, or National) and stage of approval (Initial Survey Instructions, Complete Draft, In Review, or Approved) of the survey protocol.

Narratives for Selected Surveys

Survey: *Fish Index (FF03RWIT00-012)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: *1*

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 1-1: Brook Trout

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Brook trout populations within the Great Lakes basin and inland waters are a Region 3 Resource Conservation Priority Species. Brook trout is a surrogate species for riverine and riparian habitats in the Upper Midwest Great Lakes Geography. It is listed as a Species of Concern in the Refuge HMP and as a Priority Resource of Concern in the CCP. Abundance data and other metrics recorded during the electro-fishing survey add to the larger body of data collected for the "coaster" brook trout restoration project. The combined information serves to document results and may lead to modification of restoration efforts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Osteichthyes (bony fishes); Salmoniformes (salmons);
Recurring -- every year; Sept.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Fish and Wildlife Service, Fish and Aquatic Conservation; State Agencies, WDNR

Survey: *Comprehensive Fish Survey (FF03RWIT00-013)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 2

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 1-1: Brook Trout

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Brook trout populations within the Great Lakes basin and inland waters are a Region 3 Resource Conservation Priority Species. Brook trout is a surrogate species for riverine and riparian habitats in the Upper Midwest Great Lakes Geography. It is listed as a Species of Concern in the Refuge HMP and as a Priority Resource of Concern in the CCP. Abundance data and other metrics recorded during the electro-fishing survey add to the larger body of data collected for the "coaster" brook trout restoration project. The combined information serves to document results and may lead to modification of restoration efforts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Osteichthyes (bony fishes); Salmoniformes (salmons); Sporadic or Ad Hoc; Sept.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; State Agencies; U.S. Fish and Wildlife Service, Fish and Aquatic Conservation; WDNR

Survey: *Brook Trout PIT Tag Stations (FF03RWIT00-014)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 3

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 1-1: Brook Trout

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Brook trout populations within the Great Lakes basin and inland waters are a Region 3 Resource Conservation Priority Species. Brook trout is a surrogate species for riverine and riparian habitats in the Upper Midwest Great Lakes Geography. It is listed as a Species of Concern in the Refuge HMP and as a Priority Resource of Concern in the CCP. PIT tag station data document fish migration, adding to the larger body of data collected for the "coaster" brook trout restoration project. The combined information serves to document results and may lead to modification of restoration efforts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Osteichthyes (bony fishes); Salmoniformes (salmons);
Recurring -- every year; Continuous

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; State Agencies; U.S. Fish and Wildlife Service, Fish and Aquatic Conservation; WDNR

Survey: *Restore Fish (FF03RWIT00-006)*
Refuge: *Whittlesey Creek National Wildlife Refuge*
Priority: 4

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 1-1: Brook Trout

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Brook trout populations within the Great Lakes basin and inland waters are a Region 3 Resource Conservation Priority Species. Brook trout is a surrogate species for riverine and riparian habitats in the Upper Midwest Great Lakes Geography. It is listed as a Species of Concern in the Refuge HMP and as a Priority Resource of Concern in the CCP. This survey is designed to monitor brook trout populations pre- and post-installation of large wood for in-stream habitat restoration and enhancement. Abundance data and other metrics recorded during the electro-fishing survey add to the larger body of data collected for the "coaster" brook trout restoration project. The combined information serves to document results and may lead to modification of restoration and enhancement efforts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Osteichthyes (bony fishes); Salmoniformes (salmons);
Recurring -- every year; May, July

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; Academia; U.S. Fish and Wildlife Service, Fish and Aquatic Conservation; State Agencies; WDNR; Northland College, Ashland, WI

Survey: *Macroinvertebrate Monitoring (FF03RWIT00-016)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 5

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 2-1: In-Stream

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey is designed to monitor aquatic macroinvertebrate population diversity and abundance pre- and post-installation of large wood for in-stream habitat restoration and enhancement. This and other surveys document the long-term effects of large woody debris additions. The combined information may lead to modification of restoration and enhancement efforts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Arthropoda (arthropods); Odonata (damselflies, dragonflies); Trichoptera (caddisflies); Diptera (true flies, gnats, mosquitoes); Amphipoda (amphipods); Ephemeroptera (mayflies); Plecoptera (stoneflies); Recurring -- every two years; Summer

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: *Stream Habitat Monitoring (FF03RWIT00-004)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 6

