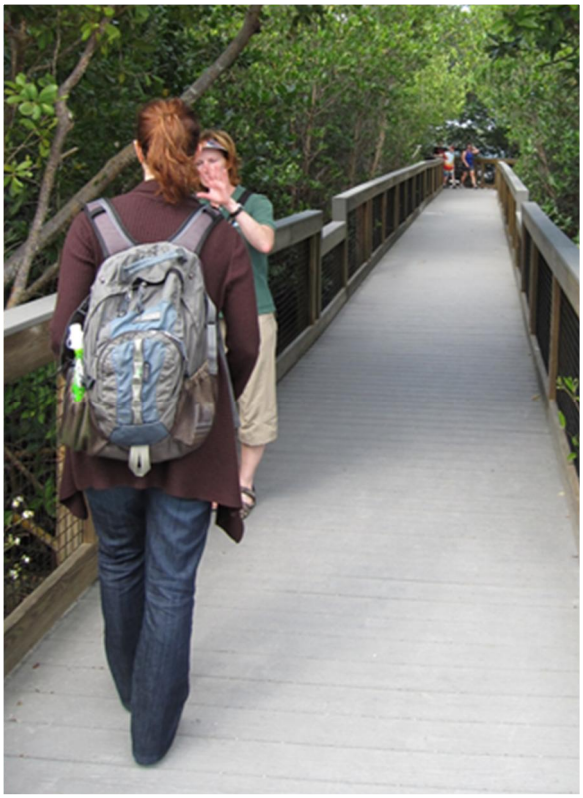
Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan



Southeast Region

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

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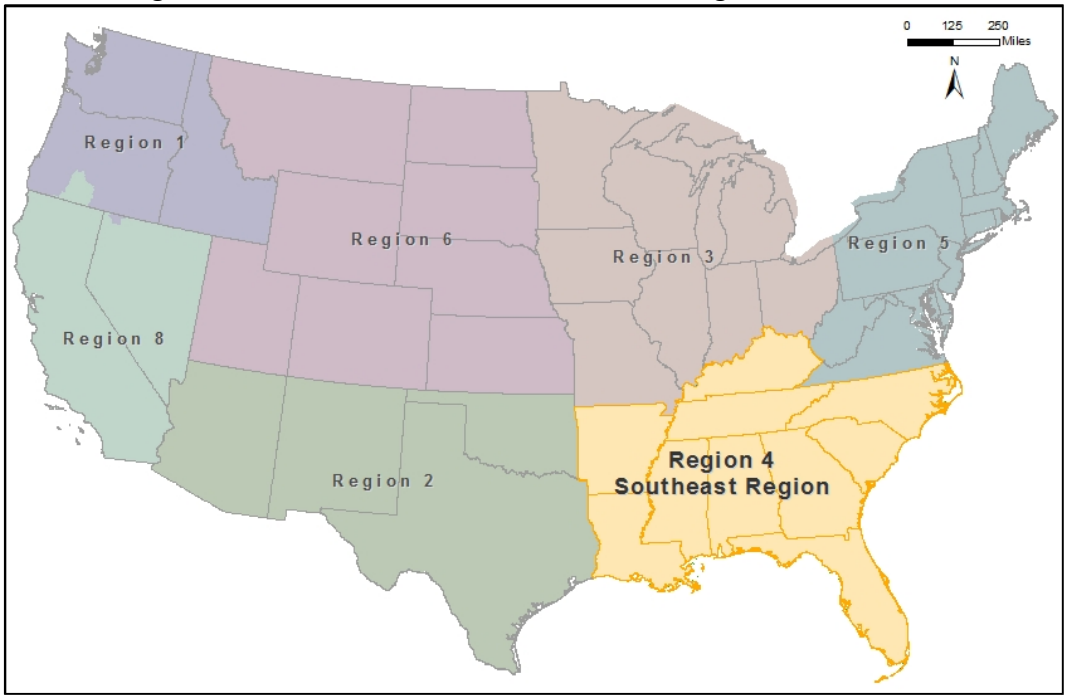
Front page photo credits (clockwise from top left): Paul Tritaik, J.N. "Ding" Darling NWR; Cristina Pastore, J.N. "Ding" Darling NWR; Steve Suder, Alligator River NWR; Paul Tritaik, J.N. "Ding" Darling NWR; Joe Saenz, Black Bayou Lake NWR.

Executive Summary

INTRODUCTION TO THE FWS REGION 4 LONG RANGE TRANSPORTATION PLAN

The Southeast Region (Region 4) of the U.S. Fish and Wildlife Service (FWS, the Service) has initiated the development of its first Long Range Transportation Plan (LRTP). With the assistance of the Eastern Federal Lands Highway Division (EFLHD) of the Federal Highway Administration (FHWA), the Service's Southeast Region (FWS Region 4) is developing a twenty-year plan for the preservation, enhancement, operations and maintenance of its transportation assets across all of its national wildlife refuges and fish hatcheries in the southeastern states and U.S. outlying areas. The FWS regional boundaries are shown in Figure 1. Region 4 states, territories, and station locations are shown in Figure 2.

Figure 1: U.S. Fish and Wildlife Service Region Boundaries



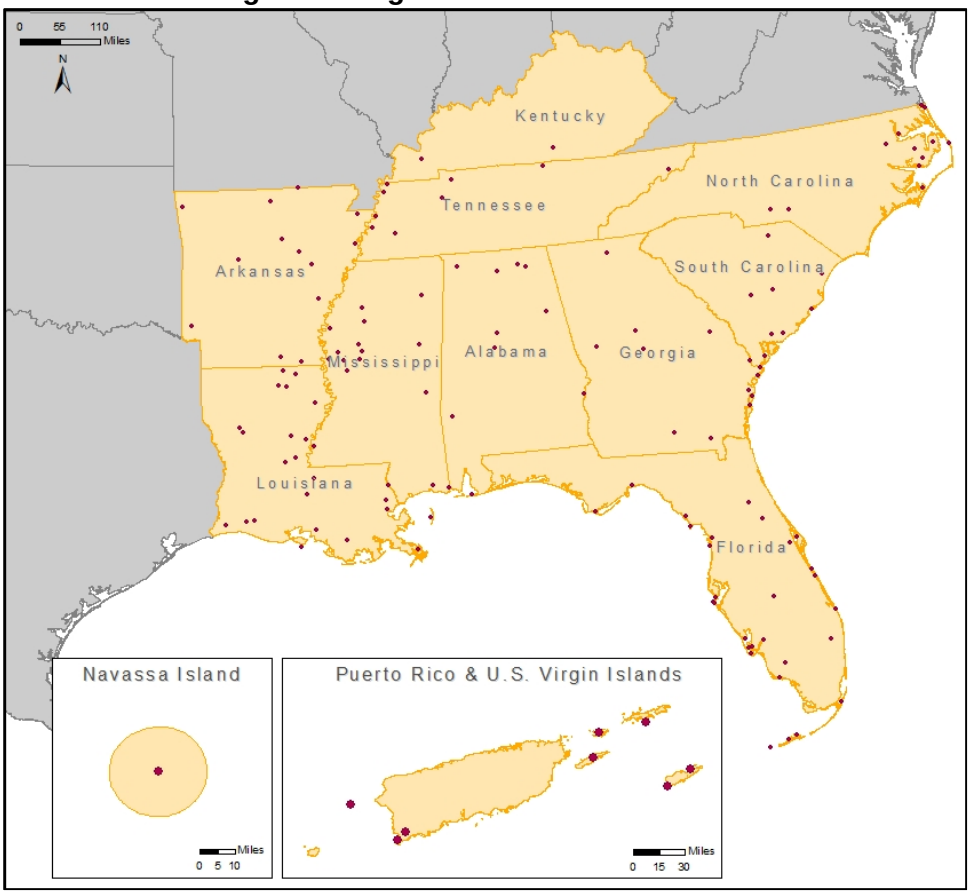
This plan accomplishes the following:

- Assesses the current and future conditions of the Service's transportation assets.
- Determines transportation needs, as well as the identification of those potential projects and policies to address those needs.
- Establishes priorities based on project performance, available funding, and coordination opportunities with other federal, state, and local agencies.

Prior to the commencement of this regional plan, the development of a national level long-range transportation plan for the Fish and Wildlife Service was initiated. The primary purpose of the national plan was to define the overall transportation policy direction for the entire Service as well as for individual regions. Similar to Region 4, many of the other regions across the country have been

completing plans of their own. These plans will aid in the Service's mission to "work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people"[1] by assisting each region with the development of a safe, efficient, and sustainable transportation system on Service lands.

Figure 2: Region 4 States and Stations



This Long Range Transportation Plan will assist Region 4 in determining its many transportation needs, prioritizing transportation projects to best utilize the funds currently available to the Service, and aid in the development of partnerships with outside agencies for coordinated planning opportunities. This plan also will help to more formally integrate transportation planning into the refuges' comprehensive conservation plans (CCPs) and the fish hatcheries' comprehensive hatchery management plans (CHMPs) to make better use of their existing planning processes.

MISSION AND GOALS

The Mission of the FWS Region 4 LRTP is to support the Service's larger national mission by connecting people to fish, wildlife, and their habitats through strategic implementation of transportation programs.

The goals of this Region 4 transportation plan reflect the six basic categories defined in the FWS National LRTP document. Each of the enhanced FWS Region 4 goals includes distinct objectives that explain how the Service will accomplish each goal. The FWS Region 4 LRTP's goals and objectives are detailed below.

[1] http://www.fws.gov/help/about_us.html

Goal 1 – Access, Mobility, and Connectivity: Ensure that units open to public visitation have adequate access, mobility, and connectivity for all potential users, including underserved, underrepresented, and disadvantaged populations.

Goal 2 – Asset Management: Provide a financially sustainable transportation system to satisfy current and future land management needs in the face of a changing climate.

Goal 3 – Coordinated Opportunities: Seek partnered transportation solutions that support the Service's mission, maximize the utility of Service resources, and provide mutual benefits to the Service and its external partners.

Goal 4 – Environment: Ensure that the transportation program helps to conserve and enhance fish, wildlife, and plant resources and their habitats.

Goal 5 – Safety: Provide a transportation system that ensures visitors traveling to and within Service lands arrive at their destinations safely.

Goal 6 – Visitor Experience: Create and sustain enjoyable and welcoming transportation experiences for all visitors.

This Long Range Transportation Plan will assist Region 4 in determining its many transportation needs, prioritizing transportation projects to best utilize the funds currently available to the Service, and aid in the development of partnerships with outside agencies for coordinated planning opportunities.

REGION 4 BACKGROUND

Region 4 is the U.S. Fish and Wildlife Service's largest region in the country, in terms of the number of transportation assets it contains. Region 4 contains 128 national wildlife refuges and 17 national fish hatcheries, comprising approximately 3.59 million acres of land and water across ten states and two territories: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee, as well as Puerto Rico and the U.S. Virgin Islands. Of the 128 refuges, 113 are open to the public for visitation at specified time periods throughout the year; all 17 hatcheries allow public visitation as well. Sixteen of the refuges were specifically established for the preservation and protection of endangered species.

Region 4 maintains an extensive system of transportation infrastructure, including roads, trails, parking lots, bridges, culverts, and low-water crossings. The roads, trails, and parking lots are primarily gravel or native/primitive surfaces, with some additional high-use facilities that have been constructed with either asphalt or concrete materials.

Approximately 3,500 miles of Service roadways exist within Region 4, of which close to 1,500 miles are open to the public. The remaining 2,000 miles are for administrative use only by Service staff. Similarly, of the approximately 1,700 parking lots and 350 miles of trails maintained by Region 4, about 1,400 parking lots and 220 miles of trails are open to the public. This compares to over 7,000 miles of roadways, 4,500 parking lots, and 1,400 miles of trails in the entire Service's nationwide transportation asset inventory. As one of the eight regions, Region 4 comprises a significant amount of the overall transportation assets of the Service nationally.

EXISTING CONDITIONS AND FUTURE TRENDS

Transportation assets receive funding based on condition, importance, and need. The intent of any LRTP is to identify future needs and plan for them proactively. Thus, it is imperative to understand the current and evolving state of transportation in Region 4 to look forward and plan for the future. The data provided in the *Existing Conditions and Future Trends Report* helps to inform the identification of improvement areas and needs to assist in the process of selecting projects.

GOAL 1 – ACCESS, MOBILITY, AND CONNECTIVITY

Access, mobility, and connectivity collectively ensure that both visitors and refuge staff can have travel-mode choices to equitably, easily, and conveniently travel to, from, and within Service units. ***Access*** addresses the ability of people of all ages, economic groups, and physical abilities, as well as underrepresented populations, to visit Service units. ***Mobility*** considers the ease and convenience for visitors to travel to, from, and within Service units using a preferred mode. Finally, ***connectivity*** addresses the potential to link many modes, both inside and outside units, to maximize possibilities for transportation connections.

The LRTP considered a wide range of spatial metrics for this goal, including access to stations by road, bicycle and trail, transit, water, and air. Spatial analysis through Geographic Information Systems (GIS) was used to complete some of this analysis, while qualitative information also was gathered from the Regional Alternative Transportation Evaluation[2] (RATE) survey. Some highlights from the analysis are included below:

- Approximately 50% of stations are within one-half mile of a navigable waterway with 18 stations within a half mile of both an inland and marine route.
- According to the RATE survey, almost a third of visitors reach stations using water-based transportation.
- Scenic Byways traverse 15 Service units and pass within 10 miles of 60% of the units (79 refuges and nine hatcheries).
- Recreational trail information was available for Florida, Georgia, Kentucky, and North Carolina. Of the 57 refuges and hatcheries within the four states, 20 intersect or are adjacent to facilities that support walking, biking, or multi-use activities and an additional 22 are located within one mile of such facilities.

GOAL 2 – ASSET MANAGEMENT

The Service's transportation system is necessary for refuge and hatchery staff and visitors to safely and easily access as well as enjoy the national network of conserved and maintained lands and waters, but it must be maintained sustainably for future generations. The Service at a national level has implemented an asset management plan that is consistent with the *Asset Management Plan 2009*[3] to manage its diverse set of transportation-related assets in order to provide the best level of service with the available resources.

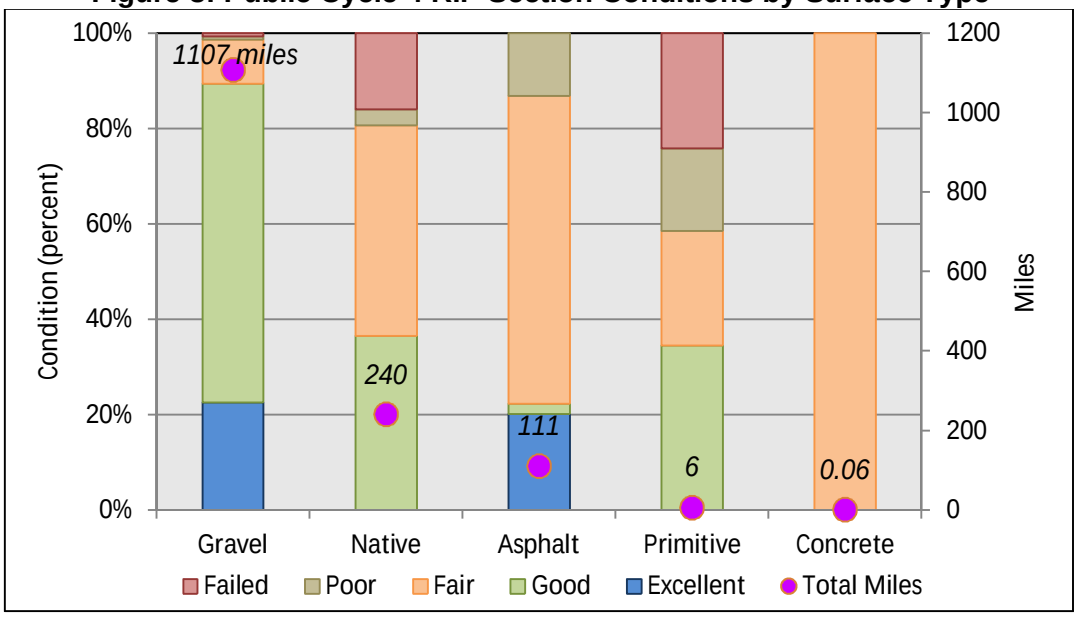
Assets maintained by the Service are inventoried in both the Service Asset Maintenance Management System (SAMMS) and the Road Inventory Program (RIP) databases. RIP is collected on a cyclical basis every five years by the FHWA's Eastern and Central Federal Lands Highway Divisions on behalf of the Service. RIP data served as the primary source for the analysis of this goal

[2] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)
[3] *Asset Management Plan* (Bureau of Land Management, 2009)

area. Figure 3 shows the variation of road conditions for each of the five pavement materials for public use roads in Region 4. Some highlights include:

- According to RIP, Region 4 contains the largest number of inventoried public use roadway miles, 1,463.9 miles, compared to the next highest inventoried road miles in Regions 6 and 2, which have approximately 944 miles and 818 public use miles, respectively.
- Of the 1,463.9 total public road miles, 75.5% (1,105.4 miles) are in "good" or "excellent" condition. Only 5.3% (77.9 miles) are in "poor" or "failed" condition.
- More than 75% of the public use road miles inventoried, or 1,107.4 miles, are gravel roads. The remaining 25% consist of native and primitive surfaces (245.7 miles or 16.8%); asphalt (110.8 miles or 7.6%); and concrete (0.06 miles or <0.1%).
- Nearly 88% of the public use trails (199.0 miles) are classified as being in "excellent" condition. Only 1.3% (2.9 miles) is classified as being in "poor" or "very poor" condition.
- For units that have more than one acre of parking, only 14 have more than 10% of their parking surfaces rated in "poor" or "failing" condition. An equal number of units have more than 80% of their parking surfaces rated as being in "good" or "excellent" condition.

Figure 3: Public Cycle 4 RIP Section Conditions by Surface Type



While many of the transportation assets maintained by Region 4 are in "good" or "excellent" condition, Region 4 is working to reduce their Deferred Maintenance (DM) backlog. Currently, road repairs and maintenance are estimated the same despite differences in mission support, design, or usage, resulting in inflated costs for roadway maintenance. The Service has created a new tiering structure that will complement the existing asset codes and classifications while addressing other critical aspects of design, usage and maintenance, and how it supports the overall mission and purpose of the station. In future RIP inventories, administrative roads and low tier roadways may not be inventoried and included in DM estimations.

GOAL 3 – COORDINATED OPPORTUNITIES

Transportation resources can be used to help support the mission of the Service. As a result, coordinated opportunities with other entities can go beyond merely leveraging funding and

perhaps consider broader maintenance goals that would be mutually beneficial to both the partner(s) and the Service. Identifying key partners in the region and at the unit level will be a valuable exercise to consider during future planning and coordination. The Service's mission to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people is perfectly aligned with considering partnerships and coordination with other non-Service entities.

GIS was used once again to identify possible partners through analysis of political boundaries that intersect or are near to Region 4 refuges and hatcheries. Some highlights include the following:

- Florida and Louisiana host the greatest numbers of refuges in the Southeast, with 30 and 24 refuges and hatcheries within their borders, respectively.
- Seven refuges within Region 4 straddle state lines, including one that intersects the Commonwealth of Virginia, outside of the northern boundary of Region 4 and extending into the territory of FWS Region 5 (Northeast).
- Refuges and hatcheries are located within 183 counties, parishes, and municipios (Puerto Rico) with 58 refuges crossing more than one county boundary and 23 crossing more than two counties.
- A total of 40 refuges and fish hatcheries intersect the planning boundaries of 30 separate metropolitan planning organizations (MPOs).
- Only 10 Region 4 refuges and two hatcheries are not located within 5 miles from another federal land management agency area. Five of those are located on small isolated islands.

GOAL 4 – ENVIRONMENT

The National Wildlife Refuge System provides benefits to human communities as well as wildlife populations. Protecting natural habitats, wetlands, coastal resources, grasslands, forests, and wildernesses, refuges maintain and even improve air and water quality. They have the potential to relieve flooding from the built (manmade) environment, improve soil quality, and help trap greenhouse gases that contribute to global warming. However, while the Refuge System can alleviate stresses on surrounding areas, it is important to also consider the effects that the surrounding built environment may have on the System.

For this goal area, analyses were performed to identify the proximity of environmentally sensitive areas to refuges and hatcheries. Some interesting results are included below:

- One hundred (100) of the 145 Southeast Region Service Units (about 69% of all units) are home to at least one species listed as endangered or threatened, of which 87 units serve to protect species that are listed as endangered.
- Over a third of the Service's Region 4 units (47) intersect areas or waterways identified as critical habitats for 29 different species.
- In Alabama, Cahaba River NWR supports the largest number of species with designated critical habitats (eight species).
- Region 4 has 19 refuges with designated wilderness areas located in six states.
- 110 of the Region's 145 units (about 76%) intersect at least one classified wetland system.

In addition to LRTP efforts across the country, the Federal Highway Administration (FHWA) worked closely with both the U.S. Fish and Wildlife Service and the National Park Service on a project known as "Strategic Research Initiative: Integration of Federal Lands Management Agency Transportation Data, Planning, and Practices with Climate Change Scenarios to Develop a Transportation Management Tool (2014)." This project, conducted by ICF International, is a separate yet parallel

effort to the LRTP planning process. Two components, *Vulnerability Assessment* and *Adaptation Planning*, are being considered as a part of the tool. The *Vulnerability Assessment* takes into account a large amount of data to determine which park and refuge transportation assets are the most vulnerable to climate change.

Photo Credits: Joe Saenz, Black Bayou Lake NWR; Cristina Pastore, J.N. "Ding" Darling NWR

Once identified, the staff from the parks and refuges can work with the FHWA and ICF International team to determine the best adaptation options for each. Results from the climate change analyses and research provide an environmental context to the larger transportation assessment and recommendations.

GOAL 5 – SAFETY

The Service supports reliable and safe access to and from its network of lands and waters. Roadways, while an essential component of the national transportation system, can be hazardous due to road pavement conditions, traffic volumes, high speeds, and the potential for both vehicle-vehicle and vehicle-wildlife collisions.

Safety is a concern not only for refuge and hatchery staff and visitors but also for wildlife. Roadways are a major component of the United States transportation system, and FWS areas located near high speed, high volume roadways pose greater risks for vehicle-wildlife collisions.

An analysis of safety hot-spots was conducted to determine areas requiring additional focus. Four key criteria were considered, including 1) high volume roadways within a mile of a unit, 2) high vehicle collision rates or fatalities within one mile of a unit, 3) road conditions considered to be "poor" or "very poor," and 4) high Asset Priority Index (API) according to the Service.

- In FWS Region 4, 51 refuges and four fish hatcheries qualified for at least one of the criteria above. Of those, 35 refuges and three hatcheries each have one criterion that falls within the 95th percentile for that specific criterion.
- Twenty-two total units qualified for at least two criteria, with three, Mississippi Sandhill Crane NWR, Pinckney Island NWR and Waccamaw NWR, qualifying for three criteria including high annual average daily traffic volumes (AADTs), high vehicle collision rates, and high API.
- Only one unit qualified for all four categories, and managed to do so in the 95th percentile of reported data for three of the four (Private John Allen National Fish Hatchery in Tupelo, MS).

GOAL 6 – VISITOR EXPERIENCE

Visitation is one way the Service can support its mission to grant current and future generations the opportunity to interact with wild lands, fish, wildlife, and plant species, where appropriate. People care about what they can experience, and the knowledge that they gain from the experiences. Thus, in the end, promoting the relevance of the U.S. Fish and Wildlife Service to the lives of Americans is about access. Wildlife refuges should be accessible to all, regardless of an individual's location or physical abilities.[4]

Information examined in regard to this goal area came from the Refuge Annual Performance Plans (RAPP), analysis of the US Census, and the RATE survey results. Some interesting highlights from the analysis include the following:

- According to the RATE report's findings, 44 percent of the FWS Region 4 stations do not believe that their refuge or fish hatchery has sufficient signage present on access roads and trails.[5]
- For the system of refuges and fish hatcheries that are open to the public, the local population within a 25-mile radius of the Region 4 system stations increased from 24.3 million people to 26.8 million people (an increase of about 2.5 million persons or about 10.4%) from 2000 to 2010 (excluding residents of the U.S. Virgin Islands).[6]
- Population is expected to grow between 2010 and 2030 from 26.0 million people (excluding residents of both Puerto Rico and the U.S. Virgin Islands[7]) to 30.5 million people (an increase of about 4.5 million persons or 17.2%) within the same 25-mile radius of the R-4 stations.
- The percent of the total regional population classified as living in poverty who are estimated to be residing within a 25-mile radius of all refuges and fish hatcheries in the Southeast Region is 17.3%,[8] which is higher than the overall national poverty rate of 15.9%[9].

Photo Credit: Donald McIntosh, J.N. Ding Darling NWR

SUMMARY OF CURRENT STAKEHOLDER OUTREACH

The LRTP has included multiple levels of stakeholder outreach, resulting in valuable insight into the processes, operations, and transportation considerations of the Southeast Region of the Fish and

[4] *Conserving the Future: Wildlife Refuges and the Next Generation*, USFWS October 2011.
[5] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)
[6] Using 2000 and 2010 county-level census data; excluding the U.S. Virgin Islands, where data is only available for 2000.
[7] State Population Predictions by county – various sources
[8] US 2010 Decennial Census and American Community Survey data, excluding U.S. Virgin Islands
[9] US Census 2011: http://www.census.gov/prod/2012pubs/acsbr11-01.pdf

Wildlife Service and its individual stations. The following groups of stakeholders have been involved in the process:

- Project Management Team, PMT (FWS Region 4, FWS Headquarters, and Eastern Federal Lands Highway Division of the Federal Highway Administration) – This team coordinated on a regular basis with the Consultant Team to guide the completion of the LRTP document.
- Coordination Team (FWS national, regional, refuge, and hatchery leaders from across the Southeast Region along with members of the PMT) – This team served as a sounding board for the PMT, provided feedback on the overall planning process, plan Goals and Objectives, productive ways to engage the individual stations for data collection and input, and opinions on final deliverables and their value to the region and stations.
- Regional Leadership (Division Chief of Budget & Facility Management and Branch Chief of Facility Management, as well as others) – These regional leaders participated in some Coordination Team meetings and provided input into the process and supplementary tools along the way.
- Station Leadership (Refuge and Hatchery Management)
    - The station leaders participated in Area calls and webinars at three key points in the process: 1) Kick-off, 2) Draft *Existing Conditions and Future Trends Report*, and 3) Draft *Recommendations Report*. These webinars allowed for both the dissemination of information to station managers about the planning process and the gathering of valuable feedback from them on report deliverables.
    - Refuge and hatchery leadership also was asked to participate in one substantial data call consisting of the RATE survey and additional planning-related questions.

FUNDING AND FINANCIAL GAP

A NEW SURFACE TRANSPORTATION BILL

With the October 1, 2012 effective date of the newest federal surface transportation bill, ***Moving Ahead for Progress in the 21st Century (MAP-21)***, the structure of federal funding programs has changed since its predecessor, SAFETEA-LU. This LRTP includes details on current key funding sources through MAP-21 as well as other non-traditional funding mechanisms that have previously awarded funds to the Service, or could be possible future funding sources. Under MAP-21, many discretionary grant programs that were provided to the FWS have been eliminated or consolidated into programs with broader applicability. New funding programs focus on performance of the transportation system, setting key transportation goals, and focusing on high-use and recreational areas in particular.

While many familiar SAFETEA-LU discretionary grant programs no longer exist in MAP-21, the magnitude of future funding levels to support the FWS transportation program, and particularly Region 4 funding levels, are not anticipated to experience significant change from that which has been observed since 2006 when the initial SAFETEA-LU allocations were set. It is anticipated that future surface transportation bills beyond MAP-21 will likely continue to provide Region 4 with an annual amount comparable to the current $5.83 million annual allocation. The LRTP focuses on current funding allocation, while additional consideration is given to new transportation funding opportunities that could be explored through partnerships with outside agencies.

KEY FUNDING SOURCES

The LRTP has identified the most relevant existing and new funding programs for the FWS, including the Federal Lands Transportation Program (FLTP), the Federal Lands Access Program (FLAP), and

the Transportation Alternatives Program (TAP). Additional sources are detailed in the *Funding and Financial Gap* section of this report.

- While Federal Agencies are not eligible to apply for or receive funds directly, **FLAP** authorizes improvements on State or Local access facilities that connect to Federal Lands, benefitting the FLMAs.
- **FLTP** authorizes funding for improvements on transportation related assets within the Federal estate that are generally owned and maintained by the respective FLMA.
- **TAP** combines several previous funding programs, including the Transportation Enhancements and Recreational Trails Programs which state and local agencies can use to enhance FLMA transportation facilities and services.

MAP-21 also has set a clear intention for agencies to coordinate projects and funding to mutually benefit a variety of users and agencies. For example, FLAP funds go directly to non-Federal entities such as state or local government agencies, but are intended to specifically improve access to Federal Lands. This makes it important for FLMAs to coordinate and collaborate directly with adjacent state, county or local government agencies. The Service's mission to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people is perfectly aligned with considering partnerships and coordination with other non-Service entities. The LRTP already emphasizes this coordination through *Goal 3 – Coordinated Opportunities*. Identifying key partners in the region and at the unit level will be a valuable exercise to consider during future planning and coordination of funding, particularly through MAP-21 programs.

OTHER FUNDING SOURCES

While the majority of transportation funds for Region 4 are anticipated to come directly through either the FLAP or FLTP programs, it is important to consider alternative means to fill funding gaps and finance transportation projects. Whether through other programs in MAP-21 or from non-Federal sources at the state or local levels, transportation funding can be leveraged from a variety of programs throughout the country.

The *Emergency Relief for Federal Roads Program (ERFO)* and the *Emergency Relief Program (ER)* are two programs that have provided relief for repairs and replacement needed due to serious damage from presidentially declared natural disasters or catastrophic failure from an external cause. While these programs have obvious limitation to applicability, Region 4 currently has $2.3 million in active emergency relief projects. Additional funding sources that have not yet been utilized by FWS Region 4 are described in detail in the ***Funding and Financial Gap*** chapter.

