

## Accomplishments for the Year 2006

*National Wildlife Refuge System, Biological Monitoring Team, Region 3 and Region 5*

In 2005, the Biological Monitoring Team (BMT) was charged with developing a pilot program to address biological monitoring and adaptive management needs for refuges. The pilot program is based in Region 3 (Midwest) and Region 5 (Northeast) of the National Wildlife Refuge System (NWRS), with an office in La Crosse, WI. The office is co-located at the USGS Upper Midwest Environmental Sciences Center, as a way to strengthen the science partnership with the U.S. Geological Survey (USGS). A Strategic Plan was completed in November 2005. This Accomplishment Report summarizes the work of the BMT for FY 2006, using the Goals from the Strategic Plan as a framework.

Fact Sheets, reports, and other resources are available on the BMT website:

[https://intranet.fws.gov/Region3/ScienceExcellenceandLandscapeConservation/bio\\_monitoring.html](https://intranet.fws.gov/Region3/ScienceExcellenceandLandscapeConservation/bio_monitoring.html)

### The Strategic Plan identifies three Goals of the Biological Monitoring Team:

**Goal 1. Refuges will evaluate the achievement of their wildlife and habitat goals, and track the management and conservation of natural resources over time and space through systematic collection, storage, and reporting of biological data that addresses specific management information needs.**



The BMT facilitates achievement of this goal by working with Refuges to identify monitoring needs that are common to numerous refuges. The BMT, Refuges and others (USGS or other experts) then work together to develop scientifically defensible sampling designs, protocols and databases to address these needs. Efficiency of the NWRS is improved through the development of a single product as opposed to multiple refuges each independently addressing the need.

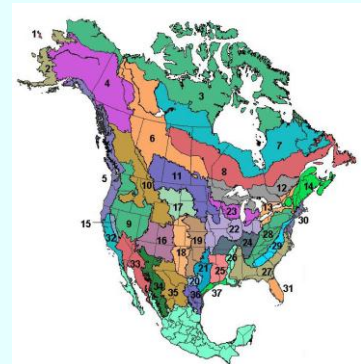
**Goal 2. Refuges will initiate management-focused research and develop new tools and techniques to fill information gaps. Adaptive management research will be used to clarify the outcomes of specific management actions and guide future management programs.**



*(Region 3 and 5 refuges participating in a wetland management study)*

The BMT works to identify management practices that are common to numerous refuges. The BMT then works to apply Adaptive Management, where appropriate, to these practices by coordinating joint USGS/FWS research studies that address management uncertainties. Multiple refuges working together facilitate the testing of management practices under a wide variety of ecological conditions and provide larger sample sizes for robust scientific investigation. The multi-refuge approach enables refuges to truly operate as a System.

**Goal 3. Refuges will contribute to regional, national, and continental conservation of trust resources as partners with other FWS Programs (Migratory Birds, Fisheries, Endangered Species, others) and the States, by collaborating with other agencies performing similar monitoring efforts to assure that data can be easily exchanged for analysis at multiple landscape scales.**



In working with Refuges to develop biological monitoring tools and conduct adaptive management, the BMT works to ensure that refuge data are compatible with similar data collected by other organizations. This sets the stage for landscape-scale monitoring and conservation planning.

## Introduction

The BMT strives to improve science-based management on Refuges through the development of defensible biological monitoring plans, efficient use of data through development of databases, and improvement of management decisions through the use of Adaptive Management. However, to effectively assist refuges to improve science-based management the BMT must first identify;

- What are the common refuge biological monitoring needs,
- How refuges are using their data to improve decisions,
- Identify refuge management uncertainties,
- And how refuges must combine their data with that of other organizations for effective use at larger landscape scales.


It has therefore been critical during this initial pilot year of the BMT to work closely with refuge staffs to attain their input and identification of these needs. Without this information the BMT could not effectively assist refuges and the results would be a haphazard approach to achieving science-based management on

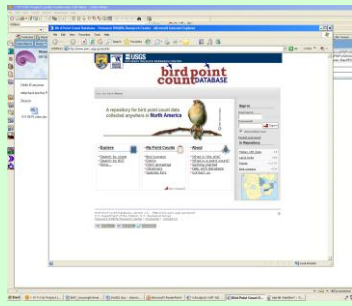

refuges. Accomplishments of the BMT during 2006 have therefore focused on development of internet-based refuge surveys, conducting refuge workshops in conjunction with USGS and other subject experts, and coordinating refuge input into development of biological monitoring plans and database development.



