



U. S. Fish and Wildlife Service National Wildlife Refuge System *Southeast Region Inventory & Monitoring – Gulf I&M Zone*

Refuge Inventory and Monitoring Status and Needs Assessment

Gulf I&M Zone Summary Report



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Southeast Region Inventory & Monitoring Network

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Executive Summary

This report represents the culmination of the Status & Needs Assessment effort in the Gulf I&M Zone, and summarizes the information collected from refuge staff from June 2012 – June 2013. During this time period, Southeast Region I&M staff visited 65 National Wildlife Refuges in Louisiana, Arkansas, Mississippi, Tennessee, and Alabama to help refuge staff populate the Planning and Review of Inventory and Monitoring on Refuges (PRIMR) database and to discuss I&M data and staff support needs. These data were used by I&M staff to identify opportunities to coordinate and improve data collection, data management, and analysis so that refuge data contributes effectively and efficiently to USFWS and partner objectives at the local and landscape scale. The most outstanding opportunities for I&M identified within the Southeast Region Gulf I&M Zone are the following:

Opportunities

- Work with refuges, the Migratory Bird Division, and Joint Ventures to identify specific data needs for wintering waterfowl and their habitat, at both the local, regional, and flyway level.
- Assess existing waterfowl and waterfowl habitat protocols for applicability to monitoring objectives and provide objective, specific recommendations to refuges, particularly with attention to protocols or combinations of protocols that address both local and landscape objectives.
- Work with the Migratory Bird Division and other partners to 1) identify potential protocols and procedures to meet local and landscape monitoring objectives for landbirds/forest breeding birds, 2) identify the most strategic sample sites (refuges) for bird monitoring, and 3) ensure data management and analysis is coordinated and timely.
- Assist in development of a common data management platform for forest inventory data on a landscape basis (on-going in collaboration with I&M, Refuges, LMVJV, and GCPO LCC).
- Collaborate with the Ecological Services Division to identify shared priority surveys for T&E species with individual refuges and support their planning, design, coordination and implementation.
- Evaluate the need and opportunities for effective baseline inventories of invasive species and develop treatment associated monitoring protocols.
- Work with refuges through the Inventory and Monitoring Plan development process to evaluate and prioritize refuge surveys, identify or develop suitable monitoring protocols, and support development and use of common databases and analysis tools in order to increase efficiency.
- Facilitate access to statistical expertise to ensure that use of collected monitoring data is not limited by a lack of analysis expertise. Opportunities may include simple statistical support from I&M staff or contracted support for complex analysis projects.
- Assist refuge staff with data analysis and data management where appropriate and facilitate training in data management for biological program staff.

Acknowledgments

We would like to express our gratitude for all those that contributed to the completion of the PRIMR survey inventory and Refuge Needs Assessment. Refuge staff for 65 refuges reviewed survey records, compiled information and met to discuss their refuge information and perspectives with Inventory & Monitoring (I&M) staff. The Needs Assessment questionnaire was derived from a similar document created by FWS Pacific Region I&M and their contributions are gratefully acknowledged. We also thank staff from the FWS Natural Resources Program Center for input on compilation of the results and for review and assessment of earlier versions of this report.

We would like to thank in particular the following individuals who assisted I&M staff with completion of the PRIMR survey inventory and Refuge Needs Assessment: Angie Dedrickson, Barron Crawford, Becky Rosamond, Bill Alexander, Bill Gates, Bill Peterson, Bob Strader, Bradley Bordelon, Brett Hortman, Brett Wehrle, Brittany Petersen, Carla Mitchell, Chris Foster, Christina Legleu, Clayton Ferrell, Danny Breaux, Danny Moss, David Linden, Deisha Norwood, Diane Borden-Billiot, Don Voros, Dwight Cooley, Emery Hoyle, Eric Johnson, Erin Bellavia, Eva Kristofik, Glenn Harris, Gypsy Hanks, Jackie Isaacs, James Harris, Jamie Farmer, Jay Hitchcock, Jeff Denman, Jena Moon, Jereme Phillips, Jeremy Bennett, Joe McGowan, Joe Saenz, John Dickson, John Earle, John Simpson, John Stark, Jonathan Windley, Justin Sexton, Keenan Adams, Keith Weaver, Keith Westlake, Kelly Purkey, Ken Litzenberger, Kenny Finch, Kent Ozment, Kimberly Sykes, Lamar Dorris, Mark Woodrey, Matthew McCollister, Michael Johnson, Mike Rich, Milton Hubbard, Natalie Sexton, Nathan Renick, Neil Lalonde, Nick Wirwa, Oliver Van Den Ende, Pat Stinson, Paul Gideon, Paul Provence, Paul Reynolds, Paul Yakupzack, Randy Bumpers, Randy Cook, Richard Crossett, Richard Smith, Richard Hines, Richard Meyers, Ricky Eastridge, Rob Hurt, Robbie Dailey, Robert Gosnell, Robert Wheat, Ron Hollis, Ross Flagen, Sarah Clardy, Scott Hereford, Scott Simmons, Stephanie Allison, Steve Gard, Steve Reagan, Steven Lewis, Susan Alexander, Terry Delaine, Tom Green, Travis Carpenter, Troy Littrell, and Will Underwood.

Introduction

The Southeast Region Inventory and Monitoring Network (I&M) is part of the national Inventory & Monitoring Initiative, which was created to increase efficiency, consistency, and the scientific rigor of wildlife and habitat inventory and monitoring activities within our National Wildlife Refuge System. Within the Southeast Region, the I&M Branch is tasked with providing a balanced approach to inventory and monitoring that reflects priorities, partnerships, and contributions at the local, regional, and national levels. The Southeast Region I&M Network is coordinated across the entire region, however staff coverage of the region is divided into two functional I&M zones (South Atlantic and Gulf I&M Zones, based on LCC boundaries).

Initial priority actions for the Southeast Region I&M Network have been the cataloging of current inventory and monitoring activities on refuges across the region using the Planning and Review of Inventory and Monitoring on Refuges (PRIMR) database and, within the Gulf Zone, conducting a Needs Assessment survey to better understand what assistance individual refuges need and how I&M can potentially fill those roles (Fig. 1). The PRIMR tool was designed to inform national and regional I&M prioritization, guide planning, and facilitate future development of refuge Inventory and Monitoring Plans (Objective SD 2.0, DM 2.0, IMP 1.4 of the 7-year Plan (USFWS 2013)) by assessing the current status of surveys conducted by refuges. Information was collected in the PRIMR database from across the entire Southeast Region and it provided overarching observations on the types of surveys that refuges conduct and how they are conducted. The Refuge Needs Assessment was designed to provide information about specific refuge needs and gaps regarding natural resource data acquisition, management, analysis, and utilization. The Refuge Needs Assessment was conducted along with PRIMR data acquisition in the Gulf Zone only. During the Status (PRIMR) and Needs Assessment process, I&M staff met with a core group of refuge managers, biologists, and other key individuals at each refuge complex to discuss details of historic, current and planned natural resource survey efforts and refuge I&M needs.

Objectives

1. Identify common surveys and methods across refuges, representing opportunities to enhance monitoring through collaboration supported by the I&M Network.
2. Identify common information gaps and support needs across refuges in the Gulf I&M Zone, representing opportunities to target I&M Network resources to improve refuge resource management information.
3. Meet the National I&M Initiative objective (DM 2.0) to catalog current survey activities across the National Wildlife Refuge System.

The Status and Needs inquiry process on Gulf I&M Zone refuges provided an unprecedented level of information about surveys that refuges conduct, information available to inform decisions, and needs that refuge see with regard to inventory and monitoring. It must be noted, however, that the Status and Needs inquiry was not a scientifically-designed study and responses to the Needs Assessment portion were opinion based, qualitative, and responses are summarized. This report represents the culmination

of the Status & Needs Assessment effort and summarizes the information collected. In compiling and interpreting this information we (I&M) highlighted specific cases, such as common strengths, needs, and surveys, in order to illustrate opportunities to enhance refuge monitoring.

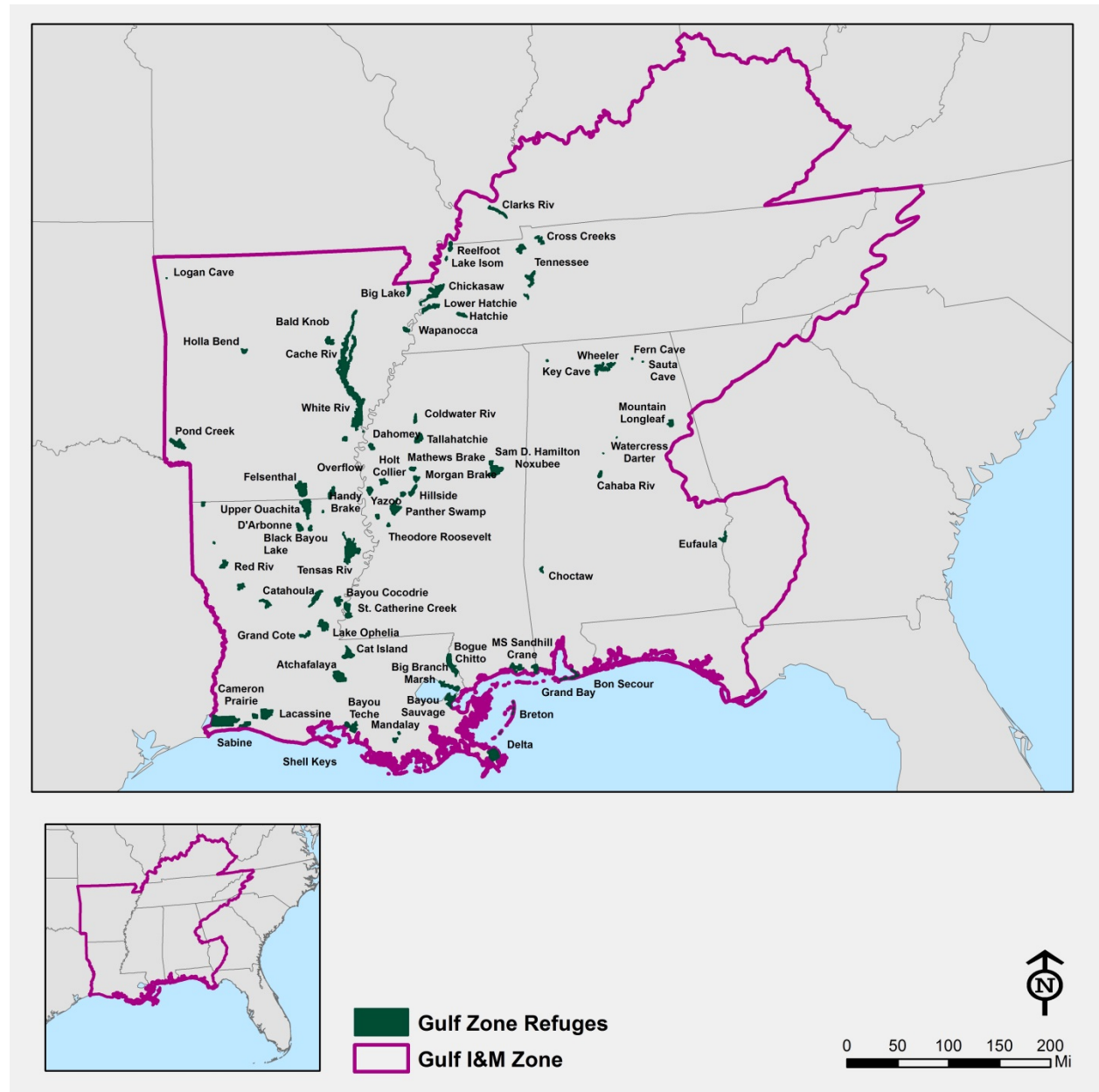


Figure 1. Refuges where PRIMR/Needs Assessment visits were conducted in the Gulf I&M Zone.

