The Nature Conservancy's Gulf Wings Project – A Case Study in Conservation Planning for Migratory Birds[1]

Charles Duncan[2, 3], Becky Abel[3, 4], Danny Kwan[3, 5], and David Mehlman[6]

Abstract

The Nature Conservancy has adopted a framework for mission success called *Conservation by Design.* We plan at the ecoregional level to define conservation targets and the portfolio of sites needed to protect them. We consider threats and strategies for abating them at these key sites, and we define measures of success to hold ourselves accountable. Migratory birds stretch our methods, crossing multiple ecoregions and requiring differing habitats temporally. Their viability is hard to assess, and population data are fragmentary at best. The Conservancy's new Gulf Wings initiative is a multi-ecoregion project to protect critically threatened stopover habitat around the Gulf of Mexico. We use it as a case study of how the Conservancy and our partners address the challenges of planning for conservation of migratory birds.

Key words: conservation, Gulf of Mexico, Gulf Wings, migratory birds, The Nature Conservancy, planning, stopover habitat.

Introduction—How the Conservancy Plans to Complete its Mission

In order to achieve its mission of preserving the plants, animals and natural communities that represent the diversity of life on Earth, The Nature Conservancy (the Conservancy) has adopted a framework for mission success called "Conservation by Design." This process has four iterative steps (*fig. 1*) (The Nature Conservancy 2001).

The first step, "setting priorities," involves planning at an ecoregional scale. This includes identifying conservation targets and information about them, setting goals for the number and distribution of the targets, assessing their viability, and assembling an efficient network of conservation areas ("the portfolio") that, if protected in its entirety, will ensure the preservation of biodiversity within the ecoregion. Targets can include species, natural communities, and ecological systems.

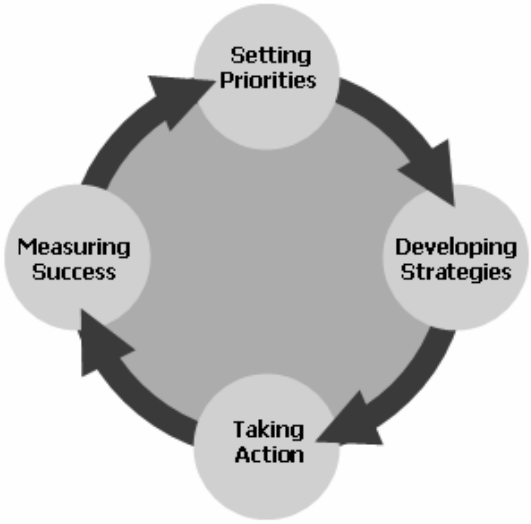

Figure 1— The four steps used by The Nature Conservancy in its conservation approach.

In the second step, strategies to protect the portfolio of conservation areas are developed. The Conservancy uses a process called Conservation Area Planning that begins by identifying the species, native communities and ecosystems that will be the focus of conservation in an area. Subsequent phases identify the stresses that threaten the conservation targets, such as habitat fragmentation or changes in natural flow patterns of waterways, as well as the sources of these stresses. Practical strategies for reducing or eliminating threats are then developed. A key part of Conservation Area Planning is the explicit assessment of progress in reducing threats, and in improving the biodiversity and ecological health of a focal conservation area.

The third step, "taking action," involves applying both familiar and novel conservation tools to implement the highest priority strategies. These tools may include

[1]A version of this paper was presented at the **Third International Partners in Flight Conference, March 20-24, 2002, Asilomar Conference Grounds, California.**

[2]Western Hemisphere Shorebird Reserve Network, Manomet Center for Conservation Sciences, P.O. Box 1770, Manomet, MA 02345. E-mail: cduncan@manomet.org.
[3]Previous address: The Nature Conservancy's Migratory Bird Program, Arlington, VA 22203
[4]Wisconsin Wetlands Association, 222 S Hamilton St, Suite 1, Madison, WI 53703.
[5]The Nature Conservancy, 490 Westfield Road, Charlottesville, VA 22901.
[6]The Nature Conservancy, 1303 Rio Grande Blvd NW, Suite 5, Albuquerque, NM 87104.

acquiring and managing key ecological areas, offering training to partners and local governments, and collaborating with resource-based industries to modify their business practices to reduce environmental impacts.