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 2-1: In-Stream

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Numerous metrics are collected to provide qualitative and quantitative ratings for evaluating fish habitat at geo-referenced index stations. This survey provides chronological documentation of changes to fish habitat including channel morphology, substrate, cover, erosion and sedimentation. The survey is designed to monitor long-term effects of in-channel and terrestrial habitat restoration and enhancement on fish habitat. The information may lead to modification of restoration and enhancement efforts.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Recurring -- every year; Summer

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: *Stream Gage Station Monitoring (FF03RWIT00-003)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 7

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 2-2: Watershed

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Collected data are critical to understanding the stream's hydrology, runoff characteristics, as well as rainfall intensity and duration. Long-term hydrograph data may indicate "flatter" flow patterns resulting from watershed management actions that slow overland flow. Data are also used in the sediment transport model that helps guide restoration engineering and design and focuses efforts and funding on the most feasible projects that have the greatest chance of producing long-term benefits.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Recurring -- every year; Continuous

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Geological Survey, Water Resources Division; U.S. Fish and Wildlife Service, Fish and Aquatic Conservation; U.S. Geological Survey; Bayfield County Land & Water Conservation Dept.

Survey: *Whittlesey Creek Sediment Transport Study (FF03RWIT00-002)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: *10*

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek: Reduce sediment loads into Whittlesey Creek to historic (pre-European settlement) range of variability; CCP Objective 2-1: In-Stream

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The current sediment transport model will need to be revised as restoration and enhancement alter conditions in the system, inputs such as land cover, precipitation, and flow change; and as new tools such as spatial and elevation (LIDAR – Light Detection and Ranging) and data become available. The sediment transport model helps guide restoration engineering and design and focuses efforts and funding on the most feasible projects that have the greatest chance of producing long-term benefits.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Recurring -- every decade; Year Round

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Geological Survey, Water Resources Division; U.S. Army Corps of Engineers

Survey: *Photo Stream (FF03RWIT00-015)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: *13*

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 2-1: In-Stream, Objective 2-2: Watershed

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Survey provides chronological visual documentation of changes to fish habitat, channel morphology, erosion and sedimentation. Combined with stream habitat monitoring and channel morphology measurements, for instance, stream habitat restoration and enhancement techniques are refined.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Sporadic or Ad Hoc; Spring, Summer, Fall, After high flows

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: *Point Count Breeding Bird Survey (FF03RWIT00-010)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 17

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Objectives for Entire Whittlesey Creek; CCP Objective 1-2: Migratory Birds

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Although the Refuge is relatively small, it is located in an important area for migratory birds at the south shore of Chequamegon Bay, Lake Superior. Several species are listed as a Species of Concern in the Refuge HMP and as a Priority Resource of Concern in the CCP. This survey will provide a long-term breeding bird record to document changes as forest, wetland and riparian restoration and enhancement progress. The data may also document effects related to climate change.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Falconiformes (Falconiforms, Falcons); Accipitriformes (Hawks); Gruiformes (Cranes, Rails); Passeriformes (Perching Birds); Piciformes (Woodpeckers); Apodiformes (Hummingbirds, Swifts); Sporadic or Ad Hoc; Spring

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Academia, Northland College, Ashland, WI

Survey: *Shorebird Survey (FF03RWIT00-011)*
Refuge: *Whittlesey Creek National Wildlife Refuge*
Priority: 18

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

CCP Objective 1-2: Migratory Birds

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Although the Refuge is relatively small, it is located in an important area for migratory birds at the south shore of Chequamegon Bay, Lake Superior. The Bay is an important migratory bird stopover site for many species of waterfowl and shorebirds. Survey data may influence refuge public use policies.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Charadriiformes (Shore Birds, Gulls, Auks, Plovers, Oystercatchers, Alcids); Recurring -- every year; Spring, Fall

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Academia, Northland College, Ashland, WI; U.S. Fish and Wildlife Service, Migratory Birds

Survey: *Migratory Waterfowl Survey (FF03RWIT00-008)*

Refuge: *Whittlesey Creek National Wildlife Refuge*

Priority: 19

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

CCP Objective 1-2: Migratory Birds

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Although the Refuge is relatively small, it is located in an important area for migratory birds at the south shore of Chequamegon Bay, Lake Superior. The Bay is an important migratory bird stopover site for many species of waterfowl and shorebirds. Survey data may influence refuge public use policies.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Podicipediformes (Grebes); Pelecaniformes (Hérons, Pelicans, Ibises); Suliformes (Cormorants); Charadriiformes (Alcids, Shore Birds, Gulls, Plovers, Oystercatchers, Auks); Sporadic or Ad Hoc; Spring and fall

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Academia, Northland College, Ashland, WI; U.S. Fish and Wildlife Service, Migratory Birds

Revising the IMP

The Project Leader will review the refuge capacity and status of surveys annually and determine which of the selected surveys will be implemented in that year. The PRIMR database was updated along with this IMP; it will be updated as approved protocols are linked to the selected surveys and when surveys are added or removed from the set of selected surveys.