For I&M, and the refuge system as a whole, to make the greatest conservation impact, we must focus on common natural resource priorities and the greatest limitations in capacity and capability. As part of PRIMR, refuge staff were asked to rank surveys (ranked from 1 [High] to 3 [Low]) currently conducted based on the relative importance to the refuge purpose, management needs, and long-term commitment to each survey. In the Gulf I&M Zone, refuge surveys most often ranked as a HIGH priority were related to wintering waterfowl, land birds, bats, and Threatened and Endangered species (Fig. 2).

The existing inventory and monitoring work of refuges within the Gulf I&M Zone, as well as their priorities as identified by the Needs Assessment, directly coincide with USFWS legal mandates, NWRS and R4 prioritizations, including the National Inventory & Monitoring Initiative 7-year Plan (USFWS 2013), USFWS Divisions and LCC partners, and recent R4 direction to refuges regarding management priorities (USFWS 2014). Based on the information from the Status & Needs Assessments and recognition of these other priorities, the R4 I&M Network will highlight the following six outstanding inventory and monitoring priorities in this report. For each we provide summary observations from the Status & Needs Assessments, outline the challenges and opportunities for enhancing monitoring excellence, and provide potential roles for I&M contribution.

- **Wintering Waterfowl**
- **Forest Breeding Birds and Bottomland Hardwoods**
- **Federally Listed Species Monitoring**
- **Invasive Species**
- **Field Capacity**
- **Data Management**

In addition to these priority topics, the data collected from the Status & Needs Assessments provided many more valuable observations, less far reaching in nature but also highly informative and are available as data summaries in the report Appendix.

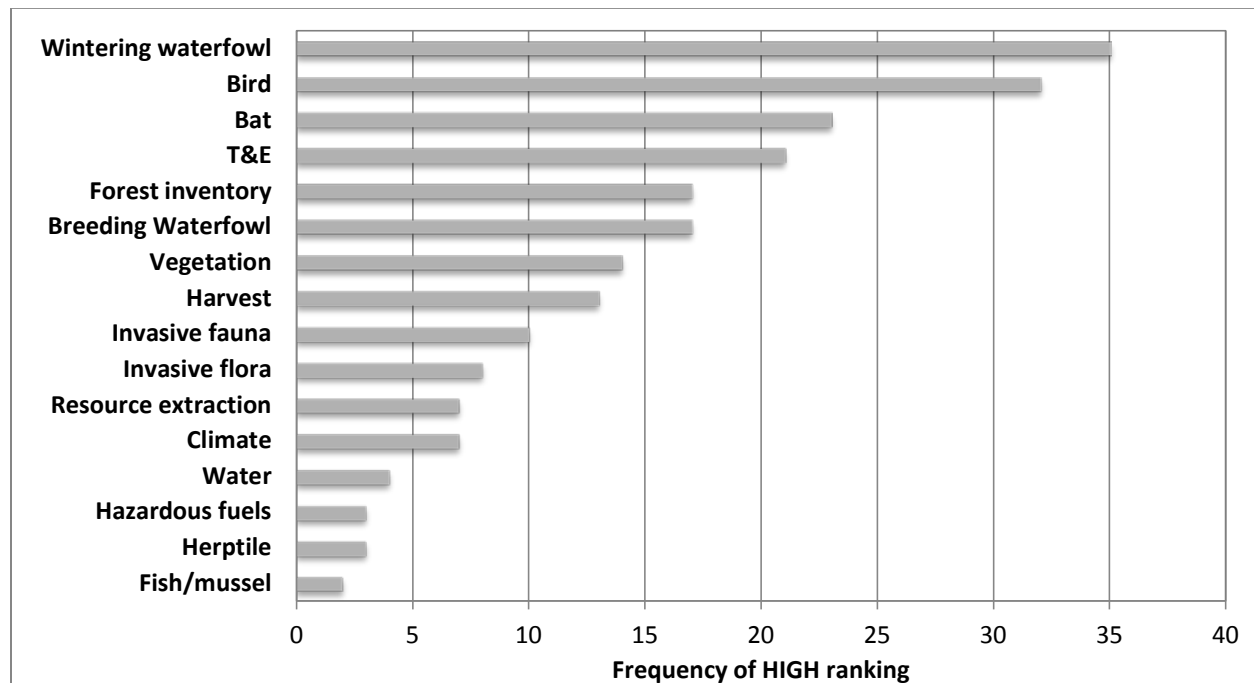


Figure 2. Current refuge biological surveys ranked as a HIGH priority in the Gulf I&M Zone PRIMR database assessment. Refuges often had more than one HIGH priority survey. This figure represents the total frequency of a HIGH ranking for each survey category. Surveys were not ranked against one another.

Wintering Waterfowl

The Southeast plays an important role in conservation of waterfowl populations. Migratory birds, particularly wintering waterfowl, are the establishing purpose for many refuges in the Gulf I&M Zone. Wintering waterfowl habitat management is common, as are waterfowl surveys among refuges in the Gulf I&M Zone. During the Needs Assessment, 75% of Gulf I&M Zone refuges specified waterfowl as a priority biological resource (Fig. 3). The focus on waterfowl was particularly strong (93%) in the Mississippi Alluvial valley subgeography (Fig. 3). Winter waterfowl surveys were most frequently ranked as a HIGH priority survey on refuges currently conducting them (Fig. 2 and 5). Data on wintering waterfowl have been collected for 25 to 75 years on twenty refuges in the Gulf I&M Zone and is indicative of the commitment to waterfowl monitoring among refuges as well as the potential impact of NWRS monitoring for long-term landscape-scale assessments (Fig. 5). Inventory and monitoring efforts and improvements related to waterfowl will enhance local level habitat management effectiveness, coincide with the priorities of FWS Southeast Region leadership and landscape level partners (e.g. Division of Migratory Birds), and contribute to the national I&M 7-year Plan Operational Goals (Adaptive Management, Bird Inventory and Monitoring).

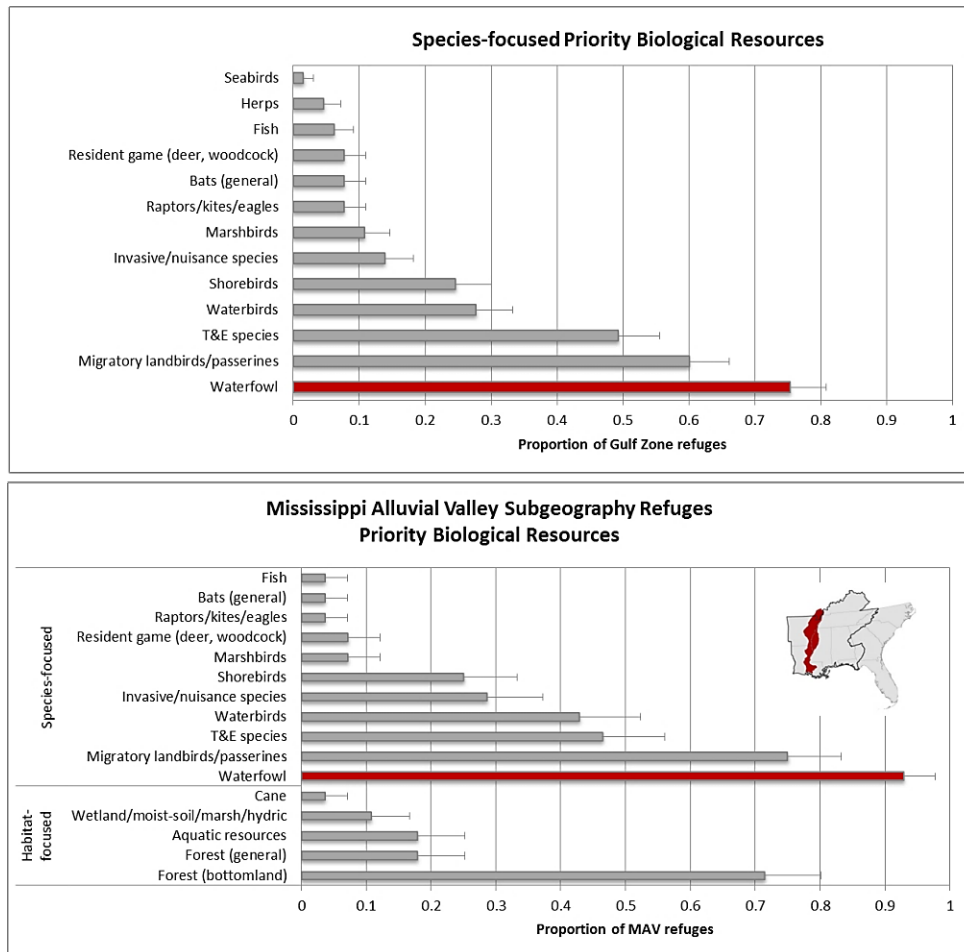


Figure 3. Proportion of Gulf I&M Zone refuges specifying waterfowl as a priority biological resource (top), and proportion of refuges in the Mississippi Alluvial Valley subgeography specifying waterfowl as a priority biological resource (bottom).

Monitoring waterfowl during the wintering season is complex. Wintering waterfowl populations consist of a mix of migratory and resident populations that are rarely stationary. However, winter waterfowl abundance data is an important contributor to understanding migratory patterns, habitat use, and annual waterfowl cycles. Most refuges specifying waterfowl as a priority biological resource in the Gulf I&M Zone felt they had adequate information on waterfowl abundance, trend, and distribution (season unspecified), but half also specified a high need to have greater abundance and trend information (Fig. 4). The need to have greater information when existing information is available may reflect the importance of waterfowl as a priority resource for many refuges, or an inability to use existing information to inform management actions.