Tables 1, 2, and 3 below, identify primary BMT accomplishments during FY2006 toward each of the identified BMT goals.

Additionally, participation by other FWS Regions and other agencies in the development, review or application of the product is identified. Unfortunately, due to the small staff size of the BMT (3 FTEs) and receipt of a budget late in the FY, all planned projects were not completed. Table 4 identifies high priority projects initially planned during FY06, which have now been deferred until FY07. During FY07 the BMT will have sufficient foundation information needs from refuges, to be able to shift focus toward the development of tangible products to help refuges meet their science-based management needs.

**Table 1. Accomplishments to Achieve Goal 1:**

Accomplishment		Description	FWS Regions	Others Involved	Cost
	<i>Landbird monitoring protocol</i>	A refuge working group, with representatives from Regions 3, 4, and 5 was assembled to develop a landbird monitoring protocol. The team met for 6 conference calls, reviewed 9 protocols, conducted a refuge survey regarding landbird monitoring needs, and selected an existing protocol for modification. Melinda Knutson will be working with the National Park Service, Great Lakes Network in early FY2007 to revise the existing protocol for use by refuges in time for the 2007 breeding season.	3 4 5 The protocol will be available for use by all FWS Regions	USGS NPS	FWS Time


Accomplishment		Description	FWS Regions	Others Involved	Cost
	<b><i>Landbird Point Count Database</i></b>	A refuge working group was assembled to work with the USGS Patuxent Wildlife Research Center staff to identify and to update the National Point Count Database to accommodate surveys conducted on refuges . The revised database captures sampling design information, includes automated reporting, and makes refuge bird data widely available to others. Two online training sessions were held for refuge staff with 41 stations attending; a training for the Regional Refuge Biologists is planned for fall 2006. Refuges should now be entering their landbird point count data into this database.	3 5  Database is available for use by all FWS Regions and other agency Partners	USGS	FWS Time  USGS-SSP \$100K
	<b><i>Landbird Database Training</i></b>	Internet training sessions were conducted to train refuge staff in the use and capabilities of the Landbird Point Count Database. . Two online training sessions were held with 41 Refuge stations participating; a training for the Regional Refuge Biologists is planned for Fall 2006.	3 5		FWS Time
	<b><i>Marsh Bird Monitoring Program and database</i></b>	A refuge working group, with representatives from Regions 2, 3, 4, 5, USGS at Patuxent and AZ Coop. Unit was assembled to guide the development of a Marsh Bird Monitoring Program for national wildlife refuges and a central database for the management of marsh bird data. Marsh bird monitoring is being conducted on over 90 refuges using the North American Marsh Bird Monitoring protocol developed by Courtney Conway (AZ USGS Coop Unit). Soch Lor has lead the group on 15 conference calls, USGS is in the process of database development. A meeting will be held in late October to work through some final protocol and database issues. Beta testing of the database is expected for late Fall 2006.	2 3 4 5  Database and protocol are available for use by all FWS Regions and other agency Partners	USGS – Arizona Coop Unit.  USGS - Patuxent	FWS Time  USGS-SSP \$50K