The IMP will be revised according to I&M Policy and as CCP and HMP plans are modified (see Revision Signature Page). An IMP revision is triggered when surveys are added or removed from the set of selected surveys. IMP revisions require signatures from refuge staff, Regional I&M staff, Regional Refuge Biologist/Natural Resources Division Chief, but not the Refuge Supervisor or Regional Chief of Refuges.

Appendix A. Criteria and Weights Used to Prioritize Surveys

The following 13 criteria were considered by Whittlesey Creek NWR staff to use to prioritize surveys through a Simple Multi-Attribute Rating Technique (SMART tool).

1) 1B. CCP or Other Management Plan Objectives

How many refuge CCP or other management plan objectives (e.g., HMP, Fire Management Plan, Recovery Plan, Integrated Pest Management Plan) are met by the focus of this survey?

Example 1: 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. Example 2: An Early Detection Rapid Response survey can be used to discover the presence of highly invasive plant species in multiple refuge habitats.

1. Does not address an objective
2. Addresses one objective
3. Addresses two objectives
4. Addresses three or more objectives

2) 1D. Management Utility (Decision Support) for the Refuge

Does the survey provide data for recurring management decisions, especially as part of an existing decision framework that is implemented on a regular basis?

Surveys providing information to either directly evaluate or serve as indicators of high-priority management actions can be considered as earning a 3 or 4 rating for this criterion.

1. No set application for the refuge
2. May have management implications, but they are not explicitly defined
3. Has management implications, but no current decision framework
4. Part of an existing adaptive management decision framework

3) 2A. FWS Programs

Does the survey provide information that directly contributes to evaluating the status and trends of resources that are a priority for another FWS regional or national program (e.g., Migratory Birds, Fisheries, Water Resources/Hydrology *other than ESA species*)?

Example 1: North American Breeding Bird Survey, North American Amphibian Monitoring Program, Mid-Winter Waterfowl Survey, and Circumpolar Biodiversity Monitoring Network are priority surveys for regional or national FWS programs.

1. Does not address a management priority identified by a FWS regional or national program or initiative
2. Addresses a management priority identified by 1 FWS regional or national program or initiative
3. Addresses a management priority identified by 2 FWS regional or national programs or initiatives
4. Addresses a management priority identified by ≥ 3 FWS regional or national programs or initiatives

4) 2B. FWS Partners

Does the survey address an identified priority of a conservation partner, such as a Landscape Conservation Cooperative(s) (LCC), state agencies, or other conservation partner?

These priorities should be obtained from documents such as the State Wildlife Action and Joint Venture plans. The staff should document where they obtained these priorities and if they were high- or medium-level priorities. The refuge itself does not count as a partner.

1. Does not focus a management priority identified by FWS partners (e.g., LCC, state agency)
2. Focus on a management priority identified by one FWS partner (e.g., LCC, state agency)
3. Focus on a management priority identified by two FWS partners (e.g., LCC, state agency)
4. Focus on a management priority identified by three or more FWS partners (e.g., LCC, state agency)

5) **3A. FWS Surrogate Species**

Does the survey focus on a surrogate species selected by the FWS?

1. No
2. Yes, one FWS surrogate species
3. Yes, two FWS surrogate species
4. Yes, three or more FWS surrogate species

6) **3B. Refuge Processes**

Does the survey focus on an ecological process (e.g., fire, water temperature, climate) that is changing at a rate that is important to the refuge or an indicator species associated with that process?

1. No
2. Yes, one significant ecological process or species
3. Yes, two or more significant ecological processes or species

7) **3C. Survey Breadth**

The focus of the survey is:

1. A single species or abiotic parameter
2. Multi-species or multi-abiotic parameters
3. A community – multi-trophic level or biota
4. An ecosystem – biotic community and abiotic parameters

8) **4A. Listed Species**

Is the objective of the survey a species or vegetation community 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)?