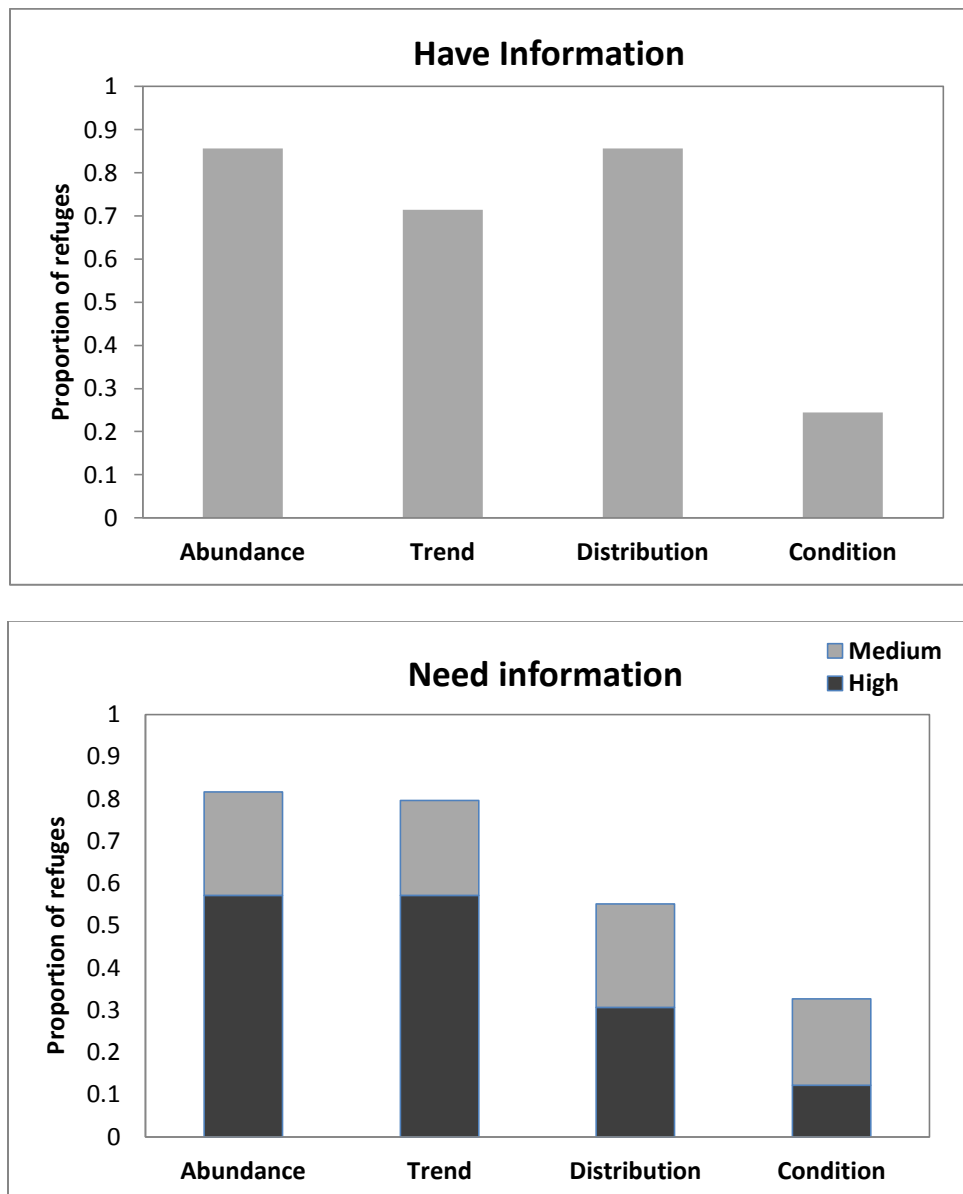


Figure 4. The proportion of refuges with waterfowl as a priority resource that have (top) and need (bottom) population information.

Population monitoring

Forty-four refuges in the Gulf I&M Zone conduct some type of waterfowl survey, typically occurring in mid-winter as part of an aggregate group of survey types commonly called the Midwinter Waterfowl Survey. However, Midwinter Waterfowl Survey efforts reflect a myriad of sampling designs including federal and state-led aerial and ground based surveys, and coordinated and non-coordinated surveys conducted monthly, weekly, bi-weekly, and on an ad-hoc basis on refuges (Fig. 5). Seventeen refuges also conduct other types of waterfowl surveys, either complimentary to mid-winter waterfowl surveys or as their only waterfowl survey type (Fig. 5).

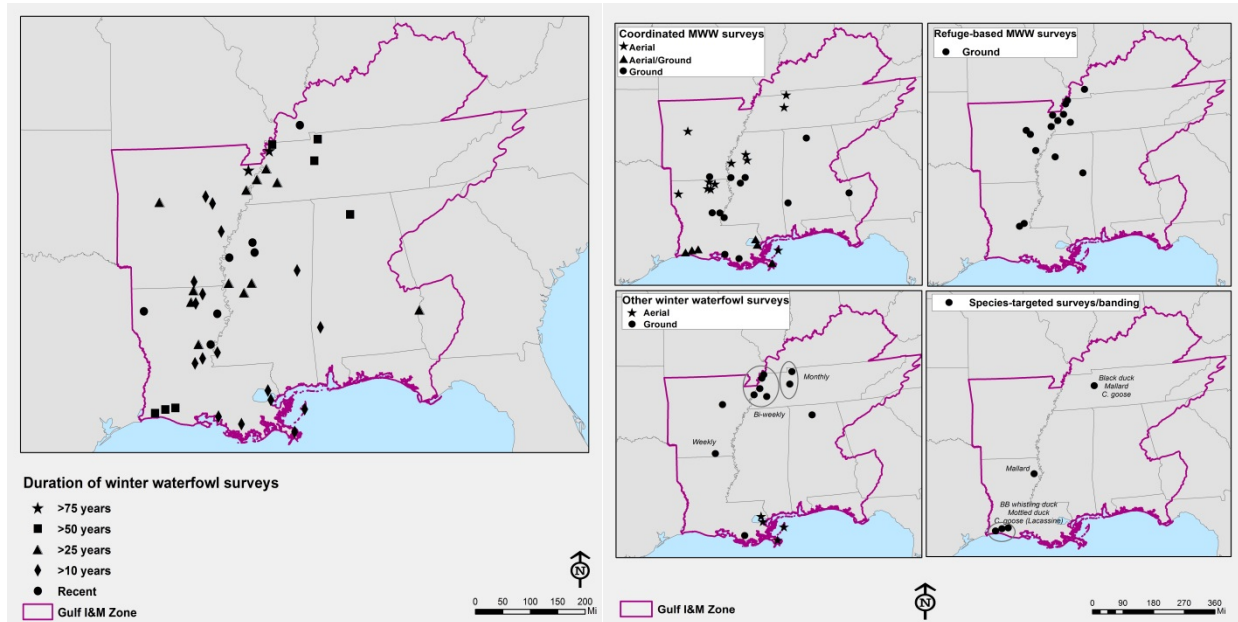


Figure 5. Refuges conducting coordinated or non-coordinated mid-winter waterfowl surveys, or other waterfowl survey types during the wintering season.

Habitat Monitoring

Many refuges in the Gulf I&M Zone supplement natural waterfowl habitat with managed moist soil units and agriculture areas. Thirteen refuges in the Gulf I&M Zone reported in PRIMR that they monitor their moist soil units. This number is likely inaccurate, however, because some refuges did not list this as a survey in PRIMR because quantitative data was not collected, while others did. A few refuges do collect periodic water depth or vegetation data, but most simply do frequent visual surveys. Thirty-two refuges contribute monitoring data (acres of managed wetlands for waterfowl) to the Lower Mississippi Valley Joint Venture (LMVJV), in support of landscape level assessment of waterfowl habitat availability (Fig. 6).

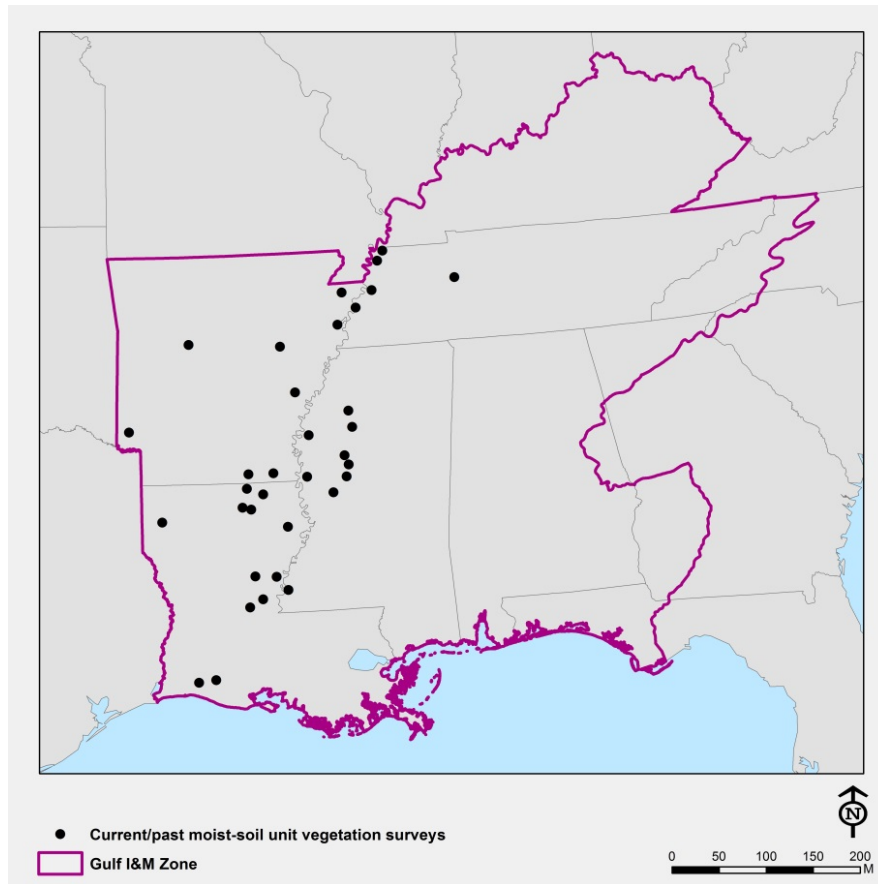


Figure 6. Refuges in the Gulf I&M Zone contributing data to the LMVJV waterfowl habitat database.

Opportunities

The basic framework of wintering waterfowl monitoring via the Midwinter Waterfowl Survey approach is broadly and willingly adopted by refuges in the Gulf I&M Zone. However, varying sampling schemes and incomplete survey metadata cause difficulties discerning if refuge wintering waterfowl data are contributory to both refuge- and landscape-scale understanding of wintering waterfowl populations. Opportunities to improve flyway-level implementation of the Midwinter Waterfowl Survey are currently being examined by FWS Migratory Birds, Joint Ventures, LCC's, I&M, and state agencies. An opportunity exists for refuges to transition the varied Midwinter Waterfowl Survey methods to a collaborative and statistically-robust standardized survey framework with adequate spatial and temporal coverage in key subgeographies. This would yield a FWS waterfowl monitoring program that is both more informative at multiple spatial scales and more efficiently applied across refuges in the region.

First, the refuge system needs to clearly identify the monitoring objectives (why are we monitoring/what question do we need to answer) for the myriad of surveys that are being conducted on refuges for waterfowl. This must include both local (refuge) and landscape (Joint Venture, Flyway) objectives. These consolidated objectives then become the basis for evaluation and/or development of

a common survey protocol framework. Nationally recognized frameworks already being used by FWS in other areas exist that have applicability and could serve as a strong beginning to this process (e.g. Integrated Waterbird Monitoring and Management Initiative, LMVJV Water Management Update and Moist Soil Monitoring, Management & Reporting Tool).

Potential Roles for I&M

- Work with refuges to clearly identify refuge specific needs for wintering waterfowl information.
- Work with Division of Migratory Birds and Joint Ventures to similarly identify specific needs for wintering waterfowl information, at both the regional and flyway level.
- Assess existing protocols for applicability to monitoring objectives and provide objective, specific recommendations to refuges, particularly with attention to protocols or combinations of protocols that address both local and landscape objectives.
- If necessary, assist in developing appropriate protocols.

At-risk Landbirds / Bottomland Hardwood Forest

Many species of at-risk landbirds are priority species for the National Wildlife Refuge System. A high number of these bird species use bottomland hardwood forest habitat which is a priority habitat for protection, restoration, and management for many refuges in the Gulf I&M Zone, particularly within the Lower Mississippi Valley subgeography. Inventory and monitoring efforts and advances in this arena inform local level adaptive management for priority species and habitats, and help support legal mandates and Refuge Purposes. Regionally they coincide with refuge leadership goals and regional partner interests (e.g. Division of Migratory Birds, Joint Venture, GCPO LCC). Such efforts also support the national I&M 7-year Plan (Adaptive Management, Bird Inventory and Monitoring).

Migratory landbirds are a top priority for refuge management on 60% of Gulf I&M Zone refuges which is consistent with the establishing purpose of many refuges (Fig. 7). Bottomland hardwood forest is the number one priority habitat for refuges across the Gulf I&M Zone, with over 50% of refuges designating it as a top priority for management (Fig. 7).