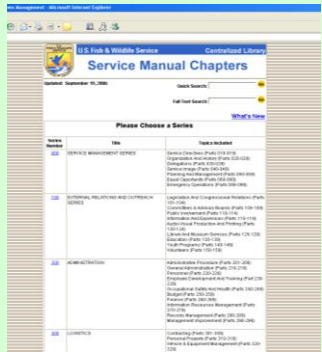
Accomplishment	Description	FWS Regions	Others Involved	Cost
	<p><b>Water level database</b></p> <p>A refuge working group, with representatives from Regions 3, 4 and 5 was assembled to develop a water level monitoring database. The team held 9 internet conference calls to define the database and user requirements. A presentation and demonstration of the database application was delivered by Todd Sutherland at the FWS National GIS Workshop (March 2006). A prototype database application was designed and developed by Todd and is currently being tested by several field stations.</p> <p>In addition to helping refuges track water levels, the database stores water quality information. The database works in a GIS environment (ArcGIS) or as an Access database. A customized charting application developed by the USGS is used to produce graphical reports that can be imported into annual water management plans.</p>	<p>3 4 5</p> <p>Database will be available for use by all FWS Regions</p>	<p>USGS – La Crosse</p>	<p>FWS Time</p>
	<p><b>Refuge Management Actions Database (RMAD)</b></p> <p>RMAD is a web-based application designed to help refuges track their management actions. Three BMT staff members are involved with RMAD. Hal Laskowski has been the leader for database development and Soch Lor has served as a member of the User Acceptance Team since its inception. Todd Sutherland coordinated Region 3 feedback from initial testing of the RMAD application; 20 stations from Regions 3 and 5 participated. Todd was responsible for testing the interface and submitting bug reports to the RMAD development team in Denver. Todd delivered a presentation and demonstration of the RMAD application at the FWS National GIS Workshop (March 2006).</p>	<p>3 5 9</p> <p>RMAD will be available for use by all FWS Regions</p>	<p>FWS Denver ITM  USGS- Patuxent</p>	<p>FWS-Time  FWS \$260K</p>

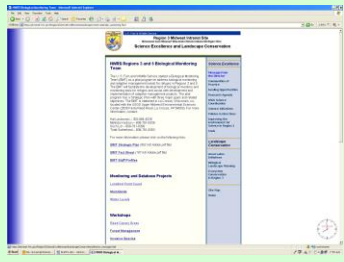
Accomplishment		Description	FWS Regions	Others Involved	Cost
	<i>National FWS Data Standards</i>	Todd Sutherland submitted two database elements for adoption as national standards. The two database elements are wind speed and wind direction. This formal process is currently in the working draft phase. Todd has been assigned as the data steward for these two database elements. Todd also serves as a member of the FWS National GIS Steering Committee which is actively involved in other national GIS data standard issues.	Todd represents all FWS Regions	FWS Denver Database Office, FWS National GIS Steering Committee	FWS – Time
	<i>Invasive Species Mapping Protocol</i>	Todd Sutherland was the primary instructor for three weed mapping training sessions held at various refuges in Regions 3, 4 and 5. The sessions were organized by the National Invasive Species Coordinator and are designed to train “volunteers” how to map invasive plant species on refuges using standardize databases and protocols that conform to the National American Weed Management Association (NAWMA) mapping standards. More information on the NAWMA standard can be found here: <a href="http://www.nawma.org/documents/Mapping%20Standards/Invasive%20Plant%20Mapping%20Standards.pdf">http://www.nawma.org/documents/Mapping%20Standards/Invasive%20Plant%20Mapping%20Standards.pdf</a>	3 4 5	TNC FWS National Invasive Species Coordinator	FWS - Time







Accomplishment		Description	FWS Regions	Others Involved	Cost
	<p><b>Statistical analysis and interpretation of landbird, marsh bird, and amphibian data</b></p>	<p>Dr. Wayne Thogmartin completed a report on landbird data collected by several refuges on the Missouri River, led by the Big Muddy NWR, “Bird habitat associations on the lower Missouri River floodplain”. This analysis provides an example of the information that flows from landbird monitoring and provides a template for future analyses.</p> <p>Several large monitoring data sets in both Regions 3 and 5 are in need of statistical analyses and interpretation. The analyses of these data sets is important because the adaptive management cycle does not operate without feedback. Future refuge management and monitoring programs can’t be improved if the evaluation data remains in raw form. The largest is a marsh bird data set from over 90 refuges and 6 FWS Regions nation-wide. Dr. Courtney Conway was contracted to continue his analyses of this data set (\$30K). Regions 3 and 5 have collected landbird monitoring data on multiple refuges; USGS was contracted under an SSP grant (Dr. Pat Heglund, UMESC) to analyze these data (\$31K + \$18K deferred to FY2007). A grassland bird study on refuges was conducted in Region 5 by Dr. Mike Runge; he was contracted to continue his analysis of this data set (\$18K). Several refuges in Region 5 have collected amphibian data in a cooperative project with the USGS Amphibian Research and Monitoring Initiative. We helped fund the analyses of these data (Dr. Larissa Bailey, PWRC, \$8K).</p>	<p>Marshbird 2 3 4 5 6</p> <p>Landbirds 3 5</p> <p>Amphibian s 5</p>	<p>USGS – La Crosse</p> <p>USGS – Patuxent</p> <p>USGS – Arizona Coop Unit</p>	<p>\$87K</p>