1. Not state, federally or globally ranked
2. Yes, state listed or ranked by state's natural heritage program
3. Yes, globally listed by NatureServe or IUCN
4. Yes, federally listed under the ESA as threatened or endangered

9) **5A. Controversy**

Does the survey support decision-making to address an action or management decision related to refuge resources that is controversial to an external party?

Note: Document why the refuge staff knows or suspects an action is controversial because the interpretation can vary from person to person. Controversy can be associated with the general public, specific interest group(s) (e.g., animal rights activist, cooperative farmers), or one or more conversation partners. This criterion is focused on a high level of known or suspected controversy from outside interests where the Service could be litigated, refuge actions that could result in a precedent setting action, or severely damage a working relationship with the state or other conversation partner. This criterion does not pertain to suspected or known issues among refuge staff members and/or other FWS employees. Examples of controversy include changes to livestock grazing, predator control, and changes to harvest regulations or water allocation.

1. Not controversial and little to no potential for controversy
2. Not currently controversial, but potentially or suspected of controversy
3. Known controversy, but data or immediate management action is not currently needed but may be in the near future
4. Pressing controversy; data required to support immediate management action

10) **5B. Threat**

Does the survey support decision-making to monitor and mitigate a known or suspected threat to refuge resources?

Note: This criterion scores surveys addressing known or suspected threats. It does not apply to baseline monitoring intended to detect new (i.e., unknown) threats or changes. If surveys are determined from Natural Resources Management Plan, focus on the threat reduction strategies identified in that plan and use adopt the scoring strategy shown in parentheses. Examples of threats may include invasive species, pollutants or toxins, and climate change.

1. No existing threat or potential for a threat to Refuge resources (the survey does not relate to threat reduction strategies)
2. No known threat, but potential for a threat to Refuge resources (Yes, supports decision making to address a threat reduction strategy with a score of ____ [e.g. 2.5])
3. Known threat to Refuge resources, but immediate management action is not currently needed but may be in the near future (Yes, supports decision making to address a threat reduction strategy with a score of ____ [e.g. 3.0])
4. Urgent threat to Refuge resources; immediate data are needed to support management action (Yes, supports decision making to address a threat reduction strategy with a score of ____ [e.g. 3.5])

11) **6A. Baseline data**

Does the survey provide high-priority information that contributes to baseline data needs?

Example: Inventories of species guilds (e.g., invertebrates, plants, reptiles) or abiotic parameters (soils, waters).

1. No
2. Yes

12) **6C. Spatial Scale**

What is the largest scale at which survey results will be applied for resource management?

Note: Only surveys with a protocol that establishes methods for data management and analysis are scored higher than a 1. The area of inference for larger-scale surveys (e.g., North American Amphibian Monitoring Program) should be considered from the refuge perspective unless the refuge directly contributes to analyses at a larger scale. This criterion is applicable to surveys covering areas on and adjacent to the refuge. Example: If a refuge participates and contributes to a regional survey involving neighboring US Forest Service lands, then this criterion would apply.

1. Small scale: Applicable to only a single refuge or sites on a refuge
2. Medium scale: Applicable to a few refuges, a refuge complex, or includes the refuge and a small area beyond the refuge boundary
3. Large scale: Applicable to multiple refuges/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, North American Amphibian Monitoring Program, and Circumpolar Biodiversity Monitoring Network)

13) 7C. Data management, analysis, and reporting

At what stage of development is the data management, analysis, and reporting?

1. Survey has no written protocol for data management, analysis, and reporting
2. Written protocol for data management, analysis, and reporting is in development (drafted)
3. Written protocol for data management, analysis, and reporting is in formal review
4. There is a published record or I&M approved protocol guiding data management, analysis, and reporting

Table A1. Weight Applied to Prioritization Criteria.

The following 13 criteria were weighted by Whittlesey Creek NWR staff and used to rank surveys through a Simple Multi-Attribute Rating Technique (SMART tool).

Criteria #	Criteria Description	Station-Specific Weight
1B	<i>CCP or Other Management Plan Objectives</i>	0.102
1D	<i>Management Utility</i>	0.127
2A	<i>FWS Program Need</i>	0.121
2B	<i>FWS Partner Need</i>	0.076
3A	<i>FWS Surrogate Species</i>	0.108
3B	<i>Refuge Processes</i>	0.107
3C	<i>Survey Breadth</i>	0.096
4A	<i>Listed Species</i>	0.032
5A	<i>Controversy</i>	0.001
5B	<i>Threat</i>	0.115
6A	<i>Baseline Data</i>	0.096
6C	<i>Spatial Scale</i>	0.006
7C	<i>Data Management, analysis, and reporting</i>	0.013

Appendix B. Prioritization Scores of All Ranked Surveys

Values used to prioritize and select the surveys likely to be conducted through 2030 at Whittlesey Creek National Wildlife Refuge. Prioritization scores were generated for candidate surveys by refuge staff using 13 criteria for each survey (Appendix A). Candidate surveys represent specific surveys or general information needs and were not always associated with specific protocols. Scores were then used as a starting reference to assign the survey status.