Landbird or all bird monitoring is currently or was recently conducted on 30 refuges in the Gulf I&M Zone (Fig. 8). Predominant bird surveys being conducted include forest and scrub-shrub bird point counts, Christmas Bird Counts, Breeding Bird Survey routes, or Monitoring Avian Productivity and Survivorship (MAPS) stations. With the exception of point counts, most of these are cooperative/collaborative surveys conducted by volunteers or partners that inform national monitoring objectives, but have little bearing on refuge management at the local or regional scale.

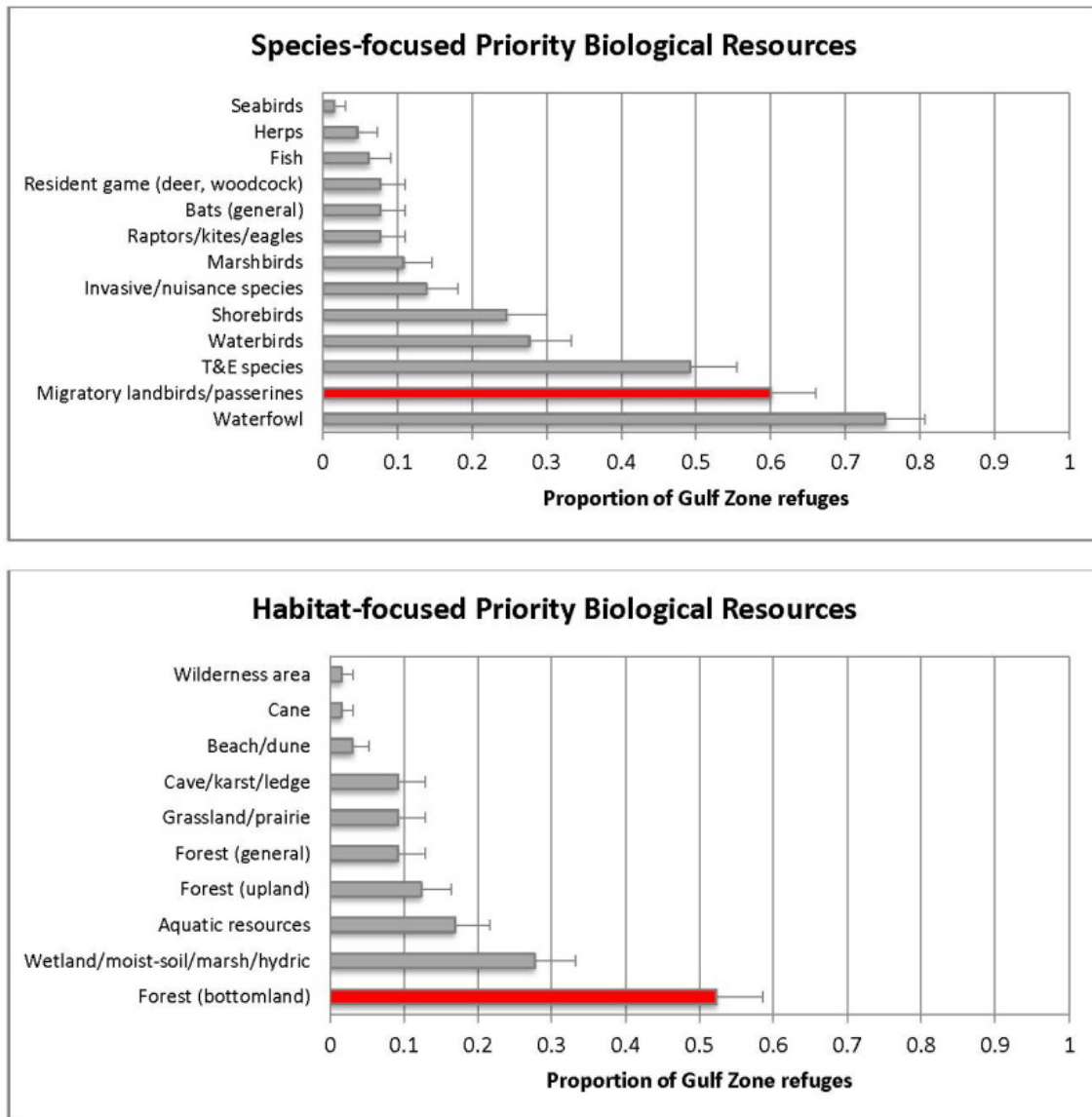


Figure 7. Proportion of Gulf I&M Zone refuges specifying landbirds (top) and bottomland hardwood forest (bottom) as a priority biological resource.

About half of Gulf I&M Zone refuges conduct some type of periodic forest inventory or forest monitoring. Continuous Forest Inventory (CFI) plots exist on 9 refuges, but are sampled without regularity and may have suffered some loss of data or plot locations due to staff loss or turnover (Fig. 9). A lack of clarity regarding CFI objectives and protocols make assessments of their value unclear, but the potential exists for these surveys to substantially assess long-term trends. Periodic, often annual, forest inventories are conducted on 27 refuges in the Gulf I&M Zone (Fig. 9). These inventories are used directly for management of forest habitat for wildlife and represent one of the Gulf I&M Zone refuges most applicable surveys.

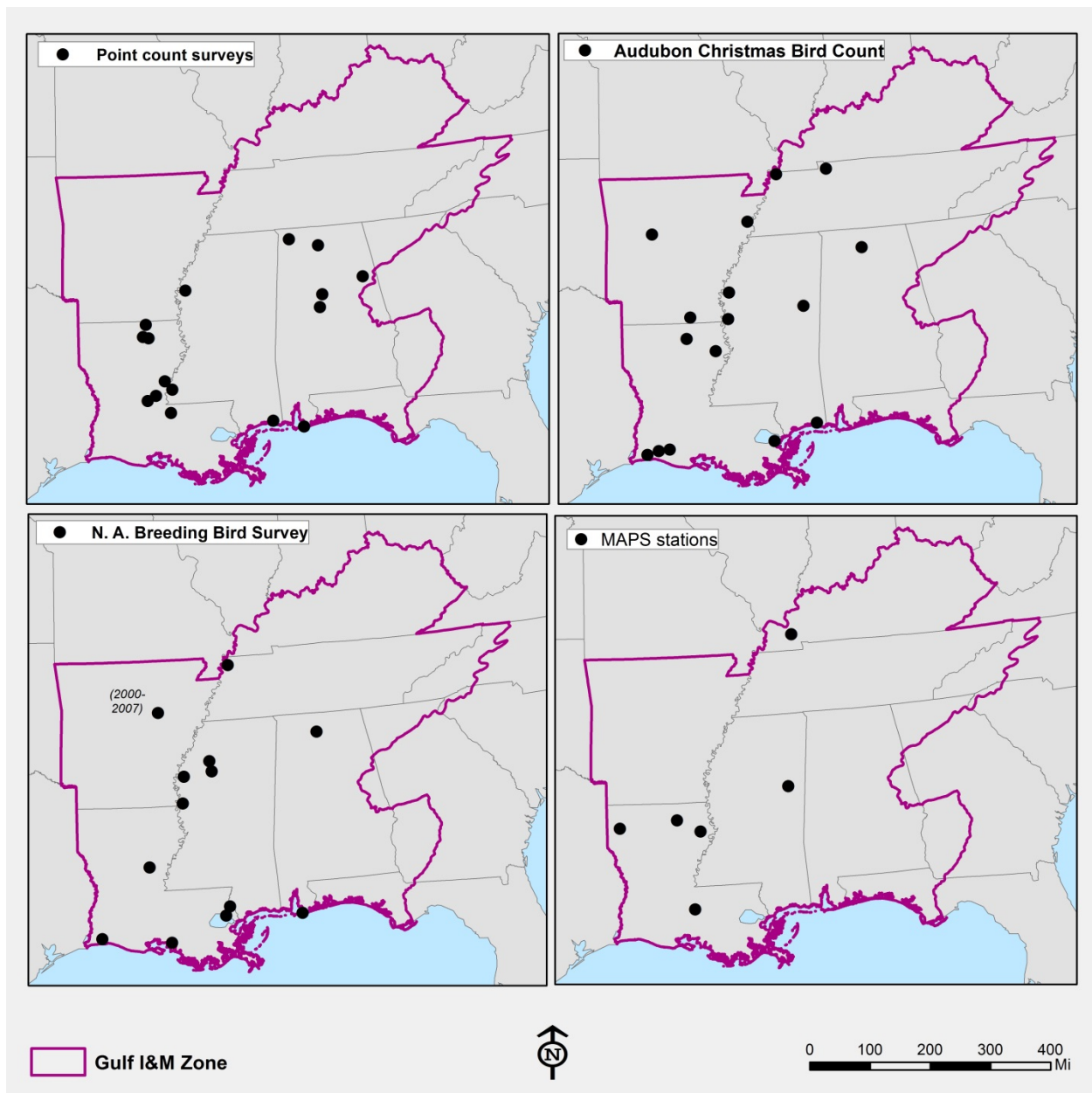


Figure 8. Refuges in the Gulf I&M Zone conducting bird point counts (top left), and/or participating in the annual Christmas Bird Count (top right), Breeding Bird Survey (bottom left), or Monitoring Avian Productivity and Survivorship (MAPS) (bottom right).

Together, At-risk landbird monitoring and bottomland hardwood forest inventories for habitat management are of particular importance in the Lower Mississippi Valley subgeography of the Gulf I&M Zone. It will be particularly important for these refuges to have the staff, assistance, and other resources necessary to effectively and efficiently monitor these resources to inform management actions.

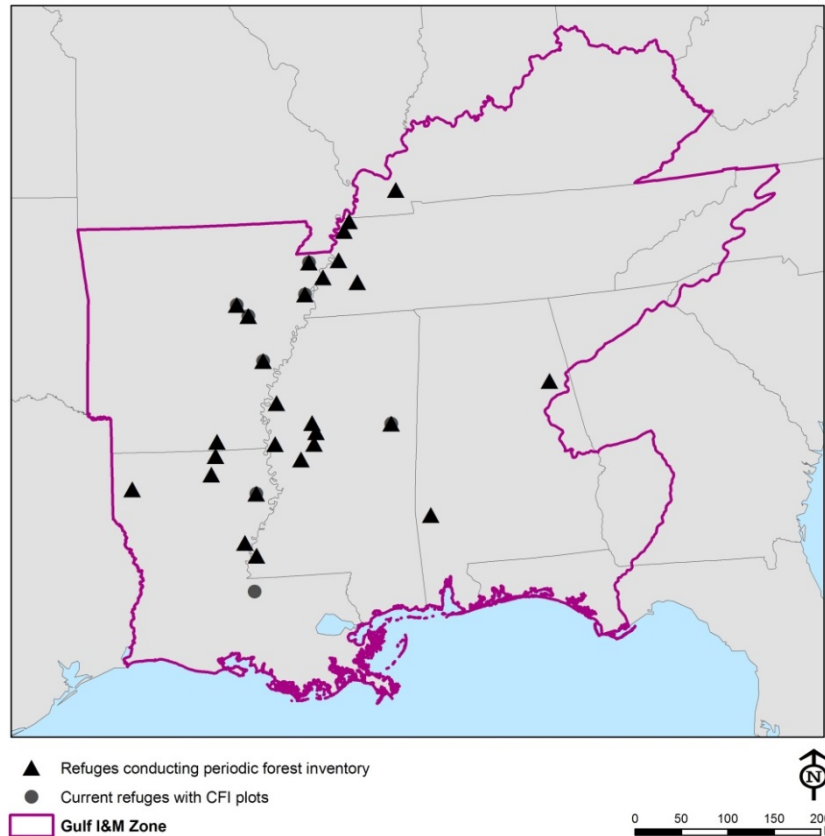


Figure 9. Refuges in the Gulf I&M Zone conducting Continuous Forest Inventory (CFI) monitoring or general/annual forest inventory for management.