The fourth step of the process, "measuring success," evaluates the long-term reduction of critical threats and uses ecological benchmarks to measure sustained maintenance or enhancement of biodiversity health. This is accomplished by regular measurement of the size, condition, and landscape context of selected conservation targets in an area, and by measuring the level of threat to conservation targets within the area. Collectively, these measures quantify our conservation impact. To hold the organization accountable for results, the Conservancy intends to measure success across full portfolios of sites, not just those conservation areas where the Conservancy itself is taking direct action.

The Challenges of Migratory Birds

Migratory birds stretch the limits of scale in conservation planning. They present a challenge for the Conservancy's approach to setting priorities, developing strategies, taking action, and measuring success. Their population size and demography are poorly known, their viability is hard to assess, and they cross ecoregional and political boundaries. In many cases there is marked temporal variation in habitat use, both within and across years. Frequently, spring (northbound) migration routes are not the simple reverse of autumn (southbound) routes.

Forest-dwelling migratory birds breed in many portfolio sites in North America, and winter in equally numerous portfolio sites south of the U.S.-Mexican border. Identified conservation areas do not automatically protect habitat *en route* between the geographic ends of the birds' life cycles, however. Even when portfolio sites do provide adequate habitat for *en route* birds, conservation area plans have rarely identified specific conservation strategies, appropriate ecological management, or reliable methods for measuring success for the conservation of migratory species.

A particularly thorny part of designing a comprehensive conservation program for migratory birds has been how to protect "stopover habitat," those places that migratory birds use en route, between the breeding and wintering seasons. As Moore (2000) has said, "Protect all the breeding woodland in North America and all the appropriate habitat on the wintering grounds and populations of intercontinental migrants will still decline unless habitat requirements during migration are factored into the conservation equation." The Conservancy and other groups have struggled with how to incorporate stopover habitat into their prioritization schemes. Partners in Flight, itself a cooperative effort involving partnerships among many groups and agencies, is notable among these.

As a response to this challenge, the Conservancy's Migratory Bird Program (then known as "Wings of the Americas"), Great Lakes Program, and Southeast Division joined to consider the implications of protecting stopover habitat for our work. We organized a three-day expert workshop in May 2001 in Moss Point, Mississippi, to discuss stopover site protection for forest-inhabiting migratory birds along the Gulf Coast and Great Lakes. The meeting was attended by 34 experts drawn from academia, government agencies, and non-profit groups. The goals of this event were to

- define "important" stopover habitat
- examine the adequacy of sample ecoregional portfolios for protecting stopover habitat
- develop consensus on if, and how, stopover sites can be prioritized
- develop consensus on how best to incorporate stopover habitat into the Conservancy's planning methods

The results of this highly successful meeting are summarized and explored elsewhere (Duncan et al. 2002). Chief among these was a categorization of stopover habitat based on landscape context and function, that we call "the Framework." The term "fire escape" is applied to sites that are generally used only under emergency conditions of adverse weather, and provide few resources other than shelter and perhaps fresh water. They are located next to ecological barriers such as large bodies of water. "Convenience store" sites are those sites located along migratory routes that typically provide only low-quality resources, sufficient for migrants to move on to the next stopover site. Finally we use the term "full-service hotel" for resource-rich sites, large enough to maintain landscape-scale integrity, where a given migrant bird may spend several days refueling for the rest of its journey.

Other key outcomes of the Moss Point meeting were

- a consensus that the Conservancy's ecoregional portfolios of conservation areas in the eastern United States are reasonably adequate for protecting migratory birds
- a recognition that considerable research is needed before Mexican areas can be identified
- the finding that "stopover habitat" is an appropriate systems-level conservation target for Conservancy planners

- a recommendation for scale-dependent studies of stopover habitat and ecology (Moore, undated ms.)

As a result of the Moss Point workshop, the Conservancy explicitly recognized its responsibility to ensure the protection of stopover habitat. This will entail identifying a network of stopover sites; designing and implementing strategies, especially multi-site strategies, to address common threats to stopover habitat; and measuring success of stopover habitat conservation to hold itself accountable.