Table of priority scores from the SMART tool for all considered surveys.

Survey	Final Score	Score Rank	Status
Stream Cond	0.742	1	Future
Restor Fish	0.734	2	Current
Fish Index	0.698	3	Current
Fish Comp	0.693	4	Current
Stream gage	0.674	5	Current
Culverts	0.672	6	Future
PIT	0.659	7	Current
Invasive	0.644	8	Historic
IWMM	0.634	9	Current
Stream Habit	0.634	10	Current
Bat	0.586	11	Historic
Stream Topo	0.578	12	Future
Map Lowland	0.567	13	Future
Macroinvert	0.459	14	Current
Point Count	0.383	15	Current
Turtle	0.332	16	Future
Photo Stream	0.287	17	Current
Blduck Nest	0.212	18	Future

Appendix C. Cost-benefit Analysis

We used linear programming to find the optimum sets of ranked surveys using the total of all frequency adjusted scores as an objective function. Main constraints included costs (weeks) and surveys selected prior to solving the linear function (summation of frequency adjusted scores across all surveys). Portfolios represent alternative sets of selected surveys and are used for decision support; they do not dictate survey selections.

Table C-1 Efficiencies in terms of frequency adjusted benefit for 12 potential IMP portfolios (1= selected, 0= not selected).

Survey Name	Portfolio*:											
	A	B	C	D	E	F	G	H	I	J	K	L
Stream Cond	1	1	1	1	0	1	1	1	1	1	0	0
Restor Fish	1	1	0	1	0	1	1	1	1	1	1	1
Fish Index	1	1	1	1	0	1	1	1	1	1	1	1
Fish Comp	1	1	0	1	0	1	1	1	1	1	1	1
Stream gage	1	1	1	1	1	1	1	1	1	1	1	1
Culverts	1	1	1	1	1	1	1	1	1	1	1	0
PIT	1	1	1	1	1	1	1	1	1	1	1	1
Invasive	1	0	0	1	1	0	0	0	0	0	0	0
IWMM	1	1	0	1	0	1	1	1	1	1	1	1
Stream Habit	1	1	0	1	0	0	1	1	1	1	1	1
Bat	1	1	1	1	1	1	1	1	1	1	1	0
Stream Topo	0	0	0	1	1	0	0	0	0	0	0	0
Map Lowland	1	1	1	1	1	1	1	1	1	1	1	0
Macroinvert	0	1	0	1	0	0	0	0	0	1	1	1
Point Count	0	0	0	1	1	1	1	0	1	0	1	1
Turtle	0	1	1	1	1	1	1	1	1	1	1	0
Photo Stream	0	0	0	1	1	1	0	1	0	0	1	1
Blduck Nest	0	1	0	1	0	1	1	1	1	1	0	0
Total benefit	3.13	3.54	3.08	3.72	2.89	3.51	3.53	3.53	3.53	3.54	3.23	1.19
annual weeks	8.15	8.15	4.20	13.75	8.40	8.15	8.35	7.95	8.35	8.15	8.15	5.65
# surveys	12	14	8	18	10	14	14	14	14	14	14	10

*Constraints in optimization routines. Portfolio A: Top Down; Portfolio B: Optimum (weeks available); Portfolio C: Optimum at half capacity (weeks available); Portfolio D: Optimum at 14 weeks; Portfolio E: including surveys not in B; Portfolio F: includes point count and photo stream; Portfolio G: includes point count; Portfolio H: includes photo stream; Portfolio I: All bird surveys; Portfolio J: All fish surveys; Portfolio K: optimized using selected surveys; Portfolio L: Whittlesey Creek NWR Staff Selected Surveys September 2014.

Appendix D. Estimated Annual Costs for Implementing Surveys

(Historic surveys are excluded, total cost includes operating and staff time costs).