Accomplishment	Description	FWS Regions	Others Involved	Cost
	<p><b>National Wildlife Refuge System Inventory and Monitoring Policy Team (701FW2)</b></p> <p>Hal Laskowski served as co-leader of a national team charged with revising the Service Policy on Inventory and Monitoring. Melinda Knutson also participated in the team. The team has engaged in monthly conference calls to review the existing policy and discuss needed changes. The revised Policy will define NWRS standards for systematic collection, storage, and reporting of biological data on refuges and set the stage for future technical support provided by the BMT and other Regional Biological staff. Biology leaders from all FWS Regions participated.</p>	<p>1 2 3 4 5 6 7 9</p>		FWS-Time
	<p><b>National Wildlife Refuge System Biology Training Team</b></p> <p>Melinda Knutson participated on a team working to establish training courses for refuge biologists and others responsible for managing the biological program on refuges. A monitoring course was a major topic of discussion and will likely be one of a series of courses designed for refuge biologists. (Regions 2, 3, 4, 5, 6, and 7 were represented, NCTC paid travel expenses)</p>	<p>2 3 4 5 6 7</p>	NCTC	FWS-Time

Accomplishment		Description	FWS Regions	Others Involved	Cost
	<i>Surveys to Identify Refuge Monitoring Needs</i>	<p>The BMT used internet-based survey software (Zoomerang) to obtain current information about monitoring needs from a large number of refuges in Regions 3 and 5. This has proved to be a low-cost way to obtain information from the field. We have conducted 5 surveys this year, with another survey in the planning stage. The first survey focused on biological inventory and monitoring activities of refuges and wetland management districts. The second survey assessed refuge objectives for conducting landbird monitoring. The subsequent surveys were used to obtain information to support our research needs assessment process, including the following:</p> <ul style="list-style-type: none"> <li>• Ranking the top 10 research themes.</li> <li>• Management activities focused on controlling reed canary grass, an invasive species of grasslands and wetlands.</li> <li>• Forest management needs and activities.</li> <li>• Refuge approaches to prioritizing invasive species management</li> </ul>	3 5		FWS-Time
	<i>BMT intranet website</i>	<p>Todd Sutherland set up an intranet website to post Fact Sheets and other resources (<a href="https://intranet.fws.gov/Region3/ScienceExcellenceandLandscapeConservation/bio_monitoring.html">https://intranet.fws.gov/Region3/ScienceExcellenceandLandscapeConservation/bio_monitoring.html</a>). This is a useful way to distribute information from the workshops and other BMT efforts, keeping our FWS partners informed. Todd is exploring options for opening an internet site to share information with partners outside the FWS.</p>	3 5 Available to all FWS staff, all Regions	Linked to National Biology Website maintained by Regional Biologists and WO	FWS-Time