Protecting Stopover Around the Gulf of Mexico

The Gulf of Mexico is, by virtue of its size and location, the single greatest barrier that many migratory landbirds encounter when traveling between the wintering grounds in the neotropics and breeding grounds in the United States and Canada. Some species avoid the water crossing through circum-Gulf migratory routes, while many make trans-Gulf flights. A few species exhibit a broad-front migration, with individuals selecting either route (for instance, Dunn and Garrett 1997). Coastal areas are crucially important as stopover habitat no matter which route is involved. Projections of human population change suggest an increasing threat to these natural areas (Simons et al. 2000, Barrow et al. 2000). The Southeast Partners in Flight network, the Gulf Coast Bird Observatory's conservation plans, and the Gulf Crossings partnership (http://www.gcbo.org), were among the first to bring conservation action to this region.

There are numerous other areas, including the Great Lakes and sites along the Atlantic Coast of the United States and Canada, that also require attention to stopover issues. Nonetheless, capacity limitations within the Conservancy dictated that stopover protection efforts be directed to one region initially. The Gulf of Mexico became the obvious choice, with the hope that lessons learned there and best practices developed can be exported to other areas. The Conservancy's efforts to protect stopover around the Gulf of Mexico were consolidated under the project title of "Gulf Wings," parallel with its Prairie Wings conservation program (McCready et al., this volume) in August 2001.

The mission of Gulf Wings is to conserve the critically threatened stopover habitat around the Gulf of Mexico crucial to the survival of the many North American bird species whose migratory routes converge on this area. The conservation vision for the project is to enhance the site-based conservation efforts of The Nature Conservancy and its partners around the Gulf of Mexico by bringing attention, coordination, resources, and scientifically sound planning to conserving habitats needed by migratory birds traveling between their North American breeding grounds and their wintering areas both in the region and farther south.

Distinctions from the Work of Others

It is worth considering explicitly how Gulf Wings is different from the work of other conservation groups working around the Gulf of Mexico. As part of The Nature Conservancy, Gulf Wings uses the Conservancy's strategy for mission success called "Conservation by Design," described above. Part of the contribution that Gulf Wings makes is to inform the priority-setting process where birds, and especially migrant birds, present unique challenges to the Conservancy's planning methods. Indeed, it is the job of Gulf Wings to ensure that stopover sites around the Gulf of Mexico, from small, infrequently used "fire-escapes" to large landscape-scale forests ("full-service hotels"), are sufficiently included in the Conservancy's overall planning priorities for the relevant ecoregions.

Thus, the Conservancy's planning methodology is used both to delineate important areas for birds within the larger context of protecting overall diversity, and also to decide where to allocate limited resources for the best return of investment. Both identification and prioritization of important stopover habitats are shaped by the over-arching Conservancy mission to preserve biological diversity at the landscape level.

Gulf Wings takes conservation action through the Conservancy's operating units and their partners—at sites that have identified as being high priority through the ecoregional planning process. Ultimately, Gulf Wings delivers tools to locally based conservationists.

Gulf Wings also attracts and leverages resources to integrate bird conservation into the broader biodiversity work of the Conservancy. As an example, Gulf Wings is helping to fund a staff position at the local level in the cheniers and bottomlands of the Upper Texas and Louisiana coasts. This person will not work exclusively on bird conservation, but by contributing to the protection of key habitats, will ensure that the appropriate actions relevant to birds are taken.

Gulf Wings, and indeed the Conservancy itself, is focused on protection of land and waters for biodiversity conservation. That tight focus on habitat protection means that good and useful activities such as environmental education or public outreach are not automatically within the Conservancy's realm. When such activities are identified as important strategies for abating key threats to stopover habitat, the Conservancy seeks partnerships with any of a number of other

groups more highly skilled and experienced in education and outreach.

The issue of the scale of Gulf Wings is important. The portfolio of sites we have identified as needing conservation action to conserve stopover habitat around the Gulf is enormous, about 7 million hectares in the United States alone. To achieve lasting tangible conservation results for stopover habitat protection, the Conservancy believes that this is the correct scale. Only by working with established Conservancy operating units and their partners, does this scale become achievable.