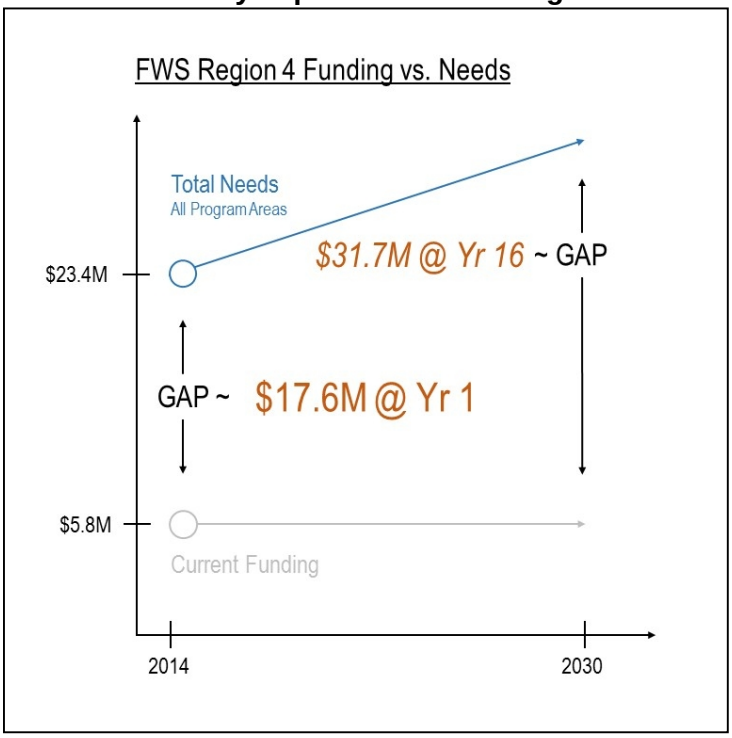
REGION 4 ASSET CONDITIONS AND FINANCIAL GAP

FWS Region 4 contains a very large share of both public-use and overall national FWS transportation infrastructure assets, as inventoried in RIP and SAMMS. In general, the majority of Region 4 public road and trail miles are in 'good' or better condition, while parking surface conditions include nearly 60% of total acreage in 'good' or better condition. While these inventories suggest that Region 4 is managing its transportation assets very well, maintaining funding levels for routine maintenance to keep these assets rated in 'good' or 'better' condition is essential to sustain and improve public transportation facilities for the long haul.
Two plans focusing on transportation assets and funding have recently been completed at the national level: The *Fish and Wildlife Service National Reauthorization 2013 Prioritization Pilot and*

Work Optimization Analyses Report[10] and the *PLAN 2035 – the National Long Range Transportation Plan*.[11] The 2013 Prioritization Pilot concluded that $30 million are being spent annually throughout the entire FWS. In order to complete an enhanced transportation program, approximately $60 million would be needed, and to complete a fully implemented plan, $95 million would be needed. At the highest level of implementation, that equates to an annual funding shortfall of approximately $65 million.

The report also determined that Region 4 paved roadway assets make up 24.4% of the national assets (25% was used to approximate the regional share of other assets such as bridges, trails, transit assets, etc.). Therefore, in order to implement an enhanced program or fully implemented program at the regional level, approximately $14.8 million and $23.4 million would be required each year, respectively. Assuming a 3% annual inflation rate, this equates to a total need of $321.6 million and $509.4 million, respectively, through FY 2030. Considering the $5.83 million annual funding allocation that is anticipated to continue for Region 4, there is estimated to be a total of approximately $99.1 million available through FY 2030, which results in a cumulative funding gap of $222.5 million for an enhanced program or funding gap of $17.6 million at year one, and a funding gap of $31.7 million at year 16, with a cumulative funding gap of $410.3 million for the fully implemented funding scenario.

Figure 3: Region 4 Transportation Funding Gap for a Fully Implemented Funding Plan



The current level of transportation funding available to Region 4 limits the Service's ability to maintain current assets and to implement new innovative and meaningful projects, now and in the future. New sources of funding should be explored wherever possible, including opportunities to partner with neighboring jurisdictions on mutually beneficial projects.

The Service's Deferred Maintenance (DM) backlog has been a high profile topic since Congressional Hearings in 2011. The magnitude of funds indicated in the national backlog at that time were astronomical and likely lacked informed differentiation between asset design, use, and maintenance needs, which resulted in a highly inflated bottom line. In parallel with the FWS Region 4 LRTP development process, the *FWS Roads Tiers and Decision Tree* was employed to complement existing asset classifications and address additional critical aspects of design, usage and maintenance to better inform maintenance and funding needs. These tools are discussed in the ***Asset Management*** chapter of the *Existing Conditions and Future Trends Report* and are anticipated to help mitigate some of the estimated funding gap by better interpreting the usage and maintenance needs of transportation assets.

[10] *Fish and Wildlife Service National Reauthorization 2013 Prioritization Pilot and Work Optimization Analyses Report* (Stantec, 2013)
[11] *U.S. Fish and Wildlife Service PLAN 2035 the National Long Range Transportation Plan* (2014)

PROJECT SELECTION PROCESS

The culmination of the LRTP effort is the development of an enhanced project selection process. In light of guidance set forth by MAP-21, performance-based planning will be at the core of all transportation funding decision-making. It is imperative that the refuges and hatcheries in Region 4 develop creative and impactful transportation projects that can compete not only within the region but also at the federal level within the FWS, with other FLMAs, and within regions and states across the country.

PROJECT IDENTIFICATION AND SELECTION

The Southeast Region of the Service annually updates and develops a 5-year project plan for transportation improvements, which includes both asset management projects and more substantial capital projects. Of the $5.8 million that the region annually receives through MAP-21, $250,000 is set aside for regraveling projects and an additional $140,000 is set aside for urgent bridge repairs. The remaining funding of approximately $5.4 million is used for larger capital projects.

Currently, stations notify the region of various project needs, and the region creates a list of potential projects. This list is then submitted to area managers for their review and feedback. With the assistance of area managers, the region creates a 5-year project plan for implementation. Much of the project identification process will remain the same as it has been, but performance-based requirements of MAP-21 will necessitate a more quantitative analysis of projects. A Project Evaluation Tool has been developed as part of the FWS Region 4 LRTP process to assist in project prioritization.

PROJECT EVALUATION CRITERIA AND TOOL

The Project Evaluation Criteria and Tool provides station, region, and national leadership with a quantitative process for evaluating transportation projects. The projects that provide higher transportation value should be funded before those that provide lower value. The National LRTP for the Fish and Wildlife Service outlines six primary metric categories for the evaluation and selection of projects. Region 4 has maintained those six categories and has included subcategory metrics using National Plan guidance, analysis conducted through the regional LRTP process, and RATE survey responses from station leadership.

The six project evaluation categories are provided below:

1. Improves transportation safety
2. Improves “state of good repair” of transportation assets
3. Enhances transportation choices to, from, and within FWS stations
4. Enhances environmental conditions in the field and/or helps to meet programmatic goals
5. Meets a local priority: (a) documented in a Comprehensive Conservation Plan (CCP), (b) other transportation plan; (c) is within a Region’s high-use or urban station; or (d) provides economic benefit to local partners
6. Supports transportation partnerships and leveraging of transportation funds/programs to benefit FWS

An illustration of a portion of the project evaluation worksheet associated with the “*Improves Transportation Safety*” category is presented below. This tool will be used to assist Regional leadership with the identification of priority projects across the Region. Technical merit is part of the prioritization process, as it is in all planning processes, but stakeholder involvement also will play an important role. Qualitative considerations for project prioritization will include availability of funds, project development delivery schedules, and time constraints for right-of-way and environmental

work. Area, regional, and national leadership will discuss high-scoring projects from a qualitative perspective to determine which projects should be advanced for implementation.

Project Evaluation Tool - Criteria Excerpt

1. Improves transportation safety of humans and wildlife	National Plan Recommended Points = 20
Goal	***Points***
Existing Conditions / Crash History (choose all that apply, maximum of 10 points)	***(max 10 points)***
Documented or anecdotal crash history where the project is planned	
High numbers of human or wildlife injuries (may include station staff anecdotal information)	/3 points
High number of human or wildlife fatalities (may include station staff anecdotal information)	/5 points
Station identified as a safety hot spot (crash) in the Region 4 LRTP (Table 14 of the Appendix)	/4 points
Project Safety Improvement (choose if applicable, maximum of 10 points)	***(max 10 points)***
Project improves safety of location *(examples - adding turn lanes, flattening horizontal curves, sight distance improvements or enhancements/countermeasures such as road safety audits, safety edge, signs and markings, traffic calming and movement restrictions, wildlife crossing, barriers, vegetation control, surface improvement, visiting hours, tools such as Highway Safety Manual, Interactive Highway Safety Design Mode, etc.))*	/10 ***points***
Goal #1 Total Points	***0 /20 points***

= Project score determined using data from the Long Range Transportation Plan

PLAN IMPLEMENTATION AND FUTURE USE

LRTP USE BY THE REGION

The Long Range Transportation Plan is meant primarily to serve as a regional planning document. The *Existing Conditions and Future Trends Report* provides a regional snapshot of transportation assets and needs with additional detail listed by station in the **Appendix** document. The *Recommendations Report* includes policy guidance and evaluation tools that the region can use to prioritize projects in light of new federal funding guidance and the FWS National LRTP that seeks to fund projects that will provide a strong return on investment. The *Recommendations Report* also includes suggested data collection efforts that the region or individual stations should consider over the next few years prior to the next update of the LRTP.

Stations for Further Transportation Study – Regional Evaluation Tool

The *Project Evaluation Tool* is an important resource for prioritizing transportation projects within the region by determining which projects provide the greatest value. Another tool has been created as part of the Region 4 LRTP effort that provides value at an earlier stage of the transportation planning process. The *Stations for Further Transportation Study* tool is meant to be primarily an evaluation tool for use by regional staff to determine which refuges and hatcheries may warrant further, more detailed transportation study.

The tool uses only information that has been analyzed or gathered as a part of the Region 4 LRTP or the voluntary RATE survey responses collected from station management. It scores each refuge on a scale of 0 to 100 points. Metrics are broken down into the six main goal areas of the LRTP. Each goal has multiple metrics for which the refuges can score points, and awarded points identify areas where there is a need or challenge that could be rectified with transportation enhancements that would require further analysis. Thus, stations with the highest scores can be considered for additional detailed transportation study.

LRTP USE BY STATIONS

The LRTP document is valuable for regional-level planning; however, it can be challenging for individual stations to extract relevant local-level information that is useful for their planning efforts. Recognizing this difficulty, as well as a lack of time and resources to consider the full LRTP process at the station and regional levels, some additional tools and resources were developed as a part of the LRTP process to provide greater value at the station level.

Incorporating Transportation into CCPs

The primary resource that the LRTP will provide at the station level is through production of an amendment to the Comprehensive Conservation Plan process for refuges to incorporate transportation considerations. Regional funding for CCPs has been discontinued at this time; however, refuges have the option to update their CCPs on their own. While CCPs may not be done regularly, the PMT decided to amend the necessary documents to include transportation so that any refuge deciding to update their plan will have the tools to adequately consider transportation. These documents include *Station Fact Sheets*, the *User Guide*, an updated *Work Plan*, and an updated *Template*. It is important to remember that the LRTP is a long range planning document with a 20-year planning horizon. Future federal funding levels are not known at this time, and it is practical to anticipate changes that may occur 5-10 years from now. A similar process can be undertaken to update Comprehensive Hatchery Management Plans (CHMPs) as well.

STAKEHOLDER OUTREACH AND COMMUNICATION PLAN

Stakeholder input is critical to the success of any planning project, no matter the size. It is important to recognize that different types of outreach are applicable to different types of planning efforts. The following guidance is provided to assist the region and its stations with tailoring outreach to the scale and intensity of the plan.

LRTPs for FLMAs

LRTPs are by nature multi-decade plans that consider large geographic areas. In the case of the Region 4 FWS LRTP, the plan has developed 20-year capital investment and maintenance needs estimates and recommendations for stations across ten states, Puerto Rico, and the U.S. Virgin Islands. It is thus prohibitively expensive and time consuming to conduct traditional outreach through public meetings and open houses in multiple locations. Following the completion of this plan, the Regional Transportation Program Manager with support from other regional, area, and station staff should reach out to key state and regional transportation planning agencies and other FLMAs to advertise the completion of the plan. The plan should be posted on the Region 4 website as well as the websites of individual refuges and hatcheries where they exist. The notice of availability of the FWS Region 4 LRTP will also be published in the Federal Register, which will provide an additional opportunity for broad public access to the plan.

Transportation step-down plans and other small area studies

Small area plans allow for more localized outreach efforts than the higher-level LRTP due to the shorter planning horizon and smaller study area. Some of these plans include subregional plans between a smaller grouping of stations (such as a refuge complex) or in partnership with other FLMAs as well as transportation step-down plans at individual refuges or hatcheries. In addition to gathering input within the Service and EFLHD, it also is prudent to engage relevant local, regional, and state agencies whose boundaries overlap with Service boundaries. Outreach to the general public as well as to refuge and hatchery visitors and Friends Groups is not only feasible but strongly encouraged at this scale as well.

Project studies

Project-level studies are the smallest and most focused of all the planning studies and therefore encourage a more targeted outreach plan than some of the broader studies. In addition to the general public meetings and surveys, stakeholders directly impacted by the project must also be involved. At this scale, all projects using federal funding must comply with the NEPA process, which includes public outreach during project scoping and feasibility, the draft environmental document, and the final environmental document. In the case of a Categorical Exclusion, less public outreach may be required.

RECOMMENDATIONS FOR FUTURE PLAN ACTIVITIES

This is the first ever Long Range Transportation Plan for the Southeast Region of the Service, and many opportunities for additional data collection, process and policy refinement, and outreach and partnership have been identified for future planning activities. Additionally, transportation conditions and needs change over time, so aspects that were not considered as a part of this plan may need to be studied in the future.

One overarching data collection item to which FWS Region 4 should commit will be the continued search for updates in available geospatial information system (GIS) databases. Cataloging resources in GIS is an ongoing process throughout the U.S., including updates to keep up with changes in the landscape of the built environment in proximity to existing and any future Region 4 stations.

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Executive Summary

U.S. Fish & Wildlife Service
1 800/344 WILD
http://www.fws.gov

February 2015

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Existing Conditions and Future Trends

Southeast Region

May 2013

Front page photo credits (clockwise from top left): Paul Tritaik, J.N. "Ding" Darling NWR; Cristina Pastore, J.N. "Ding" Darling NWR; Steve Suder, Alligator River NWR; Paul Tritaik, J.N. "Ding" Darling NWR; Joe Saenz, Black Bayou Lake NWR.

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Abbreviations and Acronyms

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
API	Asset Priority Index
APTA	American Public Transportation Association
ATS	Alternative Transportation System
BLM	Bureau of Land Management
BMP	Best Management Practices
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resource System
CCA	Comprehensive Conditions Assessment
CCP	Comprehensive Conservation Plan
CFLHD	Central Federal Lands Highway Division
CFR	Code of Federal Regulations
CHMP	Comprehensive Hatchery Management Plan
CLIR	Climate Leadership in Refuges
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CRV	Cost of Replacement Value
CVI	Coastal Vulnerability Index
DM	Deferred Maintenance
DOD	Department of Defense
DOI	Department of the Interior
DOT	Department of Transportation
EFLHD	Eastern Federal Lands Highway Division
ERFO	Emergency Relief for Federally Owned (Roads)
FAA	Federal Aviation Administration
FARS	Fatality Analysis Reporting System
FCI	Facility Condition Index
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program (MAP-21)
FLH	Federal Lands Highway Division
FLMA	Federal Land Management Agency
FLTP	Federal Lands Transportation Program (MAP-21)
FTA	Federal Transit Administration
FWS	Fish and Wildlife Service
HPMS	Highway Pavement Management System
HPP	High Priority Projects
INCA	Inventory and Condition Assessment
IPaC	Information, Planning, and Consultation
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCTA	Lowcountry Regional Transportation Authority
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century
MPO	Metropolitan Planning Organization
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NBIS	National Bridge Inventory System

NFH	National Fish Hatchery
NFIP	National Flood Insurance Program (FEMA)
NGO	Nongovernmental Organization
NHPN	National Highway Planning Network
NHS	National Highway System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NSBP	National Scenic Byways Program
NTAD	National Transportation Atlas Database
NWI	National Wetlands Inventory
NWN	National Waterway Network
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
OPA	Otherwise Protected Area (of the CBRS)
PAD-US	Protected Areas Database of the United States
PCR	Pavement Condition Rating
PMS	Pavement Management System
RAPP	Refuge Annual Performance Plans
RATE	Regional Alternative Transportation Evaluation
RIP	Road Inventory Program
RITA	Research and Innovative Technology Administration (U.S. DOT)
RRP	Refuge Roads Program
RSA	Road Safety Audit
RSL	Remaining Service Life
RTCA	Rivers, Trails, and Conservation Assistance
RTP	Regional Trails Program
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAMMS	Service Asset Maintenance Management System
Service	Fish and Wildlife Service
SMS	Safety Management System
STIP	Statewide Transportation Improvement Program
TIGER	Topically Integrated Geographic Encoding and Referencing
TIP	Transportation Improvement Program
TNC	The Nature Conservancy
TVA	Tennessee Valley Authority
UNESCO	United Nations Educational, Scientific and Cultural Organization
U.S.	United States
USC	United States Code
USFS	United States Forest Service
USGS	United States Geological Survey
VOLTRAN	Volusia County Public Transit System
WFLHD	Western Federal Lands Highway Division
WVC	Wildlife Vehicle Collision

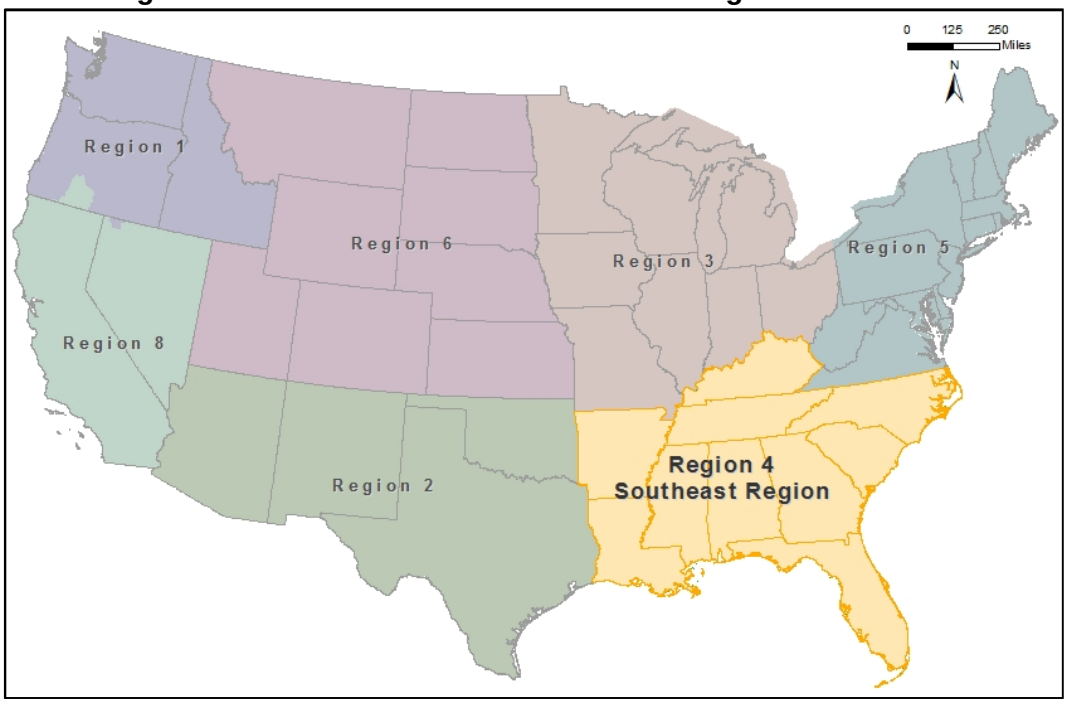
1. Introduction

The Southeast Region (Region 4) of the U.S. Fish and Wildlife Service (FWS, the Service) has initiated its first Long Range Transportation Plan (LRTP). With the assistance of the Eastern Federal Lands Highway Division (EFLHD) of the Federal Highway Administration (FHWA), the Service's Southeast Region will develop a twenty-year plan for its transportation assets across all of its national wildlife refuges and fish hatcheries. This plan will accomplish the following:

- Assess the current and future conditions of the transportation assets.
- Determine transportation needs, as well as projects and policies to address those needs.
- Establish priorities based on project performance, available funding, and coordination opportunities with other agencies.

Prior to the commencement of this plan, a national long-range transportation plan for the Fish and Wildlife Service was initiated, which set the overall direction for the entire Service as well as for individual regions. Similar to Region 4, many of the other regions across the country have been completing plans of their own. These plans will aid in the Service's mission to "work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people"[1] by assisting each region with the development of a safe, efficient, and sustainable transportation system on Service lands. Figure 1-1 shows all eight FWS regions.

Figure 1-1: U.S. Fish and Wildlife Service Region Boundaries

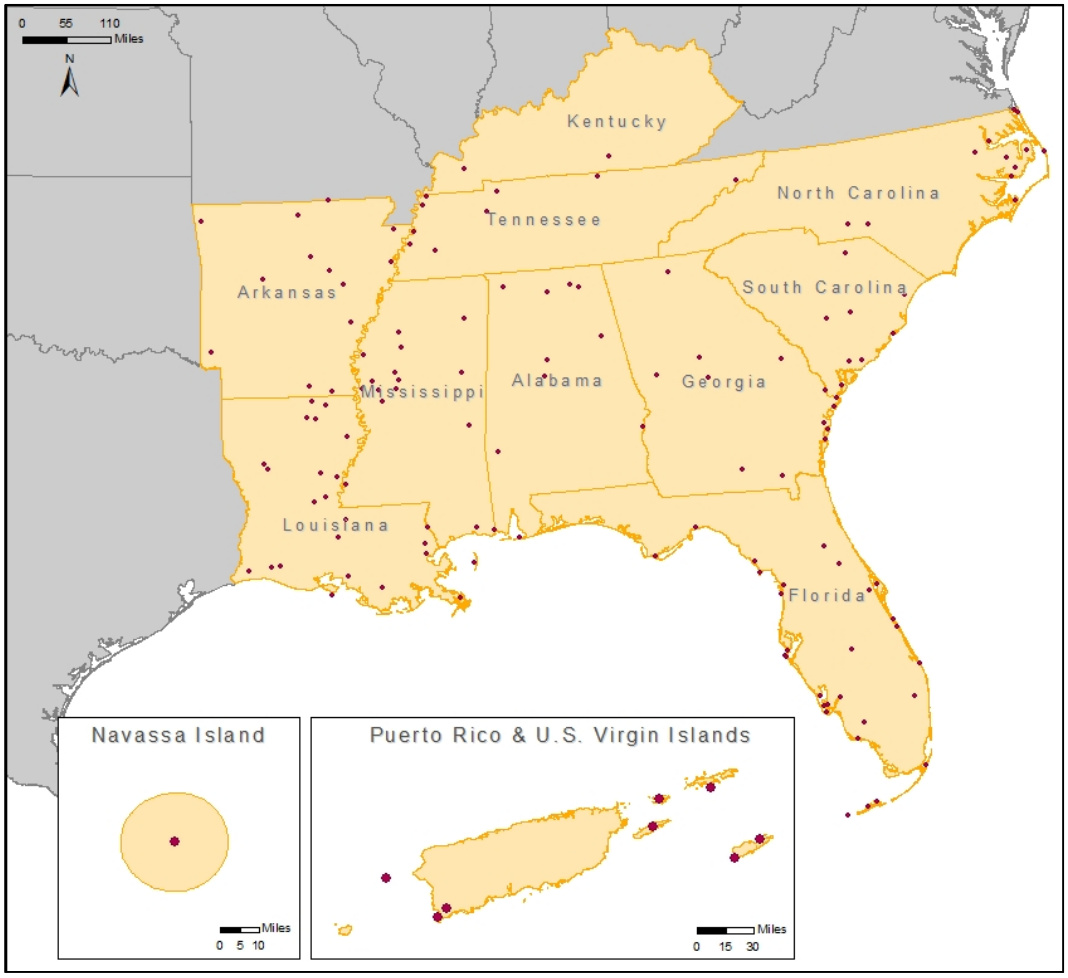


For administrative purposes, Region 4 is divided into areas to assist with funding decisions and to help manage the large number of refuges and fish hatcheries. Between 2012 and 2014, the FWS Region 4 Area boundaries have been through a series of revisions. While this LRTP will not consider the Area boundaries as a foundational portion of the study, future LRTP activities may be enhanced by considering FWS Region 4 Areas once they have been adopted and will

[1] http://www.fws.gov/help/about_us.html

remain unchanged for the foreseeable future. The boundaries of Region 4 and the locations of the refuges and hatcheries within the region are shown in Figure 1-2.

Figure 1-2: Region 4 States and Stations



The EFLHD continues to play an important role in the development of this Service plan by providing guidance and direction for the members of FWS Region 4 and the Consultant Team. The EFLHD has also provided assistance with data collection and technical efforts, funding changes for new transportation legislation, and the identification of partnering agencies for coordinated planning and implementation.

PURPOSE AND NEED

The purpose of this LRTP is to achieve the following goals:

- Establish a defensible structure for sound transportation planning and decision-making.
- Establish the mission, goals, and objectives for transportation planning in Region 4.
- Implement coordinated and cooperative transportation partnerships in an effort to improve the Service's transportation infrastructure.
- Bring the Service into compliance with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Specifically, Title 23, Section 204 of the Federal Lands Highway Program requires all federal land management agencies to conduct long-range

transportation planning in a manner consistent with the currently adopted metropolitan and statewide planning processes required under Sections 134 and 135 of Title 23. These requirements were reemphasized in SAFETA-LU's successor surface transportation system reauthorization bill, *Moving Ahead for Progress in the 21st Century* (MAP-21).

- Integrate transportation planning and funding for wildlife refuges and fish hatcheries into existing and future Service management plans and strategies.
- Promote Alternative Transportation Systems (ATS) and their associated benefits.
- Develop best management practices (BMPs) for transportation improvements on Service lands.
- Serve as another example project for regional-level transportation planning in the Service.

This Long Range Transportation Plan will assist Region 4 in determining its many transportation needs, prioritizing transportation projects to best utilize the funds currently available to the Service, and aid in the development of partnerships with outside agencies for coordinated planning opportunities. This plan will also help to more formally integrate transportation planning into the refuges' comprehensive conservation plans (CCPs) and the fish hatcheries' comprehensive hatchery management plans (CHMPs) to make better use of their existing planning processes.

SEQUESTRATION

Beginning on March 1, 2013, the Department of the Interior (DOI), along with other departments and branches across the federal government, are being adversely impacted by sequestration changes. It was not known during the original publication of this report how long the sequestration would continue; however, its impacts were felt throughout the U.S. Fish and Wildlife Service. Employee furloughs occurred and new positions were frozen; nonessential travel and contracts were reduced or eliminated; and participation in conferences was minimized. These changes had temporary negative impacts to the refuges and fish hatcheries due to reduced staff and inability to accommodate visitors; reduced maintenance (resulting in asset declines); and reductions to programs. While the purview of the Long Range Transportation Plan is twenty years or more and should not be limited by the sequestration changes, it is important to consider the short-term effects of the sequestration on the Service's ability to implement action plans for the next five years or more.

MISSION, GOALS AND OBJECTIVES

The mission, goals, and objectives for the Region 4 LRTP were developed initially by the Fish and Wildlife Service's National LRTP. Through collaboration among national and FWS Region 4 staff, the FHWA's EFLHD staff, and representatives of the project Coordination Team, the objectives have been refined and customized to fit the specific considerations of the refuges and fish hatcheries within Region 4. The mission, goals, and objectives are critical in setting the direction of the plan and will serve to guide the development of evaluation criteria that will be used in the prioritization of transportation projects.

Mission

To support the Service's mission by connecting people to fish, wildlife, and their habitats through strategic implementation of transportation programs.

Goals and Objectives

The goals of this Region 4 transportation plan represent six categories. Each goal includes distinct objectives that explain how the Service will accomplish each goal. The LRTP's goals and objectives are:

Goal 1: Access, Mobility, and Connectivity

Ensure that units open to public visitation have adequate access, mobility and connectivity for all potential users, including underserved, underrepresented, and disadvantaged populations.

Objective 1 Integrate the U.S Fish and Wildlife Service's transportation facilities with local community transportation systems, including roads, transit, and nonmotorized systems, in a way that encourages increased local visitation, where applicable, and has the potential to facilitate ancillary economic and community benefits to partner and gateway communities.

Objective 2 Collaborate with regional partners on transportation projects that impact and/or benefit the Service and regional partners alike.

Objective 3 Provide context-appropriate transportation facilities that address the specific needs of local visitor groups and respect the natural setting of the refuge.

Objective 4 Provide a variety of transportation choices, including public transportation and nonmotorized access (pedestrian, bicycle, etc.), where appropriate.

Objective 5 Reduce congestion to and within Service units.

Objective 6 Encourage visitors to use a wide range of transportation modes and provide clear directional information to support visitor mobility.

Goal 2: Asset Management

Provide a financially sustainable transportation system to satisfy current and future land management needs in the face of a changing climate.

Objective 1 Use asset management principles to preserve and maintain important transportation infrastructure elements at an appropriate condition level.

Objective 2 Decommission low priority assets not needed to meet the Service's mission.

Objective 3 Examine operational and maintenance sustainability when considering new assets.

Objective 4 Adapt to changing climate conditions.

Goal 3: Coordinated Opportunities

Seek partnered transportation solutions that support the Service's mission, maximize the utility of Service resources, and provide mutual benefits to the Service and its external partners.

Objective 1 Identify key potential internal and external partnerships at the national, regional, and unit levels.

Objective 2 Devise and follow a systematic method to continually expand numbers of partners and partnership opportunities.

Objective 3 Develop best partnership practices for each goal that illustrate best practices in forming and nurturing coalitions to support the Service's mission.

Objective 4 Maximize leveraging opportunities by identifying and pursuing partnership opportunities where there may be shared planning, design, implementation, and/or potential economic savings for projects of mutual interest and benefit.

Goal 4: Environment

Ensure that the transportation program helps to conserve and enhance fish, wildlife, and plant resources and their habitats.

Objective 1 Identify and adopt design guidelines and design metrics for transportation infrastructure projects that use planning, design, and construction methods and outcomes that are responsive to the mission of the Service, departmental policy, and federal law.

Objective 2 Identify transportation facilities and activities that can be altered, eliminated or enhanced to reduce environmental degradation, habitat fragmentation, and vehicle collisions with wildlife, fish, and their habitats.

Objective 3 Reduce habitat fragmentation on and adjacent to Service lands. Consider creating environmental linkages by considering which rivers, streams, wetlands, forested areas, etc. connect to the refuge and help make it an important resource.

Objective 4 Protect wildlife corridors and enhance terrestrial and aquatic organism passage on and adjacent to Service lands to conserve fish, wildlife, and plant populations.

Objective 5 Coordinate programs within the Service, including Refuges, Ecological Services, Fisheries, and Migratory Birds during the development of regional long-range and project-level planning.

Objective 6 Consider the impacts of increased climate variability in the management of transportation assets.

Objective 7 Reduce greenhouse gas (GHG) emissions and air pollutants by increasing transportation alternatives.

Goal 5: Safety

Provide a transportation system that ensures visitors traveling to and within Service lands arrive at their destinations safely.

Objective 1 Identify safety issues on the Service's transportation system using quantitative data.

Objective 2 Identify and implement appropriate safety countermeasures and tools to reduce the frequency and severity of crashes between different transportation modes, as well as between vehicles and animals.

Objective 3 Use open communication among the "4Es"—engineering, education, enforcement, and emergency medical services—to collaboratively address safety issues on Service-owned roads.