**Table 2. Accomplishments to Achieve Goal 2: (Adaptive Management)**

Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Waterbird Response to Impoundment Drawdowns</b>	<p>The impoundment study is evaluating seasonal timing of impoundment draw-downs on migratory waterbirds (shorebirds, wading birds, waterfowl). Twenty-three refuges in Regions 3 and 5 are participating in the 3-year study (2005-2007) with Mike Runge at the USGS Patuxent Wildlife Research Center. The goals of the study are to:</p> <ul style="list-style-type: none"> <li>• Resolve uncertainties about effects of impoundment management on wetland use by migratory birds.</li> <li>• Assess trade-offs of different seasonal management regimes in terms of responses by vegetative, invertebrate, and bird communities.</li> <li>• Determine the potential of Refuges to enhance conservation value of managed wetlands to migrating shorebirds and other waterbird guilds.</li> </ul>	<p>3 5</p> <p>Results will apply to refuges that manage impoundments</p>	USGS - Patuxent	<p>FWS- ~\$150 K</p> <p>USGS-RCRP \$150K</p>
	<b>Cattail Control through Prescribed Fire</b>	<p>The purpose of this study is to investigate prescribed fire as a strategy for controlling cattail dominance in wetlands. Five refuges and New York State DEC are participating in this 4-year study (2004-2007) with Murray Laubahn at the USGS Northern Prairie Wildlife Research Center. The goals are to:</p> <ul style="list-style-type: none"> <li>• Improve prescribed fire planning for cattail control by quantifying the effect of fire in relationship to wetland biotic and abiotic conditions.</li> <li>• Provide predictive, testable models of cattail response to fire application for guiding habitat decision making at Refuges throughout the Regions.</li> </ul>	<p>3 5</p> <p>Results will apply to refuges that manage impoundments with cattails</p>	USGS – Northern Prairie Wildlife Research Center	<p>FWS- ~\$60K</p> <p>USGS-RCRP \$121K</p>

Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Workshop on Management of Invasive Reed Canary Grass</b>	The Reed Canary Grass workshop was held 12-14 July 2006 at the Upper Mississippi National Wildlife and Fish Refuge, Onalaska Office in Wisconsin. The workshop planning committee conducted a survey prior to the workshop to obtain information concerning RCG management and research needs on refuges to better inform and organize the workshop. Refuge, state (MN, MO), and university and USGS scientists convened to discuss the state of our understanding about RCG in science and management. Workshop participants brainstormed 6 potential topics for USGS cooperative adaptive management project, which ranged from better RCG methods to restoration of native plant communities to wildlife values of RCG.	3 5 6	USGS – LA Crosse  USGS – Patuxent  State Agencies (MN and WI) The Nature Conservancy	FWS \$30K  SSP-\$3K
		<b>Workshop on Forest Management</b>  The Forest Management workshop was held 8-10 August 2006 at Big Oaks National Wildlife Refuge in Indiana. Thirty-nine refuge and USGS staff from the two Regions participated, including a forester from the state of Maryland. The planning committee conducted a survey of forest management on refuges prior to the workshop. A major theme arising from the workshop was the need for baseline information to put refuge forests in perspective with the regional landscape. Restoration benchmarks are needed that consider historical conditions, restoration potential of the site, and the NWRS mission and priorities. Invasive species control and re-establishing forests are also major issues on many refuges. (Regions 3 and 5 participated; cost =)	3 5	USGS – Patuxent  USGS – Columbia Missouri  Univ of Missouri  Univ of Michigan  State of Maryland	FWS - \$30K  SSP – 3K

Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Invasive Species Workshop</b>	The BMT is planning a refuge workshop to allow refuges to identify their invasive species management needs and priorities. This information will form the basis of a subject theme for a USGS Request for Proposals to conduct a multi-refuge adaptive management study to address refuge invasive species management.	3 5 9		FWS- Time  \$ Deferr ed to FY07 see below.



Accomplishment	Description	FWS Regions Involved	Others Involved	Cost
	<p><b>Adaptive Management Consultancy</b></p> <p>Adaptive management is a process of continually improving management actions and decisions to achieve specific conservation goals and objectives. This project provides USGS consultation regarding implementation of adaptive management within the National Wildlife Refuge System (NWRS) through focused case studies.</p> <p>All FWS Regions will be requested to submit case studies. The case studies will focus on routine management decisions that refuge, wetland management district (WMD), and private land (PL) biologists make repeatedly and where proper evaluation of management actions will help to guide future decision-making. The case studies will be designed not as research projects, but as a re-direction of existing planning and monitoring resources on refuges.</p> <p>Consultants with specialized expertise will provide background information and assistance with structuring each problem during an initial scoping session. In these sessions (workshops), consultants and managers together will sketch out the components of an adaptive decision making framework, including the identification of management objectives, feasible decision alternatives, models of system response, and appropriate monitoring designs. Refuges and FWS cooperators will further develop these components, contacting and working directly with USGS or other scientists, as necessary and as individually arranged. Refuges will take responsibility for implementing the case study on the ground, data management, reporting, and arranging for outside assistance with data analysis and modeling support as needed.</p>	1 2 3 4 5 6 7	USGS – Science Centers depend upon expertise required.	FWS \$40K