The Gulf Wings project will be of finite duration, about 36 months. At the end of this period, Conservancy operating units will have been informed of the importance of stopover habitat, and will have incorporated it into their ecoregional and conservation area plans. Moreover, the permanent conservation and management of these portfolio sites will address the needs of migratory birds. Responsibility and the needed tools will have been transferred to the relevant operating units of The Nature Conservancy and ultimately, their partners.

Building an Internal Constituency

A key step in planning the Gulf Wings project was to decide on the specifics of its geography. In doing so, we considered the boundaries of the Conservancy's ecoregions (Groves et al. 2000) that border the Gulf of Mexico. In Mexico, ecoregions have been aggregated into ecological planning units or EPUs and we chose to use these for consistency. Additionally we considered the boundaries of existing Joint Ventures and bird conservation regions, http://www.nabcius.org/aboutnabci/bcrjv.pdf, as well as various constant-distance-from-the-coast schemes. Ultimately, we were guided by a simple concept: the project should encompass sites that were roughly within a single night's travel of the coast for a migrating songbird. The resulting working version of the project boundaries (*fig. 2*) extends around the Gulf of Mexico from roughly the Suwannee River of Florida to the Caribbean coast of the Yucatan Peninsula of Mexico.

To ensure that the project we envisioned met the needs of the Conservancy's operating units, we met with internal stakeholders in November 2001. Twenty-five people, representing the Conservancy's field offices of the five Gulf coastal states of the United States, and the Northeast Mexico program attended the meeting, held in Baton Rouge, Louisiana. To this group we presented the drafts of the project's mission and vision; the concepts of the Framework categorizing stopover site according to landscape context and function; spatially explicit information about protected areas, important bird areas, the Conservancy's own completed ecoregional portfolios; and the draft project boundaries. For Mexico, where the Conservancy has not completed ecoregional plans or their equivalents, we presented information about priority terrestrial sites identified by the Mexican National Commission for the Understanding and Use of Biodiversity (CONABIO, from its acronym in Spanish). Those present were highly supportive of the project and agreed that the initial project boundaries were a sensible starting point.

Setting Priorities

We asked participants at the Baton Rouge meeting to nominate stopover areas chosen from the ecoregional portfolios within their own area of responsibility, classified using the Framework concepts where possible. Again, where possible, those two or three sites considered of highest priority were identified within each ecoregion. This set of conservation areas was thus selected as an initial set of areas where the Conservancy's operating units and the Gulf Wings project would focus attention on stopover protection (*fig. 3*).

We had thus made progress toward two important aspects of the priority-setting process: we had identified the conservation target (stopover habitat) and a set of priority areas where the Conservancy and its partners could engage. It was, however, recognized that while there may be some relatively few sites in the United States that are not yet identified, the level of the group's knowledge about stopover sites along the Mexican coast of the Gulf of Mexico was especially inadequate and would need to be addressed in another forum. This issue was considered in depth at an experts' workshop we organized in the state of Veracruz, Mexico in September 2002. Participants working in groups organized by geographic regions of the Mexican Gulf coast identified key stopover areas (41 sites, 11 million ha), threats and sources of threats and in some cases, proposed conservation strategies. Moreover, Mexican participants at the workshop decided to form a regional alliance for the conservation of birds to be called ARCA.

Designing Strategies

A first step toward designing one or more conservation strategies is to identify the threats and the sources of these threats that endanger the biodiversity that we seek to protect. While actually abating these threats and their sources may be enormously challenging, we have found it essential to summarize them as an initial planning step.