Opportunities

We are increasingly aware that taxa like birds need to be monitored and managed for at the landscape scale. Likewise, their habitat needs to be monitored and managed beyond the scope of a single tract or even agency in order to promote the growth and health of metapopulations. Common interest across many refuges in assessment of bottomland hardwood habitat and breeding birds makes these strong opportunities for identification of shared objectives, standard protocol frameworks, and data management and analysis mechanisms to address refuge level and larger scale information needs.

In the Gulf I&M Zone Needs Assessment, only 54% of refuges with landbirds as a priority resource felt they had good abundance data and less than 30% of refuges have trend analysis results for the refuge or the greater landscape (Fig. 10 (left)). This indicates that although there is a standardized protocol being used by refuge biologists for bird point counts, it has not met refuge needs. There is an opportunity to revisit point count protocols and essential next steps to better meet the needs of refuges and the region, such as analysis of existing data and endorsement of a single protocol template with analysis and reporting procedures.

The need for data driven management information is also great for bottomland hardwood forest. Over 60% of refuges that prioritized bottomland hardwood forest habitat specified a need for useful data

such as species abundance and community trend (Fig.10 (right)). Existing commonalities in approach to forest inventories make it a good candidate for development of a forest inventory protocol framework. Currently, development of a standard, web-based forest inventory database is in progress under the LMJVJ Forest Resource Conservation Working Group, which would expand relevance of this opportunity to a broader landscape scale, for multiple agencies and partners.

As discussed later in this report, refuges need increased data management and analysis capabilities so we can answer important management questions like these. Along with standardized protocols, refuges need coordinated and supported databases and analysis tools for management of our common, high priority species and habitats. Multiple landbird landscape and national protocols are available avenues for Refuges to contribute information on a landscape scale, serving as valuable sample sites – many refuges are already contributing in this way. These collaborative efforts provide opportunities for refuges to contribute where established mechanisms ensure data are used.

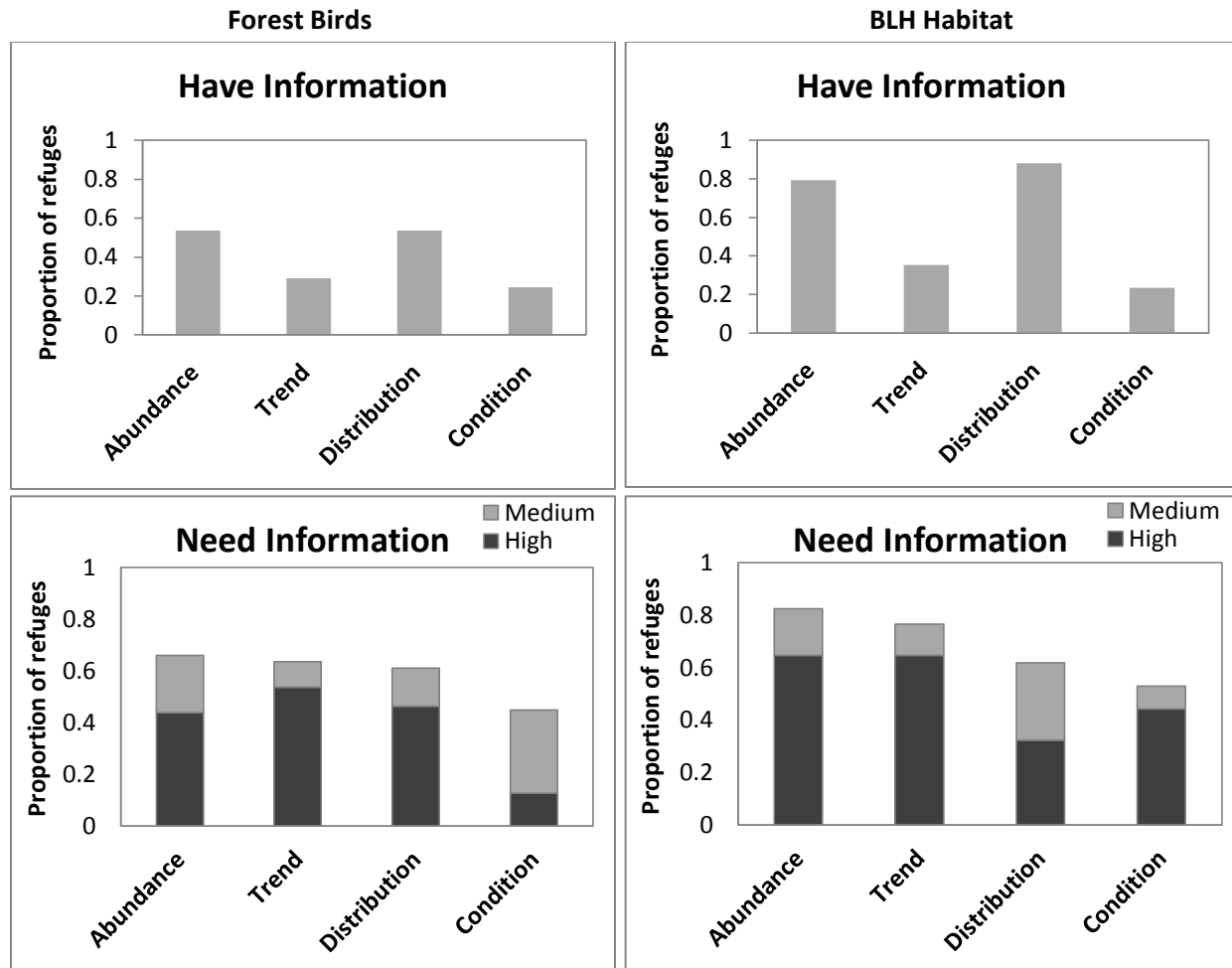


Figure 10. The proportion of refuges with forest/neotropical migratory birds as a priority resource that have (top left) and need (bottom left) population information. The proportion of refuges with bottomland hardwood forest as a priority resource that have (top right) and need (bottom right) population information.

Potential Roles for I&M

- Work with Division of Migratory Birds and other partners to 1) identify potential protocols and procedures to meet objectives, 2) identify sample sites (refuges) that are most valuable for forest breeding bird contributory survey data, and 3) ensure data management and analysis is coordinated and conducted where coordinated protocols are used.
- Assist in development of a common data management platform for forest inventory data on a landscape basis (on-going in collaboration with Refuges, LMV Joint Venture, and GCPO LCC).
- Explore opportunities to improve, coordinate, and standardize use of CFI plots.

Federally Listed Species Monitoring

Protection and restoration of North America's threatened and endangered (T&E) species is a top priority of the Fish and Wildlife Service. A recent national assessment of endangered species revealed Gulf I&M Zone refuges are home to 34 federally or state endangered and 15 threatened species from a variety of taxa. Additional Candidate and Proposed species are present on refuges and share the protections of listed species. Refuges are actively engaged in monitoring federally listed species that in many, but not all, cases are an explicit purpose of the refuge under establishing legislation. Inventory and monitoring efforts and advances in this arena contribute to local-level, baseline assessments of listed species presence, condition, or abundance, assess and inform management for listed species, and in many cases are specific responsibilities identified in Species Recovery Plans. At a regional level, listed species inventory and monitoring data from refuges contribute to the Ecological Services Division assessment of populations and progress towards species recovery goals. These efforts also support the national I&M 7-year Plan Operational Goals (Endangered Species Act Reporting, and Baseline Biotic Inventories).

The Gulf I&M Zone Needs Assessment revealed nearly half of area refuges listed T&E species as a priority biological resource (Fig. 11). However, emphasis on T&E species inventory and monitoring differed by geography within the Gulf I&M Zone. Refuges falling within the boundaries of the Appalachian LCC and the Interior Highlands sub-geography of the Gulf Coastal Plains and Ozarks LCC most frequently listed T&E species as their top priority biological resource, while it ranked third across the entire Zone (Fig. 11).

Multiple refuges in the Gulf I&M Zone actively conduct targeted monitoring of T&E species (Fig. 12). Monitoring of T&E species on refuges was conducted to evaluate whether management actions benefited these species or negative population impacts were occurring from threats. These surveys often require a significant share of refuge staff's time and resources because of the importance and intensity of these monitoring efforts.

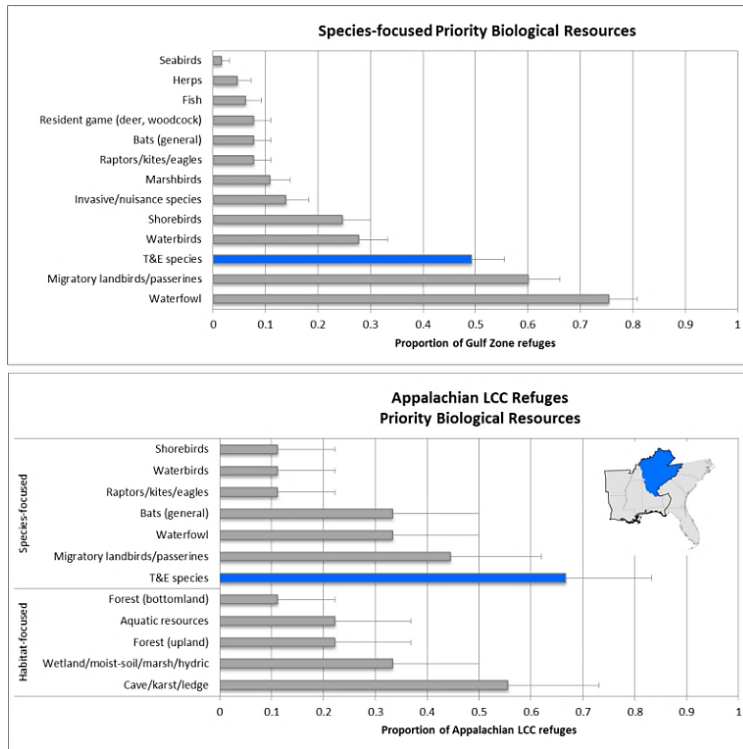


Figure 11. Proportion of Gulf I&M Zone refuges specifying T&E species as a top priority biological resource (top), and proportion of refuges in the Appalachian LCC portion of the Gulf I&M Zone specifying T&E species as a priority biological resource (bottom).