**Table 3. Accomplishments to Achieve Goal 3: (Monitoring Coordination with other Agencies/Organizations)**

Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Continental Marsh Bird Monitoring Steering Committee</b>	Soch Lor served as a steering committee member to develop a standardized continental marsh bird monitoring program. The steering committee includes scientists and biologists from Canadian Wildlife Service, Bird Studies Canada, USGS and USFWS, who organized the second continental Marsh Bird Monitoring Technical Workshop, held at Patuxent WRC on 6-8 March 2006. This international workshop, convened marsh bird experts to 1) Determine the current status of the development of marsh bird survey protocols, survey sampling designs, and a data management system for marsh bird survey data; 2) Assess whether these efforts are technically adequate to commence implementation of a large-scale marsh bird monitoring program; 3) Establish whether additional research and development are needed to enhance the program, and 4) Identify steps needed to move towards implementation of a large-scale marsh bird monitoring program.	1 2 3 4 5 6	States, USGS, CWS, Others.	FWS- Time



Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Upper Mississippi River - Great Lakes Joint Venture</b>	Melinda Knutson served on the Landbird subcommittee of the Upper Mississippi River - Great Lakes Joint Venture (UMRGLJV). She took a leadership role in writing the Landbird Habitat Management Strategy. She also participated in national Partners in Flight (PIF) activities, including a workshop on Conservation Design held in St. Louis in March 2006. It is important to maintain communication with colleagues in Migratory Birds and PIF to identify the role that Refuges should play in landscape scale conservation and to ensure that monitoring protocols and databases will be interchangeable in the future. (The JV is entirely within Region 3)		FWS Migratory Birds, HAPET office, 9 States	
	<b>Natural Resources Monitoring Partnership</b>	Hal and Melinda worked to improve monitoring efforts nation-wide through the Natural Resources Monitoring Partnership. The interagency group, led by USGS, is working to make monitoring protocols and databases widely available by posting them on a national website. Hal attended a national meeting in San Diego and Melinda participated in a conference call. (All FWS Regions and multiple agencies participate)	3 5 All Regions will benefit when the partnership and website are fully implemented	USGS, National Park Service, BLM, States	
	<b>Wisconsin Monitoring Summit</b>	Melinda Knutson was an invited speaker at the Wisconsin Monitoring Summit held in Madison, WI (April 2006). She helped biologists from all over Wisconsin design a state-wide monitoring plan.			





Accomplishment		Description	FWS Regions Involved	Others Involved	Cost
	<b>Alaska (Region 7) Biologists' Workshop</b>	Melinda Knutson was an invited speaker at the 2006 Region 7 Biologists' Workshop in March 2006. She described efforts on-going within the NWRS to address inventory and monitoring needs on refuges. She also met with Region 7 staff to discuss possible future collaborations.			
	<b>Monitoring Symposium, 2006 The Wildlife Society Annual Meeting</b>	Melinda Knutson collaborated with John Sauer (USGS) to organize and moderate a Symposium, <i>Objectives and Metrics for Monitoring Wildlife</i> at the 2006 National TWS Meeting. The purpose of the symposium was to improve the quality of information derived from monitoring programs by (1) examining the relationships between wildlife monitoring objectives and the metrics used to achieve those goals and (2) offering case studies of successes and lessons learned by land management agencies with regard to objectives and the metrics in wildlife monitoring programs. Papers from the symposium will be published in a special section of the <i>Journal of Wildlife Management</i> .	All Regions	USGS, National Park Service, US Forest Service, Institute for Bird Populations	



**Table 4. Planned projects for which there was insufficient staff time during FY06 to complete. Each project remains a high priority for the BMT to complete during FY07.**