Survey Name	Survey ID Number	Survey Priority	Survey Status	FWS Staff Total	Total Cost
Fish Index	FF03RWIT00-012	1	Current	\$1,231.00	\$1,331.00
Comprehensive Fish Survey	FF03RWIT00-013	2	Current	\$1,231.00	\$1,331.00
Brook Trout PIT Tag Stations	FF03RWIT00-014	3	Current	\$462.00	\$512.00
Restore Fish	FF03RWIT00-006	4	Current	\$4,900.00	\$5,150.00
Macroinvertebrate Monitoring	FF03RWIT00-016	5	Current	\$2,450.00	\$2,550.00
Stream Habitat Monitoring	FF03RWIT00-004	6	Current	\$7,350.00	\$7,850.00
Stream Gage Station Monitoring	FF03RWIT00-003	7	Current	\$615.00	\$2,615.00
Whittlesey Creek Sediment Transport Study	FF03RWIT00-002	10	Current	\$6,154.00	\$6,404.00
Photo Stream	FF03RWIT00-015	13	Current	\$735.00	\$835.00
Point Count Breeding Bird Survey	FF03RWIT00-010	17	Current	\$1,846.00	\$2,096.00
Shorebird Survey	FF03RWIT00-011	18	Current	\$615.00	\$715.00
Migratory Waterfowl Survey	FF03RWIT00-008	19	Current	\$615.00	\$715.00
Culvert Condition Survey	FF03RWIT00-021	8	Future	\$6,125.00	\$6,875.00
Stream Condition and Mapping Survey	FF03RWIT00-022	9	Future	\$12,250.00	\$12,750.00
Topographic Stream Surveys	FF03RWIT00-024	11	Future	\$2,450.00	\$2,700.00
Lowlands Mapping	FF03RWIT00-023	12	Future	\$7,350.00	\$7,850.00
Wood Turtle Survey	FF03RWIT00-019	14	Future	\$923.00	\$1,023.00
Black Duck Nest Survey	FF03RWIT00-020	15	Future	\$923.00	\$1,023.00
Common Tern Survey	FF03RWIT00-018	16	Future	\$923.00	\$1,023.00
				Staff Total	Total Cost
Total for selected (current and expected) surveys:				\$28,204.00	\$32,104.00
Total for future surveys:				\$30,944.00	\$33,244.00

Appendix E. Estimated Annual Work Schedule for Selected Surveys, January – December.

Survey Name	Survey Priority	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Comments
Fish Index	1									FW				Other tasks completed by FWS Ashland FWCO
Comprehensive Fish Survey	2									FW				Other tasks completed by FWS Ashland FWCO
Brook Trout PIT Tag Stations	3				FW	FW	FW			FW	FW	FW		Refuge assistance typically after high flows, antennae maintenance - Other tasks completed by FWS Ashland FWCO
Restore Fish	4					P, T, FW		P, T, FW						Other tasks completed by Prof. Derek Ogle, Northland College
Macroinvertebrate Monitoring	5							P, T, FW, DE, A, R	A, R					I.D. assistance by Prof. Andy Goyke, Northland College
Stream Habitat Monitoring	6						P, T, FW, DE, A, R	P, T, FW, DE, A, R	P, T, FW, DE, A, R					
Stream Gage Station Monitoring	7	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	Refuge checks and services as needed to clear channel debris, clean precip gage. Other tasks complete by USGS Water Resources and Northland College students
Whittlesey Creek Sediment Transport Study	10	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	Other tasks completed by USGS Water Resources and U.S. Army Corps of Engineers
Photo Stream	13				FW	FW					FW	FW		Leaf-off after high flows preferred
Point Count Breeding Bird Survey	17				P, T	P, T, FW	FW	FW					DE	Most tasks completed by Northland College students and Prof. Katie Stumpf
Shorebird Survey	18				P, T, FW	FW				P, T, FW	FW	FW	DE	Other tasks completed by Ted Koehler FWS Ashland FWCO and Northland College students
Migratory Waterfowl Survey	19				P, T, FW	FW				P, T, FW	FW	FW	DE	Other tasks completed by Ted Koehler FWS Ashland FWCO and Northland College students

Tasks: P=Planning, T=Training, FW=Field Work, DE=Data Entry, A=Analysis, R=Reporting

Appendix F. Non-selected Surveys

A status of future denotes surveys that have been prioritized but have low chance of being conducted during the span of the IMP because of low priority or because the capacity to conduct the survey will be difficult to secure. Historic status surveys have been recently completed or discontinued.