Objective 4: Reduce transportation corridor (roads, trails, fencing) barriers and hazards by planning, designing, and evaluating sites that facilitate the safe movement of wildlife across roads to increase motorist safety.

Goal 6: Visitor Experience

Create and sustain enjoyable and welcoming transportation experiences for all visitors.

Objective 1 Improve traveler information for both internal (on Service lands) as well as external (off Service lands) wayfinding and orientation for all modes of travel.

Objective 2 Integrate interpretation, education, and stewardship into the transportation experience.

Objective 3 Assess and improve the external accessibility of all Service lands in all future planning endeavors.

Objective 4 Evaluate the feasibility of alternative transportation systems at all refuges at a regional level and promote connections with other existing and planned public and private transportation service providers.

Objective 5 Integrate materials and adaptations that will help refuges specifically cater to populations that already visit often, or populations that the Service would like to target. Seek to get more individuals interested in the benefits of engaging in outdoor activities and in support of a national network of lands and waters for present and future generations to enjoy.

Objective 6: Ensure that refuges are welcoming, safe, and accessible and that the transportation program will provide visitors with clear information so they can easily determine where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities.

Objective 7: Implement a comprehensive and uniform sign plan that promotes a consistent image and branding for the agency.

REGION 4 BACKGROUND

Region 4 is the U.S. Fish and Wildlife Service's largest region in the country, in terms of the number of transportation assets it contains. Many diverse lands and transportation considerations are present throughout the region. This diversity will be explored in greater detail in Chapter 2, Existing Conditions and Trends.

NATIONAL WILDLIFE REFUGES AND NATIONAL FISH HATCHERIES

Region 4 maintains 128 national wildlife refuges and 17 national fish hatcheries, comprising approximately 3.59 million acres of land and water across ten states and two territories: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee, as well as Puerto Rico and the U.S. Virgin Islands. Of the 128 refuges, 113 are open to the public for visitation at specified time periods throughout the year. Sixteen of the refuges were specifically established for the preservation and protection of endangered species.

REGION 4 TRANSPORTATION SYSTEM

Region 4 maintains an extensive system of transportation infrastructure including roads, trails, parking lots, bridges, culverts, and low-water crossings. The roads, trails, and parking lots are primarily gravel or native/primitive surfaces, with some additional high-use asphalt or concrete facilities.

Approximately 3,500 miles of Service roadways exist within Region 4, of which close to 1,500 miles are open to the public. The remaining 2,000 miles are for administrative use only by Service staff. Similarly, of the 1,700 parking lots and 350 miles of trails maintained by Region 4, 1,400 parking lots and 220 miles of trails are open to the public. This compares to over 7,000 miles of roadways, 4,500 parking lots, and 1,400 miles of trails nationwide. As one of the eight regions, Region 4 comprises a significant amount of the overall transportation assets of the Service nationally.

With the passing of the newest federal transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21), the structure of federal funding programs has changed since its predecessor, SAFETEA-LU. Three new programs have been established that directly affect transportation in and around Service lands:

- Federal Lands Transportation Program (FLTP) – for assets within federal estates[2]

[2] http://www.fhwa.dot.gov/map21/guidance/guidefltp.cfm

- Federal Lands Access Program (FLAP) – for facilities outside providing access to federal lands[3]
- Transportation Alternatives Program – a consolidation and revision of multiple smaller programs (often focused on alternative transportation projects) that can be allocated to state and metro areas as well as federal agencies.

Many discretionary grant programs that were provided to the FWS (approximately $100 million over 14 years) have been eliminated or consolidated. The new programs focus on performance of the transportation system, setting key transportation goals, and focusing on high-use and recreational areas in particular. More details on each of these programs, as well as additional funding opportunities, will be discussed in later chapters.

PRIMARY AUDIENCE

The Long Range Transportation Plan is meant to assist transportation decision-making at multiple levels. First, this document will provide guidance to refuge and hatchery managers within Region 4, as well as regional and national leaders within the Service. Second, the document will be helpful to other regional and national agencies, including federal land management agencies and representatives of the FHWA's Federal Lands Highway Division. Additionally, this plan will aid in planning efforts with many other governmental and nongovernmental agencies, including municipal, county, and state agencies, metropolitan planning organizations (MPOs), and even refuge and hatchery friends groups.

PROJECT LEADERS

Refuge and hatchery managers as well as project leaders at each of the stations will be able to use the LRTP as a guide for prioritizing the most important projects on the lands they manage. Additionally, the plan will provide insight into other planning studies that might need to be conducted at each of the stations when enough detail cannot be studied at the regional level of this plan. Refuge managers can also use the LRTP as a tool for partnering with local agencies that have a mutual interest in the implementation of key projects.

REGIONAL LEVEL

The LRTP is a very important tool at a regional level. Given the limited transportation dollars available to all public agencies across the country, especially to the Service, it is extremely important to spend existing dollars on the highest priority projects. In addition, regional leaders can use this plan to work with other agencies—FLMAs, states, MPOs, etc.—and explore new partnerships and opportunities for joint project sponsorship. The direction of the LRTP is a good starting place for incorporating transportation planning into the refuges' comprehensive conservation plans (CCPs) and the fish hatcheries' comprehensive hatchery management plans (CHMPs), thereby keeping transportation as an important focus in existing planning exercises.

NATIONAL LEVEL

The Region 4 LRTP has been designed to reflect the overall goals and direction of the Service's National LRTP, as the other regional plans have done. This consistency across the entire Service will allow for more directed and well-coordinated planning across the agency, and allow the Service to partner more easily with other FLMAs, states, and MPOs between regions.

[3] http://www.fhwa.dot.gov/map21/guidance/guidefltp.cfm

POTENTIAL PARTNERS

The LRTP will be a great resource for partner agencies to understand the overall mission, goals, and objectives of the Service as they relate to transportation, in addition to the needs and priorities established in the planning process. The priorities stated in the plan will be vetted throughout Region 4 and will be based heavily on technical evaluation and assessment of transportation needs. The plan's objective foundation will ensure to potential partners that the Service has a good understanding of its needs and high priorities, making it a great agency with whom to team. As mentioned previously, some of the potential partnering groups include other federal land management agencies, state DOTs, MPOs, county and local governments, and friends groups.

PUBLIC INVOLVEMENT

The public involvement process for the Region 4 LRTP considers traditional outreach methods, but also recognizes the unique needs and opportunities of a plan that covers ten states, Puerto Rico, and the U.S. Virgin Islands. Typical public meetings are not an option for this study area, and unlike many MPO transportation plans, the goal is not to specifically reach out to all people in a geographic area.

Internal stakeholder outreach efforts are primarily focused on FWS staff. The first level of outreach includes a Coordination Team that consists of national, regional, refuge, and hatchery leaders from across the Southeast Region, as well as representatives from the FHWA's Eastern Federal Lands Highway Division (EFLHD). This Coordination Team serves as a sounding board for all work conducted during the plan. The team assists with the refinement of goals and objectives, provides direction on some analysis work, and reviews all documents before they are distributed to the larger FWS Region 4 community. Multiple rounds of webinars also will be conducted with regional and station leaders at key points throughout the process (kick-off, at the conclusion of the Existing Conditions and Trends development, and near the conclusion of the recommendations process).

External stakeholder outreach will be focused on partner agencies, friends groups, visitors, and members of the general public. At important points throughout the process, advertisements will be provided to other agencies such as state DOTs, MPOs, and other FLMAs; coordination will occur with friends groups; and information will be posted on the Region 4 website and possibly made available in hard copy at FWS stations across the region. The opportunity also exists to possibly participate in other agency planning processes.

While the geographic area included in the plan is substantial, it is important to receive stakeholder input into the process to ensure that the plan's benefits are maximized.

PLAN OVERVIEW

The LRTP is divided into six chapters: *Introduction*, *Existing Conditions and Future Trends*, *Summary of Current Stakeholder Outreach, Funding and Financial Gap*, *Project Selection Process,* and *Plan Implementation and Future Use*. This section concludes the first two chapters; the remaining four chapters are briefly described below.

Chapter 2, Existing Conditions and Future Trends: This chapter summarizes the current status of Region 4's transportation system and the overall access to, from, and on Service lands. The information is organized under the six goals of the plan, as outlined in Chapter 1. Mapping and analysis were conducted for Region 4, and the current conditions for each station are summarized in tables and in the Appendix. In addition to considering current conditions, the chapter also includes an assessment of needs based on future projections of population growth and visitation at each of the stations.

Chapter 3, Summary of Current Stakeholder Outreach: Chapter 3 provides an overview of the stakeholders and outreach that occurred throughout the LRTP process. Region 4 LRTP included multiple levels of stakeholder outreach, resulting in valuable insight into the processes, operations and transportation considerations of the Southeast Region of the Fish and Wildlife Service and its individual stations.

Chapter 4, Funding and Financial Gap: This chapter summarizes the available and anticipated future funding sources and compares anticipated funding levels to anticipated needs for FWS transportation projects and maintenance of transportation assets. Current funding allocations are a key focus, and additional consideration is given to new transportation funding opportunities that could be explored through partnerships with outside agencies.

Chapter 5, Project Selection: Chapter 5 focuses on the selection and implementation of projects across Region 4. The project selection process relies heavily on the goals and objectives outlined in Chapter 1. Criteria based on each of the goals will be used to rank the projects, so that the ones that align most with the goals of the plan come to the top of the priority list. Chapter 5 includes an overview of the Project Evaluation Criteria and Tool developed as part of this LRTP.

Chapter 6, Plan Implementation and Future Use: While the Region 4 LRTP is intended to serve as a regional planning document, data collection efforts included in Chapters 1 and 2 and the Appendix can serve as valuable information for both the region and individual stations or areas. Chapter 6 provides an overview of tools created throughout the LRTP process for LRTP use at the regional and station levels. At the regional level, the Stations for Further Transportation Study: Regional Evaluation Tool provides information to determine which units may warrant a further more detailed transportation study. At the station level, Station Fact Sheets, the User Guide, the CCP Work Plan, and the Climate Change Tool are identified as resources to assist transportation planning efforts at the station level. Throughout the data collection process for the LRTP, some deficiencies in data were noted. Chapter 6 also includes recommendations for new or revised data collection efforts that should occur (either through the Service or other partnering agencies) to improve the Existing Conditions and Trends analysis for future updates of the transportation plan. This chapter also considers other factors, such as climate change and safety, which will need additional analysis and updates as new data becomes available, in order to better serve the LRTP with the most current information.

2. Existing Conditions and Future Trends

Transportation assets receive funding based on condition, importance, and need. The intent of any LRTP is to identify future needs and plan for them proactively. Thus, it is imperative to understand the current and evolving state of transportation in Region 4 in order to look forward and plan for the future. The data provided in this chapter will help inform the identification of improvement areas and needs to assist in the process of selecting projects that will be detailed in Chapter 5, Project Selection and Funding. Project selection will not be based on just the examination of existing data alone; it will also consider likely future conditions and an objective data-driven process that is cognizant of prevailing circumstances throughout the Region.

With the goals and objectives in mind, this chapter documents the existing conditions relating to the six goals:

- Access, Mobility and Connectivity;
- Asset Management;
- Coordinated Opportunities;
- Environment;
- Safety; and
- Visitor Experience.

GOAL 1 – ACCESS, MOBILITY, AND CONNECTIVITY

The foundation of any sustainable multimodal transportation system is based on reliable, effective and enhanced access, connectivity, and mobility. Private vehicles have been and will continue to be an important part of the Service's transportation system because many units are rural and remote. However, alternative transportation systems can be used in both urban and rural areas. To ensure a sustainable and multimodal system for years to come, the Service is committed to increasing the efficacy and availability of other modes to travelers in order to support broader Service goals.

***Goal**: Ensure that units open to public visitation have adequate access, mobility and connectivity for all potential users, including underserved, underrepresented, and disadvantaged populations*.

Objective 1: Integrate the U.S Fish and Wildlife Service's transportation facilities with local community transportation systems, including roads, transit, and nonmotorized systems, in a way that encourages increased local visitation, where applicable, and has the potential to facilitate ancillary economic and community benefits to partner and gateway communities.

Objective 2: Collaborate with regional partners on transportation projects that impact and/or benefit the Service and regional partners alike.

Objective 3: Provide context-appropriate transportation facilities that address the specific needs of local visitor groups and respect the natural setting of the refuge.

Objective 4: Provide a variety of transportation choices including public transportation and nonmotorized access (pedestrian, bicycle, etc.), where appropriate.

Objective 5: Reduce congestion to and within Service units.

Objective 6: Encourage visitors to use a wide range of transportation modes and provide clear directional information to support visitor mobility.

Access, mobility, and connectivity collectively ensure that both visitors and refuge staff can have travel-mode choices to equitably, easily, and conveniently travel to, from, and within Service units. ***Access*** addresses the ability of people of all ages, economic groups and physical abilities as well as underrepresented populations to visit Service units. ***Mobility*** considers the ease and convenience for visitors to travel to, from, and within Service units using a preferred mode. Finally, ***connectivity*** addresses the potential to link many modes, both inside and outside units, to maximize possibilities for transportation connections.

This goal applies to refuges open to the public; however, it is also beneficial for consideration by those refuges that are not open to the public but are accessed by Service staff.

Additionally, while multimodal transportation connections are encouraged in our modern world, transportation modes must make sense to the Service when considered relative to each of the unique habitats, species of fish and wildlife, and plant resources for the conservation, management, and, where appropriate, restoration of wildlife habitats for the benefit of present and future generations of Americans.

There are refuges that connect to pedestrian and bicycle trails, some located on islands only accessible by water, and even a few that intersect "blueways,"or water trails along river routes. Blueways are the equivalent of a water-based "greenway," or land-based recreation trail that is open for multiple use recreation activities such as walking and biking. In February of 2012, Secretary of the Interior Ken Salazar signed a Secretarial Order amending the National Trails System Act of 1968 to include water trails as a class of national recreation trails, and directed that such trails collectively be considered in a National Water Trails System. Under the order, the National Park Service is in the process of inventorying blueways, and will coordinate the water trail nomination process. Where these modes are appropriate for both habitats and inhabitants, they provide direct opportunities for legitimate and appropriate uses of the Refuge System by visitors, including hunting, fishing, wildlife observation, photography, and environmental education and interpretation.

Evaluating access and connectivity is unique for different modes. For example, walking or biking to access a destination would not be considered reasonable beyond one or two miles and likely would be more commonly used for very short distances. Vehicular travel is much more widespread and can be considered for distances both short and very long. Access by water would require a direct connection or a perceived direct connection via a very short pedestrian trail. Table 2-1 summarizes the relative distance from the outer edge of each refuge or hatchery that was considered as a study area for each mode. Longer-haul transportation systems generally were considered at a wider radius than more traditionally short-haul transport; consideration for transit or pedestrian access was within a one-mile radius with the understanding that the last-mile connectivity is incredibly important for access by these modes.

Table 2-1: Study-Area Radius by Mode

Mode	Distance Studied from Extent of Service Unit
Air (airports)	25 miles
Roadways (personal automobile)	10 miles
Roadways (transit)	1 mile
Bicycle Routes, Recreation Trails	1 mile
Water (navigable waterways)	½ mile

AIR

While FWS visitor surveys indicate that the majority of visitors come from within approximately 25 miles of refuges and hatcheries, those that come from further away may fly or drive along major national highways or scenic byways. Of the 128 refuges and 17 hatcheries that make up the Region 4 system, 37 refuges (29%) and one hatchery (6%) is located within 25 miles of a major airport.[4] Seven of these refuges are located near more than one airport, with Pinellas NWR in Florida located within 25 miles of three major airports; this information can be found in Appendix A2.1.

WATER

With refuges located on islands and peninsulas and within reach of streams and coastal areas, it is no wonder that travel by water is a viable option for many, if not the sole option for access to several Service units. Twenty refuges do not have direct access to inventoried roadways, either because these refuges are solely located on an island with no bridge connecting to a nearby mainland, or because they are located along coastal plains that currently are not connected to the broader roadway network.[5] Of these refuges, fifteen are located exclusively on islands or land separated by an estuary. The remaining five are multi-site refuges with either refuge or administrative facilities located on the main land along with additional islands off the coast. Ten of the island refuges are closed to the public, leaving six that may be considered for visitor access by water. Table 2-2 provides some additional information about island refuges, while Figure 2-1 shows all refuges that are only accessible by water.

With the emerging concept of blueways (water trails), routes along rivers and streams could be an exciting opportunity to draw paddlers along water routes connecting to and from other natural areas or areas accessible by other modes. Pedestrian trails could supplement the water route to complete the last-mile connectivity for waterways that currently do not connect with Service assets. These assets likely would be pedestrian trails that allow paddlers to access the refuge and complete their trips on foot.

Table 2-2: Refuges Located on Islands Only Accessible by Water

Unit Name	State	Waterway Connectivity
Open to the Public		
Blackbeard Island NWR	Georgia	Island directly off the coast
Breton NWR	Louisiana	
Buck Island NWR	U.S. Virgin Islands	
Cedar Keys NWR	Florida	Several islands with one area directly connected to the peninsula
Delta NWR	Louisiana	Island with separate administrative facility on peninsula
Egmont Key NWR	Florida	
Key West NWR	Florida	
Pinellas NWR	Florida	
St. Vincent NWR	Florida	Island with separate administrative facility on nearby mainland
Wassaw NWR	Georgia	Island directly off the coast

[4] Major airports are defined here as those that report 250,000 or more enplanements per year. Data retrieved from the Federal Aviation Administration (FAA) Airports shapefile from National Transportation Atlas Database.
[5] As inventoried by TIGER Lines 2010

Unit Name	State	Waterway Connectivity
Closed to the Public		
Desecheo NWR	Puerto Rico	
Green Cay NWR	U.S. Virgin Islands	
Island Bay NWR	Florida	Several islands with one area directly connected to the peninsula
Matlacha Pass NWR	Florida	Several islands with one area directly connected to the peninsula
Navassa Island NWR	Navassa Island[6]	
Passage Key NWR	Florida	
Pine Island NWR	Florida	
Shell Keys NWR	Louisiana	
Tybee NWR	South Carolina	Island directly off the coast, separated by an estuary
Wolf Island NWR	Florida	

The National Waterway Network (NWN) dataset provided by the *National Transportation Atlas Database 2012* through the Research and Innovative Technology Administration (RITA), U.S. DOT, is composed of the national system of navigable waterways, including both inland and marine routes that represent actual shipping lanes and representative paths where no defined lanes exist. The network covers the 48 contiguous states plus the District of Columbia, Hawaii, Alaska, Puerto Rico, and water links between. This dataset calls out waterways that can support much larger vessels than those that would carry visitors or staff members. However, the dataset also indicates the Service units accessible by water routes that are navigable by larger vessels (e.g., ferry boats) that could provide an alternative to land-based transportation modes for large groups of visitors. The NWN is by no means a comprehensive list of waterways, both inland and marine, that are navigable for single-person vessels such as kayaks and canoes.

Slightly more than 25% of Service units (37) directly intersect a National Waterway Network navigable route. This number doubles to 74 accessible Service units when considering navigable routes within a half mile of refuge and hatchery boundaries. Furthermore, some refuges are accessible by both inland and marine routes—seven directly connect and 18 are located within a half mile of an inland or marine NWN route, as shown in Table 2-3.[7] Of the units identified, one hatchery directly connects while three additional hatcheries are located within a half mile.

According to the RATE, more than half of the stations in Region 4 reported that their visitors accessed the station using water-based transportation modes. In fact, nearly 90 percent of refuges in Region 4 offer some sort of non-motorized boating, and many provide water-based access to the refuge. The average percentage of visitors among all Region 4 stations who use water-based transportation for station access is 32 percent. While the National Waterway Network certainly provides a basis for water transport viability, it is important to note that water-based access may not require waterways that have been noted as navigable.

[6] Unorganized, unincorporated and uninhabited territory located in the Caribbean near Haiti

[7] Marine routes defined by the National Waterway Network (NWN) dataset provided by NTAD, are considered within harbors, bays, intracoastal waterways, sealanes, and open water; Inland routes consist of rivers, creeks, lakes, estuaries, channels, canals, and locks. Some Units that have water access may not appear in this table because they connect to waterways that are not documented as navigable via the NWN dataset.

Figure 2-1: Refuges Accessible by Water Only

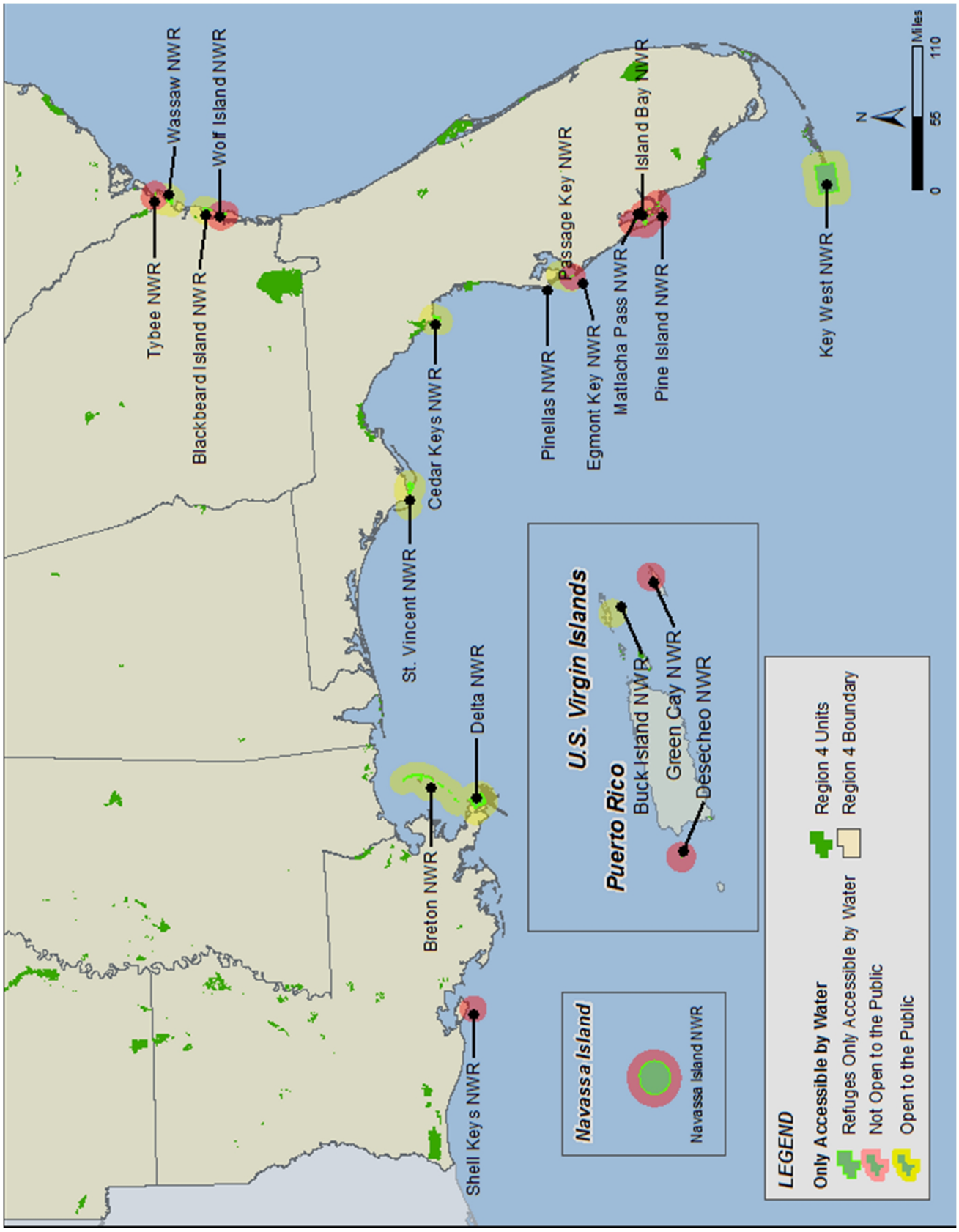


Table 2-3: Service Units with Proximity to both Inland and Marine Navigable Waterways

Unit Name	State	Direct Connection		Within ½ Mile	
		Marine	Inland	Marine	Inland
Bayou Sauvage NWR	LA	X	X	X	X
Bayou Teche NWR	LA			X	X
Big Branch Marsh NWR	LA		X	X	X
Bon Secour NWR	AL			X	X
Chassahowitzka NWR	FL	X	X	X	X
Egmont Key NWR	FL			X	X
Ernest F. Hollings Ace Basin NWR	SC	X		X	X
J. N. "Ding" Darling NWR	FL			X	X
Lacassine NWR	LA	X	X	X	X
Merritt Island NWR	FL	X	X	X	X
Pea Island NWR	NC			X	X
Pelican Island NWR	FL	X	X	X	X
Pinckney Island NWR	SC	X		X	X
Pine Island NWR	FL			X	X
Pocosin Lakes NWR	NC	X		X	X
Sabine NWR	LA			X	X
St. Marks NWR	FL	X	X	X	X
Tybee NWR	SC	X		X	X
Waccamaw NWR	SC	X	X	X	X
Wassaw NWR	GA	X		X	X
Wolf Island NWR[8]	GA			X	X

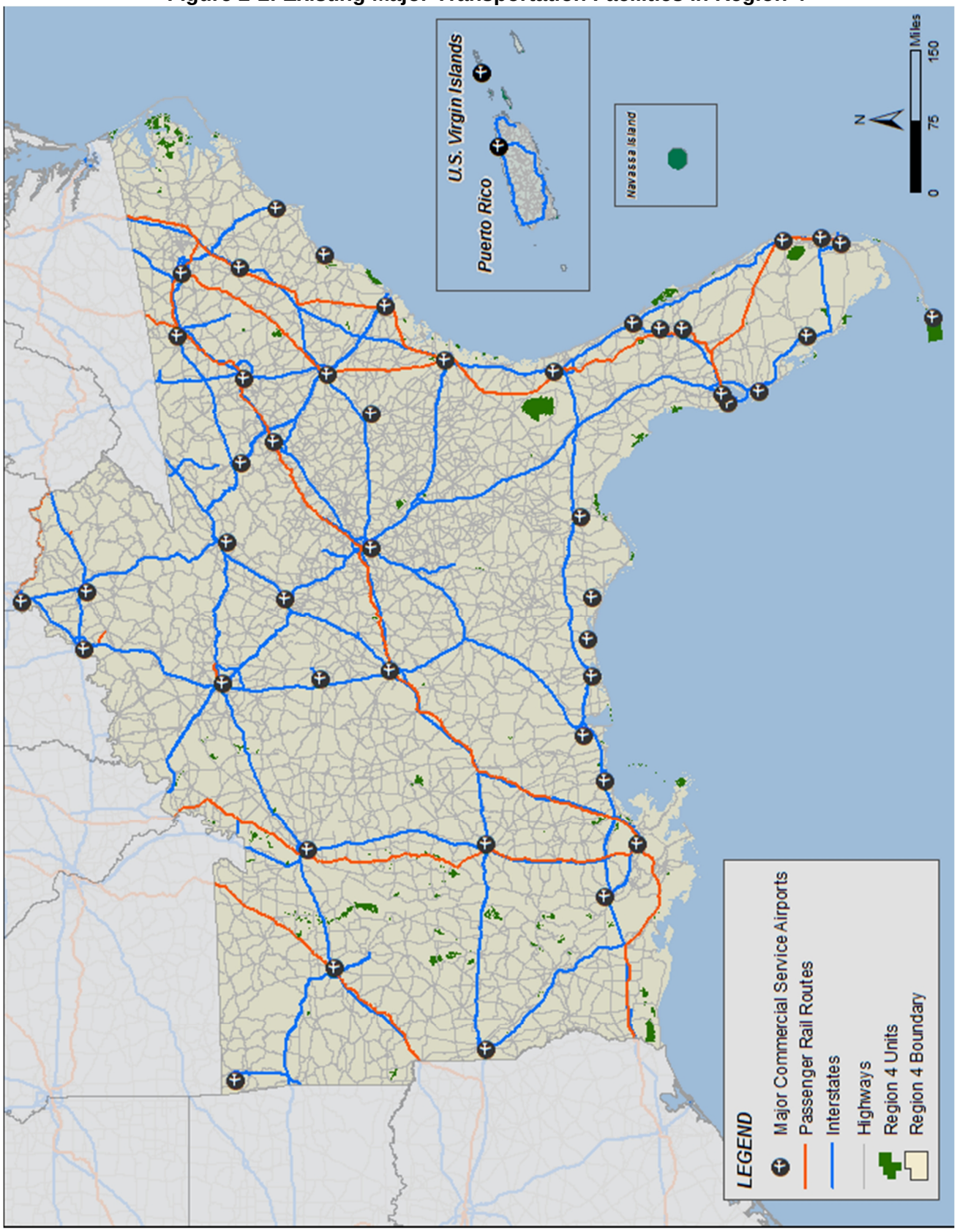
SURFACE TRANSPORTATION

Transportation across the United States is predominantly completed by movement across the land. Our roadway network is extensive and a major component of the surface transportation system. Private automobiles, transit systems, and freight companies rely on the roadway network to move goods and people around the country. The nation's railway network also is an important component of the surface transportation system. Rail is predominantly used for freight. It carries 40% of America's freight ton-miles, more than any other transportation mode.[9] However, Amtrak, the nation's railway network, provides rail transportation for approximately 900,000 passengers per week. Amtrak hit a record 30.2 million passengers for the fiscal year 2011.[10] Figure 2-2 shows the major transportation facilities that exist today in Region 4.

Nonmotorized transportation is also an extremely important component of the surface transportation system. In fact, pedestrian travel is a key element of the nation's transportation system, because every trip—regardless of mode—includes a pedestrian component. For the Service, pedestrian infrastructure may be necessary to allow staff to access different parts of a particular Service unit or for visitors to access facilities or portions of units where pedestrian access is appropriate. In some cases, recreation trails, bicycle routes, and other paths can allow pedestrians or bicyclists to enjoy Service lands and waters, or access the units from other locations via walking or cycling.

[8] Wolf Island NWR is closed to the public and thus not considered accessible by water even though located within proximity of navigable waterways.
[9] https://www.aar.org/keyissues/Documents/Background-Papers/Overview-US-Freight-RRs.pdf
[10] http://www.amtrak.com/ccurl/677/158/2011-Amtrak-Annual-Report-Final.pdf

Figure 2-2: Existing Major Transportation Facilities in Region 4



Roads

As noted previously, vehicles will continue to play a major role for transportation access and connectivity for the people who staff and visit Service lands. In general, Region 4 is very well connected to the national roadway network. Only 15 refuges located on islands and one fish hatchery are not connected to the roadway network identified by the Topically Integrated Geographic Encoding and Referencing (TIGER) line shapefiles. TIGER shapefiles are used by the U.S. Census Bureau for the United States, Puerto Rico, the U.S. Virgin Islands, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the Midway Islands. Ten Service units intersect more than 100 miles inventoried in the TIGER database, as shown in Table 2-4. A full list of road miles surrounding and intersecting Service units can be found in Appendix A2.1.