<b>Project</b>	<b>Description</b>	<b>FWS Regions Involved</b>	<b>Cost</b>
Workshops to scope future FWS/USGS joint adaptive management projects. Funds will pay for travel for FWS and USGS staff to attend.	The BMT is currently planning a refuge workshop to allow refuge staff to identify invasive species management needs. The results of this workshop will be incorporated into a subject theme for a USGS Request for Proposals to the various USGS Science Centers. The successful proposal will become a multi-refuge Adaptive Management study.	3 5 USGS – Patuxent	\$30K
Abiotic (nutrient, sedimentation, and hydrologic) assessment and Ecological Monitoring of a representative sample of national wildlife refuges	1) Ecological Monitoring Protocol for various relevant abiotic and biotic attributes on refuges, including water and soil nutrients, water inflow/outflow, vegetation characteristics when appropriate; 2) Obtain baseline abiotic and biotic information on NWRs; 3) Long-term abiotic and biotic monitoring that will be used as part of the adaptive management process in managing refuge wetlands; 4) Long-term benefit in educating biologists and refuge managers on the importance of considering the relationship between abiotic and biotic factors and management actions on refuge lands. Measurements will be incorporated into an abiotic integrity index for discrete wetlands to be used to evaluate impacts on biological resources.	3 5 USGS – Science Centers Consultant Leigh Fredrickson	\$40K
Refuge Biological Monitoring Need.	Host meeting of refuge staff and partners to discuss refuge role in waterbird monitoring. Refuge staff to identify waterbird monitoring needs, uses of their waterbird data, limitations on data collection procedures, and sharing of data. Product from meeting will be draft of Requirements Analysis document for refuge waterbird monitoring.	3 5 USGS Waterbird experts	\$10K
Host meeting of Marsh Bird Database team	Faster resolution of issues surrounding Marsh Bird Database; some urgency as USGS wants to wrap up development of Marshbird database for use by refuges and other agencies.	2 3 4 5	\$10K
Managing baseline inventory data on refuges.	Refuges need a process for documenting baseline inventory data.  The products would be a process (SOP) and database for refuges to use to create baseline inventory data from various sources, mostly residing at the refuge itself. This SOP could be disseminated to refuges and they would be responsible for conducting the process and/or working with the BMT to accomplish it over the next 10 years. This is similar to the process that the NPS used for national parks using their NP Species database.	The products from this project will apply to entire NWRS.  Representatives from all other Regions will be requested to participate in development of this product.	\$20K

## Reports , Protocols, Publications, and Databases

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Ewert, D. N., M. G. Knutson, T. Will, B. Potter, M. Roell, and J. Castrale. Draft. Landbird Habitat Conservation Strategy for the Upper Mississippi River and Great Lakes Region Joint Venture. U.S. Fish and Wildlife Service, Migratory Birds Program, East Lansing, MI.

Knutson, M. G., B. R. Gray, and M. S. Meier. In press. Comparing the effects of local, landscape, and temporal factors on forest bird nest survival using logistic exposure models. Pages XX-XX in Beyond Mayfield: measurements of nest survival data (S. L. Jones and G. R. Geupel, Eds.). Studies in Avian Biology, Denver, CO.

Knutson, M. G., L. A. Powell, M. A. Friberg, G. J. Niemi, and R. K. Hines. 2006. An assessment of bird habitat quality using population growth rates. Condor 108:301-314.

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Laskowski, H., M. C. Runge, and J. Lyons. 2006. Bird use response to impoundment drawdown. Fact Sheet. U.S. Fish & Wildlife Service, Milton, DE.

Lor, S., and M. Laubahn. 2006. Cattail control through prescribed fire. Fact Sheet. U.S. Fish & Wildlife Service, La Crosse, WI.

Lor, S. and R. A. Malecki. 2006. In Press. Breeding ecology and nesting habitat associations of five marsh bird species in western New York. Waterbirds.

Powell, L. A., and M. G. Knutson. 2006. A productivity model for parasitized, multi-brooded songbirds. Condor 108:292-300.

Thogmartin, W. E., T. J. Fox, J. J. Rohweder, and M. G. Knutson. 2006. Emerging technologies: LINK - a land conservation decision support tool. Bulletin of the Ecological Society of America (online) July 2006:<http://www.esapubs.org/bulletin/backissues/backissues.htm>.

Thogmartin, W. E., M. G. Knutson, J. J. Rohweder, and B. R. Gray. 2006. Bird habitat associations on the lower Missouri River floodplain: A report to the U.S. Fish and Wildlife Service Big Muddy National Wildlife and Fish Refuge. U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, WI. 123 pp.

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### For further information contact:

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