<i>Survey Name</i>	<i>Survey ID Number</i>	<i>Survey Status</i>	<i>Survey Priority</i>
Culvert Condition Survey	FF03RWIT00-021	Future	8
Stream Condition and Mapping Survey	FF03RWIT00-022	Future	9
Topographic Stream Surveys	FF03RWIT00-024	Future	11
Lowlands Mapping	FF03RWIT00-023	Future	12
Wood Turtle Survey	FF03RWIT00-019	Future	14
Black Duck Nest Survey	FF03RWIT00-020	Future	15
Common Tern Survey	FF03RWIT00-018	Future	16
Invasive-Free Zone (IFZ)	FF03RWIT00-005	Historic	NA
Baseline Amphibian Survey	FF03RWIT00-007	Historic	NA
Bat Survey	FF03RWIT00-017	Historic	NA

Appendix G. Refuge Condition Summary

This summary can be used as a reporting tool throughout the life of the IMP to track the status, trends, and desired conditions of the selected surveys. Updates to summary can be made during annual reviews and reported in Annual Habitat Work Plans (AHWP). Updates to this table do not require an IMP revision, but should be uploaded as a digital file associated with the ServCat record that contains the approved IMP.

Whittlesey Creek NWR - REFUGE SUMMARY TABLE

Date of last update: 1/5/2016

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Survey Name and PRIMR ID (FF03RWIT00-) ⁸
Biological Integrity	Other Biota	fish species diversity and abundance, length ADDITIONALLY for brook trout (BKT) - weight, sex, maturity, presence/absence of PIT tag, genetic sample	Not Available	FWS Ashland Fish & Wildlife Conservation Database	Self-sustaining migratory Brook Trout population; 25 spawning pairs exhibiting migratory life history by 2030	HMP	TBD	Fish Index (012)
			Not Available	FWS Ashland Fish & Wildlife Conservation Database		HMP	TBD	Comprehensive Fish Survey (013)
			Not Available	FWS Ashland Fish & Wildlife Conservation Database		HMP	TBD	Restore Fish (006)
		BKT abundance, directional movement, time/date stamp of PIT tagged BKT in Whittlesey Creek (2 antennas), passage, time/date stamp of PIT tagged BKT in Little Whittlesey Creek (1 antenna)	Not Available	FWS Ashland Fish & Wildlife Conservation Database		HMP	TBD	Brook Trout PIT Tag Stations (014)

Whittlesey Creek NWR - REFUGE SUMMARY TABLE continued

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Survey Name and PRIMR ID (FF03RWIT00-) ⁸
Biological Integrity	Other Biota	aquatic macroinvertebrate population diversity and abundance	Family-level biotic index ratings: Good to Very Good	Preliminary Results	Family-level biotic index ratings: Very good to excellent	Hilsenhoff 1988/HMP	No	Macroinvertebrate Monitoring (016)
		breeding bird populations (Survey conducted at request of Migratory Birds)	N/A	N/A	Continue to provide benefits to migratory birds through restoration of forests, wetlands, and floodplains on the Refuge and in the watershed.	CCP	N/A	Point Count Breeding Bird Survey (010)
		shorebird populations (Survey conducted at request of Migratory Birds)	N/A	N/A		CCP	N/A	Shorebird Survey (011)
		waterfowl populations (Survey conducted at request of Migratory Birds)	N/A	N/A		CCP	N/A	Migratory Waterfowl Survey (008)

Whittlesey Creek NWR - REFUGE SUMMARY TABLE continued

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Survey Name and PRIMR ID (FF03RWIT00-) ⁸
Water	Hydrology	channel morphology, substrate, cover, erosion and sedimentation	Fair to excellent qualitative ratings	Preliminary Results	Good to excellent rating at index stations by 2036	Simonson et al. 1993/HMP	TBD	Stream Habitat Monitoring (004)
		long-term hydrograph data	N/A	Provisional data at USGS Water Resources: http://waterdata.usgs.gov/usa/nwis/uv?040263205	A 20% reduction in flood peaks in Whittlesey Creek, as measured by 2 to 10 year flood events.	HMP	TBD	Stream Gage Station Monitoring (003)
		substrate gradation, hydrology, sediment sources and properties, hydraulics	N/A	N/A	Roughness coefficient of overland flow increased to 0.5 (using overland flow coefficient calculated in SWAT model (Lenz et al. 2003))	HMP	TBD	Whittlesey Creek Sediment Transport Study (002)
		changes to fish habitat, channel morphology, erosion and sedimentation	N/A	N/A	In-channel roughness of 0.06 (using Manning's roughness coefficient).	HMP	TBD	Photo Stream (015)

¹ Level 1 and 2 refer to the PRIMR Resource Themes 1 and 2 and cannot be altered.