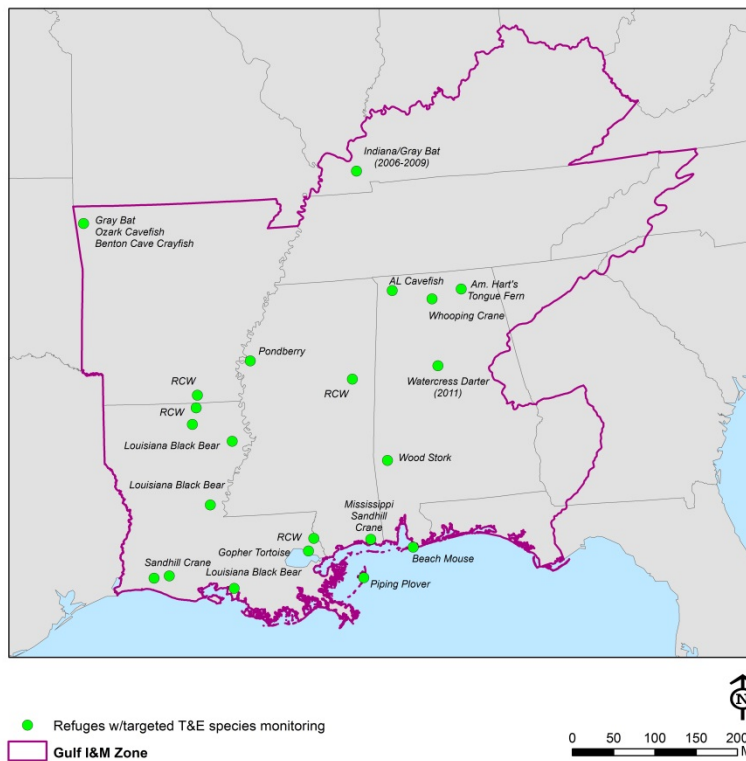


Figure 12. Refuges that conduct targeted monitoring of T&E species in the Gulf I&M Zone.

In the Gulf Needs Assessment, most refuges stated they had adequate information on distribution and abundance, but felt they lacked information on condition (health) of T&E species (Fig. 13). However, over half of refuges also stated a high need for abundance, trend, distribution and condition data for T&E species (Fig. 13). This suggests a 50:50 split between refuges that have adequate T&E species information and refuges that feel information on T&E populations is lacking. The discrepancy between refuges that have adequate T&E species information and refuges that feel information on T&E populations is lacking is site and taxa-specific. Intensive management and monitoring is demanded by recovery plans for specific species (e.g. red-cockaded woodpecker) while others get less attention, often due to the detection problems common to rare species.

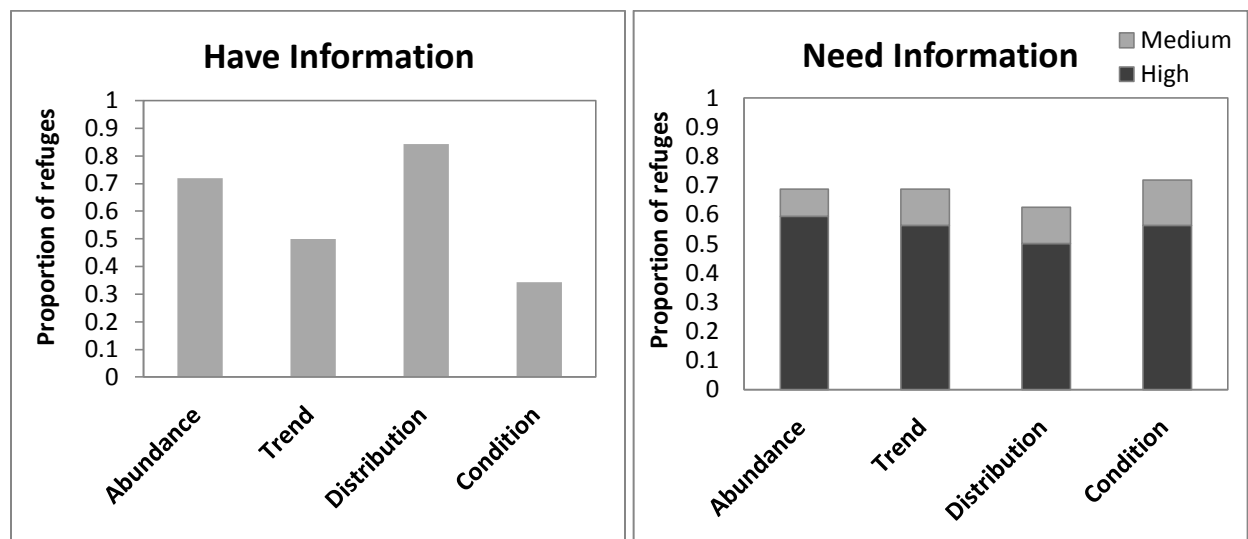


Figure 13. Refuge staff specifying they have and need T&E species population information Gulf I&M Zone.

Opportunities

As landscapes become increasingly stressed, refuges will play a greater role in conservation and recovery of federally listed species. There continues to be additional species listed as Endangered, Threatened, Candidate and Proposed, which represents increasing future inventory and monitoring responsibilities for refuges where they occur. Adding to the difficulty, T&E species populations are often very small and isolated, making design and implementation of large-scale standardized monitoring programs and statistically robust population estimates difficult. They also often require resource intensive sampling efforts to provide adequate detection. Despite the difficulties, refuge lands provide an opportunity to serve as sample sites for listed species. Surveys provide valuable baseline information at a local level as well as inform on landscape level species occupancy and abundance (e.g. recent mussel surveys at Pond Creek NWR provided baseline information on mussel species occurrence in refuge aquatic habitat and delineated beds and identified listed species locations valuable to Ecological Services).

Comprehensive information regarding current population distribution, historic range, and current monitoring efforts is still largely lacking for some federally listed species. Refuges and Ecological

Services offices may locally possess T&E species information not easily accessed, limiting its usability. New data management tools developed by the National I&M Initiative (e.g. Endangered Species Act database application and Service Catalog) represent an opportunity to provide mechanisms to facilitate cross-division updates of data and mutual access to listed species records. These tools aim to maximize information exchange between USFWS Divisions and ensure that refuge records (legacy or new) are available to Ecological Services and others.

Potential Roles for I&M

- Refuge I&M has committed to support refuges in use of the new Service Catalog (ServCat) and Endangered Species database applications, through training, support for legacy information upload to ServCat, and coordination of ESA database application maintenance.
- I&M capacity is well suited to collaborate with the Ecological Services Division to identify shared priority surveys with individual refuges and support their planning, design, coordination and implementation.
- Use I&M staff for T&E monitoring on refuges where staff expertise and locality makes for efficient field cooperation. Although I&M staff are not necessarily conveniently located to support monitoring at all refuges, opportunities exist to utilize I&M support, particularly for non-recurring baseline inventory surveys.

Natural Resource Threats

In our highly anthropogenically modified landscape, natural resource threats are prevalent. Invasive species, water quality and quantity, altered disturbance regimes, and other threats continually affect natural resources and require active management to combat the effects. Across Gulf I&M Zone refuges, the most prevalent challenge and the one recognized as demanding the most refuge management resources is invasive species, both plant and animal. Inventory and monitoring efforts and advances in this area support local level assessment of resource conditions and effects of management, complement state and other landscape partner efforts, and support national I&M 7-year Plan objectives (Invasive Species Inventory and Monitoring, Adaptive Management).

In the Gulf I&M Zone Needs Assessment, over half of refuges (36) stated invasive species management was their most intensive natural resource management activity, taking a majority of refuge staff time and money (Fig. 14). However, only 14 refuges identified on-going surveys for invasive species in PRIMR (Fig.15). Most invasive species assessment conducted in the Gulf Zone is simple visual surveillance monitoring directly associated with control treatments.

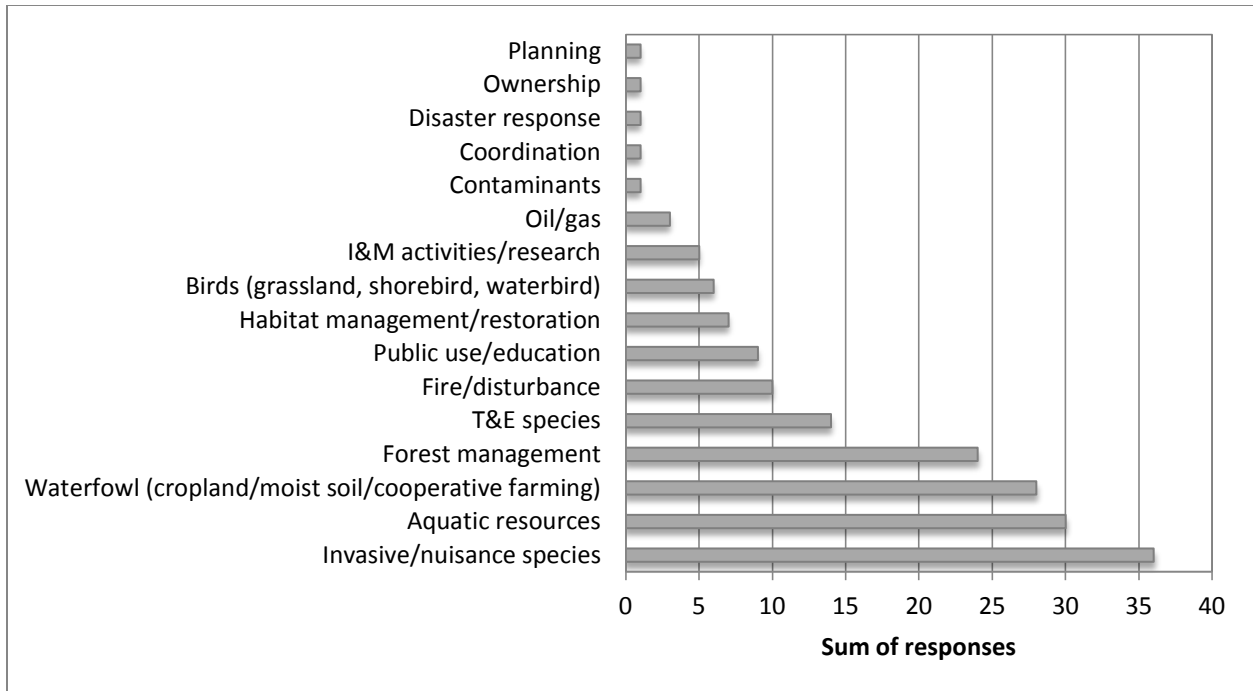


Figure 14. Most costly (time and money) natural resource management activities identified by refuge staff in the Gulf I&M Zone. Refuge staff were asked to identify the top three for each refuge.

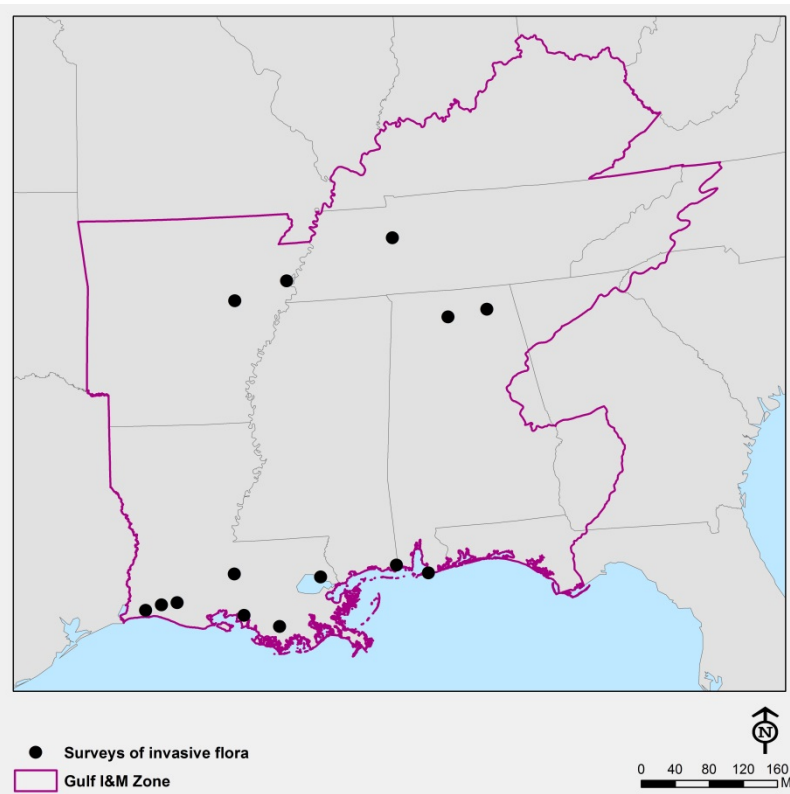


Figure 15. Refuges in the Gulf I&M Zone conducting invasive species inventory or monitoring activities associated with control efforts.