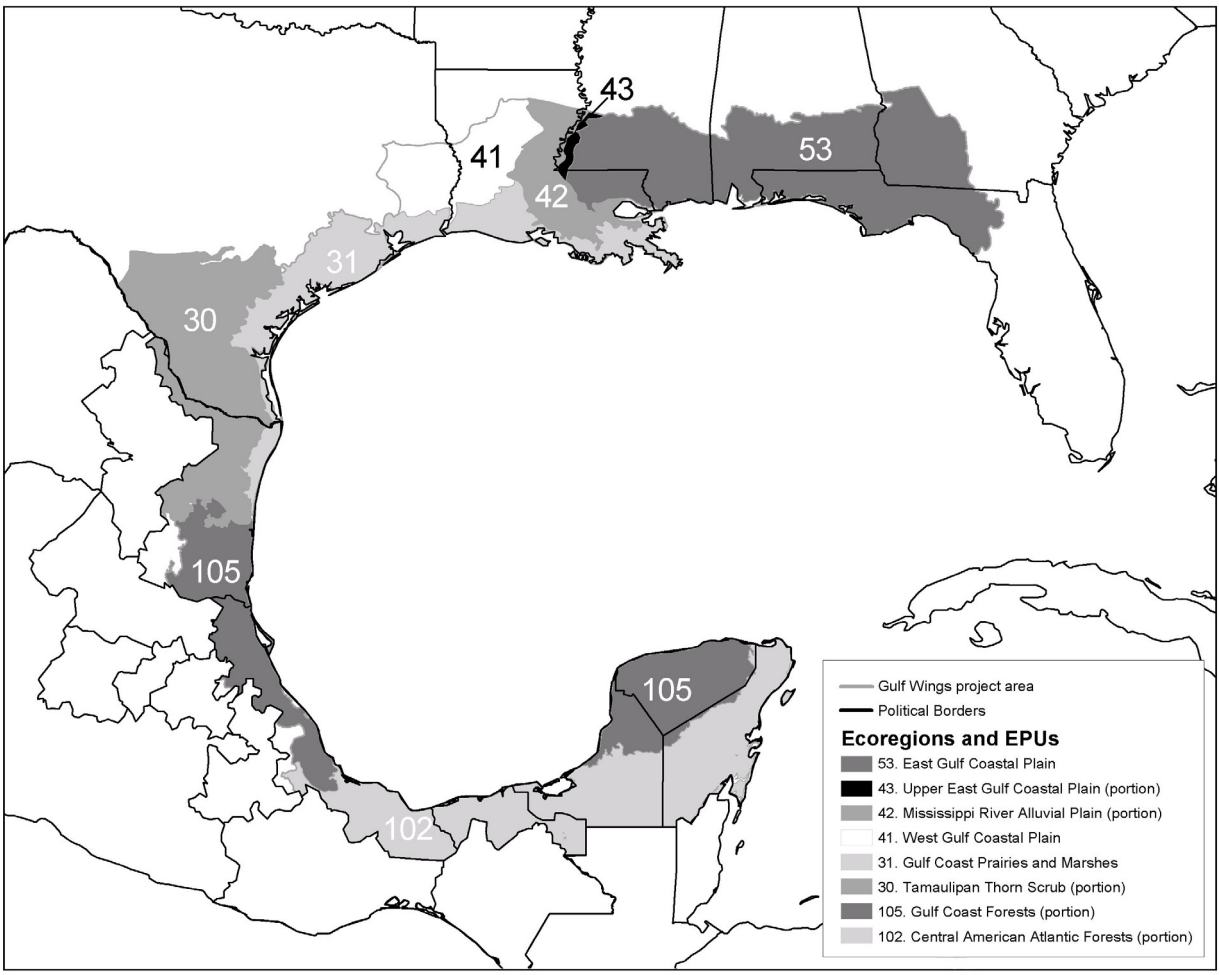

Figure 2— Boundaries of the Gulf Wings project were selected to include the Gulf coastal ecoregions of the Unites States and the ecological planning units (EPUs) bordering the coast in Mexico. The two U.S. ecoregions aligned roughly north-south along the Mississippi River (numbers 42 and 43) were truncated with a line connecting their neighboring ecoregions. In Mexico, the EPUs included were truncated at the state boundaries so that only coastal Mexican states are included. The numbering scheme is that used by the Conservancy for its entire ecoregional map.

The threats and their sources that we have so far identified as endangering stopover habitat include the following:

- **Habitat Destruction** is a critical threat that affects stopover habitat as well as habitat for other conservation targets. Migratory birds are affected by habitat destruction over a larger spatial scale than many other conservation targets. While migrating birds do not need the same specific habitat they need for breeding, they still have general habitat needs. For example, migrating forest birds are dependent on a range of forest habitat types. The sources of this stress are site- and context-specific.