The National Highway Planning Network (NHPN) includes interstates, U.S. highways, state routes, county routes, and some other major roadways. Table 2-4 shows the numbers and types of road miles that intersect a 10-mile radius from the 10 most frequently intersected Service units in Region 4, as well as the number of route miles that directly intersect these same Service units.

While the TIGER roads file identifies all classifications of roadways and includes inventoried routes with direct access to 127 of the 145 Service units in Region 4, the direct access may be limited to small local roadways that lack connectivity with the broader roadway network. Connectivity throughout the United States relies heavily on the National Highway Planning Network, which is a comprehensive network of the nation's major highways including all of the National Highway System (NHS) as well as other major routes such as rural arterials and urban principal arterials. This network covers the United States as well as Puerto Rico and intersects 62 units directly.

Table 2-4: Top 10 Service Units by Miles of Surrounding and Intersecting Roadway Network

Service Unit	State	Road Miles within 10-Mile Radius of Service Units						Road Miles in Service Units		
		National Highway Planning Network (NHPN)					Scenic Byways	NHPN	Scenic Byways	TIGER
		Inter-state	U.S. Route	State Route	County Route	Other				
Alligator River NWR	NC		103.4	26.2			114.0	33.9		195.0
Carolina Sandhills NWR	SC		33.3	84.7				1.0		176.3
Lower Suwannee NWR	FL		23.3	18.8	23.6	1.4		1.2		107.2
Merritt Island NWR	FL	49.6	53.2	101.3	9.1	59.1	80.8	28.2	15.9	226.5
Okefenokee NWR	FL/GA		110.8	96.7	10.3	8.1		0.1		120.8
Pocosin Lakes NWR	NC		91.3	53.0			101.0	5.0		177.2
St. Marks NWR	FL		94.8	44.8	14.2		92.5	0.9	10.3	106.0
Tensas River NWR	LA	34.7	64.1	89.3			171.9	0.6		133.9
Vieques NWR	PR	0.9		5.1		16.3				137.1
White River NWR	AR		70.2	68.3		31.9	106.0	4.2	4.1	170.7
Region 4 Total (miles)		1,423	5,598	6,695	440	1,060	4,353	194	68	3,531
Count of: Refuges		*47*	*104*	*114*	*27*	*71*	*79*	*59*	*15*	*122*
Hatcheries		*4*	*15*	*17*	*2*	*4*	*9*	*3*	*0*	*17*

Excluding the 13 island refuges that in no way connect to a mainland nor inventoried roadway routes, all refuges and hatcheries have a U.S. or state route within 10 miles of their boundaries, providing direct or relatively direct connectivity with nearby communities or the broader roadway network. Nonetheless, fewer than half of the refuges and hatcheries are located within one mile of the Interstate Highway System, which is indicative of the commonly rural and remote environment of

many Service units. Regardless, the roadway network is an effective and important aspect of travel to and from the majority of Service units.

The National Scenic Byways Program (NSBP) recognizes, preserves and enhances routes throughout the United States that have been selected based on one or more archeological, cultural, historic, natural, recreational, and scenic qualities.[11] Scenic Byways traverse 15 Service units, as shown in Table 2-5, and pass within 10 miles of 60% of the Service units, or 79 refuges and nine hatcheries. A full list of Scenic Byways near refuges can be found in Appendix A2.1.

Table 2-5: Scenic Byways that Intersect Region 4 Units

Unit Name	State	Scenic Byway
Archie Carr NWR	FL	Indian River Lagoon National Scenic Byway
Bon Secour NWR	AL	Alabama's Coastal Connection
Cameron Prairie NWR	LA	Creole Nature Trail
Cedar Island NWR	NC	Outer Banks Scenic Byway
Chickasaw NWR	TN	Great River Road
Crocodile Lake NWR	FL	Florida Keys Scenic Highway
Great White Heron NWR	FL	Florida Keys Scenic Highway
Lower Hatchie NWR	TN	Great River Road
Merritt Island NWR	FL	Indian River Lagoon National Scenic Byway
National Key Deer Refuge	FL	Florida Keys Scenic Highway
Pea Island NWR	NC	Outer Banks Scenic Byway
Pelican Island NWR	FL	Indian River Lagoon National Scenic Byway
Sabine NWR	LA	Creole Nature Trail
St. Marks NWR	FL	Big Bend Scenic Byway
White River NWR	AR	Great River Road

Rail

While the U.S. rail system heavily caters to freight rather than passenger transport, rail systems are extensive throughout the country and have the potential to offer additional mobility for people. Passenger rail is becoming a frequent national topic with the consideration of high speed and commuter rail as methods to improve transportation efficiency, energy savings, and the environmental mitigation that could be provided by encouraging mass transport options rather than single-occupant vehicle use. While high speed rail is not a mode that would directly impact the Service, the indirect increase in passenger rail connectivity has the potential in the long term to provide additional mobility and connectivity options for the Service.

Even abandoned railroad lines have the ability to positively impact the access to FWS stations. In recent years, The Rails to Trails Conservancy has successfully promoted an initiative to convert abandoned or unused rail corridors into recreational trails.[12] With a large number of rail miles, particularly in the southeast, this initiative could directly impact future pedestrian and bicycle access to refuges that intersect or are situated near rail. This potential will be discussed further in the Trails section.

Rail connectivity was identified through the Rail Network database provided by the 2012 National Transportation Atlas Database (U.S. Department of Transportation Research and Innovative Technology Administration – RITA), which includes a comprehensive set of the nation's railway

[11] http://byways.org/
[12] http://www.railstotrails.org/

systems for all 50 states and the District of Columbia. From that set it was determined that the national rail network has rights-of-way that pass through or are immediately adjacent to 27 refuges and three hatcheries within Region 4. Three additional refuges are within one mile of a rail route. Rail passes within 10 miles of as many as 113 Service units across all of Region 4.

National Rail Network

While rail transport seems an unlikely candidate to uphold the mission of the Fish and Wildlife Service, the potential to identify and convert abandoned rail segments into recreational trails is a consideration for future access and connectivity between Service units and the surrounding communities. On the other hand (and as discussed in the Safety section), the presence of rail corridors intersecting Service lands could pose a safety concern for visitors and wildlife.
The Rails to Trails Conservancy has a highly active field office in Florida. To date, it has opened 329 miles of trail along 35 abandoned rail routes in its southeast region, which shares nine of the 10 continental states that make up Region 4, excluding Arkansas.

Passenger Rail

In the long term, the Service could coordinate with Amtrak to provide a limited schedule or special-event transport to Service units along passenger routes. Passenger rail operated by Amtrak directly intersects nine of the 14 refuges identified as having immediate connectivity to the national rail network. These are listed in Table 2-6.

Passenger rail lines fall within a 10-mile radius of 28 refuges and four hatcheries in Region 4. In addition, 18 Amtrak stations have been identified within 10 miles of 17 refuges and two hatcheries. The closest stations are within approximately a half mile of Ernest F. Hollings Ace Basin NWR in Yemassee, South Carolina, and Lake Woodruff NWR in Deland, Florida. The Slidell, Louisiana station is near three refuges—Bayou Sauvage NWR, Big Branch Marsh NWR, and Bogue Chitto NWR—which may make it an excellent candidate for a shuttle bus that takes visitors to each of the three refuges from the rail station.

Table 2-6: Refuges that Intersect, or located in proximity to Passenger and Freight Rail

Unit Name	State	Direct Intersect (rail miles)		Within 10 miles (rail miles	
		Passenger	All Rail	Passenger	All Rail
Bayou Sauvage NWR	LA	5.8	10.5	30.7	129.2
Lake Woodruff NWR	FL	2.9	2.9	31.1	41.3
Bayou Teche NWR	LA	0.7	0.7	29.2	81.7
Carolina Sandhills NWR	SC	0.4	0.4	33.7	54.8
Big Branch Marsh NWR	LA	0.2	0.7	23.1	96.2
Savannah NWR	GA/SC	0.2	1.2	64.3	258.5
Bald Knob NWR	AR	0.2	0.2	25.9	55.9
Morgan Brake NWR	MS	0.2	0.2	26.1	29.6
Ernest F. Hollings Ace Basin NWR	SC	0.2	2.1	49.1	116.7
Theodore Roosevelt NWR	MS			70.1	233.0
Lake Wales Ridge NWR	FL		0.8	49.7	83.8
Panther Swamp NWR	MS			36.7	51.9
Chickasaw NWR	TN			33.7	84.5
Hillside NWR	MS			32.8	37.2

Unit Name	State	Direct Intersect (rail miles)		Within 10 miles (rail miles	
		Passenger	All Rail	Passenger	All Rail
Bogue Chitto NWR	LA/MS			31.7	125.5
Mountain Longleaf NWR	AL			30.5	126.5
Okefenokee NWR	FL/GA		1.1	29.5	146.2
Lower Hatchie NWR	TN			27.8	69.8
Welaka NFH	FL			23.7	25.7
Arthur R. Marshall Loxahatchee NWR	FL			23.6	44.8
Mathews Brake NWR	MS			23.3	47.5
Tallahatchie NWR	MS			22.9	26.2
Meridian NFH	MS			22.7	100.9
Mississippi Sandhill Crane NWR	MS		0.8	22.1	185.6
Coldwater River NWR	MS			22.0	26.3
Mckinney Lake NFH	NC			21.6	79.8
Watercress Darter NWR	AL			20.4	197.7
Cache River NWR	AR		3.6	11.5	257.2
Sabine NWR	LA			11.5	73.9
Bears Bluff NFH	SC			11.4	33.0
Cahaba River NWR	AL		0.9	8.3	70.3
Wassaw NWR	GA			5.6	49.6

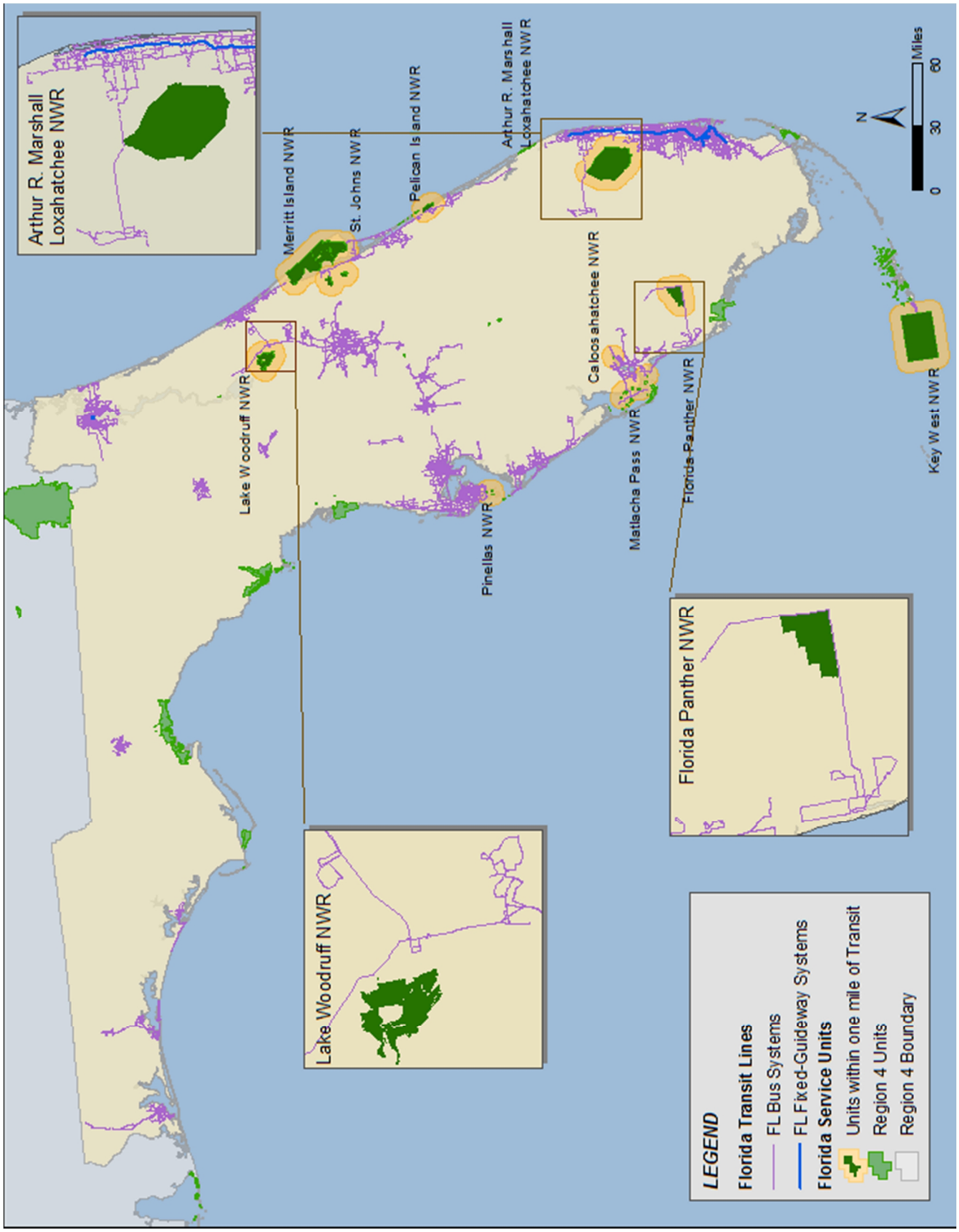
Transit

Transit connections include shuttles, buses, light rail, heavy rail, and trolleys serving multimodal connections. Internal transit tends to be seasonal, and vehicle fleets could be shared between nearby refuges of opposite peak seasons.[13] Underserved populations can benefit from external transit connections, allowing the Service to improve outreach for these demographics. Many refuges are located within a county that provides some transit program; however, the potential for any transit program to reach refuges will depend much on the proximity to refuge entrances, the extent of service during the day and on specific days of the week, and the ability to commit to a partnership with the Service. The American Public Transportation Association (APTA) provides links to thousands of transit agencies in the United States; information is updated frequently and can be found on APTA's website.[14] As part of the Regional Alternative Transportation Evaluation[15] (RATE) survey, refuge managers can help determine if transit is a viable consideration for access to individual refuges.

Florida's abundance of geospatial data includes the state's fixed-guideway transit and bus routes. While the fixed-guideway systems in Florida are in highly urban areas and away from refuges, several bus routes run within one mile of refuges. Ten refuges have bus routes within one mile of their land boundaries, with Florida Panther NWR actually intersecting Collier Area Transit's Blue Route.[16] Figure 2-3 shows Florida's bus and fixed-route transit systems and the connectivity that currently exists with ten refuges in the state.

Figure 2-3: Florida Bus and Fixed-Guideway Transit

[13] http://www.fta.dot.gov/documents/Transit_Trails_Layout_Final_123010.pdf
[14] http://www.apta.com/resources/links/unitedstates/Pages/default.aspx
[15] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)
[16] Based on 2008 data pulled from the Florida Geographic Data Library < http://www.fgdl.org/ >


Arthur R. Marshall Loxahatchee NWR
Merritt Island NWR
St. Johns NWR
Pelican Island NWR
Arthur R. Marshall Loxahatchee NWR
Lake Woodruff NWR
Pinellas NWR
Caloosahatchee NWR
Matlacha Pass NWR
Florida Panther NWR
Key West NWR
Lake Woodruff NWR
Florida Panther NWR
N
0
30
60
Miles
LEGEND
Florida Transit Lines
FL Bus Systems
FL Fixed-Guideway Systems
Florida Service Units
Units within one mile of Transit
Region 4 Units
Region 4 Boundary

In 2010, the Volpe Center evaluated 142 refuges in urban and suburban areas for connections to transit service and trail connections. The Volpe Center is part of the U.S. Department of Transportation's Research and Innovative Technology Administration (RITA). A quantitative assessment consisted of scoring transit systems and trails from one to five, based on the refuge's proximity to urban areas and the distance from a refuge's postal address to trailheads or transit stops. Transit systems were considered for daily frequencies and weekly schedules, as well as the ease of connection via transit with other population centers in the region. Trails will be discussed in the next section of this report. A total of 42 refuges were considered from Region 4. A sample of the Volpe Center's findings for transit located near 15 of the studied refuges in Region 4 is provided in Table 2-7. The full list of evaluated refuges along with transit and trail findings can be found in Appendix A2.1.

Of the evaluated refuges in Region 4, the Volpe Center found that St. Catherine Creek NWR in Mississippi and J. N. "Ding" Darling NWR in Florida operate internal tram services due to high visitation to enhance access for visitors within the refuges. While no information was readily available on St. Catherine Creek NWR's tram through the report, J. N. "Ding" Darling's tram service was noted to provide an interpretive program; a concessionaire provides a one and a half hour tour year-round on the four-mile Wildlife Drive.

Lake Woodruff NWR in Florida was noted as having potential for transit due to the presence of a bus route from VOLTRAN (Volusia County Public Transit System) that passes within one mile of the refuge entrance and headquarters. The evaluation noted that this route currently caters to commuters, but it could also be considered for a partnership for visitor access.

Pinckney Island NWR in South Carolina has several bus routes operated by the Lowcountry Regional Transportation Authority (LCTA) that pass by the refuge entrance to connect Hilton Head Island with the mainland. No bus stops were noted nearby, but this transit system could be a potential partnership for future transit access to Pinckney Island NWR.

As urban areas expand, it will be important to consider new ways that communities can connect and access Service lands. Planning for future access also will need to consider mobility concerns for populations that would otherwise become underserved without proper infrastructure or accommodations. This will ensure that all citizens of the American public can experience the legacy of natural lands, fish and wildlife habitats, and species that the Service continues to preserve.

Table 2-7: Transit and Trails Connections: Region 4 Transit Findings[17]

Unit Name	State	Transit		
		Mode	Distance (Miles)	Transit Agency
Pelican Island NWR	FL	Bus	12	GoLineLRT
Archie Carr NWR	FL	Bus	4	Space Cost Area Transit
Lake Woodruff NWR	FL	Bus	0.8	VOTRAN
Mountain Longleaf NWR	AL	Bus	5	Areawide Community Transportation System (Anniston, AL)
Arthur R. Marshall Loxahatchee NWR	FL	Bus and Rail	7 / 11.5	PalmTran and Tri-Rail
Bayou Sauvage NWR	LA	Bus	4.5	NORTA
Mississippi Sandhill Crane NWR	MS	Bus	1.5 (approx.)	Coast Transit
Hobe Sound NWR	FL	Bus	8	PalmTran

[17] http://www.fta.dot.gov/documents/Transit_Trails_Layout_Final_123010.pdf

Unit Name	State	Transit		
		Mode	Distance (Miles)	Transit Agency
Merritt Island NWR	FL	Bus	5.9	Space Cost Area Transit
Red River NWR	LA	Bus	4	SPORTRAN
Black Bayou Lake NWR	LA	Bus	7	
D'arbonne NWR	LA	Bus		Monroe Transit System
National Key Deer Refuge	FL	Intercity bus	0-2.5	Greyhound
Savannah-Pinckney NWR	GA/SC	Bus	Unknown	Lowcountry Regional Transit Authority
Wheeler WNR	AL	On-demand rural transit		MCATS – Morgan County Area Transportation System; TRAM –Transportation for Rural Areas of Madison County

** Information presented in this table taken directly from Volpe Center Transit and Trails report*

Recreation Trails and Paths

Trails within Service units can provide educational and scenic routes for visitors, while trails that connect units to the broader transportation network are great options to improve last-mile connectivity or simply to encourage pedestrian and bicycling use for the residents of nearby communities. Seventy-seven refuges (about 60% of the 128 within Region 4) contain a total of approximately 350 miles of Service-owned and maintained walking, biking, and administrative trails that have been inventoried for Region 4 in the SAMMS database.

Biking and walking within units need to be evaluated on a per-unit basis because these activities have the potential to more easily disrupt the habitat of plant and animal species in areas immediately adjacent to trails. Recreational bicycling can reach high speeds that may not be appropriate for the species of wildlife that live in certain areas. While not every species or habitat is suited for visitation by pedestrians and bicyclists, trails can be a wonderful way to access or experience the diverse lands that the Service maintains.

Currently, recreational trails across the U.S. are not inventoried by a single entity. However, based on data that was available in October 2012 from the states of Florida, Georgia, Kentucky, and North Carolina, state and/or local bicycle routes were evaluated for proximity to Service Units. Florida and Kentucky also had inventoried recreational trails, which included bicycle routes, multi-use paths, and equestrian trails. Florida had even inventoried its blueways (water trails). While additional recreation trails and bicycle routes likely exist in the remaining four states within Region 4 (and perhaps within the four studied states), the existence and proximity of trails to Service lands in these four states can inform further analysis for connectivity to pedestrian and biking trails for other locations based on local knowledge of trails; or as additional recreational trails are inventoried, they can be mapped and inform future LRTPs of the potential to connect to non-motorized transportation facilities. The Florida, Georgia, Kentucky, and North Carolina trails are shown in Figure 2-4 through Figure 2-7, with some additional details on the refuges and hatcheries that are located within one mile of the trails or connect to trails.

Of the 57 refuges and fish hatcheries located within the four states, 20 intersect or are adjacent to facilities that support walking, biking, or multi-use activities and an additional 22 are located within one mile of such facilities. Paddling, or blueway, facilities intersect 10 refuges and are located within a mile of an additional 15 refuges. Cyclists often ride farther than pedestrians are willing to walk, thus it is notable that 50 refuges and eight hatcheries are within 10 miles of biking or multi-use trails. Table 2-8 identifies the types of trails and number of Service Units in the four states that have provided bicycle route and trail data at this time.