Opportunities

For most refuges in the Gulf I&M, invasive species issues are perceived as a top natural resource threat requiring intensive management activities. Many refuge staff stated that, given limited resources and time, active invasive species control activities are frequently conducted without quantitative monitoring (either before or after control activities). Thus, quantitative evaluation of invasive species control measures is sometimes not possible. There are opportunities to improve our use of control measures on refuges by quantitatively monitoring treatment efficacy, particularly when large-scale or otherwise expensive efforts are conducted. Evaluation of treatment success can then be used to inform future management efforts, potentially increasing efficiency and reducing cost. There are likely also opportunities to provide refuge support to minimize the time and effort staff spend dealing with invasive/nuisance species so greater biological focus can be on priority resources. Broad invasive species monitoring efforts (e.g. development of coordinated standard protocols) and control efforts (e.g. Invasive Species Strike Teams) can reduce refuge resources used. These would be most effectively directed where the resource threat is particularly high (Lower Mississippi Valley and Gulf Coast subgeographies) and to the species that are the highest threat (e.g. feral hogs, tallow trees).

Potential Roles for I&M

- Evaluate the need for and opportunities for effective baseline inventories of invasive/nuisance and development of treatment associated monitoring protocols.

Field Capacity

It is critical for effective land and wildlife management that refuges have adequate field capacity. Field capacity, often thought of as ‘boots-on-the-ground’, was one of the most common concerns that we encountered when talking with refuges about monitoring. The need for field assistance was the highest ranked and most common need identified by all refuge staff surveyed. Although a challenging topic to address, we felt that any review of the Status and Needs of inventory and monitoring for refuges would be incomplete without a discussion of field capacity. Efforts and advances in this area enhance local level effectiveness and ability to address inventory and monitoring needs and inform management, allow for contribution to regional partner efforts (e.g. Joint Venture, GCPO LCC), and allow contribution to the multiple objectives of the national I&M 7-year Plan that involve data collection at the refuge level.

The I&M support need most frequently listed as highly needed by refuges was “field data collection” which indicates that they often feel staff shortages are limiting their ability to conduct monitoring (Fig. 16). Refuge staff numbers are currently waning and refuge biologists are being called to do an increasing amount of other duties (e.g. maintenance and infrastructure management), which makes wildlife and habitat work increasingly difficult or prohibitive. With heavier workloads, biologists have less time to plan, think critically, implement actions, and evaluate outcomes. Much like the discussion coming from refuge leadership, carefully focusing our efforts on the most important resources and improving the efficiency of our monitoring efforts targeting those resources can positively affect the

impact of limited staff. However, with increasing numbers of trust resources and refuge land area, efficiencies alone will not fulfill all needs.

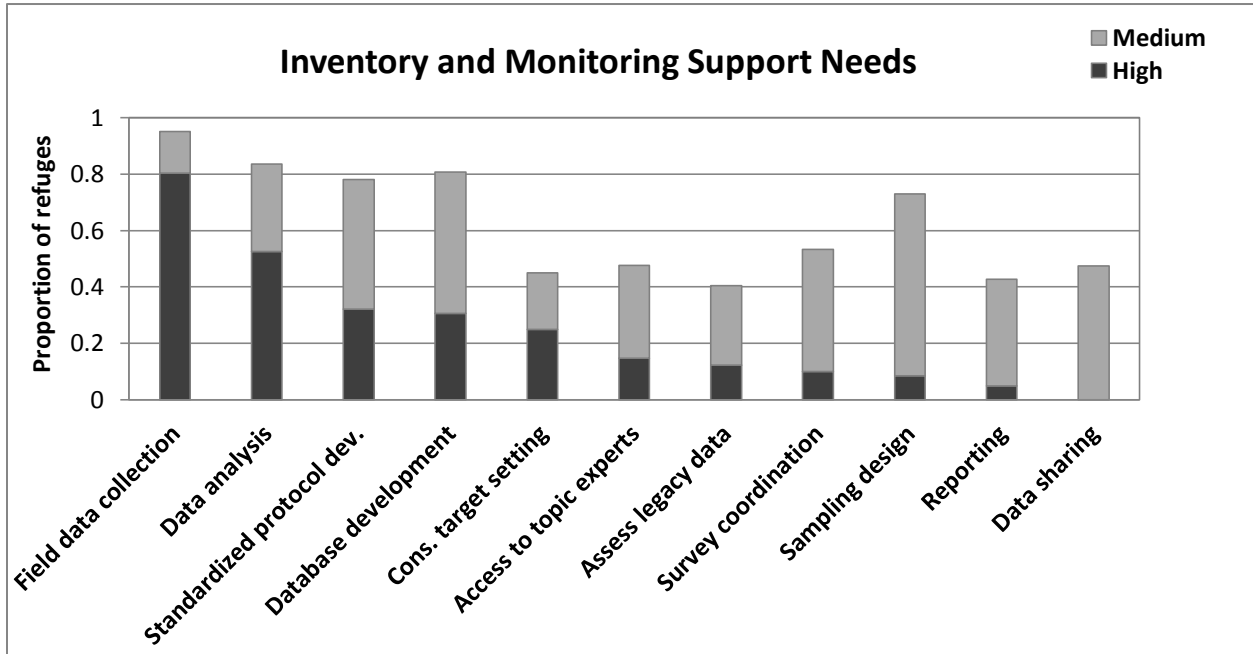


Figure 16. The proportion of refuge staff indicating a high or medium level of need for inventory and monitoring support by category.

Opportunities

The Inventory and Monitoring Plan development process presents a good opportunity to evaluate and prioritize the surveys being conducted at each refuge. It involves looking critically at the needs of each refuge, the larger landscape, and realistically considering the resources available at each station. One of the goals of this process is to improve efficiency so that refuge staff can meet multiple management objectives while ensuring that what refuges are spending their time and resources on is scientifically sound and meets the needs of local and regional priorities.

The majority of surveys occurring on refuges in the Gulf I&M Zone were cooperative (i.e., surveys are conducted by or in concert with refuge partners) (Fig. 17) and refuges recognize the importance of collaborative survey activities to their biological programs. Most cooperative surveys were considered baseline monitoring (i.e., monitoring to track population status and trend over time), whereas most refuge-based surveys were considered monitoring to inform management actions (i.e., monitoring to assess population response to direct management). The number and diversity of cooperative surveys conducted on refuges illustrates the willingness of refuge staff to support multi-scale assessments consistent with resource priorities.

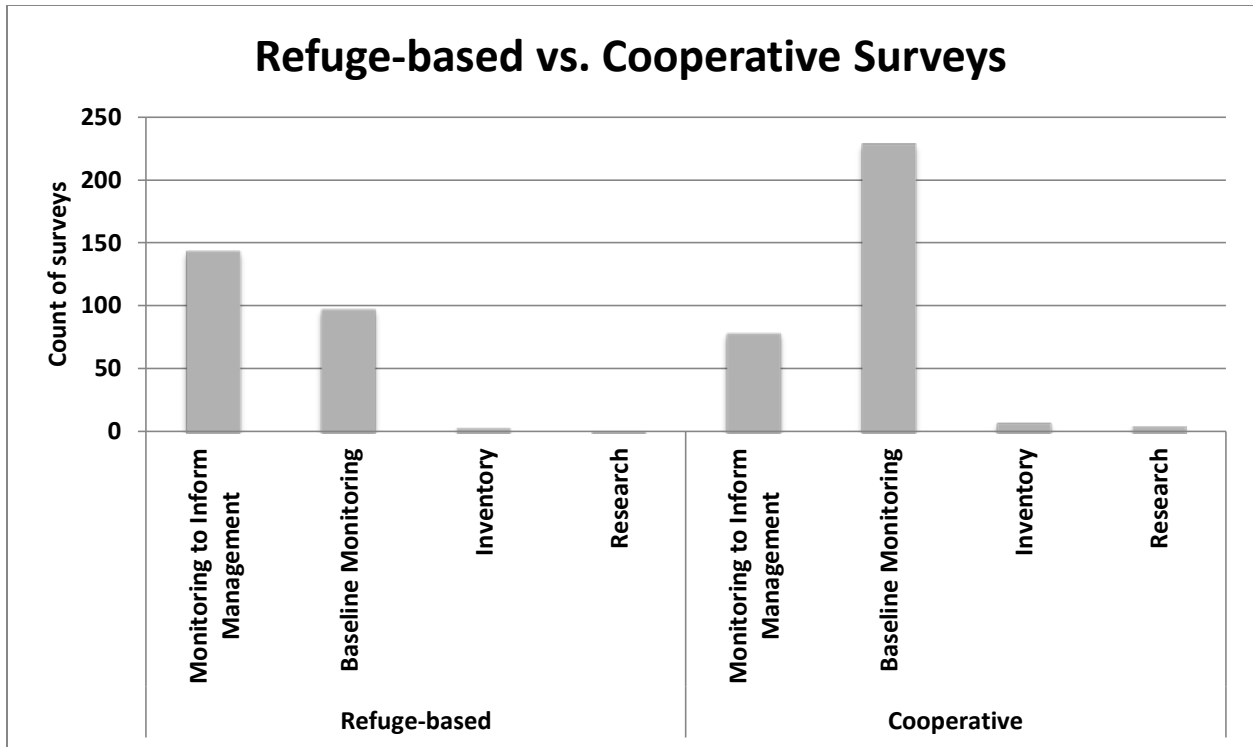


Figure 17. Types of refuge biological surveys specified in the Gulf I&M Zone PRIMR database.

Two common answers to the Needs Assessment question about top refuge strengths were university partnerships and volunteers. These both represent opportunities to meet the goals of the refuge system and local management. These Status and Needs Assessment data show that a strong partnership with a university results in a clear increase in the number of biological surveys currently and historically occurring on a refuge. If appropriately directed, this represents an opportunity to gain invaluable and otherwise unattainable data, analysis, and interpretation for refuge management by making refuges lands a living laboratory. Some refuges are also successful in supplementing refuge staff with use of interns and resident volunteers. In these cases, the additional ‘boots’ may help directly with surveys or by providing other refuge support that results in biological staff being more able to focus on biological activities.

Potential Roles for I&M

- Work with refuges through the Inventory and Monitoring Plan development process to evaluate, prioritize, and identify or develop suitable and efficient monitoring protocols.
- Work to increase the efficiency of common Gulf I&M Zone surveys by supporting standardized protocol development and implementation, and development and use of common databases and analysis tools.
- Facilitate partnerships with NGOs, universities, and citizen science organizations with similar goals to increase capability for mutually-beneficial research and data sharing.

- Have I&M staff help with or conduct surveys on refuges when critical data would otherwise not be collected due to refuge staff shortage, particularly where location or staff expertise makes this efficient.
- Identify and facilitate outside funding opportunities to support refuge monitoring efforts, for example grant opportunities or soliciting university research were compatible with refuge needs.