- **Habitat Alteration** is a critical threat that affects many conservation targets but may have serious implications for stopover sites. This is especially true if forest structure is simplified and/or forest composition is altered. The sources for this stress are many, including nonnative invasive species and industrial forestry. Subcategories of Habitat Alteration include:

    - *Lack of critical resources*: This is a threat specific to migratory birds, as they are dependent on high-quality food and freshwater resources for survival. Current management or past land use may have eliminated key resources from Stopover Habitat. Especially significant are freshwater sources in Fire Escape and Convenience Store stopover sites. Changes in species composition, especially those caused by invasive species, may also have caused corresponding changes in the kinds, quantity, and quality of food resources.

- *Extraordinary predation*: A critical threat specific to migratory birds and a few other organisms (e.g., lizards, snails, some plants). The significance of this threat is unknown but may be considerable in small Fire Escape or Convenience Store stopover site types functioning as habitat islands. The sources of this stress can be feral or domestic cats, and elevated levels of native predators such as raccoons (*Procyon lotor*) and foxes (*Vulpes* sp.).

- *Increased aerial mortality*: A potentially critical threat caused by communication towers, lighted buildings, plate-glass windows, and wind-powered generators. The impact of this threat is increasing with the growing number of cellular phone and digital television towers, and the spread of urban and suburban development.

- *Habitat fragmentation*: While migratory birds are apparently not as sensitive to habitat fragmentation en route as during the breeding season, and may even congregate in edge habitat where insects are often abundant, some species may still seek out areas away from edges and human disturbance. Research, however, is sparse and ambivalent. The sources of habitat fragmentation include roads, utility corridors, residential/commercial development, and industrial development.

Multi-site stresses and sources of stress for stopover habitat identified by meeting participants included

- residential and urban development
- incompatible forestry practices
- incompatible grazing
- incompatible recreation