Figure 2-4: Recreational Trails in Florida

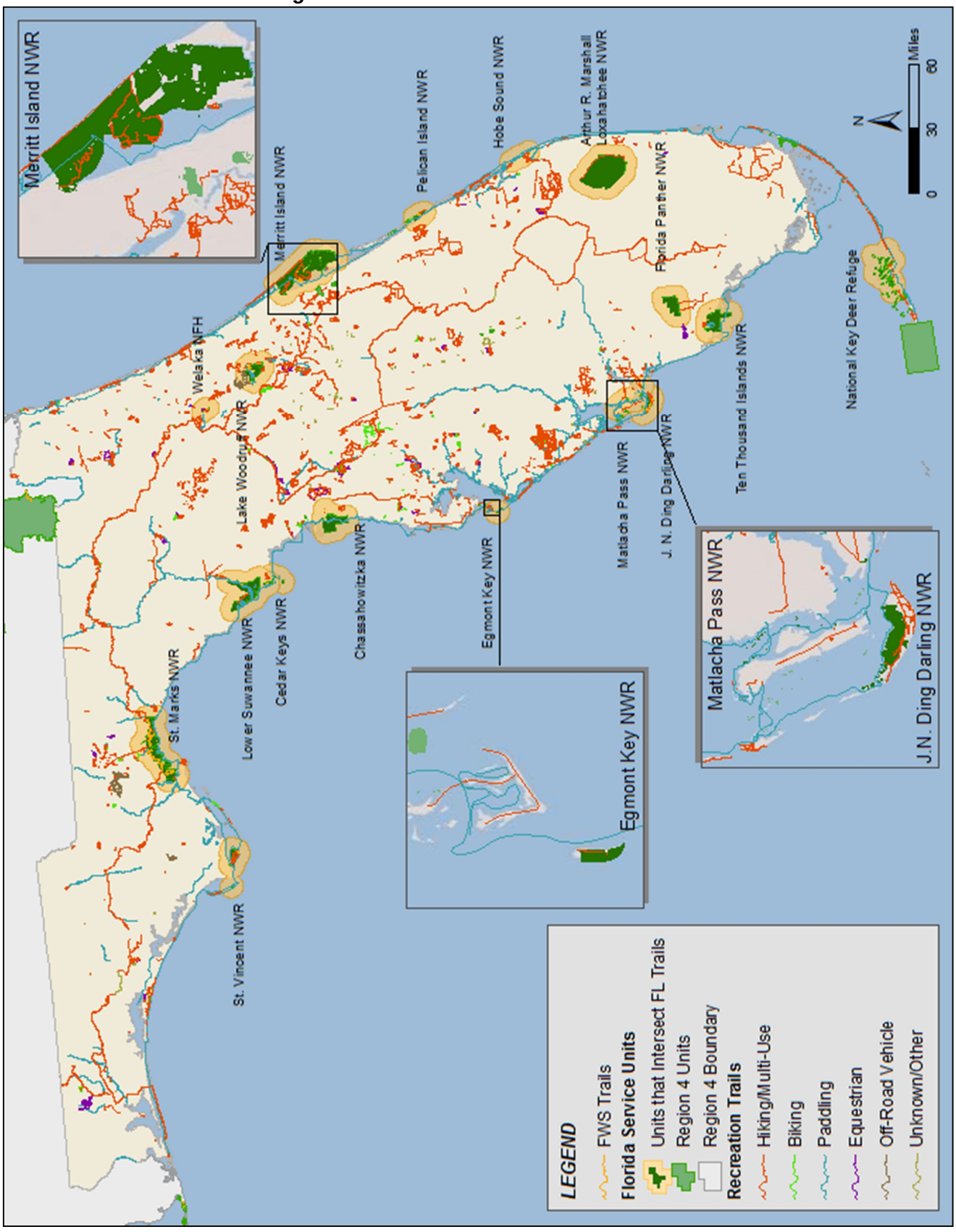


Figure 2-5: Bicycle Routes in Georgia

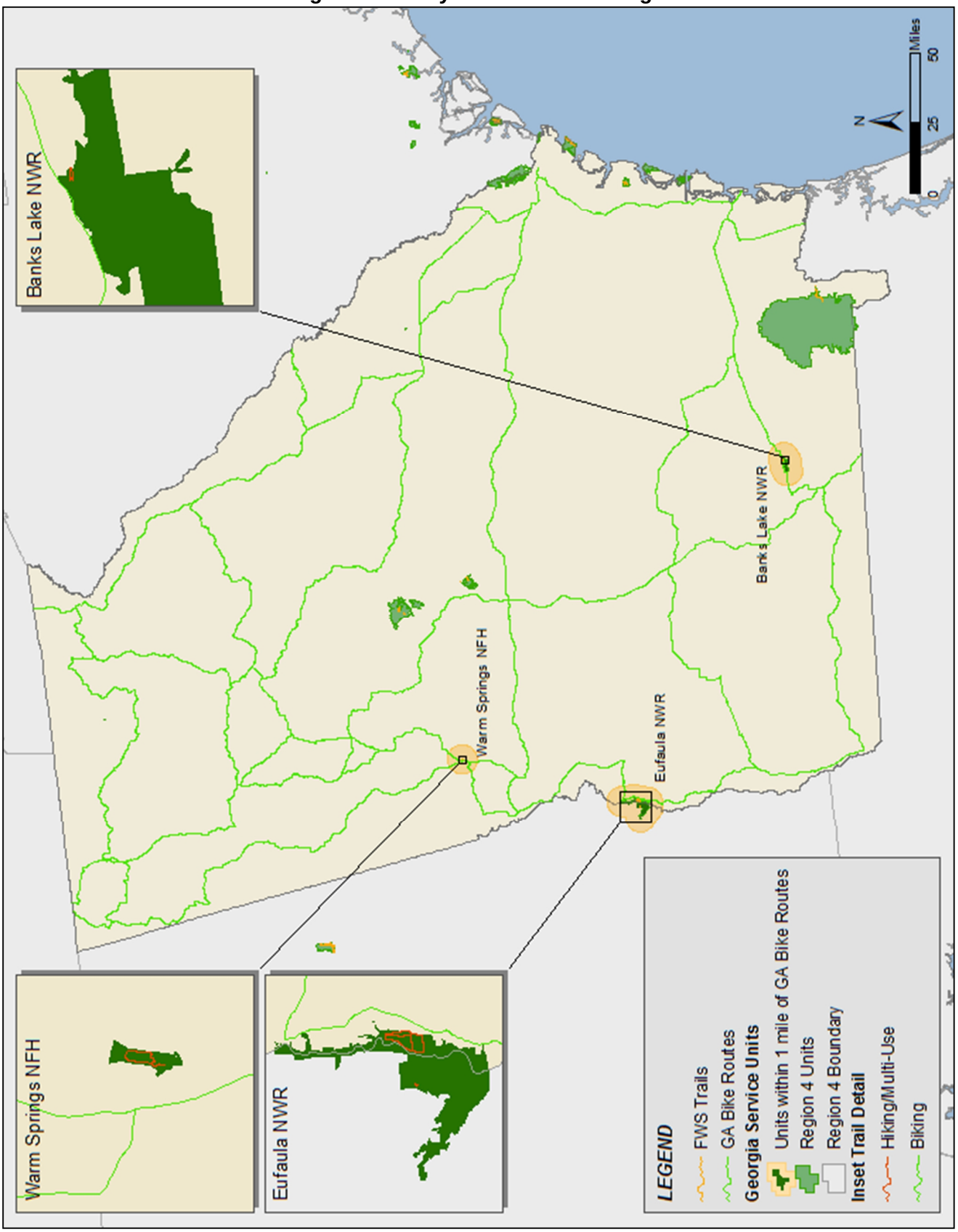


Figure 2-6: Recreational Trails in Kentucky

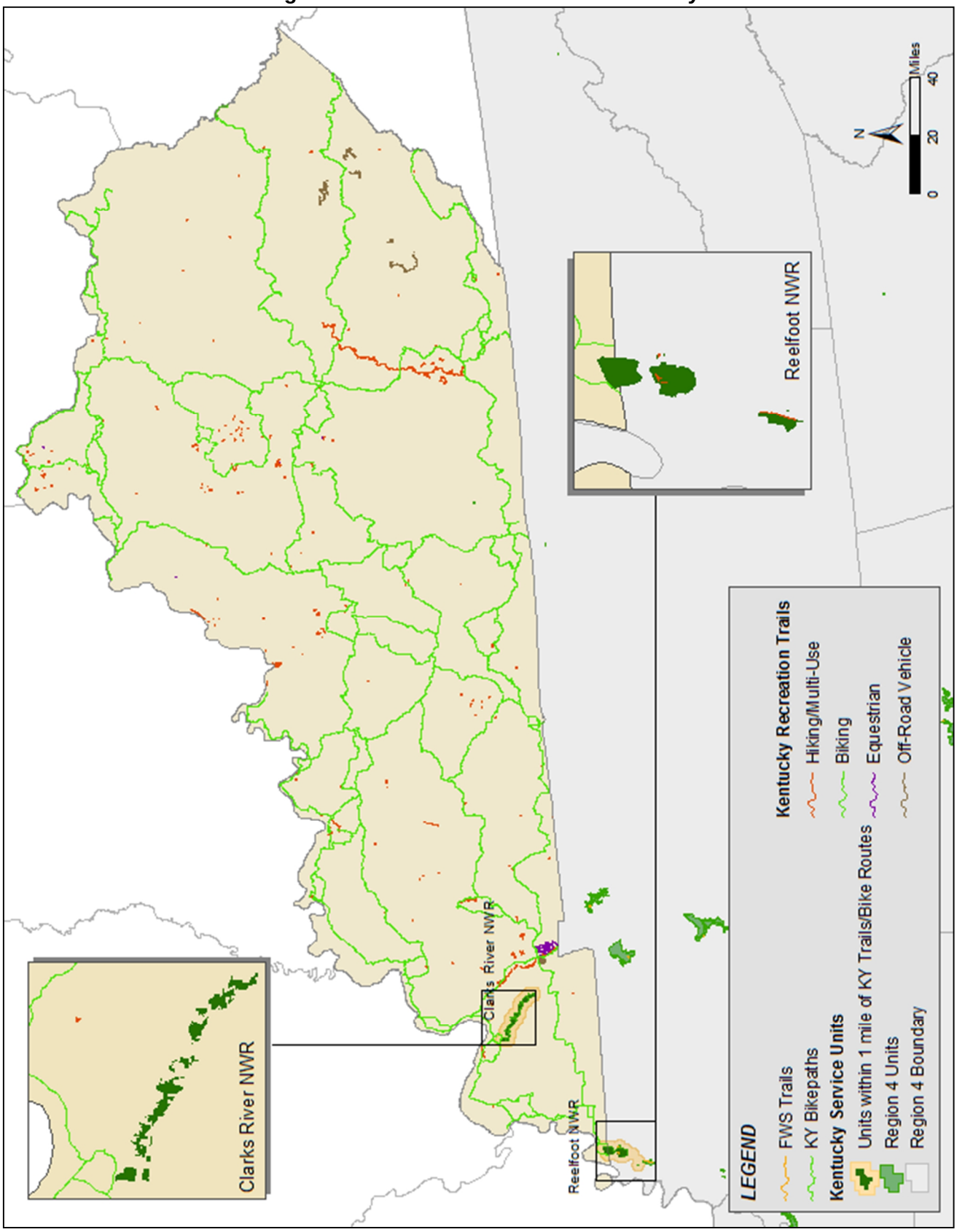


Figure 2-7: Bicycle Routes in North Carolina

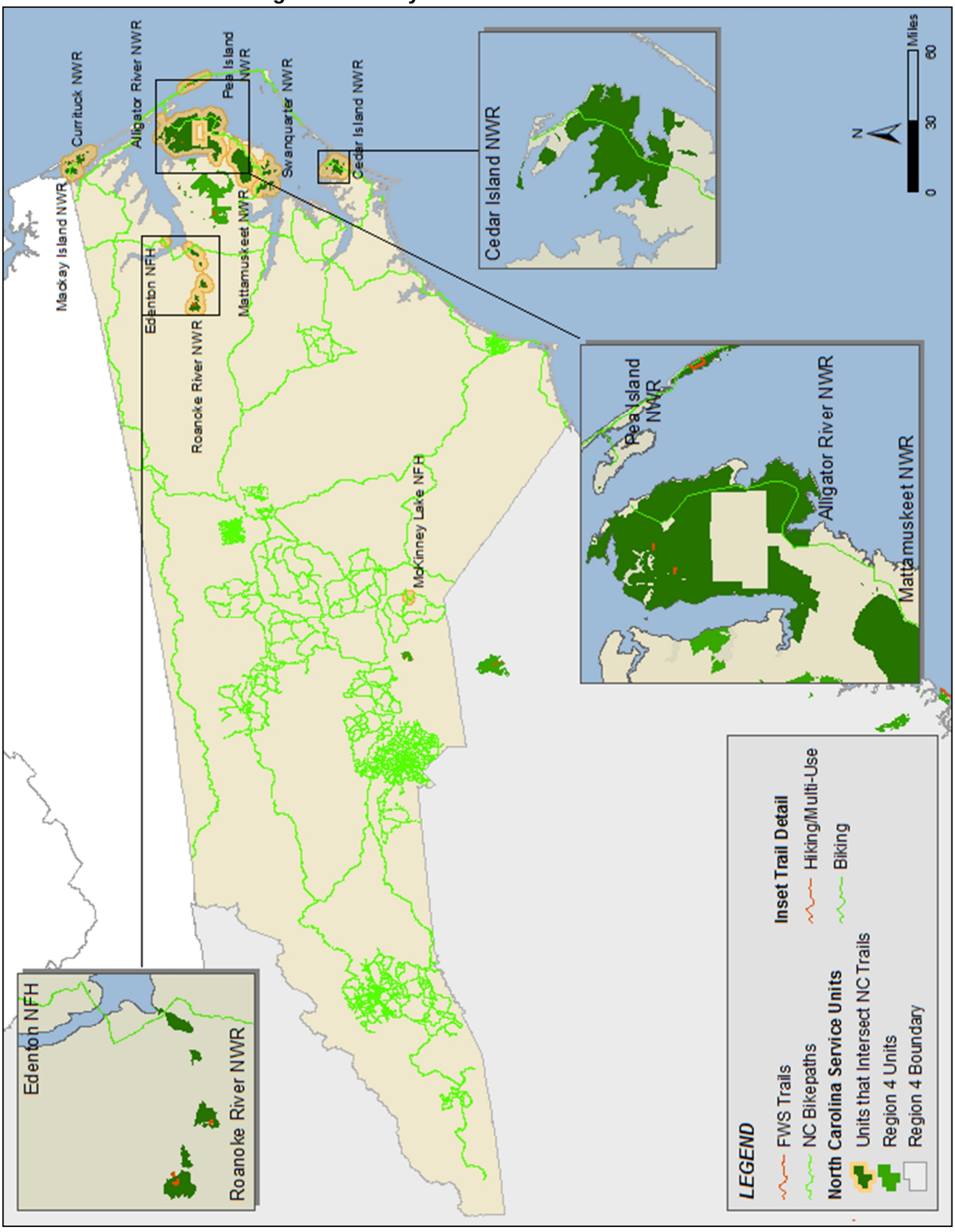


Table 2-8: Units within One Mile of Recreational Trails & Bicycle Routes in FL, GA, KY, and NC

Service Unit	State	Type of Recreational Trail[18]					
		Walking	Biking	Multi-Use (walking and/ or biking)	Paddling	Equestrian	Motorized
Alligator River NWR	NC		X				
Arthur R. Marshall Loxahatchee NWR	FL	X					
Banks Lake NWR	GA		X				
Cedar Island NWR	NC		X				
Cedar Keys NWR	FL				X		
Chassahowitzka NWR	FL				X		
Egmont Key NWR	FL	X					
Eufaula NWR	AL/GA		X				
Florida Panther NWR	FL	X					
Hobe Sound NWR	FL				X		
J. N. "Ding" Darling NWR	FL	X		X			
Lake Woodruff NWR	FL			X	X		X
Lower Suwannee NWR	FL				X		
Mackay Island NWR	NC/VA		X				
Matlacha Pass NWR	FL				X		
Mattamuskeet NWR	NC		X				
Mckinney Lake NFH	NC		X				
Merritt Island NWR	FL			X	X		
National Key Deer Refuge	FL			X			
Pea Island NWR	NC		X				
Pelican Island NWR	FL			X	X		
Roanoke River NWR	NC		X				
St. Marks NWR	FL	X			X		
St. Vincent NWR	FL	X					
Swanquarter NWR	NC		X				
Ten Thousand Islands NWR	FL				X		
Welaka NFH	FL				X	X	
Total Number of Units with Trail Type:		6	10	5	10	1	1

[18] As identified in inventoried trail routes provided by Florida, Georgia, Kentucky, and NC Departments of Transportation. It is anticipated that this list will grow and change as additional recreational facilities are created and more data becomes available. This table was created based on data available October 2012 including: Florida Geodatabase Library (http://www.fgdl.org) Recreational Trails data from October 16th, Georgia DOT Designated Bicycle Routes from the Atlanta Regional Commission GIS Library, Kentucky Bicycle Routes and Recreational Trails (http://transportation.ky.gov/Planning), North Carolina Bicycle Routes (https://connect.ncdot.gov/resources/gis).

The Volpe Center's *Transit and Trails*[19] project considered multi-use paths based on proximity of trails to refuges' postal addresses similarly quantifying the connectivity and potential for access to trails as transit discussed in the previous section. Trails also were rated based on the quality of the trail, which considered overall length, surface condition, and connectivity or proximity to urbanized areas and/or regional destinations. Table 2-9 provides some details for six representative Region 4 refuges that were found to be near existing trails in the *Transit and Trails* project.

Table 2-9: Transit and Trails Connections: Region 4 Trails Findings[20]

Refuge	State	Trails		
		Names of Trail(s)	Length (Miles)	Distance from NWR (Miles)
Big Branch Marsh NWR	LA	Tammany Trace	27.5	Adjacent
Pelican Island NWR	FL	Jungle Trail	7.8	Through refuge
Archie Carr NWR	FL	Jungle Trail	7/8	0.5
J. N. "Ding" Darling NWR	FL	Surfsound Ct/ Locke Ave/ unnamed	All < 0.5 miles	Adjacent
Mountain Longleaf NWR	AL	Chief Ladiga Trail	33	4.3
St. Marks NWR	FL	Tallahassee-St. Marks Historic Railroad Trail	20	2

** Information presented in this table taken directly from Volpe Center* Transit and Trails *report*

Region 4 refuges assessed for this program that had direct trail connections were Big Branch Marsh NWR in Louisiana and Pelican Island NWR and J.N. "Ding" Darling NWR in Florida. Each one of the trails identified above is in good or better condition. Big Branch Marsh NWR connects to a 27.5-mile bicycle trail called the Tammany Trace Bike Trail. Pelican Island has an unpaved road used by bicyclists and walkers that runs through the refuge and is nearby the Indian River Lagoon National Scenic Byway. J.N. "Ding" Darling's trail system and Wildlife Drive is connected to an extensive multi-use path system owned and maintained by the City of Sanibel. Almost the entire island of Sanibel is covered with bicycle trails with more than 26 miles of paved trails.

Two additional evaluated refuges in Florida and one in Alabama were noted as refuges with high potential for direct trail connections. Archie Carr NWR (Florida) is located near Pelican Island NWR within a half mile from the Jungle Trail. A multi-use path inside Archie Carr NWR runs alongside the same scenic byway that runs alongside Pelican Island, granting a tremendous opportunity to coordinate last-mile connectivity between the two refuges. St. Marks NWR (Florida) has two potential prospects for trail connections, the closest within two miles. The convergence of the St. Marks and Wakulla Rivers keeps St. Marks NWR disconnected from the town of St. Marks and the 20-mile Tallahassee-St. Marks Historic Railroad Trail. However, the St. Marks entry road was designated recently by the FHWA as the Big Bend National Scenic Byway, which connects to the refuge's historic lighthouse, a huge draw for visitors. Mountain Longleaf NWR in Alabama is approximately 4.3 miles from the 33-mile Chief Ladiga Trail. As a relatively new refuge with limited visitor facilities, it was recommended that Mountain Longleaf NWR consider connecting to the trail to expand access as it continues to grow and develop.

[19] http://www.fta.dot.gov/documents/Transit_Trails_Layout_Final_123010.pdf
[20] http://www.fta.dot.gov/documents/Transit_Trails_Layout_Final_123010.pdf

Regional Alternative Transportation Evaluation[21]

The U.S. Fish and Wildlife Service, along with the U.S. DOT's Volpe Center, conducted a regional alternative transportation evaluation (RATE) in Region 4 that began in the early part of 2013. The RATE team sent a questionnaire to Region 4 refuge leadership that included questions on ATS as well as general transportation planning. Of the 133 stations, 116 responded to the questionnaire, resulting in a response rate of 87 percent. Half of the stations that did not respond are closed to the public.

The RATE serves as a pilot program to integrate alternative transportation systems (ATS) into the LRTP through the effective consideration and integration of travel means other than the use of a personal automobile. Increased ATS would be beneficial to Region 4 due to a number of complementary goals. As noted in the RATE report, the use of ATS modes supports natural resource protection with short-term benefits such as the reduced potential for animal-vehicle collisions, and reductions in air, water, and soil pollutants from vehicle emissions. Land preservation could become a benefit in the long term because ATS could positively impact units by negating the need for roadway network and/or parking expansion.

The RATE report notes the following potential alternative transportation systems that could be implemented through the Service or through Service partnerships with others:

- Water-based transportation
- Regional transit connections (bus, light rail, trolley, commuter rail, passenger rail)
- Shuttles and van transit connecting stations with other destinations
- Bicycle and pedestrian infrastructure (sidewalks, paths, bicycle lanes, regional trails)
- Motorized transportation systems operating internally within stations
- Publicly and privately operated systems[22]

Water-based Transportation

Findings through the RATE have shown that Region 4 has a high potential for water-based access. Many Region 4 units are located near major bodies of water and wetlands, which could offer positive ATS impacts from water-based transportation, and almost 90 percent of refuges offer some type of non-motorized boating. Alternatively, there is risk associated with certain infrastructure stability due to the potential for variable water levels and vulnerability to impacts of climate change.

Water-based access is already being used in Region 4. In fact, more than half of the stations reported that visitors could and had accessed the station using water-based transportation. The RATE also noted that 32 percent of the visitors, on average, accessed stations by a water-based mode. Because fishing is the most popular activity throughout Region 4, it is feasible that the percentage of visitors who access Service units via water-based modes could be augmented by additional promotion for the use of boats, kayaks and canoes as means to both access and participate in water-based activities such as fishing.

[21] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)
[22] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)

Transit Connections

Other than water-based transport, the RATE reported that most refuges indicated limited ATS use. It also reported that many refuges in Region 4 are not located near urban areas, making connections with major transit providers a challenge. It noted that the majority of stations indicated that current visitors were not familiar with transit and were not inclined to use bicycles, which may be an indication that visitors in less urban areas may not be exposed to biking, walking, and transit which are all more prevalent in urbanized areas. For the existing transit service that is located near Service units, last-mile connectivity is a challenge. Eleven percent of Region 4 units are located within three miles of a transit station, but only three percent are located within a half mile of a transit station. The use of transit for special events is indicated as the most appropriate way to incorporate transit into Region 4's refuges and hatcheries. Thirteen percent of Region 4 refuges utilize transit for special events already.

Nonmotorized Transportation

The RATE concluded that the majority of refuges allow bicycling on all or parts of the refuge (47 percent allow cycling in general; 29 percent allow cycling in specific areas). Currently, almost 13 percent of Region 4's units are located within a half mile of a regional multi-use trail; nearly 20 percent are located within three miles of a trail. The RATE recommends that the Service consider connectivity with nearby regional trails along with additional signage and interpretive panels in order to extend the refuge experience to trail users and the surrounding community. Encouraging walking or biking as an access mode can be beneficial for the reduction of impacts associated with motorized modes, such as noise and air pollution.

Improved Visitor Programs

One of the RATE survey questions focused on transportation improvements that could improve visitor programs. Over 100 of the refuges responded to this question with the highest responses (over 30%) including improved signage for orientation to and within the station, water-access facilities, pedestrian trails/paths within the station, and social media and/or web-based interpretation. Twenty percent of the refuges answering the question haven't considered transportation issues at all. The breadth of responses to the RATE survey shows the diversity of refuges, opportunities, and challenges that exist across Region 4. Regardless of the transportation considerations, most refuges could explore more robust ways of incorporating ATS on and to their stations.

Partnerships

One way to expand ATS opportunities on a refuge includes partnering with other agencies and organizations to find mutually beneficial projects. Of the nearly 100 refuges answering a question about transportation partnerships, nearly all indicated previous work with local governments. Most have also worked with state government agencies, nongovernmental agencies, and Friends groups. Even still, only 13 percent of the refuges coordinate with local, regional, and state governments on a long-term basis. Growing these relationships to include long-range planning can be very beneficial for refuges, not only for ATS but across all transportation planning aspects.

Project Selection

Because ATS is an important part of the overall LRTP effort, the RATE team reviewed evaluation criteria being implemented at the National level and highlighted key linkages between the criteria and ATS projects. As refuge managers consider ATS projects within and connecting to their stations, it will be valuable for them to consider the evaluation criteria and how their ATS projects can excel.

GOAL 2 – ASSET MANAGEMENT

The Service's transportation system is necessary for refuge staff and visitors to safely and easily access as well as enjoy the national network of conserved and maintained lands and waters, but it must be maintained sustainably for future generations. The Service at a national level has implemented an asset management plan that is consistent with the *Asset Management Plan 2009* (prepared by the U.S. Department of the Interior's Bureau of Land Management [BLM]) to manage its diverse set of transportation-related assets in order to provide the best level of service with the available resources.

***Goal**: Provide a financially sustainable transportation system to satisfy current and future land management needs in the face of a changing climate.*

Objective 1: Use asset management principles to preserve and maintain important transportation infrastructure elements at an appropriate condition level.

Objective 2: Decommission low priority assets not needed to meet the Service's mission.

Objective 3: Examine operational and maintenance sustainability when considering new assets.

Objective 4: Adapt to changing climate conditions.

The Service, similar to many federal agencies, is challenged to fully maintain its available assets with currently available resources. It will be important to maintain high priority infrastructure before investing in new assets to expand capacity, as well as consider solutions that are sustainable in the long run. Decommissioning low priority assets that are not necessary for the Service's mission, as well as careful examination when considering new assets for operational and maintenance sustainability can help moderate the management of assets, high-dollar maintenance backlogs, and the overall cost of replacement value (CRV).

Under the current federal transportation bill, Moving Ahead for Progress in the 21st Century (MAP-21), the Federal Lands Transportation Program (FLTP) funds projects that improve access within the federal estate, including a $30 million commitment to the U.S. Fish and Wildlife Service. The FLTP will require the maintenance of a comprehensive national inventory of public federal lands transportation facilities for identification, assessment of condition, and determination of transportation needs.

Assets maintained by the Service are inventoried in both the Service Asset Maintenance Management System (SAMMS) and the Road Inventory Program (RIP) databases. RIP is collected on a cyclical basis every five years by the FHWA's Federal Lands Highway Division on behalf of the Service. Data collected includes condition of pavements, geometrics, and feature locations on existing roads and parkways. The data helps provide ongoing monitoring of the conditions of all public use roads, trails, and parking lots to help Federal Lands Management Agencies (FLMA) and the FHWA define and support decisions for improvement projects. SAMMS is updated more frequently by the Service to assist budgetary decision-making by providing information on facility and equipment deficiencies, as well as justifying budgetary requests for maintenance needs.

Areas for condition and/or safety improvements are determined through examination of a few variables including the Asset Priority Index (API) and the Facility Condition Index (FCI) in SAMMS, as well as the observed conditions through the cyclical RIP data. The API is determined by the Service for roads and trails—those assets with an API greater than or equal to 80 are considered "mission critical." Mission critical assets should be kept in "good" or better condition, which is assessed either

through the FCI or through the most recent RIP cycle. The FCI gives an indication of the ratio of deferred maintenance cost to the full replacement value, and is often used as an indicator of infrastructure condition. RIP Cycle 4 was completed in 2011 for Region 4 and provides deficiencies, condition ratings from "failed" to "excellent," and an indication of remaining service life (RSL).

The SAMMS database indicates that Region 4 contains 2,430 transportation assets, including vehicular bridges as well as paved and unpaved roads and trails. As solely a list of assets (not considering miles of roads or trails), Region 4 holds the largest share of national assets in the SAMMS database, with slightly more than 40% of the total of 5,968 transportation assets identified for the Service's eight regions.

DEFERRED MAINTENANCE BACKLOG

The Deferred Maintenance (DM) backlog for the National Wildlife Refuge System (NWRS) became a high-profile topic of discussion during Congressional hearings in 2011. At that time, some Congressional representatives indicated that the NWRS should not request funds to buy additional land until the DM backlog was reduced. An NWRS Leadership Team established a work group that further investigated the backlog situation and determine ways to reduce it. Throughout the process, the team determined that eight of the Service's refuge field stations make up approximately one-third of the total DM backlog for the National Wildlife Refuge System. Five of the top eight refuges are located in the Southeast Region: White River (Arkansas), St. Marks and Merritt Island (Florida), Pocosin Lakes (North Carolina), and Carolina Sandhills (South Carolina). In order to address the backlog, the national and regional offices, with assistance from field station personnel, are undertaking an intense review of all assets, particularly roadways, levees, and non-mission critical assets. The portion that pertains to roadways includes a reclassification of these assets into tiers that determine the type of maintenance to be applied. The existing road classification standards include a total of five classes (as determined by FHWA):

- Class I – Principal Refuge Road (Public Roads). Routes that constitute the main access route, main auto tour route, or thoroughfare for refuge visitors.
- Class II – Connector Refuge Road (Public Roads). Routes that provide circulation within the refuge. These routes can also provide access to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, education centers, etc.
- Class III – Special Purpose Refuge Roads (Public Roads). Roads that provide circulation within special use areas, such as campgrounds or public concessionaire facilities, or access to remote areas of the refuge.
- Class IV – Administrative Access Roads (Administrative Roads). Routes intended for access to administrative developments or structures, such as maintenance offices, employee quarters, or utility areas.
- Class V – Restricted Roads (Administrative Roads). Routes normally closed to the public, such as maintenance roads, Service roads, and patrol roads. These routes may be open to the public for a short period of time for a special use, such as hunting access.

Currently, road repairs and maintenance are estimated the same despite differences in mission support, design, or usage, resulting in inflated costs for roadway maintenance. The Service has created a new tiering structure that will complement the existing asset codes and classifications while addressing other critical aspects of design, usage and maintenance, and how it supports the overall mission and purpose of the station. One of the following three tiers will be assigned to each roadway (as described in the attachment *Guidance for Reducing the NWRS Deferred Maintenance (DM) Backlog* dated November 13, 2012):

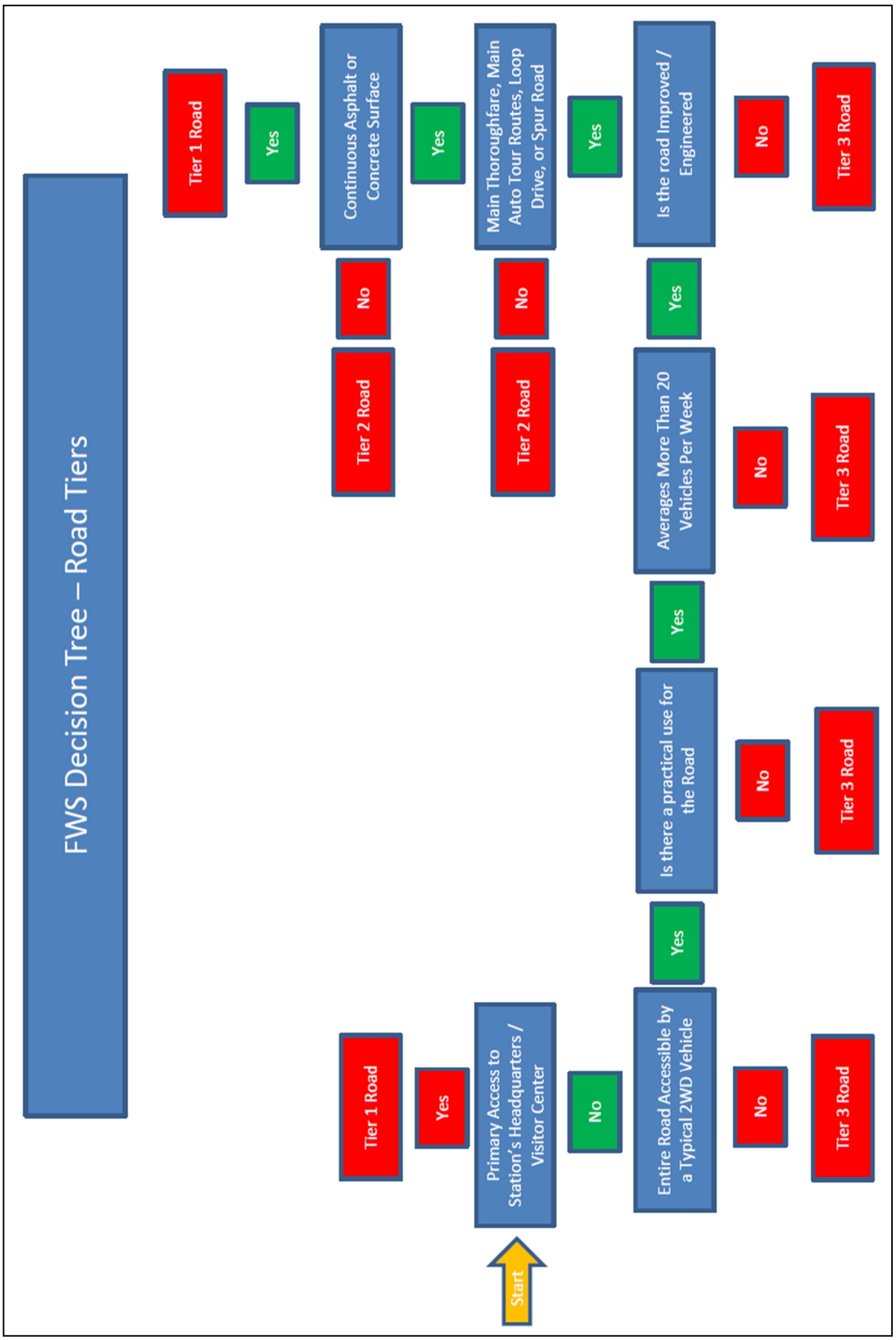
- *Tier 1 Road - Paved with a continuous surface of asphalt or concrete material. Tier 1 roads are primarily the main thoroughfare, main auto tour routes, loop drive, and spur roads for visitors or critical administrative/management functions. They may be routes leading to maintenance shops, quarters, public concessionaire facilities, education centers, scientific or cultural interest, or visitor facilities. These roads must be accessible by standard two wheel drive passenger or commercial vehicles including low clearance cars, vans, light trucks, and heavy trucks. Other than the main access to the station headquarters or visitor center, Tier 1 roads should have average to above average traffic levels for a refuge setting. Tier 1 roads may be maintained and repaired through the expenditure of Operations, Annual Maintenance, Deferred Maintenance (DM), Construction (CI), FWS Transportation Program, Emergency Relief for Federally-Owned Roads (ERFO) program funds or other fund sources.*

- *Tier 2 Roads - Improved roads constructed with natural or aggregate surfaces, continuously or with mixed surface types, and provide primary access to or as a main thoroughfare, auto tour route, loop drive, and spur road. They may be routes leading to station facilities, scientific or cultural interest locations, and recreational areas. Tier 2 roads will normally have at least two of the following attributes: road crowns or cross slope, road side ditches, berms, bridges, geotextile fabric, engineered base materials, or culverts installed to enhance the performance of the road. Regular maintenance allows passage by standard two wheel drive passenger and commercial vehicles including low clearance cars. Tier 2 roads could have varying levels of traffic depending on use. Tier 2 roads may be maintained or repaired through the expenditure of Operations, Annual Maintenance, DM, CI, FWS Transportation Program, or ERFO program funds or other fund sources.*

- *Tier 3 Roads - Natural or improved roads containing native soils, asphalt, concrete, aggregate, sand, or any other surface or combination of surfaces. To qualify as a road, these roads must have been physically constructed and are being maintained as described in Section 4 of this guidance. Tier 3 roads typically receive below average traffic use in a refuge setting. Even an administrative paved road that is passable at all times may be a Tier 3 road if it is rarely used; for example, a paved road around abandoned structures that is only used during the Annual Condition Assessment. Maintenance and repair of these roads is performed only as necessary, not in accordance with a regular schedule or industry standard practices. Tier 3 roads are normally repaired only by routine operations and Annual Maintenance funds, and are not routinely eligible for DM, FWS Transportation Program, or ERFO program. Tier 3 roads receive no regular or extended Deferred Maintenance or Transportation funding. Tier 3 roads may be eligible for emergency and DM funding for repairs on a case-by-case basis when failure to complete the required repairs would seriously impair the ability of the field station to fulfill mission requirements. Any expenditure of DM funds or contribution to DM backlog due to emergency repair needs approval by the Regional Program Chief or Roads Coordinator on a case-by-case basis. Tier 3 roads condition could vary from sometimes passable by a two wheel drive vehicle to only suitable for high-clearance four wheel drive vehicles. Seasonal conditions or wet weather may render these roads impassable. Comprehensive Condition assessments for Tier 3 roads will not be completed by either FWS or FHWA except to review their classification. Only Annual Condition Assessments by the field station will be completed to verify the inventory and to ensure the road is still passable as necessary to meet mission needs.*

The flowchart in Figure 2-8 shows the series of decisions that staff will take to determine the tiers of all roadway assets. This work began in 2012 and will continue through much of 2013 as well. Validation of the tiers will continue with assistance from FHWA through current and future inspection cycles.

Figure 2-8: Road Tiers - FWS Decision Tree



ROADS

Region 4 holds a large share of national assets inventoried in RIP as well as SAMMS. According to RIP, Region 4 contains the largest number of inventoried public use roadway miles, 1,463.9 miles, compared to the next highest inventoried road miles in Regions 6 and 2, which have approximately 944 miles and 818 public use miles, respectively. The RIP database for Cycle 4 currently lacks information for Regions 1, 7, and 8. These regions have not completed full inventories for this Cycle. However, total road miles further show Region 4 with the largest share of miles, 34% or roughly 3,532 miles, of the combined 10,381 road miles within the five regions (2, 3, 4, 5 and 6) inventoried to date. Tables showing all Region 4 road assets inventoried by RIP Cycle 4 can be found in Appendix A2.2. Table 2-10 notes the condition of Region 4's public use roads by State.

Within the region, Arkansas contains the largest number of road miles for the Region 4 Fish and Wildlife Service, with 320.9 public use road miles, approximately 22% of the regional total. North Carolina follows with 243.9 public use road miles, or 16.7% of the regional total. Nine states have more than 80 miles of public use road. Puerto Rico, Kentucky, and the U.S. Virgin Islands are the exception with 19.7, 4.9, and 2.2 miles, respectively.

Road condition extremes fall to the states with the smallest share of roadways. Kentucky, with 4.9 miles of public roads, has 89.2% in 'good' or 'excellent' condition. In contrast, the U.S. Virgin Islands, with only 2.2 miles of public roads, have 96.8% failing roadway conditions.

More than 75% of public-use miles inventoried, or 1,107.4 miles, are gravel roads. The remaining 25% of the Region 4 Service roadways consist of native and primitive surfaces (245.7 miles), asphalt (110.8), and concrete roads (0.06).

Overall, Region 4's public roads are in relatively good shape. Of the 1,463.9 total public road miles, 75.5% (1,105.4 miles) are in "good" or "excellent" condition. Only 5.3% (77.9 miles) are in "poor" or "failed" condition.