² Characteristics of a system that are of interest of survey and can be observed or estimated.

³ If known, current conditions of system being measured.

⁴ Document in which current condition is reported. If not available enter "unknown" or "N/A".

⁵ Desired conditions of system being measured.

⁶ Document in which desired condition is reported. If not available enter "unknown" or "N/A".

⁷ Does the current condition and desired condition match? YES/NO/To Be Determined (TBD)

⁸ Survey name should match PRIMR record.

REFERENCES:

- Hilsenhoff, W.L. 1988. Rapid field assessment of organic pollution with a family-level biotic index. *Journal of North American Benthological Society*. 7:65-68. http://www.jstor.org/stable/1467832?seq=1#page_scan_tab_contents
- Lenz, B.N., D.A. Saad, and F.A. Fitzpatrick. S. Geological Survey. 2003. Simulation of ground-water flow and rainfall runoff with emphasis on the effects of land cover, Whittlesey Creek, Bayfield County, Wisconsin, 1999-2001. Water-Resources Investigation Report 03-4130, U.S. Department of Interior, Geological Survey, Reston, VA.
- Simonson, T. D., J. Lyons, and P. D. Kanehl. 1993. Guidelines for evaluating fish habitat in Wisconsin Streams. Gen. Tech. Rep. NC-164. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 36 p. http://www.nrs.fs.fed.us/pubs/gtr/gtr_nc164.pdf
- U.S. Fish and Wildlife Service. 2015. Comprehensive Conservation Plan and Environmental Assessment for Whittlesey Creek National Wildlife Refuge. USFWS Region 3. Bloomington MN.
- U.S. Fish and Wildlife Service. 2006. Whittlesey Creek National Wildlife Refuge Habitat Management Plan and Environmental Assessment. USFWS Region 3. Ft. Snelling, MN.
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Appendix H. Environmental Action Statement (EAS)

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR 1500-1508), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the following proposed action does not require additional NEPA documentation.

Proposed Action, Alternatives, and NEPA Documentation

The proposed action is to implement an Inventory and Monitoring Plan (IMP) for the Whittlesey Creek National Wildlife Refuge. This IMP is a refinement of the 2015 Comprehensive Conservation Plan (CCP) and associated Environmental Assessment (EA) for the Refuge. This IMP provides more-specific guidance for surveys of Refuge's fish, wildlife, plant, habitat, and abiotic resources to fulfill the Refuge's purposes and help achieve Refuge's goals and objectives.

The EA for Whittlesey Creek National Wildlife Refuge CCP included goals and objectives for the refuge and assessed the impacts associated with a range of reasonable alternatives to achieve those goals and objectives. The rationale for selection of one specific alternative for implementation is explained in the Finding of No Significant Impact (FONSI) accompanying the final CCP. The goals, objectives, and survey strategies included in this IMP fall within the bounds of those described and assessed in the CCP and EA or EIS.

Pursuant to 40 CFR 1502.9, no additional NEPA documentation is required to implement this IMP beyond the EA and FONSI prepared concurrently with the CCP. No substantial changes to the proposed action alternative that was identified, analyzed, and selected for implementation within the CCP, EA, and FONSI are proposed through this IMP. Similarly, no significant new information or circumstances exist relevant to environmental concerns and bearing on the proposed action or its impacts.

In accordance with 43 CFR 46.205 and 40 CFR 1508.4, some surveys within this IMP are covered by the following Departmental categorical exclusion because they would not have significant environmental effects.

“Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources which involve negligible animal mortality or habitat destruction, no introduction of contaminants, or no introduction of organisms not indigenous to the affected ecosystem.” 516 DM 8.5B(1)

Project Leader/Refuge Manager

Date

[Note: this signature and dating is not required if a statement is placed below the IMP signature page indicating that the Project Leaders signing of that page applies to all contents of this IMP].

Reference: U.S. Fish and Wildlife Service. 2015. *Comprehensive Conservation Plan and Environmental Assessment for Whittlesey Creek National Wildlife Refuge*. USFWS Region 3. Bloomington MN.

IMP Revision Signature Page

IMP Revisions Whittlesey Creek National Wildlife Refuge

<i>Action</i>	<i>Signature /Printed Name</i>	<i>Date</i>
Survey list and priority changed:		
Submitted By:	Refuge Manager/Project Leader	
Reviewed By:	Regional I&M Coordinator	
Approved By:	Refuge Supervisor	