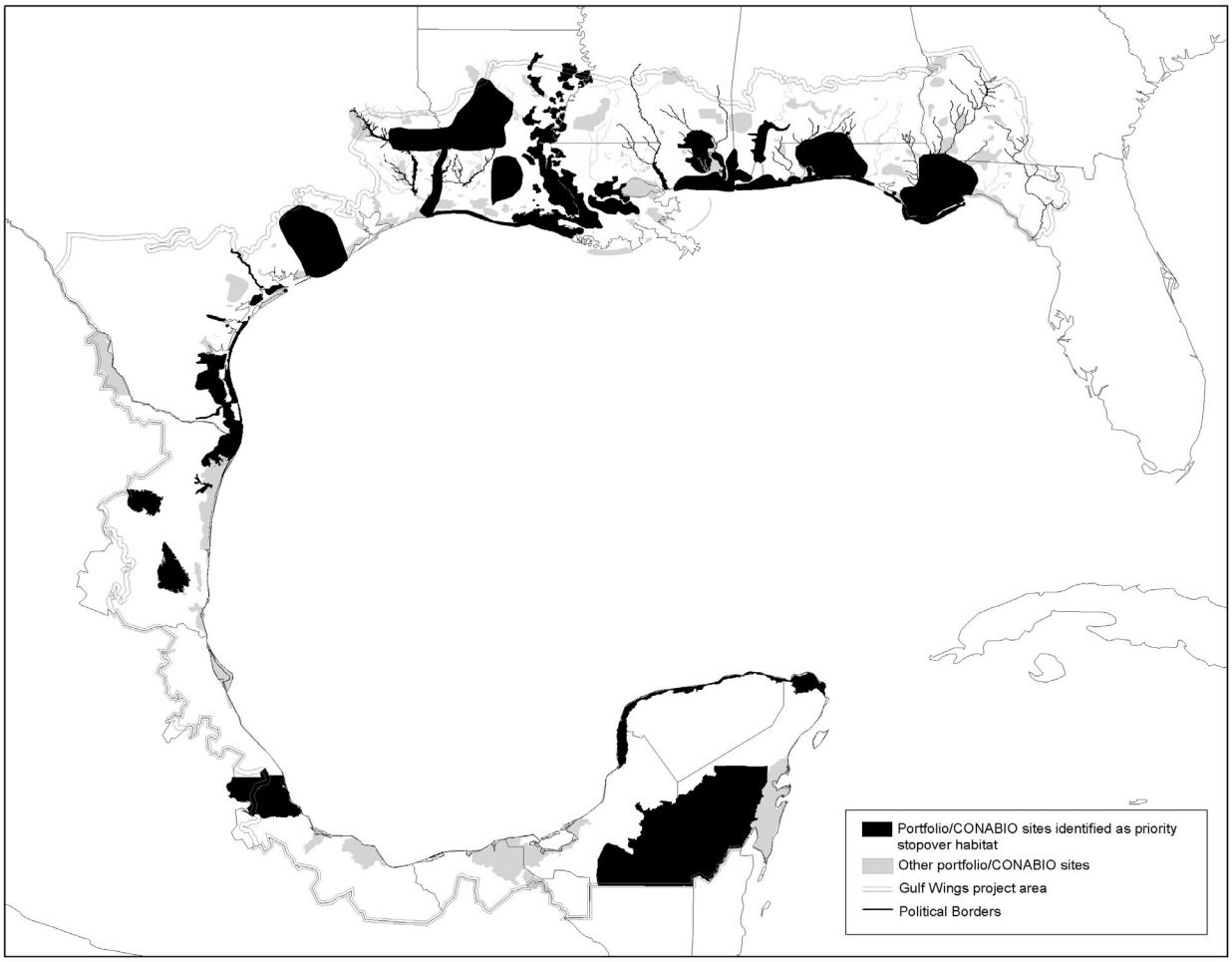

Figure 3— Areas shown in black are sites chosen from the Conservancy's ecoregional portfolios in the United States and from the CONABIO list of priority sites in Mexico, that are believed to be priority areas for protecting stopover habitat. Areas shown in gray are other Conservancy (U.S.) portfolio sites or CONABIO (Mexico) priority areas.

- introduction of exotic plants and animals, with the Chinese tallow tree (*Sapium sebiferum*) being a key example
- altered hydrology through dams, levees, and water withdrawal
- gas wells on terrestrial sites
- altered fire regimes, with both negative and positive results depending on bird species considered

In some cases, threat abatement strategies will be site-specific. In others, where stresses and their sources are common to several locales, a multi-site strategy may be applicable. A sample of such multi-site strategies includes

- developing a certification program for migratory bird-friendly housing development with recommendations concerning amount of cover, shrub species to be planted, and preventing cats from roaming
- contributing to a network of conservation practitioners
- spurring management action by federal land-managing agencies such as the U.S. Forest Service, U.S. Fish and Wildlife Service, and Department of Defense
- holding Conservation Area Planning workshops for stopover sites
- providing matching money to local governments for protection of critical areas for birds
- contributing to networks that can accomplish site-based surveys of en route migratory birds
- partnering to strengthen conservation capacity, including fundraising, of local Audubon groups, bird clubs, and land trusts
- affecting public policy concerning rebuilding after hurricanes and conversion of small isolated wetlands

Taking Action

The Gulf Wings project has already begun to implement some of the recommended actions for stopover-habitat conservation, and it will work to achieve others. To date (August 2002), we have

- contributed $140,000 for habitat acquisition along Mississippi's Pascagoula River
- encouraged and empowered Alabama's Friends of Dauphin Island Audubon Sanctuaries to undertake a $4 million capital campaign
- begun collaborations with ornithologists using weather-surveillance radar to identify stopover habitat along the northern Gulf Coast
- committed funds to hire a Conservancy employee to work on cheniers and woodlots in the Gulf Coast Prairies and Marshes ecoregion
- begun collaborations with the U.S. Fish and Wildlife Service concerning stopover habitat protection in the Florida Panhandle
- prepared an issue paper (Duncan et al. 2002) to inform Conservancy planners, senior managers, and partner groups of the importance of stopover protection and strategies for conserving it
- partnered with Pronatura Veracruz and the Instituto de Ecología, A.C. to organize an experts workshop to identify stopover sites along the Mexican coast of the Gulf of Mexico, as well as needed research

Measures of Success

A significant challenge for projects seeking to protect migratory birds is how to measure the positive impacts of the project. Ideally, protected stopover habitat reduces mortality and stabilizes or increases populations of relevant species. Measuring abundance, mortality or condition of migratory birds at even a single site is operationally difficult and labor-intensive. Even if such measures were available at an entire suite of stopover sites, their interpretation would be challenging. Annual changes in migratory bird populations will be confounded by events remote from the conservation area (e.g., nesting success on the breeding grounds) as well as stochastic weather variations during migration.