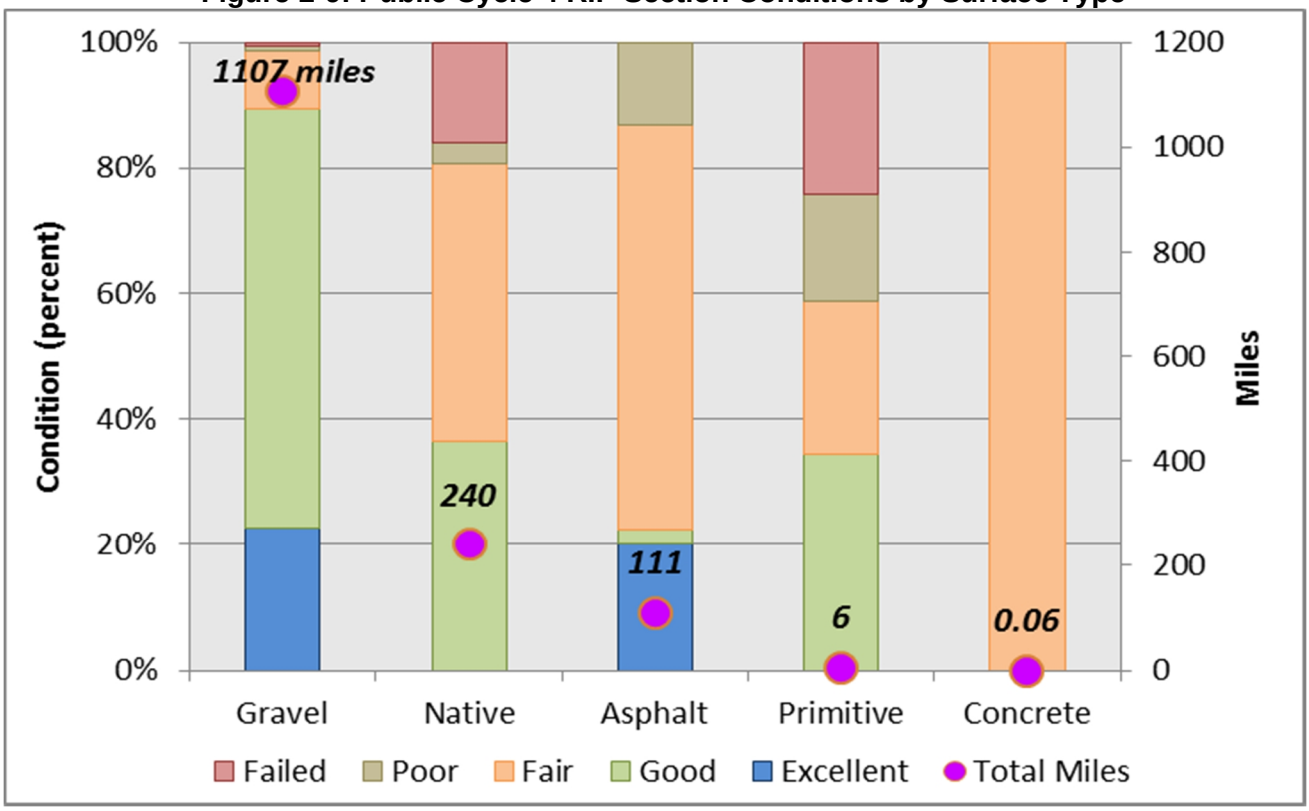
Table 2-10: Cycle 4 RIP Public Use Sections Conditions by Region 4 State

Region 4 States	Total Public Roadway Miles	Percent of Region 4 Total	Public Road Condition Rating (Reported in Miles and Percent of Total)				
			Excellent	Good	Fair	Poor	Failed
Alabama	85.1	5.8%	2.1	66.6	15.5	0.2	0.6
			2.5%	*78.3%*	*18.2%*	*0.3%*	*0.8%*
Arkansas	320.9	21.9%	77.5	178.2	43.2	8.3	13.7
			24.2%	*55.5%*	*13.4%*	*2.6%*	*4.3%*
Florida	124.5	8.5%	14.9	70.9	31.4	1.8	5.5
			12.0%	*56.9%*	*25.2%*	*1.4%*	*4.4%*
Georgia	80.5	5.5%	4.5	50.3	23.4	2.1	0.1
			5.6%	*62.5%*	*29.0%*	*2.7%*	*0.1%*
Kentucky	4.9	0.3%	2.8	1.6	0.3	--	0.2
			56.1%	*33.0%*	*6.0%*	*--*	*4.9%*
Louisiana	167.0	11.4%	36.7	99.2	23.7	4.9	2.5
			22.0%	*59.4%*	*14.2%*	*2.9%*	*1.5%*
Mississippi	141.0	9.6%	24.2	89.6	23.0	4.0	0.1
			17.2%	*63.6%*	*16.3%*	*2.9%*	*0.1%*

Region 4 States	Total Public Roadway Miles	Percent of Region 4 Total	Public Road Condition Rating (Reported in Miles and Percent of Total)				
			Excellent	Good	Fair	Poor	Failed
North Carolina	243.9	16.7%	67.6	131.4	37.6	5.0	2.3
			27.7%	*53.9%*	*15.4%*	*2.1%*	*0.9%*
Puerto Rico	19.7	1.3%	7.4	6.3	3.2	--	2.8
			37.5%	*31.9%*	*16.4%*	*--*	*14.2%*
South Carolina	175.8	12.0%	26.3	73.6	59.6	0.6	15.6
			15.0%	*41.9%*	*33.9%*	*0.4%*	*8.9%*
Tennessee	98.5	6.7%	8.3	65.1	19.9	3.7	1.5
			8.5%	*66.1%*	*20.2%*	*3.8%*	*1.6%*
U.S. Virgin Islands	2.2	0.2%	--	0.1	--	--	2.1
			--	*3.2%*	*--*	*--*	*96.8%*
Region 4 Total	**1,463.9**		**272.4**	**833.0**	**280.7**	**30.7**	**47.2**
			18.6%	***56.9%***	***19.2%***	***2.1%***	***3.2%***

Figure 2-9 shows the variations in road conditions for each of the five surface types of public use roads in Region 4. More than 75% of the public use miles inventoried, or 1,107.4 miles, are gravel roads. The remaining 25% consist of native and primitive surfaces (245.7 miles or 16.8%); asphalt (110.8 miles or 7.6%); and concrete (0.06 miles or <0.1%).

Figure 2-9: Public Cycle 4 RIP Section Conditions by Surface Type



Road conditions at the unit level are discussed in more detail in the Safety section.

TRAILS

In Region 4, a total of 77 Service units contain trails identified in the Cycle 4 RIP data. Of these, the majority of trails are hiking trails. Two locations have bicycle trails. Many units have administrative road trails and some "other" trails which include fire-break trails. Overall, 226.9 public use trail miles are identified in Region 4's Cycle 4 RIP data. The trail conditions by surface type are noted in Table 2-11. The administrative road trails have not been rated and account for 123.1 total miles.

Table 2-11: Service Trail Conditions by Trail Surface Type

Trail Surfaces	Total Public Trail Miles	Percent of Region 4 Total	Public Trail Surface Condition Rating (Reported in Miles and Percent of Total)				
			Excellent	Good	Fair	Poor	Failed
Asphalt	4.6	11.4%	3.5	0.2	0.0	0.9	0.0
			76.4%	*5.0%*	*0.0%*	*18.6%*	*0.0%*
Boardwalk	6.5	16.3%	6.5	0.0	0.0	0.0	0.0
			99.5%	*0.0%*	*0.0%*	*0.0%*	*0.5%*
Concrete	1.9	4.7%	1.7	0.0	0.1	0.0	0.0
			93.5%	*0.0%*	*6.5%*	*0.0%*	*0.0%*
Gravel	31.2	78.0%	30.3	0.9	0.0	0.0	0.0
			97.1%	*2.9%*	*0.0%*	*0.0%*	*0.0%*
Mowed	24.7	61.8%	20.8	2.3	0.0	1.1	0.5
			84.3%	*9.3%*	*0.0%*	*4.4%*	*2.1%*
Native	154.8	387.0%	133.0	10.1	11.3	0.0	0.5
			85.9%	*6.5%*	*7.3%*	*0.0%*	*0.3%*
Paver Block	0.5	1.1%	0.5	0.0	0.0	0.0	0.0
			100.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Puncheon	0.1	0.2%	0.1	0.0	0.0	0.0	0.0
			100.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Woodchip	3.0	7.4%	3.0	0.0	0.0	0.0	0.0
			100.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*

Service trails consist of a variety of surface types. Native trails are by far the most prevalent, but a sizeable number of trail miles consist of gravel and mowed surfaces. Less common, although notable, are trails that traverse boardwalks or are made of puncheon paver-blocks, wood chips, or more traditional paved surfaces such as concrete and asphalt.

Generally, the public use trails in Region 4 are in very good condition. Nearly 88% of the public use trails (199 miles) are classified as being in "excellent" condition. Only 1.3% (2.9 miles) is classified as being in "poor" or "very poor" condition. Considering surface type only, asphalt trails are the worst, with 0.85 of 4.56 total miles (18.6%) rated in "poor" condition. All 0.85 miles of poor condition asphalt trails are located in Bayou Sauvage NWR, where about half of the asphalt trails are in poor condition. Bayou Sauvage NW is located in Louisiana.

Table 2-12 shows the public use trail miles by state and overall condition. Table 2-13 includes the number of trail miles by state and activity, as detailed in the existing database. Florida has 57.2 miles of trails followed by Louisiana, which has 45.1 miles. Puerto Rico is the only state that has trails designated specifically for bicycle use. Kentucky and the U.S. Virgin Islands do not have any identified trails in Service units.

Table 2-12: Public Use Service Trails by State

Region 4 States	Total Public Trail Miles	Percent of Region 4 Total	Public Trail Condition Rating (Reported in Miles and Percent of Total)					Admin Roads (Not Rated)
			Excellent	Good	Fair	Poor	Failed	
Alabama	15.5	6.8%	14.6	0.4	0.5	--	0.03	17.1
			94.4%	*2.3%*	*3.1%*	--	*0.2%*	
Arkansas	11.4	5.0%	9.9	1.0	0.4	--	--	--
			87.2%	*9.1%*	*3.7%*	--	--	
Florida	57.2	25.2%	48.2	2.1	6.9	--	--	48.9
			84.2%	*3.7%*	*12.1%*	--	--	
Georgia	31.3	13.8%	27.0	2.0	0.6	1.1	0.6	12.2
			86.1%	*6.5%*	*2.1%*	*3.4%*	*1.9%*	
Kentucky	--	0.0%	--	--	--	--	--	--
			--	--	--	--	--	
Louisiana	45.1	19.9%	42.2	1.7	--	0.9	0.4	6.2
			93.5%	*3.8%*	*0.0%*	*1.9%*	*0.9%*	
Mississippi	22.2	9.8%	22.2	--	--	--	--	13.5
			100.0%	--	--	--	--	
North Carolina	7.5	3.3%	4.9	0.9	1.7	--	--	5.1
			65.1%	*12.1%*	*22.8%*	--	--	
Puerto Rico	8.4	3.7%	5.7	1.6	1.2	--	--	0.8
			67.4%	*18.4%*	*14.2%*	--	--	
South Carolina	17.6	7.7%	15.7	1.8	--	--	--	8.8
			89.6%	*10.4%*	--	--	--	
Tennessee	10.5	4.6%	8.5	2.0	--	--	--	10.0
			80.9%	*19.1%*	--	--	--	
U.S. Virgin Islands	--	--	--	--	--	--	--	--
Region 4 Total	226.9		199.0	13.5	11.4	1.9	1.0	122.6
			87.7%	*6.0%*	*5.0%*	*0.9%*	*0.4%*	

Table 2-13: Public Use Service Trail Types by State

State	Biking	Hiking	Other	Total
Alabama		15.5		15.5
Arkansas		11.4		11.4
Florida		57.2		57.2
Georgia		20.0	11.3	31.3
Louisiana		45.1		45.1
Mississippi		22.2		22.2
North Carolina		7.5		7.5
Puerto Rico	4.5	3.9		8.4
South Carolina		17.6		17.6
Tennessee		10.5		10.5
Grand Total	4.5	211.0	11.3	226.9

** 'Other' trails are generally fire-breaks or trails between fire breaks.*

PARKING

Region 4 has 117 Service units with parking facilities. These parking facilities account for a total of approximately 288.6 acres. Parking facilities are composed of a variety of materials including asphalt, concrete, gravel, and native and primitive surfaces. Arkansas has 80.2 acres of public parking, by far the most for the Region. Table 2-14 summarizes the parking acreages and overall condition by state, including a summary of all FWS Region 4 parking conditions.

Table 2-14: Parking Surface Conditions by Region 4 State

Region 4 States	Total Public Parking Acres	Percent of Region 4 Total	Public Parking Surface Condition Rating (Reported in Acres and Percent of Total)				
			Excellent	Good	Fair	Poor	Failed
Alabama	13.7	4.7%	0.0	7.3	5.5	0.9	--
			0.1%	*53.4%*	*40.2%*	*6.3%*	--
Arkansas	80.2	27.8%	0.5	29.8	40.7	9.0	0.3
			0.6%	*37.2%*	*50.7%*	*11.2%*	*0.3%*
Florida	28.7	10.0%	3.6	19.8	4.9	0.5	--
			12.4%	*68.9%*	*17.1%*	*1.7%*	--
Georgia	13.9	4.8%	1.7	6.8	4.7	0.7	--
			12.2%	*48.8%*	*33.9%*	*5.1%*	--
Kentucky	3.1	1.1%	0.3	1.7	1.0	0.1	--
			8.5%	*55.2%*	*32.0%*	*4.4%*	--
Louisiana	50.6	17.5%	2.4	29.1	13.3	5.5	0.2
			4.8%	*57.6%*	*26.4%*	*10.8%*	*0.4%*
Mississippi	27.1	9.4%	1.8	15.8	7.8	1.6	0.1
			6.5%	*58.2%*	*28.9%*	*5.9%*	*0.4%*
North Carolina	15.7	5.4%	1.3	8.4	5.8	0.2	--
			8.1%	*53.6%*	*37.2%*	*1.1%*	--
Puerto Rico	3.8	1.3%	1.1	0.8	1.8	0.2	--
			28.4%	*20.1%*	*46.6%*	*4.9%*	--
South Carolina	19.3	6.7%	2.0	10.8	6.1	0.4	--
			10.3%	*56.2%*	*31.4%*	*2.2%*	--
Tennessee	31.7	11.0%	1.1	18.7	9.3	1.9	0.8
			3.4%	*58.9%*	*29.2%*	*6.1%*	*2.4%*
U.S. Virgin Islands	0.6	0.2%	--	0.2	0.1	0.4	--
			--	*27.8%*	*13.7%*	*58.4%*	--
Virginia[23]	0.2	0.1%	--	--	0.2	--	--
			--	--	*100.0%*	--	--
Region 4 Total	288.6		15.6	149.2	101.2	21.2	1.3
			5.4%	*51.7%*	*35.1%*	*7.4%*	*0.5%*

Parking condition inside Service units generally is fair. For units that have more than one acre of parking, only 14 have more than 10% of their parking surfaces rated in "poor" or "failing" condition. An equal number of units have more than 80% of their parking surfaces rated as being in "good" or

[23] Parking in Virginia is part of the Mackay Island NWR, which crosses the border from North Carolina into Virginia.

"excellent" condition. Table 2-15 and Table 2-16, respectively, identify the five units with the best and worst overall parking surface conditions.[24]

Table 2-15: Service Units with Best Parking Surface Conditions

Station (units considered had at least one acre of parking)	State	Acres of Parking by Pavement Condition					Total Acres	Percent Good / Excellent
		Excellent	Good	Fair	Poor	Failed		
Chassahowitzka NWR	FL		1.3				1.3	100.0%
Hobe Sound NWR	FL		1.6				1.6	100.0%
Pelican Island NWR	FL	0.0	1.1				1.1	100.0%
Okefenokee NWR	FL/GA	1.5	7.9	0.1			9.4	99.4%
Bayou Cocodrie NWR	LA	0.5	3.4	0.1			4.0	97.4%

Table 2-16: Service Units with Worst Parking Surface Conditions

Station (units considered had at least one acre of parking)	State	Acres of Parking by Pavement Condition					Total Acres	Percent Good / Excellent
		Excellent	Good	Fair	Poor	Failed		
Meridian NFH	MS				1.0		1.0	100.0%
Mountain Longleaf NWR	AL		0.2	0.4	0.6		1.2	51.4%
Atchafalaya NWR	LA		0.6	0.6	1.0		2.3	45.2%
Cat Island NWR	LA		0.8	0.7	0.6		2.1	27.8%
Grand Cote NWR	LA		2.0	0.6	0.9		3.5	25.6%

GOAL 3 – COORDINATED OPPORTUNITIES

Transportation resources can be used to help support the mission of the Service. As a result, coordinated opportunities with other entities can go beyond merely leveraging funding and perhaps consider broader maintenance goals that would be mutually beneficial to both the partner(s) and the Service. Identifying key partners in the region and at the unit level will be a valuable exercise to consider during future planning and coordination. The Service's mission to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people is perfectly aligned with considering partnerships and coordination with other non-Service entities.

As previously mentioned, the current surface transportation reauthorization act, MAP-21, requires the maintenance of a comprehensive national inventory of public federal land transportation facilities relative to the new Federal Lands Transportation Program (FLTP), as well as an inventory adjacent and connecting transportation assets not owned or maintained by federal land management agencies relative to the new Federal Lands Access Program (FLAP). Public highways, roads, bridges, trails, or transit systems that are located on, adjacent to, and provides access to federal lands for which the title or maintenance responsibility is vested in a state, county, town, township, tribe, municipal or local government will be eligible for funds under the Federal Lands Access Program. This program will pave the way for new partnerships that will be mutually beneficial for federal land management agencies (FLMAs) as well as adjacent departments of transportation (DOTs).

[24] For units that have at least one acre of parking

***Goal**: Seek partnered transportation solutions that support the Service's mission, maximize the utility of Service resources, and provide mutual benefits to the Service and its external partners.*

Objective 1: Identify key potential internal and external partnerships at the national, regional, and unit levels.

Objective 2: Devise and follow a systematic method to continually expand numbers of partners and partnership opportunities.

Objective 3: Develop best partnership practices for each goal that illustrate best practices in forming and nurturing coalitions to support the Service's mission.

Objective 4: Maximize leveraging opportunities by identifying and pursuing partnership opportunities where there may be shared planning, design, implementation, and/or potential economic savings for projects of mutual interest and benefit.

For this section, identification of entities that share political boundaries with Service lands has helped create a tangible list of potential new partnerships and collaborating agencies at both the Regional and unit level. Funding opportunities can be leveraged with an increase in the number of partnerships and number of partnered projects.

POLITICAL BOUNDARIES

Region 4 falls within the boundaries of 10 states within the contiguous United States, along with Puerto Rico and the U.S. Virgin Islands. In addition, Navassa Island, along with the U.S. Virgin Islands, is an unorganized, unincorporated territory of the United States. Although Navassa Island is very small and inhabited mainly by goats and some species of waterfowl, it is a NWR in its entirety and is located in the Caribbean Sea less than 50 miles west of Haiti. Florida and Louisiana host the greatest numbers of refuges in the Southeast, with 30 and 24 refuges and hatcheries within their borders, respectively. For comparison, Mississippi contains the third largest number of Service units with 17 units. Kentucky and the U.S. Virgin Islands have the fewest refuges and hatcheries with only three each. Puerto Rico only has five.

Refuges do not necessarily conform to political boundaries. In fact, while four refuges share a border with state lines, seven refuges within Region 4 straddle state lines, including one that intersects the Commonwealth of Virginia, outside of the northern boundary of Region 4 and extending into the territory of FWS Region 5 (Northeast). Figure 2-10 shows the seven refuges that straddle state lines. Refuges and hatcheries are located within 183 counties, parishes, and municipios (Puerto Rico local jurisdictions), along with Navassa Island and the three main land masses or geopolitical units that make up the U.S. Virgin Islands. Overall, 58 refuges cross more than one county boundary, with 23 crossing more than two counties. The Theodore Roosevelt NWR has multiple disconnected (but collectively managed) sites, and is scattered throughout eight separate counties. Alternatively, 46 counties in Region 4 share land with more than one refuge or fish hatchery, with as many as four units being contained wholly or in part within a single county.

Metropolitan Planning Organizations (MPOs) are associated with urbanized areas that have a population greater than 50,000. A total of 40 refuges and fish hatcheries intersect the planning boundaries of 30 separate MPOs, as shown in Figure 2-11. In some cases, a single MPO contains more than one Service Unit, as noted in the call-out boxes. As many as four refuges intersect the boundaries of a single MPO in Fort Meyers, Florida. The Space Coast Transportation Planning Organization in Viera, Florida, and the Regional Planning Commission of New Orleans, Louisiana, share planning boundaries with three refuges each. The intersection of Service units with political boundaries is summarized in Appendix A2.3.

NATIONAL AMBIENT AIR QUALITY STANDARDS – NONATTAINMENT AREAS

Six refuges directly intersect air quality nonattainment areas (NAAs) that have been identified for nonattainment with three of the six common air pollutants: ozone, sulfur dioxide, and particulate matter less than 2.5 micrometers in diameter. Refuges located within NAAs defined by the National Ambient Air Quality Standards (NAAQS) will be discussed further in the Environment section. However, it is important to note that nonattainment areas have some potential for coordinated educational and financial opportunities with the local MPO in order to address the concern of air quality standards for both wildlife and human inhabitants for the areas.

OTHER PROTECTED AREAS

The Protected Areas Database of the United States (PAD-US) is the official inventory of protected open space in the United States. This inventory captures more than 750 million acres—including FWS lands—in thousands of holdings held in trust by national, state, and some local governments, as well as some nonprofit conservation organizations.[25] More than 500 federal, territorial, Native American, state, regional, local, private, and nongovernmental organization (NGO) lands are located within five miles of Region 4 refuges and fish hatcheries. Any of the entities potentially could serve as partners or share resources with the FWS. Table 2-17 summarizes the various kinds of land management agencies and organizations with protected open space areas that lie within five miles of Region 4 units.

As shown in Figure 2-12, only 10 Region 4 refuges and two hatcheries are not located within 5 miles from another land management area. Not surprisingly, five of these isolated Service units are located on small islands separated from mainland masses. The remaining five refuges and the two hatcheries happen to be located farther away from other land management areas. Perhaps these areas should be evaluated for habitat fragmentation and for local coordination to ensure that habitat continuity is sufficient for sustained human and wildlife population growth and change. Habitat fragmentation also could be addressed in locations with several closely clustered land management areas, if the connection of multiple areas would not unnecessarily inhibit existing transportation routes.

[25] USGS GAP Analysis, PAD-US Factsheet, September 2012

Figure 2-10: Service Units that Straddle State Boundaries

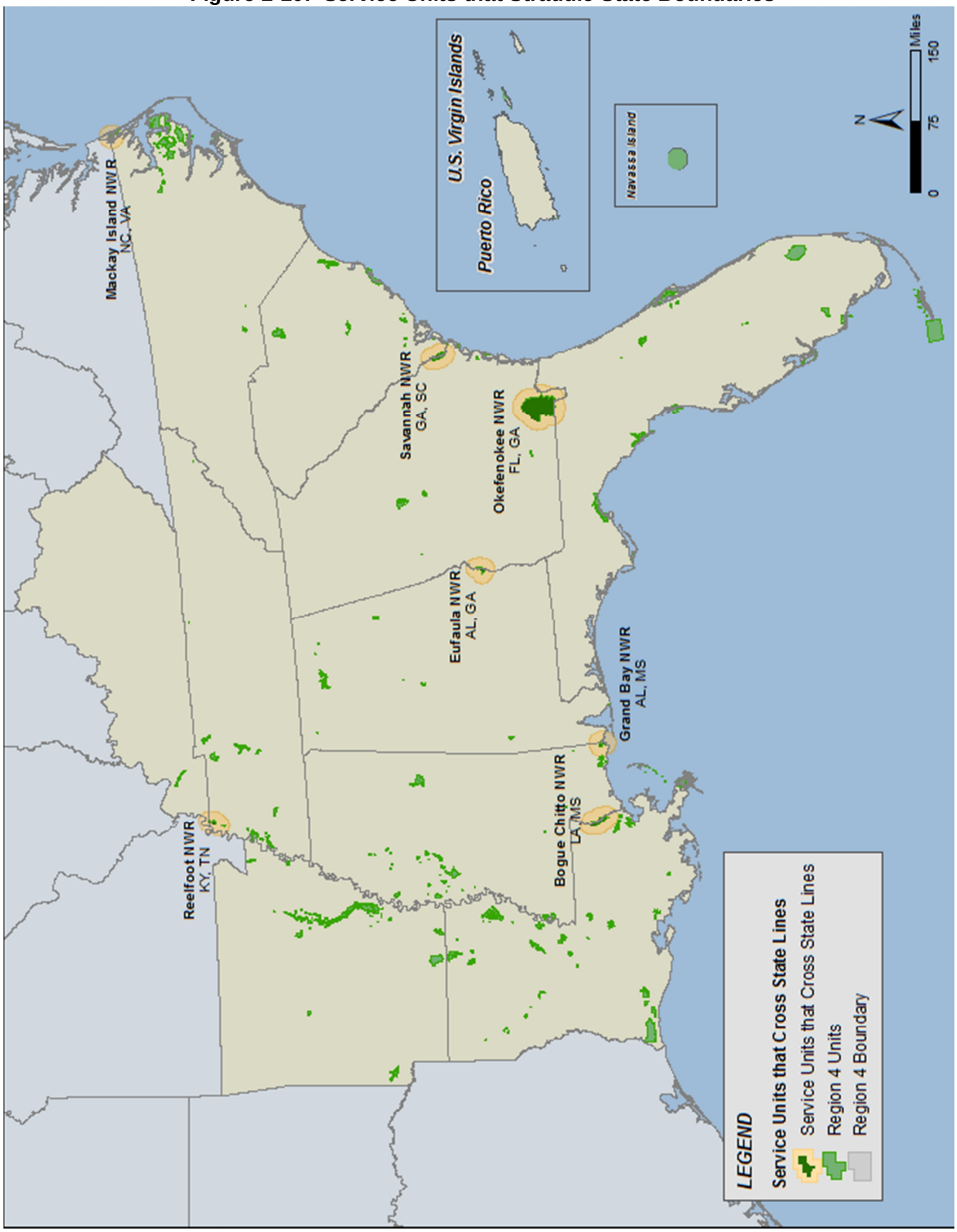


Figure 2-11: MPOs with One or Multiple Service Units

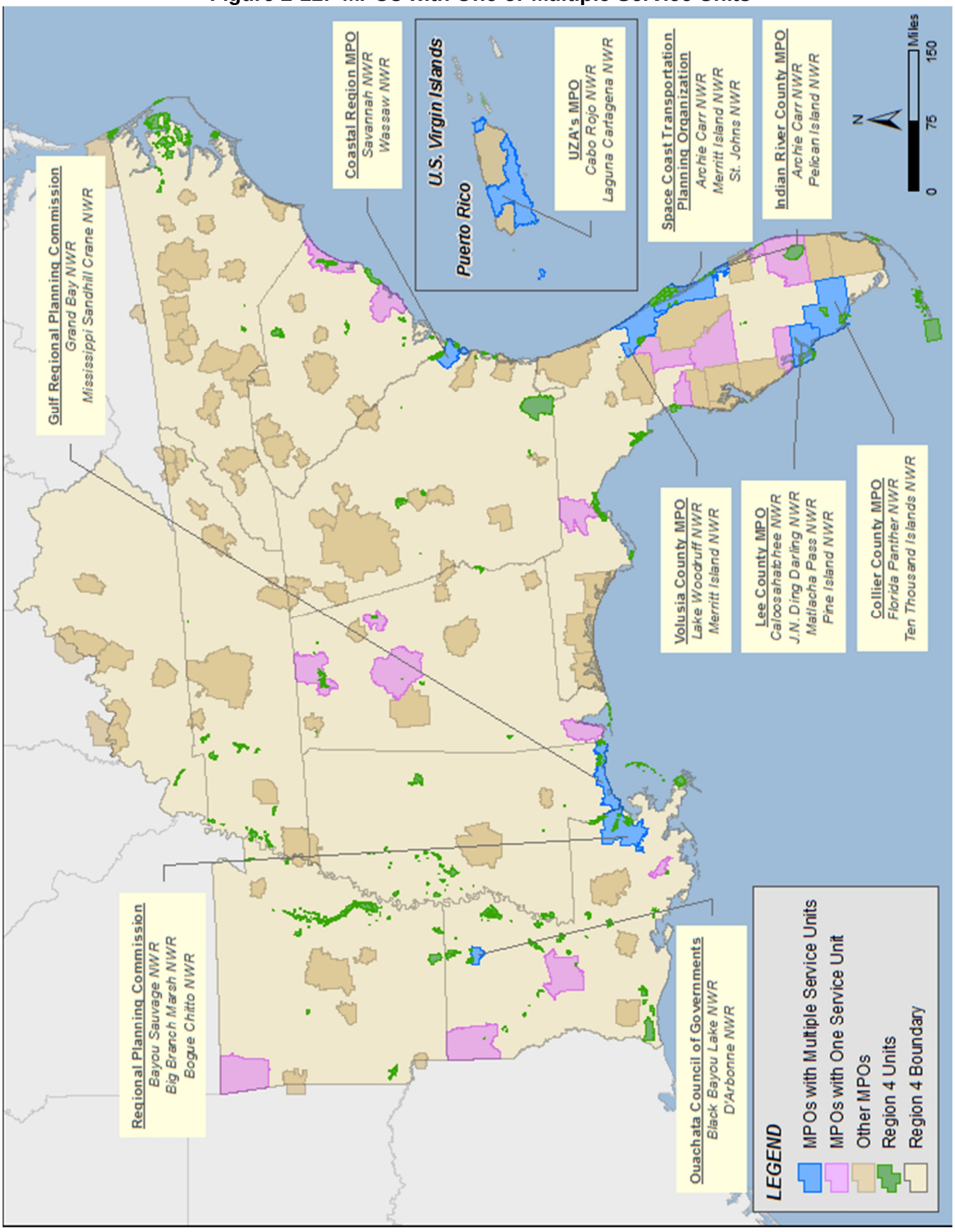
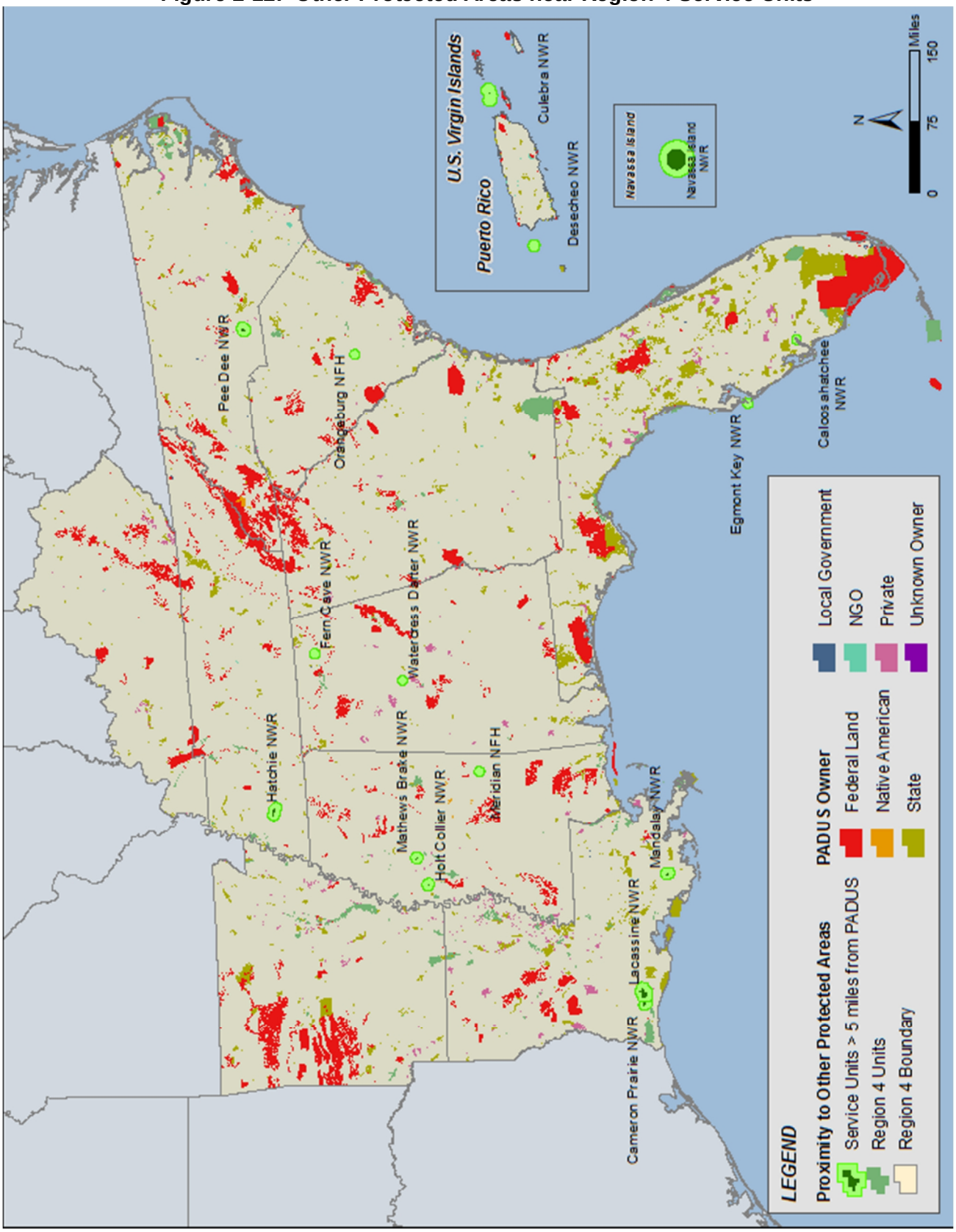


Table 2-17: Land Management Agencies/Organizations within 5 miles of Region 4 Units[26]

Land Management Agency/Organization	Number of FWS Units within 5 miles
Audubon Society	1
Bureau of Land Management (BLM)	1
City Land	1
County Land	3
Department of Defense (DOD)	34
Forest Service (USFS)	18
Local Land Trust	7
National Oceanic and Atmospheric Administration (NOAA)	1
National Park Service (NPS)	19
Native American Land	2
Other Federal Land	5
Other State Land	13
Private Conservation Land	27
Private Unrestricted for Development/No Known Restriction	4
Regional Agency Land	1
State Coastal Reserve	12
State Cultural Affairs	16
State Department of Conservation	2
State Department of Land	10
State Department of Natural Resources	32
State Department of Transportation	7
State Fish and Wildlife	70
State Land Board	8
State Natural Heritage Program	7
State Park & Recreation	57
Tennessee Valley Authority (TVA)	5
The Nature Conservancy (TNC)	11
Unknown	4
U.S. Territories - Unknown Owner	2
U.S. Virgin Islands Government	3

[26] Produced from GIS analysis of the Protected Areas Database of the United States (PAD-US).