Data Management and Analysis

The need for support in data management and analysis was a recurring priority across Gulf I&M Zone refuges, supported in several different contexts throughout the Needs Assessment. This highlights a gap in current refuge capabilities and an opportunity for the I&M Network to provide valuable support. We asked refuge staff to assess their data management strengths and needs, including capabilities to develop, manage, and analyze both spatial (e.g., GIS) and non-spatial survey data. As the Service promotes its vision of scientific integrity and culture of data transparency, refuges will increasingly be called upon to provide organized and clearly documented biological survey data for local and landscape level use. Efforts and advances in this area enhance local level efficiency, use and integrity of survey data, coincides with regional partner interests (e.g. Joint Venture, GCPO LCC), and supports the national I&M 7-year Plan (Data Management).

Refuge staff in the Gulf Zone rated themselves, on average, 2.7 (out of 10) in data analysis capabilities (Fig. 18). Refuge staff suggested that the reason for low analysis skills was either because there was little data to analyze or that staff had reduced proficiency over time due to inability to conduct analysis as a result of time constraints. Several refuges suggested a regional need for data development and that support of a biometrician would be a great benefit. Data analysis skills are not easily enhanced locally, as expertise in data analysis requires a high level of training, continuing education and experience, interest, and time. It is not efficient to provide for that capability on a local basis.

Refuge staff rated themselves, on average, 4.4 (out of 10) in data management capabilities with a wide range of scores, indicating that the need is more refuge specific than data analysis (Fig. 18). Inefficient use of refuge staff time related to data management is a problem, with many refuges indicated a lack of organization of data and expressing difficulty in finding refuge data, particularly following staff turnover. However, others suggested centralized refuge servers and quality databases allowed for easy access to data. Thus, the approach to meeting refuge data management needs must be individual in nature to meet specific gaps and needs associated with local capability.

When refuges were asked to rank the most urgent non-spatial survey data management needs, refuges specified data analysis, organizing and maintaining data, and linking survey data to GIS as their greatest needs (Fig. 19). The greatest need for spatial data management (e.g., GIS) included staff to conduct GIS at the refuges.

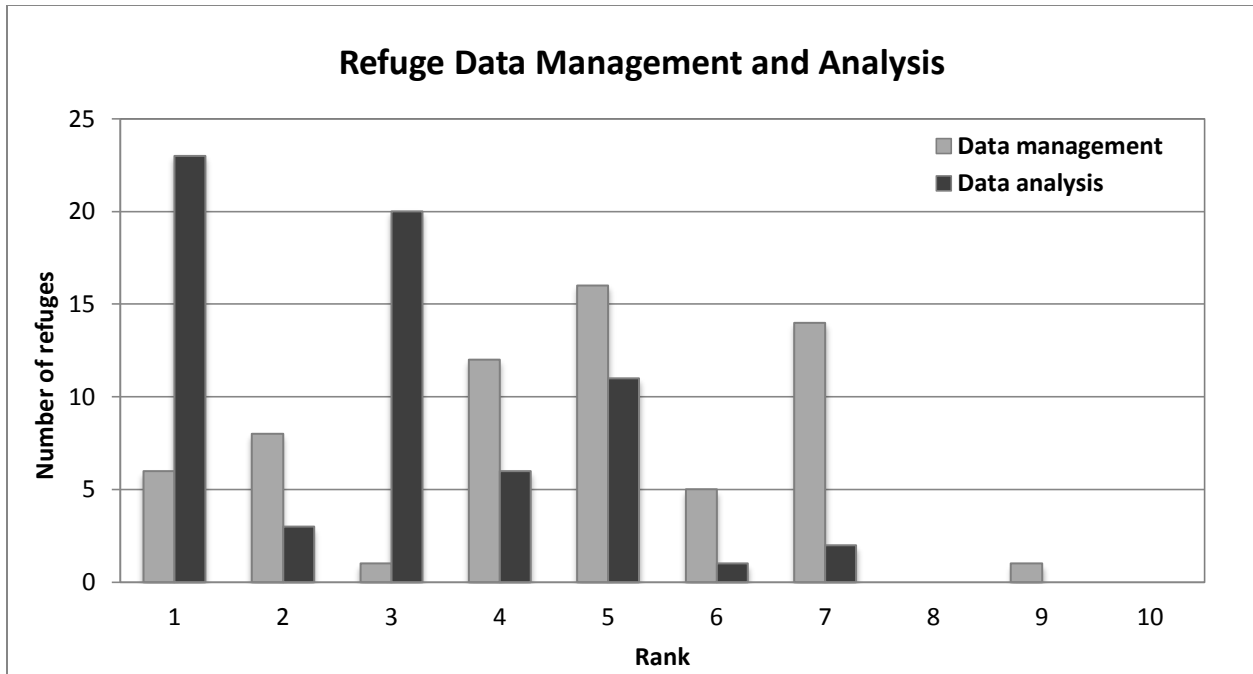


Figure 18. Proportion of refuges assigning themselves a rating between 1 (poor) and 10 (excellent) regarding quality of survey data management and analysis capabilities at their refuge.

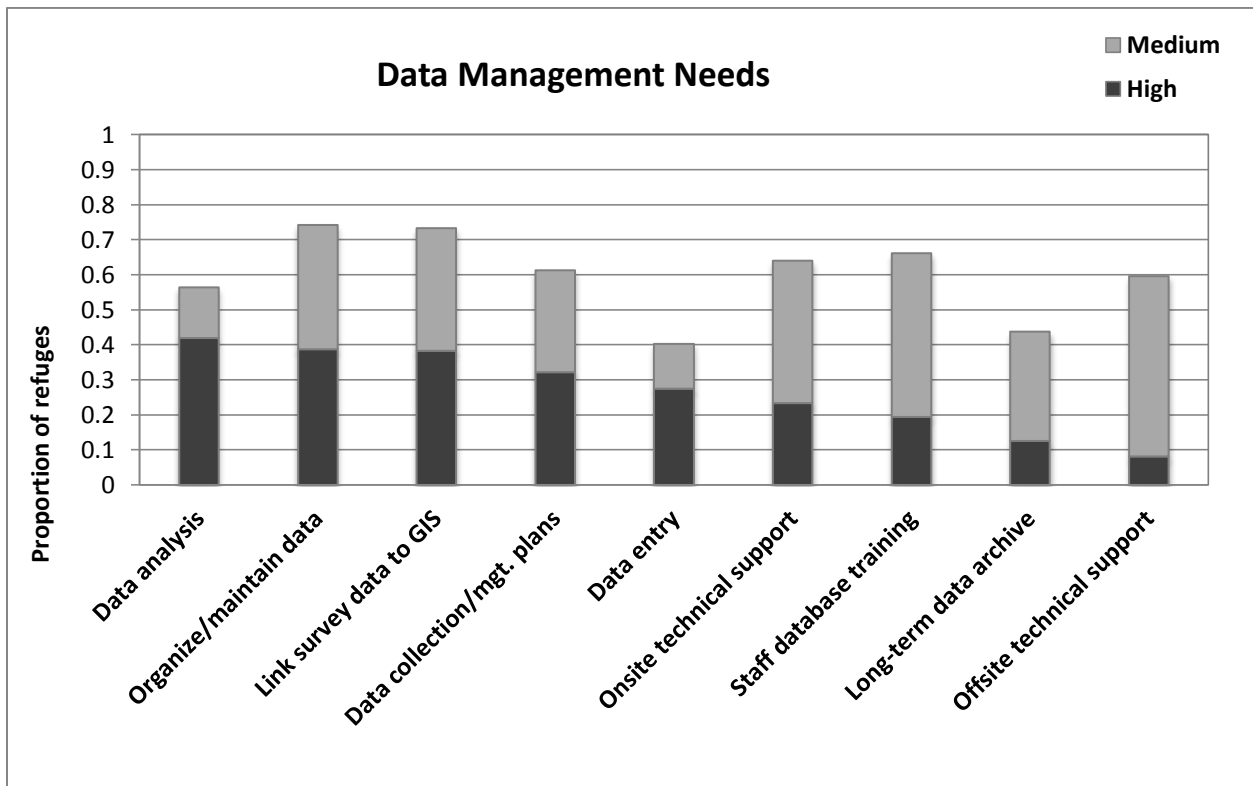


Figure 19. Proportion of refuges in the Gulf I&M Zone specifying high and medium needs for data management support by category.

Opportunities

Despite the difficulties, there are opportunities to improve local data analysis and data management capability or provide refuges with increased support. It is critical that we improve skills for those that rated themselves poorly and ensure that data is managed both efficiently and effectively, enabling refuges to make use of data collected. Further, there is a need to improve data analysis capabilities on refuges beyond simple count summaries to clearly link refuge management actions to target outcomes. There is also an increasing importance of standardization and coordination of data collection across multiple refuges and partners so that response to management and population trends may be assessed at the landscape scale and so local management becomes more efficient with standardized reports and analysis. There are training opportunities provided by the FWS related to survey design, data collection, database creation and management, GIS, and others that can begin to improve our local capability. Also, I&M itself is an opportunity within the refuge system to add capacity in these areas specifically, with staff that was selected to have strong skills in data management and analysis.

Potential Roles for I&M

- Assist refuges with data analysis and data management where appropriate and facilitate training in data management (e.g., MS Access, GIS) to ensure that all Gulf I&M Zone biological program staff have a more equivalent baseline skillset.
- Promote participation in collaborative and mutually beneficial surveys where data contributes to a landscape-level understanding of the resource, while providing refuge-level summaries to assess management outcomes.
- Continue to promote and facilitate use of existing National information management systems, such as PRIMR, ServCat, and Water Resources Application, that facilitate data management through provided systems.
- Similarly, work towards standardized protocol development for various monitoring needs that incorporates standard data management and analysis procedures and presents less unique data challenges.
- Facilitate access to statistical expertise to ensure that use of collected monitoring data is not limited by a lack of analysis expertise. Opportunities may include simple statistical support from I&M staff or contracted support for complex analysis projects.

Conclusion

The Status & Needs Assessment has contributed to an understanding of opportunities for I&M to enhance existing monitoring strengths and to address common needs and information gaps. These values go beyond the needs specifically of the I&M Gulf network however, as for the first time the NWRS has a holistic view of the breadth and depth of monitoring occurring on refuges within the Southeast Region, as well as understanding where our monitoring efforts can most effectively be strengthened, modified, or improved. For the first time there is a comprehensive list of surveys on-going on refuges, with associated information. It is now possible to see patterns in types, geography,

and use of surveys across refuges, and for refuge staff to more cognitively assess their role in the larger landscape of monitoring efforts. Also for the first time, we have summarized the perspectives of refuge managers and biological staff in regard to outstanding strengths and needs in order to improve the rigor, use, and effectiveness of refuge survey information.

Outstanding observations regarding inventory and monitoring on National Wildlife Refuges for 65 refuges within the 7 state Gulf Zone include the contribution by refuges to the assessment of regional natural resources. 568 surveys are current and on-going, of which 58% are contributing to larger landscape monitoring efforts. Another 39% are refuge-based and categorized as in support of documentation of base refuge resources or monitoring to inform (active) management. There is a strong need for monitoring, particularly related to wintering waterfowl, priority forest breeding birds, and threatened and endangered species which mirrors recognition of refuge responsibilities to trust species, Refuge Purposes, regional leadership directives, and I&M Initiative priorities. There is also a clear recognition by refuges as to limitations in meeting these needs, particularly in field implementation staffing ('boots-on-the-ground'), invasive species management, and capabilities related to data analysis.

Given the new capabilities and resource for monitoring now available through the I&M Initiative within FWS, this is an opportune time to build on shared priorities within Region 4 to address the limitations identified in this report. Resources are not unlimited or sufficient to meet all needs, but used effectively, should have great positive impacts on the ability of refuges to conduct meaningful and useful monitoring in order to generate credible data and inform local and landscape level conservation.