The Gulf Wings project, therefore, proposes to use alternative measures of success. The most efficient measures of success for conserving stopover habitat are those that monitor change in the spatial aspects of the habitat (spatial area, continuity, configuration, fragmentation and surrounding land uses) and the ecological processes that maintain the habitat structure and composition (hydrologic regime, fire, wind/storm events). Such measures can be taken for large landscapes by remote sensing or selected site-specific measurements. These metrics do not measure the migratory birds themselves, but rather the spatial aspects of their required habitat.

Secondly, Gulf Wings uses the Nature Conservancy's (2001) standard Conservation Area Planning method to evaluate the changes in status of threats to stopover habitat (for example a threat ranked "high" is reduced to "medium" or "low").

Finally, Gulf Wings also uses the Conservancy's measures of operational performance to judge its work. Among these measures are the following:

- number of landscapes where the project is engaged
- number of partners, including federal, state and local governments as well as non-government organizations
- quantity of private funds raised and directed to stopover protection
- public funds secured and directed to stopover protection

Acknowledgments

We greatly appreciate the many contributions to this project made by D. Ewert, S. Mabey, R. Sutter, and M. Woodrey. We thank the participants of the Moss Point workshop and their home institutions for their many contributions and their generosity in sharing without concerns for issues of "turf." D. Cimprich's analogy comparing some stopover sites to fire escapes has proven to be an extraordinarily powerful unifying tool in thinking about stopover conservation, and we are grateful to him for sharing it.

Literature Cited

Barrow, W. C., C. -C. Chen, R. B. Hamilton, K. Ouchley, and T. J. Spengler. 2000. **Disruption and restoration of *en route* habitat, a case study: The Chenier Plain.** Studies in Avian Biology 20: 71-87.

Duncan, C., B. Abel, D. Ewert, M. L. Ford, S. Mabey, D. Mehlman, P. Patterson, R. Sutter, and M. Woodrey. 2002. **Protecting stopover sites for forest-dwelling migratory landbirds.** Unpublished report. Arlington, VA: The Nature Conservancy. Available at http://www.conserveonline.org/2002/08/k/en/Stopover_Conservation_Issue_Paper.doc.

Dunn, J. L., and K. L. Garrett, 1997. **A field guide to the warblers of North America.** New York, NY: Houghton Mifflin; 656 p.

Groves, C., L. Valutis, D. Vosick, B. Neely, K. Wheaton, J. Touval, and B. Runnels. 2000. **Designing a geography of hope: A practitioner's handbook for ecoregional planning,** Vol. II, appendices, 2nd ed. Arlington, VA: The Nature Conservancy.

McCready, B., D. Mehlman, D. Kwan, and B. Abel. This volume. **The Nature Conservancy's prairie wings project: A conservation strategy for the grassland birds of the western Great Plains.**

Moore, F. R. 2000. **Preface to stopover ecology of nearctic-neotropical landbird migrants: Habitat relations and conservation implications.** Studies in Avian Biology 20: 1-3.

Moore, F. R. (undated) **Analysis of habitat use by intercontinental bird migrants along the northern coast of the Gulf of Mexico: A scale-dependent approach.** Unpublished manuscript available from the author: University of Southern Mississippi, Department of Biological Sciences, Hattiesburg, MS 39406-5018.

Simons, T. R., S. M. Pearson, and F. R. Moore. 2000. **Application of spatial models to the stopover ecology of trans-Gulf migrants.** Studies in Avian Biology 20: 4-14.

The Nature Conservancy, The. 2001. **Conservation by design, a framework for mission success.** Arlington, VA: The Nature Conservancy; 16 pp. Available at http://nature.org/aboutus/howwework /about/art5720.html.