Figure 2-12: Other Protected Areas near Region 4 Service Units



TRANSPORTATION SYSTEMS

Existing transportation systems can provide a solid footing to coordinate opportunities for both visitors and staff to reach Service Units. As mentioned previously in the Access, Mobility and Connectivity section in this report, airports, navigable waterways, the existing national roadway network, passenger rail, transit, and recreation trails all play some part in the Region's connectivity to the broader transportation system. Table 2-18 below notes potential partnering activities with transportation systems or agencies.

Partnering with the agencies that manage each of the noted transportation systems could provide the Service with an opportunity to promote visitation through new avenues, particularly for units that already connect or are located nearby an existing mapped transportation system. Alternatively, considering overall access and connectivity, the Service may come up with creative methods to link multiple modes together in order to provide transportation options to visitors and staff, alike.

Table 2-18: Transportation Systems and Agencies to Consider for Coordinated Opportunities

Transportation System	Potential Partnering Activities
Airports	• Request Service units added to local visitation maps • Ask car rental companies to carry FWS brochures/ information
Navigable Waterways/ Blueways	• Request ferry lines to note stops that access Service units or consider limited or special-event service to Service units • Request that blueway maps identify refuge areas accessible for paddlers
Roadway Network	• Request that Service units are identified on local road maps • Consider partnering with DOT districts to improve wayfinding or roadway repair leading up to Service units
Passenger Rail	• Consider the potential for limited or special event service to Service units
Transit	• Request Service units added as landmarks for those accessible via existing transit stops • Consider partnering for limited or special-event service
Recreation Trails	• Request the addition of Service units to trail maps where existing trails directly connect • Consider partnering to create trail connections between an existing trail and Service lands

GOAL 4 – ENVIRONMENT

The National Wildlife Refuge System provides benefits to human communities as well as wildlife populations. Protecting natural habitats, wetlands, coastal resources, grasslands, forests, and wildernesses, refuges maintain and even improve air and water quality. They have the potential to relieve flooding from the built (manmade) environment, improve soil quality, and help trap greenhouse gases that contribute to global warming. However, while the Refuge System can alleviate stresses on surrounding areas, it is important to also consider the effects that the surrounding built environment may have on the System.

Transportation systems, while necessary for access to Service units, can be taxing on natural resources. The landscape for conservation is changing. "Our population is larger and more diverse

… there is less undeveloped land, more invasive species and we are experiencing the impacts of a changing climate."[27] Human demands on the environment, paired with environmental stressors, are causing an urgent need for conservation choices. A balance is needed to ensure that the transportation system does not overly affect the natural environment. The transportation system should be managed to ensure that it provides adequate access for resource management activities by refuge and hatchery staff, as well as access for the general public to pursue wildlife viewing, education, hunting, fishing, and other compatible activities.

Roadway design can be mitigated to better integrate with the natural environment. The Roadway Design guidelines created by Region 1 during its LRTP process are being considered for national adoption. It is certainly an option for Region 4, when considering best management practices and operation standards to better maintain and sustainably consider roadway expansions in the future.

***Goal**: Ensure that the transportation program helps to conserve and enhance fish, wildlife, and plant resources and their habitats.*

Objective 1: Identify and adopt design guidelines and design metrics for transportation infrastructure projects that use planning, design, and construction methods and outcomes that are responsive to the mission of the Service, departmental policy, and federal law.

Objective 2: Identify transportation facilities and activities that can be altered, eliminated or enhanced to reduce environmental degradation, habitat fragmentation, and vehicle collisions with wildlife, fish, and their habitats.

Objective 3: Reduce habitat fragmentation on and adjacent to Service lands. Consider creating environmental linkages by considering which rivers, streams, wetlands, forested areas, etc. connect to the refuge and help make it an important resource.

Objective 4: Protect wildlife corridors and enhance terrestrial and aquatic organism passage on and adjacent to Service lands to conserve fish, wildlife, and plant populations.

Objective 5: Coordinate within Service programs, including Refuges, Ecological Services, Fisheries, and Migratory Birds during the development of regional long-range and project-level planning.

Objective 6: Consider the impacts of increased climate variability in the management of transportation assets.

Objective 7: Reduce greenhouse gas (GHG) emissions and air pollutants by increasing transportation alternatives.

This section includes a baseline of critical habitats and endangered species as well as an inventory of wetlands within Region 4. Potential impacts from air pollutants and the impacts of storm surges and rainfall also are considered.

ENDANGERED AND AT-RISK SPECIES

National wildlife refuges have provided homes to more than 280 of the nation's endangered or threatened species for several decades. Refuges have provided safe havens for 11 species to date that have been removed from the endangered species list due to their recovery. An additional 17 species have improved from endangered to threatened.[28] Of the 1,436 endangered or threatened

[27] *Conserving the Future: Wildlife Refuges and the Next Generation*, (USFWS, October 2011).
[28] http://www.fws.gov/refuges/whm/endangered.html

species tallied most recently, more than 500 are considered stable and/or improving, which means they may be removed soon from the National List.[29] One hundred of the 145 Southeast Region Service Units are home to at least one species listed as endangered or threatened, of which 87 units serve to protect species that are listed as endangered. There are many units that protect multiple species. Of note are Merritt Island NWR and Lake Wales Ridge NWR, which serve as refuges for 14 and 12 species respectively, including a variety of birds, mammals, plants, and reptiles. A full list of threatened and endangered species in Region 4 units is noted in Appendix A2.4. Fifty-nine of the nation's refuges were created specifically to assist with the conservation of endangered or threatened species. Of these 59, 16 refuges in Region 4 were established specifically for the conservation of endangered species. The list in Table 2-19 notes each of the refuges specifically established for endangered species, some of them named aptly to denote the endangered species that the refuge protects. Figure 2-13 shows the locations of these 16 refuges.

Table 2-19: Region 4 Refuges Specifically Established for Endangered Species

State	Unit Name	Species of Concern	Unit Acreage
Alabama	Sauta Cave NWR	Indiana Bat, Gray Bat	264
	Fern Cave NWR	Indiana Bat, Gray Bat	199
	Key Cave NWR	Alabama Cavefish, Gray Bat	1,060
	Watercress Darter NWR	Watercress Darter	7
Arkansas	Logan Cave NWR	Cave Crayfish, Gray Bat, Indiana Bat, Ozark Cavefish	124
Florida	Archie Carr NWR	Loggerhead Sea Turtle, Green Sea Turtle	29
	Crocodile Lake NWR	American Crocodile	6,686
	Crystal River NWR	West Indian Manatee	80
	Florida Panther NWR	Florida Panther	23,379
	Hobe Sound NWR	Loggerhead Sea Turtle, Green Sea Turtle	980
	Lake Wales Ridge NWR	Florida Scrub Jay, Snakeroot, Scrub Blazing Star, Carter's Mustard, Papery Whitlow-wort, Florida Bonamia, Scrub Lupine, Highlands Scrub Hypericum, Garett's Mint, Scrub Mint, Pygmy Gringe-tree, Wireweed, Florida Ziziphus, Scrub Plum, Eastern Indigo Snake, Bluetail Mole Skink, Sand Skink	659
	National Key Deer Refuge	Key Deer	8,542
	St. Johns NWR	Dusky Seaside Sparrow	6,255
Mississippi	Mississippi Sandhill Crane NWR	Mississippi Sandhill Crane	19,713
Virgin Islands	Green Cay NWR	St. Croix Ground Lizard	14
	Sandy Point NWR	Leatherback Sea Turtle	327

Additionally, Region 4 faces an extensive list of fish, wildlife, and plant species that already may be at risk or nearly at risk. In October 2012, Region 4 created a conservation strategy to prevent the extinction of a record number of species that need to be evaluated. No federal protection for at-risk species exists, which means conservation often is limited to the voluntary actions of public and private landowners to maintain best management practices. The region proposes to proactively

[29] http://ecos.fws.gov/tess_public/pub/boxScore.jsp

conserve more than 400 species over the next decade with the help of public and private partners in hopes of preventing the need to list these species under the Endangered Species Act. The goal is not to list the species as endangered, but rather to conserve them in voluntary and innovative ways for future generations of Americans.

CRITICAL HABITATS

The Service has identified habitats throughout the nation that are critical to a variety of fish, wildlife, and plant varieties. These areas not only are located inside Service-managed lands, but also in areas managed or owned by other organizations or entities. Critical habitats have been mapped in GIS as areas of land as well as lines along waterways. Over a third of the Service's Region 4 units (47) intersect areas or waterways identified as critical habitats for 29 different species. Four additional refuges and one fish hatchery are located within a mile of areas identified as critical habitats, including those that support at least one additional species. A full list of the refuges and the single fish hatchery, along with the species associated with critical habitats, is provided in Appendix A2.4. In some cases, critical habitats located near or upon Service units are intersected by major roadways. These pose some concern for land-dwelling species that may come into conflict with vehicles. For example, Interstate Highway 10 cuts through Mississippi Sandhill Crane NWR, where the sandhill crane and Gulf sturgeon reside; and Interstate Highway 20 runs adjacent to Tensas River NWR, which is surrounded by critical habitat for the Louisiana black bear (Figure 2-13 and Figure 2-14).

In Alabama, Cahaba River NWR supports the largest number of species with designated critical habitats. It supports eight species, including the Alabama moccasinshell (*Medionidus acutissimus*); finelined pocketbook (*Lampsilis altilis*); orangenacre mucket (*Lampsilis perovalis*); ovate clubshell (*Pleurobema perovatum*); southern acornshell (*Epioblasma othcaloogensis*); southern clubshell (*Pleurobema decisum*); triangular kidneyshell (*Ptychobranchus greenii*); and upland combshell (*Epioblasma metastriata*).

Species most commonly found in critical habitats that intersect Service lands are the West Indian manatee (*Trichechus manatus*), found in 13 refuges; and the elkhorn and staghorn corals (*Acropora palmate* and *Acropora cervicornis*) as well as the piping plover (*Charadrius melodus*), each found in 12 refuges.

Figure 2-13: Refuges Specifically Established for Endangered Species

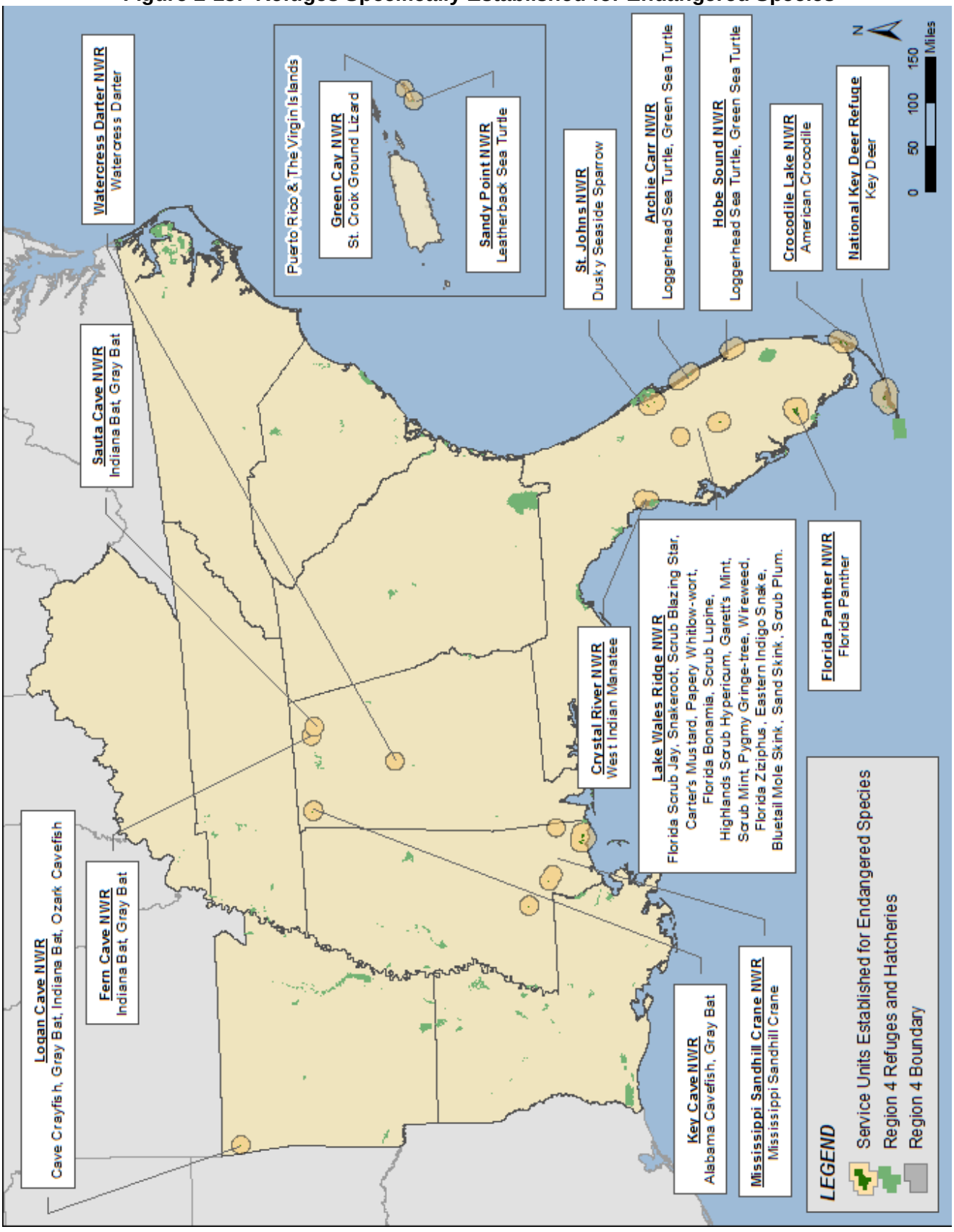
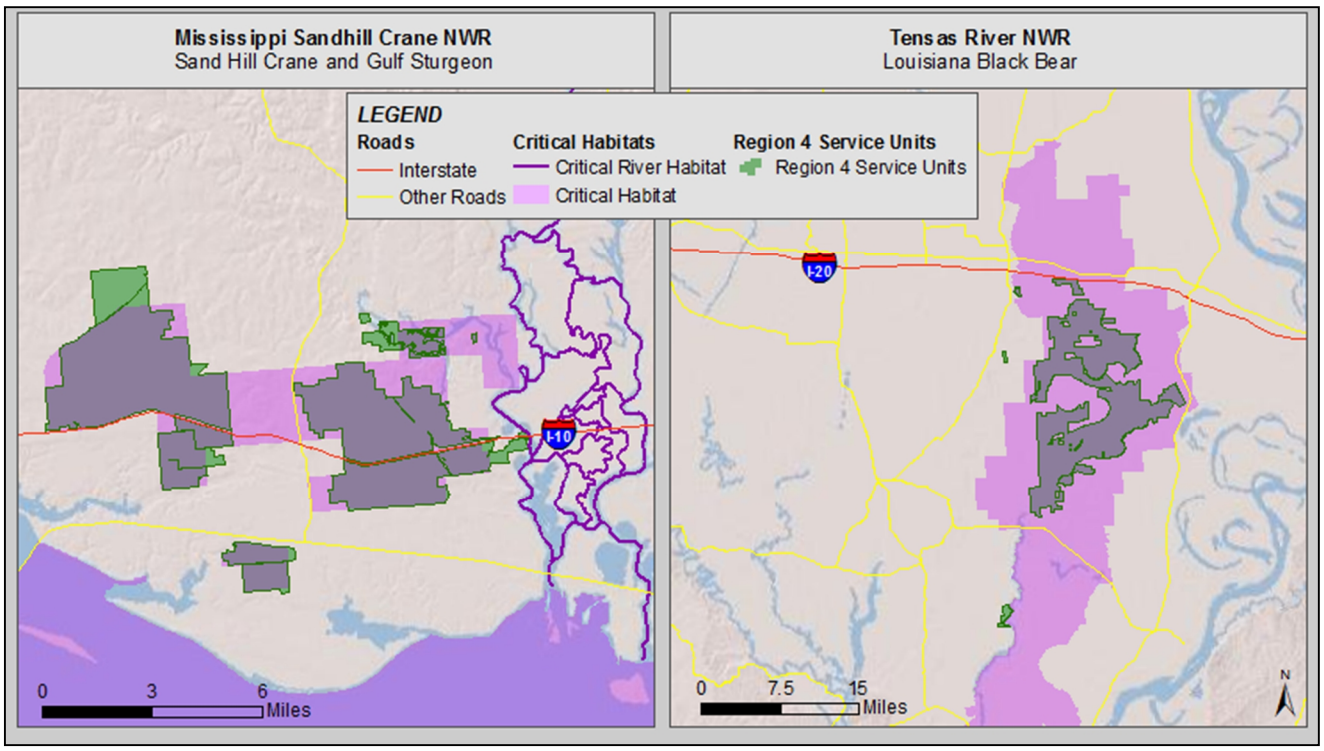


Figure 2-14: Critical Habitats Intersected by Major Interstates



SPECIAL MANAGEMENT AREAS

The National Wildlife Refuge System contains more than 170 refuges with special management areas, such as wilderness areas designated by Congress, and international biosphere reserves designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO).[30]

Wilderness Areas

Within the 500 years since the first European explorers encountered the American continent, an almost unbroken wilderness that was present then is now almost gone. The National Wilderness Preservation System was established by the Wilderness Act of 1964 in order to conserve the remnants of the American wilderness legacy.[31] Wilderness is recognized as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain."[32] Today, the Wilderness System protects more than 107 million acres of designated wilderness, of which about 20 million acres, or 75 wilderness areas, are found in 63 units of the Refuge System in 26 states. Region 4 has 19 refuges with designated wilderness areas located in six states. These are listed in Table 2-20.

[30] http://www.fws.gov/refuges/whm/wilderness.html
[31] *Welcome to the Wilderness: In the National Wildlife Refuge System,* http://www.fws.gov/refuges/whm/pdfs/WildernessBro_sprds.pdf
[32] The Wilderness Act, Public Law 88-577 (16 U.S. C. 1131-1136), http://wilderness.nps.gov/document/wildernessAct.pdf

Table 2-20: Region 4 Service Units with Wilderness Area Designations

Service Unit	State	Wilderness Area	Designation Year
Big Lake NWR	AR	Big Lake Wilderness Area	1977
Blackbeard Island NWR	GA	Blackbeard Island Wilderness Area	1975
Breton NWR	LA	Breton Wilderness Area	1975
Cape Romain NWR	SC	Cape Romain Wilderness Area	1975
Cedar Keys NWR	FL	Cedar Keys Wilderness Area	1972
Chassahowitzka NWR	FL	Chassahowitzka Wilderness Area	1977
Great White Heron NWR	FL	Florida Keys Wilderness Area	1977
Key West NWR			
National Key Deer Refuge			
Island Bay NWR	FL	Island Bay Wilderness Area	1970
J.N. "Ding" Darling NWR	FL	J.N. "Ding" Darling Wilderness Area	1977
Lacassine NWR	LA	Lacassine Wilderness Area	1976
Lake Woodruff NWR	FL	Lake Woodruff Wilderness Area	1977
Okefenokee NWR	FL/GA	Okefenokee Wilderness Area	1977
Passage Key NWR	FL	Passage Key Wilderness Area	1970
Pelican Island NWR	FL	Pelican Island Wilderness Area	1971
St. Marks NWR	FL	St. Marks Wilderness Area	1975
Swanquarter NWR	NC	Swanquarter Wilderness Area	1977
Wolf Island NWR	GA	Wolf Island Wilderness Area	1975

Biosphere Reserves

Under the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) Man and the Biosphere Program, five units of the National Wildlife Refuge System have been designated as international biosphere reserves; of these, three units are located in Region 4:

- Blackbeard Island NWR (Georgia)
- Cape Romain NWR (South Carolina)
- Wolf Island NWR (Georgia)

These refuges have been internationally recognized as protected areas of representative and coastal environments for their value in conservation and in providing the scientific knowledge, skills, and human values that support sustainable development. As an international network of reserves, the Biosphere Reserve Program facilitates the worldwide sharing of information relevant to the conservation and management of natural and managed ecosystems.[33]

NATIONAL WETLANDS INVENTORY

The National Wetlands Inventory (NWI) was established by the Service in 1974 to conduct a nationwide inventory of U.S. wetlands made available to the public through maps and geospatial wetland data. The inventory is used to aid conservation efforts both by providing maps and digital

[33] http://www.fws.gov/refuges/whm/wilderness.html

databases for the public as well as to report on national wetland trends and consider projections for the future. An estimated 46% of endangered or threatened species are associated with wetlands, making the NWI data instrumental in helping determine the occurrence of species and design plans for species recovery.[34]

A large percentage of the land area in the United States is considered to be in the form of wetlands. While this may be surprising, wetlands are transitional areas between aquatic and terrestrial ecosystems where land is covered by shallow water or the water table is near the land surface, supporting the predominant growth of plants classified as hydrophytes, or plants adapted to grow in water. Tidal zones, swamps, bogs, and marshes are considered a part of the wetland system. In general, wetlands are considered areas where the saturation with water is a dominant characteristic for the soil environment, as well as the types of plants and animals that reside within the soil and on its surface. According to the U.S. Geological Service (USGS), "there is no single, correct, indisputable, ecologically sound definition for wetlands, primarily because of the diversity of wetlands and because the demarcation between dry and wet environments lies along a continuum."[35]

Five main systems of wetlands exist: marine, estuarine, riverine, lacustrine, and palustrine. While marine, estuarine and riverine wetlands are fairly self-explanatory, the Lacustrine System refers to lakes, and the Palustrine System refers to marshes or swamps. With that context, there are subsystems based on whether the habitats are tidal, subtidal or nontidal, have saltwater or freshwater, and based on flow or seasonal water level, for example. Further still, classes, subclasses, and dominance types describe the general habitat appearance in terms of dominant life forms or land formation, climate, currents, and distribution of flora and fauna. Table 2-21 notes nine refuges that intersect seven different types of wetland subsystems, including deepwater estuarine and marine systems, estuarine and marine wetlands, freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater ponds, lakes and riverine wetlands. A full list of Service units that intersect with the National Wetlands Inventory can be found in Appendix A2.4.

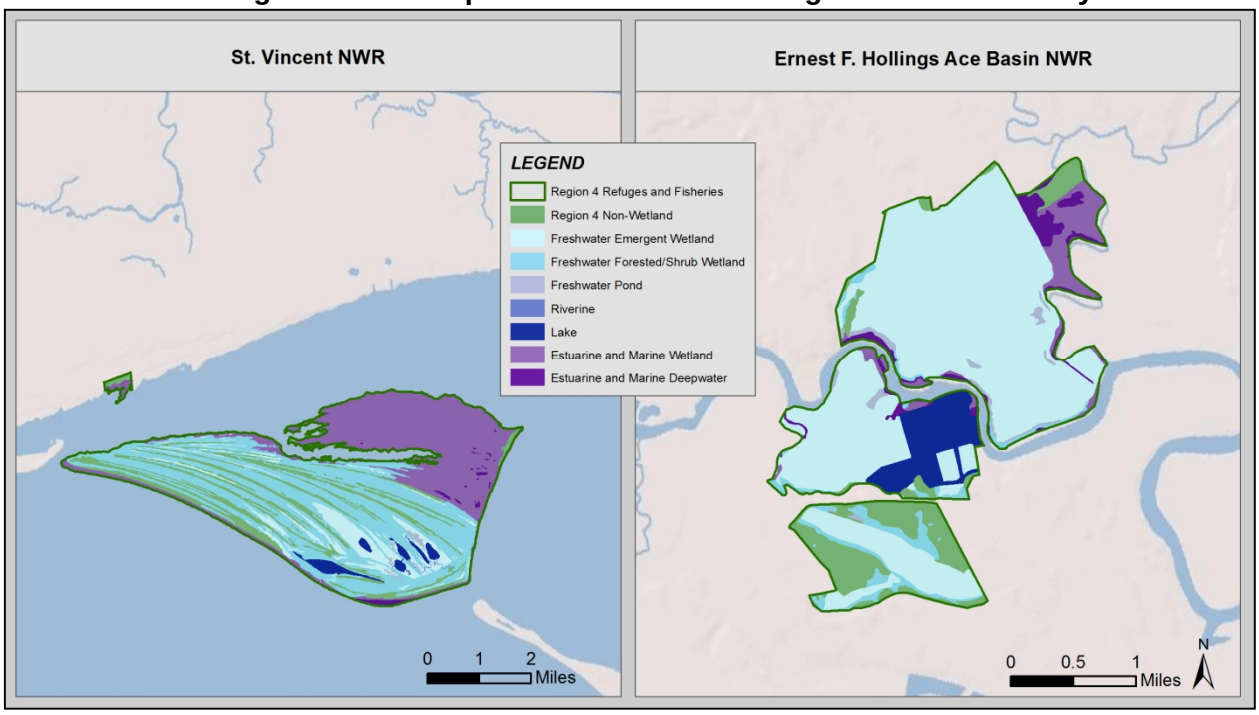
Table 2-21: Sample of Units with High Wetland Diversity

Unit Name	State
Alligator River NWR	North Carolina
Ernest F. Hollings Ace Basin NWR	South Carolina
Big Branch Marsh NWR	Louisiana
Delta NWR	Louisiana
Merritt Island NWR	Florida
Pocosin Lakes NWR	North Carolina
Savannah NWR	Georgia
St. Marks NWR	Florida
St. Vincent NWR	Florida

The National Wetland Inventory presently includes information for all Region 4 states except Mississippi and Arkansas. The inventory covers a great expanse of the Region; however, 110 of the Region's 145 units intersect at least one classified wetland system. Wetland diversity is abundant among many units in the Region. Figure 2-15 shows the high wetland diversity that is apparent in both St. Vincent NWR and Ernest F. Hollings Ace Basin NWR.

[34] http://www.fws.gov/wetlands/NWI/Overview.html
[35] http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm

Figure 2-15: Sample Service Units with High Wetland Diversity



Wetlands of International Importance

The Convention on Wetlands of International Importance is an intergovernmental treaty signed in Ramsar, Iran, in 1971 to provide the framework for international cooperation and action on the conservation and use of internationally important wetlands and their resources.[36] To date, the convention has been signed by 160 countries with 1,994 designated wetland sites worldwide, including 30 in the United States and 19 on national wildlife refuges. Region 4 has five refuges that are designated as wetlands of international importance (Table 2-22).

Table 2-22: Region 4 Units with Ramsar Wetlands of International Importance37

Unit (State)	Significance
Cache River NWR (AR)	Cache River – Cypress Creek Wetlands are at the convergence of four prominent physiographic provinces, where unusually varied species exist in close proximity. The area has major importance for waterfowl, particularly diverse neotropical migrant birds.
Cache River NWR (AR)	The Cache River-Lower White Rivers area has the largest continuous expanse of bottomland hardwoods in the Lower Mississippi Valley important for wintering waterbirds, game and fur-bearing mammals. The area is important for recreation, research, and education.
Catahoula NWR (LA)	Catahoula Lake is a unique example of a lower Mississippi wetland community and is the most important inland wetland for waterbirds and shorebirds in Louisiana.
Okefenokee NWR (FL/GA)	Okefenokee NWR is a designated Wilderness Area and swamp forest and is the second largest wetland complex in the US. It is an extensive drainage basin on the divide between Atlantic Ocean and Gulf of Mexico.
Pelican Island NWR (FL)	Pelican Island NWR is a designated Wilderness Area and National Historic Landmark. The unique climate overlap supports plants and animals from temperate and tropical zones. The mix of salt and fresh water allows for high biological diversity and the lagoonal waters of the Indian River are important as a nursery for juvenile endangered marine turtles.

[36] http://www.fws.gov/refuges/whm/ramsar.html
[37] http://www.fws.gov/refuges/whm/ramsar.html

COASTAL BARRIER RESOURCES SYSTEM

The Coastal Barrier Resources Act (CBRA) in 1982 established the designation of protected coastal barriers along the Atlantic and Gulf coasts as part of a system of undeveloped coastal barriers, often unique landforms, that provide protection for diverse aquatic habitats and serve as the first line of defense against the impacts of severe coastal storms and erosion on the mainland. This Act was established through the recognition that certain actions and programs of the federal government have historically encouraged and subsidized development on coastal barriers, resulting in threats to human life, health and property, as well as the loss of natural resources along with the expenditure of millions of tax dollars each year. Conservation of hurricane-prone and biologically rich coastal barriers is encouraged through lack of eligibility for federal flood insurance, for example. Development is discouraged through the stipulation that private developers or nonfederal parties bear the full cost of any portion of development. Through the identification and designation of the Coastal Barrier Resource System (CBRS), the federal government has been able to restrict eligibility for federal expenditures and financial assistance in these areas. The Act's reauthorization in 1990 extended the CBRS to include undeveloped coastal barriers along the Florida Keys, the Great Lakes, Puerto Rico, and the U.S. Virgin Islands.[38]

CBRS units contain two classifications: system units and otherwise protected areas (OPAs). Nationally, 585 system units and 272 OPAs encompass about 1.3 million and 1.8 million acres of land and aquatic habitat, respectively. System units include private lands that were relatively undeveloped at the time of their designation with the CBRS, and tend to follow geomorphic, development, or cultural features. OPAs are generally held by a qualified organization primarily for the purpose of a wildlife refuge or sanctuary, recreational or natural resource conservation, and generally follow boundaries of conservation or recreation areas. While system units are prohibited from most new federal expenditures and financial assistance, including federal flood insurance, the OPAs are only prohibited from flood insurance.

The coastline along the Southeast region is home to 190 system and 135 OPA units, nearly one third and one half of the national units, respectively. Region 4 has 32 coastal refuges, identified in Table 2-23 that intersect with CBRS units, with approximately 15,300 acres sharing land with system units and nearly 218,000 acres sharing land with OPAs.

Ten refuges, shown in bold in Table 2-23, are composed of OPAs in nearly their entirety, while 22 refuges have more than half of their land areas dedicated to the CBRS's system units. Finally, four additional refuges are located within a mile of a CBRS unit, for a total of 36 refuges in close proximity to the Coastal Barrier Resource System.

[38] http://www.fws.gov/CBRA/

Table 2-23: Region 4 Overlap with the Coastal Barrier Resource System

Unit Name	State	Total CBRS Acres	Total Unit Acres	Percent CBRS
Archie Carr NWR	FL	83.9	256.5	32.7%
Blackbeard Island NWR	GA	5,591.1	5,591.1	100.0%
Bon Secour NWR	AL	6,160.0	7,053.7	87.3%
Breton NWR	LA	7,541.8	7,541.8	100.0%
Buck Island NWR	USVI	45.1	45.1	100.0%
Cabo Rojo NWR	PR	792.1	1,861.3	42.6%
Cape Romain NWR	SC	60,095.2	60,122.8	100.0%
Cedar Keys NWR	FL	760.5	764.0	99.5%
Crocodile Lake NWR	FL	6,788.8	6,794.6	99.9%
Culebra NWR	PR	315.2	1,487.6	21.2%
Currituck NWR	NC	8,653.4	8,733.8	99.1%
Egmont Key NWR	FL	329.9	331.2	99.6%
Great White Heron NWR	FL	4,106.4	5,940.1	69.1%
Green Cay NWR	USVI	12.8	12.8	100.0%
Hobe Sound NWR	FL	537.5	1,046.4	51.4%
J. N. "Ding" Darling NWR	FL	5,845.4	6,367.9	91.8%
Key West NWR	FL	20,082.1	210,664.0	9.5%
Lower Suwannee NWR	FL	1,373.7	51,742.9	2.7%
Matlacha Pass NWR	FL	138.2	532.2	26.0%
Merritt Island NWR	FL	60,163.2	129,369.0	46.5%
National Key Deer Refuge	FL	4,468.4	6,262.1	71.4%
Passage Key NWR	FL	63.1	63.1	100.0%
Pea Island NWR	NC	4,647.2	4,649.0	100.0%
Pelican Island NWR	FL	4,970.9	5,424.9	91.6%
Pine Island NWR	FL	270.4	630.4	42.9%
Pinellas NWR	FL	391.3	392.0	99.8%
Sabine NWR	LA	4.2	141,520.0	0.0%
Sandy Point NWR	USVI	457.4	518.0	88.3%
St. Marks NWR	FL	1,214.2	71,949.5	1.7%
St. Vincent NWR	FL	12,169.4	12,176.9	99.9%
Wassaw NWR	GA	10,185.9	10,231.4	99.6%

FEMA NATIONAL FLOOD HAZARD LAYER

While it is possible for flooding to occur anywhere it rains, some areas are at higher risk than others. Flood risk is based on a number of factors including land changes due to building and development, topography, flood control measures, and, of course, rainfall, river flow and tidal surges. Flood hazard maps have been created to show varying degrees of risk to help determine the cost of flood insurance. The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA) to both offer flood insurance to property owners and renters while helping enforce sound floodplain management standards. FEMA conducts flood insurance studies, which include statistical data on, for example, river flow and storm tides, rainfall, and topographic surveys in order to create flood hazard maps. These maps are continuously

updated based on changing weather patterns, erosion, and infrastructure development, because all of these factors can affect floodplain boundaries.

High-risk areas with a 1% annual chance of flooding, labeled as zones with the letters A (inland) or V (coastal), include areas where there is at least a 1 in 4 chance of flooding during a 30-year period, the standard length of a typical home mortgage. Home and business owners in these areas with mortgages from federally regulated or insured lenders are required to buy flood insurance. While moderate-to-low risk areas have a reduced risk of being flooded, flood insurance is recommended but not federally required. Still, these areas submit over 20% of claims to the NFIP and receive one-third of disaster assistance for flooding. Floodways are designated by FEMA as areas that should remain free of development to moderate increases in flood heights due to encroachment of the floodplain.

In Region 4, 69 refuges and six fish hatcheries fall within high-risk area zones A and V. Additionally, nine refuges and two hatcheries intersect floodways. These 11 units are listed in Table 2-24 with their relative risk for flooding. While flooding may be a necessary element of the ecosystems supported in refuges, it is important to consider the risk of loss of Service assets that fall within high-risk flooding areas. The Service should have particular concern for designated floodways, which have been determined as critical locations to avoid or mitigate development in order to ensure the water table, permeable surfaces, and topology are not compromised to increase the potential for flood damage in the vicinity.

Table 2-24: Service Units, and Route Types that Intersect FEMA Designated Floodways[39]

Unit Name	State	Number of Service Assets Intersecting Floodways			
		Gravel	Native	Primitive	Total
Bald Knob NWR	AR				
Bond Swamp NWR	GA				
Clarks River NWR	KY				
Grand Bay NWR	AL/MS	1	1		**2**
Lower Suwannee NWR	FL	3	2	2	**7**
Meridian NFH	MS				
Mississippi Sandhill Crane NWR	MS				
Private John Allen NFH	MS	1			**1**
Roanoke River NWR	NC	4	1		**5**
Watercress Darter NWR	AL				
Wheeler NWR	AL	13	4		**17**

The nine refuges and two hatcheries listed in Table 2-24 intersect FEMA-designated floodways, five of which include inventoried Cycle 4 RIP sections that intersect the designated floodway areas. While the assets shown in Figure 2-16 are currently gravel, native, and primitive, it is important to consider that a future conversion to an impermeable surface (i.e., concrete or asphalt) should be considered only second to realigning outside of the designated floodway area. Any change in a designated floodway area could raise the water table and create higher risk for damage from flooding, besides being built in a location prone to water and storm damage. A full list of the routes intersecting floodways is provided in Appendix A2.4.

[39] Service Assets considered were those in the Cycle 4 RIP database.

NATIONAL AMBIENT AIR QUALITY STANDARDS – NONATTAINMENT AREAS

The Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants that are sources of concern for health and environmental effects. In Region 4, six refuges directly intersect areas identified for nonattainment of three of the common pollutants: ozone, sulfur dioxide and particulate matter.

Ozone is a gas that occurs in both the upper atmosphere and at ground level. Ozone is created by the chemical reaction between emissions from a variety of sources, including vehicle exhaust and volatile organic compounds that are emitted by both human-made and naturally occurring chemical compounds, often released by plants. In the upper atmosphere, ozone protects the Earth from harmful ultraviolet rays from the sun, but at ground level ozone is harmful to breathe and can damage crops, trees and other vegetation.[40] Ozone is clearly a concern for plant populations, wildlife, and people, which presents an opportunity to assist local planning organizations with considerations to reduce ozone creation.

Sulfur dioxide is a highly reactive gas that largely comes from the combustion of fossil fuels at power plants and other industrial facilities. Even short-term exposure with sulfur dioxide is linked with adverse effects on the respiratory system. Those with impaired respiratory function have increased visits to hospital emergency rooms, even with very limited exposure to sulfur dioxide; it can cause constriction of the bronchial tubes as well as an increase in asthma symptoms.[41]

Particulate matter, typically called PM2.5 or PM10 (the diameter of particles in micrometers), is a complex mix of tiny particles and liquid droplets made up of acidic nitrates and sulfates, organic chemicals, metals, and soil or dust particles. Particulate matter comes from a variety of sources, but it generally includes particles directly emitted into the air from a source such as construction sites, dust from unpaved roads, fields, smokestacks, or fires; indirect sources of particulate matter come from complicated reactions in the atmosphere. The size of the emitted particles is directly linked to the potential to cause health problems when inhaled, because they are tiny enough to enter the lungs and bloodstream; and some contain compounds that could be toxic to the body.[42]

Table 2-25 lists the six Region 4 refuges in which pollutant(s) are a concern, and their most current attainment status. Five of the six refuges are located in nonattainment areas for ozone. Bond Swamp NWR and Watercress Darter NWR are located within areas that have nonattainment status for both ozone and particulate matter, PM2.5. Figure 2-17 shows the locations of refuges that intersect air quality nonattainment areas in Region 4.

Table 2-25: Refuges in Nonattainment Areas

Refuge	State	MPO/ Nonattainment Area Name	Pollutant(s)
Atchafalaya NWR	LA	Baton Rouge, LA	Ozone
Bond Swamp NWR	GA	Macon, GA	Ozone / Particulate Matter – $PM_{2.5}$
Key Cave NWR	AL	Lauderdale County, AL	Sulfur Compounds - SO_x
Mackay Island NWR	NC/VA	Norfolk-Virginia Beach-Newport News, VA	Ozone
Wapanocca NWR	AR	Memphis, TN-AR	Ozone
Watercress Darter NWR	AL	Birmingham, AL	Ozone / Particulate Matter – $PM_{2.5}$

[40] http://epa.gov/airquality/ozonepollution/pdfs/ozonegb.pdf
[41] http://epa.gov/airquality/sulfurdioxide/
[42] http://epa.gov/airquality/particlepollution/

Figure 2-16: Sample Locations where Service Assets Intersect FEMA Floodways

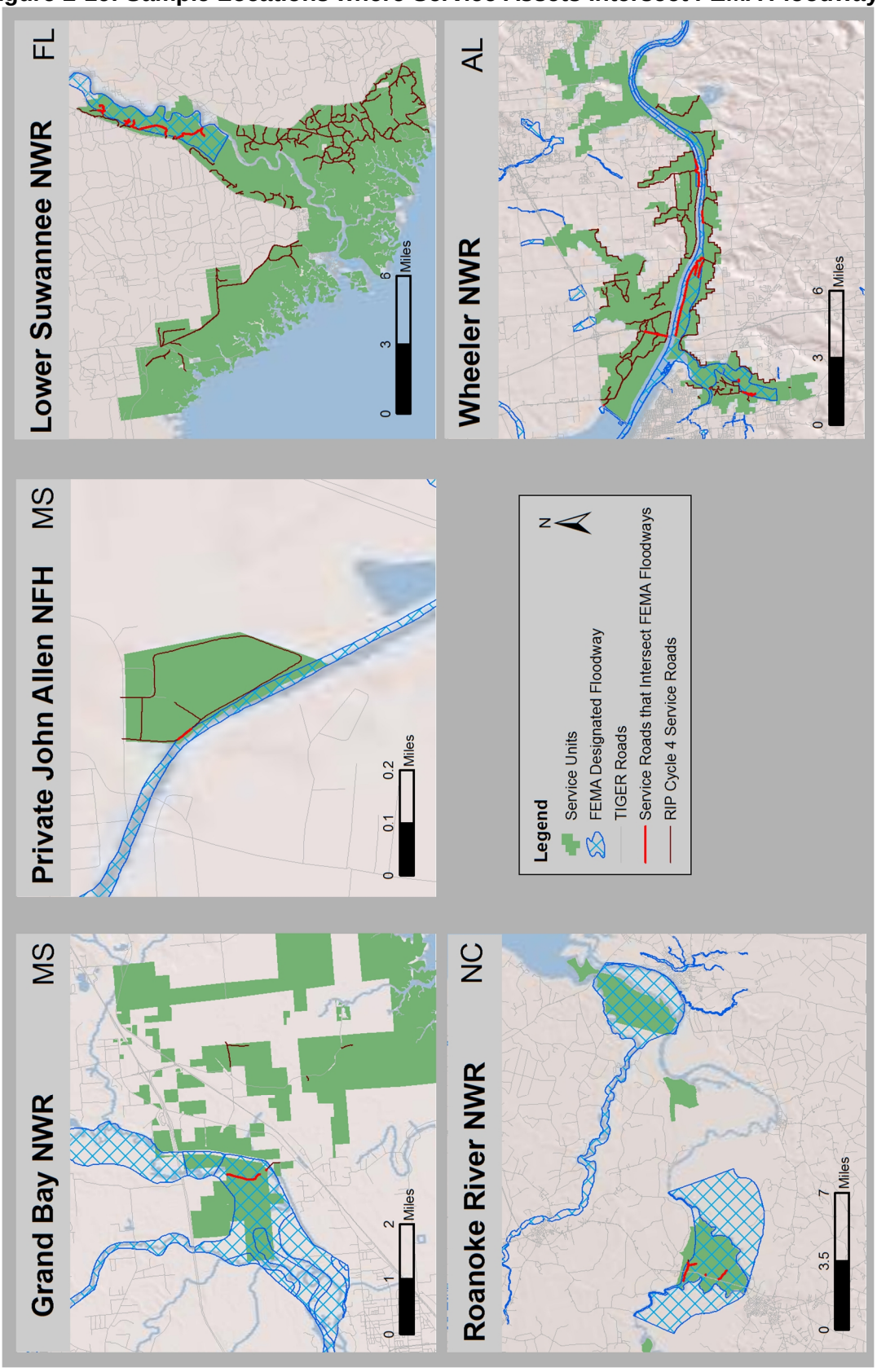
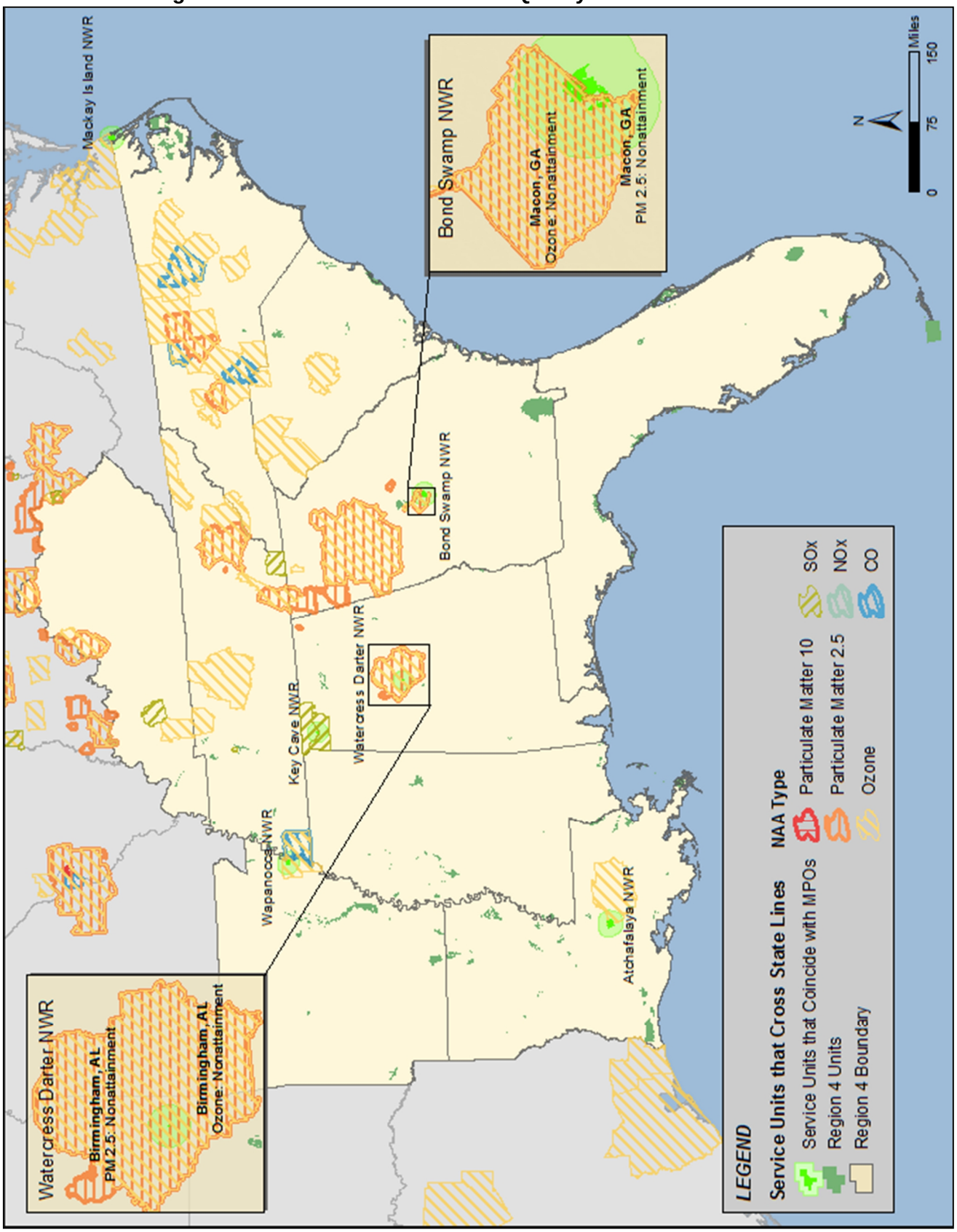


Figure 2-17: Units that Intersect Air Quality Nonattainment Areas



Alternative Fuel Vehicles

Habitat and wildlife can benefit from the replacement of traditional fueled vehicles because alternative fuels reduce air pollution and greenhouse gas emissions. Refuges and groups that own and operate transit services within refuges are seeking a switch from traditional fueled vehicles to alternative fueled vehicles, in response to the *2008 FWS Policy and Management Guidance* (Chapter 320). Alternative fuel vehicles are becoming increasingly more common, necessitating an expansion in the number of alternative fueling stations across the country.

An inventory of alternative fueling stations from 2011, provided by the National Transportation Atlas Database (NTAD 2012), assisted with the identification of 41 refuges open to the public that are located within 10 miles of alternative fueling stations. Mobility becomes a concern for alternative fuel vehicles, because alternative fuel is not accessible everywhere and it is necessary for the ability of the vehicles to continue running. The U.S. Department of Energy maintains a website called the Alternative Fuels Data Center,[43] which provides a plethora of information on the types of alternative fuels and vehicles; fuel conservation efforts; laws and incentives for using alternative fueled vehicles; and a database of alternative fueling stations. The website also includes a mapping program, which can help recommend routes that will pass near alternative fuel stations so that owners can ensure access to the appropriate fuel.[44] Alternative fuel vehicles also can be considered as replacement vehicles for the Service's maintenance fleets in areas where alternative fuels are available. Many alternative fuels have a dual benefit of lifetime cost savings compared to vehicles that run on petroleum products, and many show improvements in reducing environmental impacts because they burn cleaner.

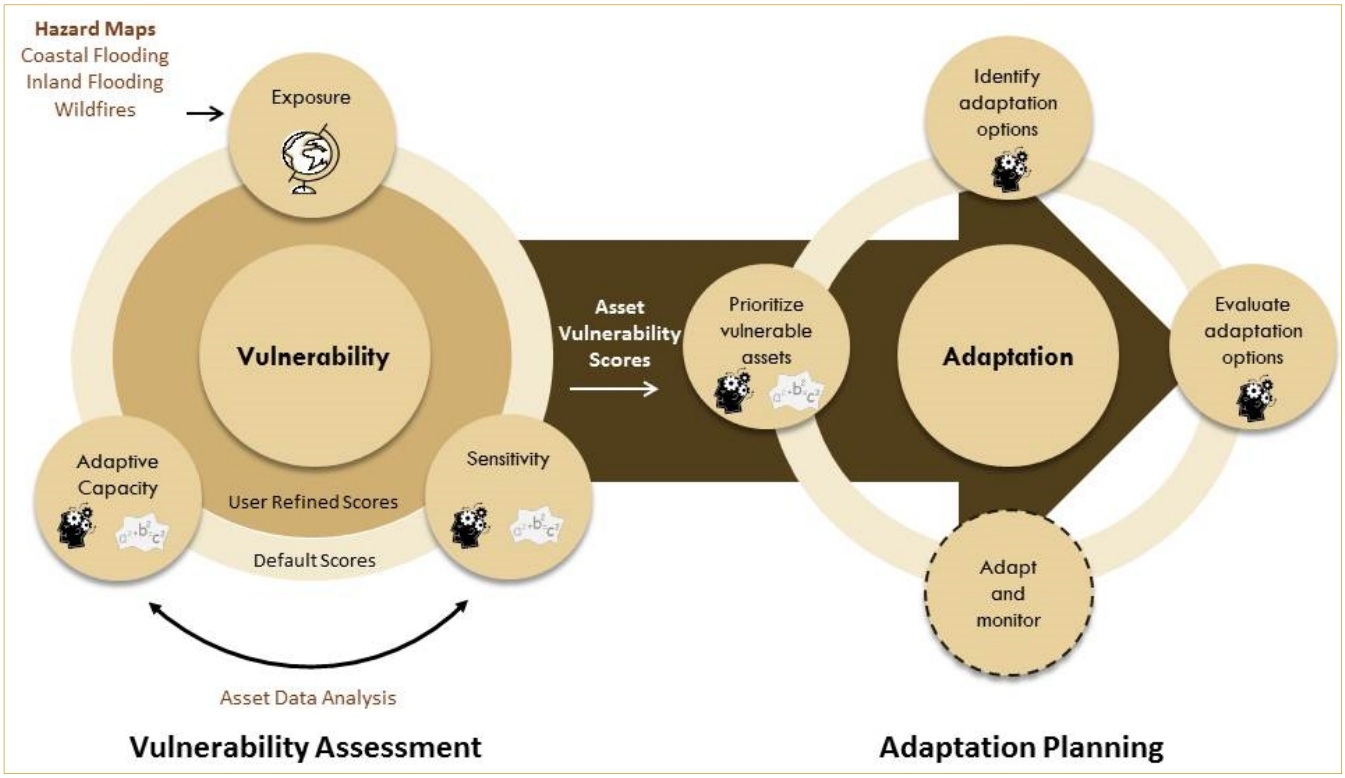
CLIMATE CHANGE

The Federal Highway Administration (FHWA) is working closely with both the U.S. Fish and Wildlife Service and the National Park Service on a project known as "Strategic Research Initiative: Integration of Federal Lands Management Agency Transportation Data, Planning, and Practices with Climate Change Scenarios to Develop a Transportation Management Tool." This project, being conducted by ICF International, is a separate yet parallel effort to the LRTP planning process. Results from the climate change analyses and research will provide an environmental context to the larger transportation assessment and recommendations.

Two components, Vulnerability Assessment and Adaptation Planning, are being considered as a part of the tool. The Vulnerability Assessment takes into account a large amount of data to determine which park and refuge transportation assets are the most vulnerable to climate change. Once identified, the staff from the parks and refuges can work with the FHWA and ICF International team to determine the best adaptation options for each. Workshops were conducted at a total of four stations in the Southeast Region—two national parks and two national wildlife refuges—to refine the tool and discuss possible adaptation strategies. The Vulnerability Assessment is a function of three aspects: exposure (how much the asset is exposed to certain climactic hazards); sensitivity (which assets experience the greatest damage when exposed equally); and adaptive capacity (how well the assets adjust, repair, and respond to damage). Figure 2-18 shows the overall process for the plan and the tool.

[43] http://www.afdc.energy.gov/locator/stations/
[44] http://www.afdc.energy.gov/locator/stations/#route/

Figure 2-18: Climate Change Vulnerability Assessment and Adaptation Planning



The three components are explained in more detail below, per the technical memorandum from April 2013, *J.N. "Ding" Darling National Wildlife Refuge Climate Change and Transportation Tool Pilot Workshop*, prepared by ICF International. These components are the basis for determining the overall vulnerability to climate change of all transportation assets for the National Park Service and the U.S. Fish and Wildlife Service.

- *Exposure*
  - *Inland Flooding*
    - *100-year flood zone – Assets in the 100□year flood zone are more likely to be exposed to inland flooding events*
    - *500-year flood zone – Assets in the 500-year flood zone are more likely to be exposed to inland flooding events*
  - *Coastal Flooding*
    - *Elevation – Assets at lower elevation are more likely to be flooded by incoming coastal waters*
    - *Coastal Vulnerability Index – Coastal Vulnerability Index calculates the relative risks to a coastal area due to future sea level rise, and includes factors such as tidal range, wave height, coastal slope, shoreline change, geomorphology, and historical rate of sea level rise.*
  - *Wildfire*
    - *Fire Regime Group Frequency – Assets located in a Fire Regime Group with a more frequent return interval are more exposed to wildfire.*
    - *Fire Regime Group Severity – Assets located in a Fire Regime Group with more sever fires are more exposed to damage from wildfire.*

- *Sensitivity*
  - *Facility Condition Index (FCI) – FCI measures the amount of deferred maintenance relative to the current replacement value (CRV) of an asset; a proxy for condition.*
  - *Asset Material (pavement) – Unpaved roads, trails, and parking lots are more likely to experience damage during flooding events. SAMMS "construction material" field used.*
  - *Asset Material (wood) – Wooden assets are more likely to experience damage during wildfire events. SAMMS "construction material" field used.*
  - *Remaining Service Life (RSL) –RSL measures the years of service life remaining for an asset, based on a condition assessment.*
  - *Pavement Condition Rating (PCR) – PCR is an assessment of pavement condition based on a formula that rolls up the rutting, roughness and cracking indices.*
  - *Scour Criticality – Scour criticality measures the scour condition of bridges, noting bridges that are "scour critical."*
  - *Movable Components on Bridge – Based on "structure type" field from NBI; movable components on bridges (e.g., drawbridges with electrical components) are more easily damaged from storm surge or water exposure.*

- *Adaptive Capacity*
  - *Current Replacement Value (CRV) – Assets with a higher replacement cost are likely more expensive to maintain, repair, and replace in the event of damage.*
  - *Asset Priority Index (API) – Assets with a higher API score are highly critical to the function of the refuge and may be irreplaceable, indicating a very low adaptive capacity.*
  - *Historic Status – Assets that are designated historic may be irreplaceable to the Refuge.*
  - *Detour Length – Bridges with a higher detour length cause a bigger service disruption when damaged.*
  - *Average Daily Traffic (ADT) – Bridges with higher daily traffic counts cause a bigger service disruption when damaged.*

Following the completion of the Vulnerability Assessment, ICF International along with the FHWA, NPS, and FWS will be developing adaptation strategies for the stations and assets of highest priority. This will include considering proactive and reactive adaptation strategies, evaluating costs, feasibility, and consistency with other station goals, and looking for opportunities for adaptation within existing planning structures.

ICF International completed the four workshops in February 2013 and finished the workshop technical reports and the 75% Tool in April 2013. In the Fall of 2013, ICF International will complete the 100% Tool, which includes the final toolbox consisting of a web portal, vulnerability assessment tool, and adaptation planning tool that can be used at stations across the nation.

More information regarding the climate change tool and its results will be provided in the final report of the Region 4 LRTP, including recommendations for how climate change adaptation can be incorporated in the regional and station-level planning efforts.

GOAL 5 – SAFETY

The Service supports reliable and safe access to and from its network of lands and waters. Roadways, while an essential component of the national transportation system, can be hazardous due to road pavement conditions, traffic volumes, high speeds, and the potential for collisions.

Safety is a concern not only for refuge staff and visitors but also for wildlife. Roadways are a major component of the United States transportation system, and FWS areas located near high speed, high volume roadways pose greater risks for collisions.

Many factors contribute to collisions. High crash areas can be identified for further evaluation by considering recent historical crash data. Roadway surface condition can be a contributing factor to collisions and other safety-related concerns. Proper identification of areas that either have high volume, high speeds, high collision rates, or simply poor pavement quality can ensure that maintenance concerns are brought up, and through a coordinated effort, addressed to improve overall roadway quality.

***Goal**: Provide a transportation system that ensures visitors traveling to and within Service lands arrive at their destinations safely.*

Objective 1: Identify safety issues on the Service's transportation system using quantitative data.

Objective 2: Identify and implement appropriate safety countermeasures and tools to reduce the frequency and severity of crashes between different transportation modes, as well as between vehicles and animals.

Objective 3: Use open communication among the "4Es"—engineering, education, enforcement, and emergency medical services—to collaboratively address safety issues on Service-owned roads.

Objective 4: Reduce transportation corridor (roads, trails, fencing) barriers and hazards by planning, designing, and evaluating sites that facilitate the safe movement of wildlife across roads to increase motorist safety.

ROADWAY NETWORK CONDITIONS

Service Asset Conditions

While all roads are inventoried, public use roads get more use than administrative roads, and will be considered below as an important subset of Region 4's transportation assets. Overall, the Service's public roads in Region 4 are in fairly good condition. Of the 79 units with more than five miles of road, as inventoried by Cycle 4 RIP, twenty have over 80% of their road miles rated as being in "good" or better condition; only seven refuges have over 10% of their road miles rated as being in "poor" or "failed" condition. The following two tables rate the public use road conditions for stations with at least five miles of public road, with the best (Table 2-26) and worst (Table 2-27) overall roadway surface condition. A comprehensive list of both public and administrative roads by Service unit and condition data can be found in Appendix A2.2. Figure 2-19 shows a sample of the units identified in Table 2-26 and Table 2-27.

Table 2-26: Service Units with Best Overall Service Road Conditions

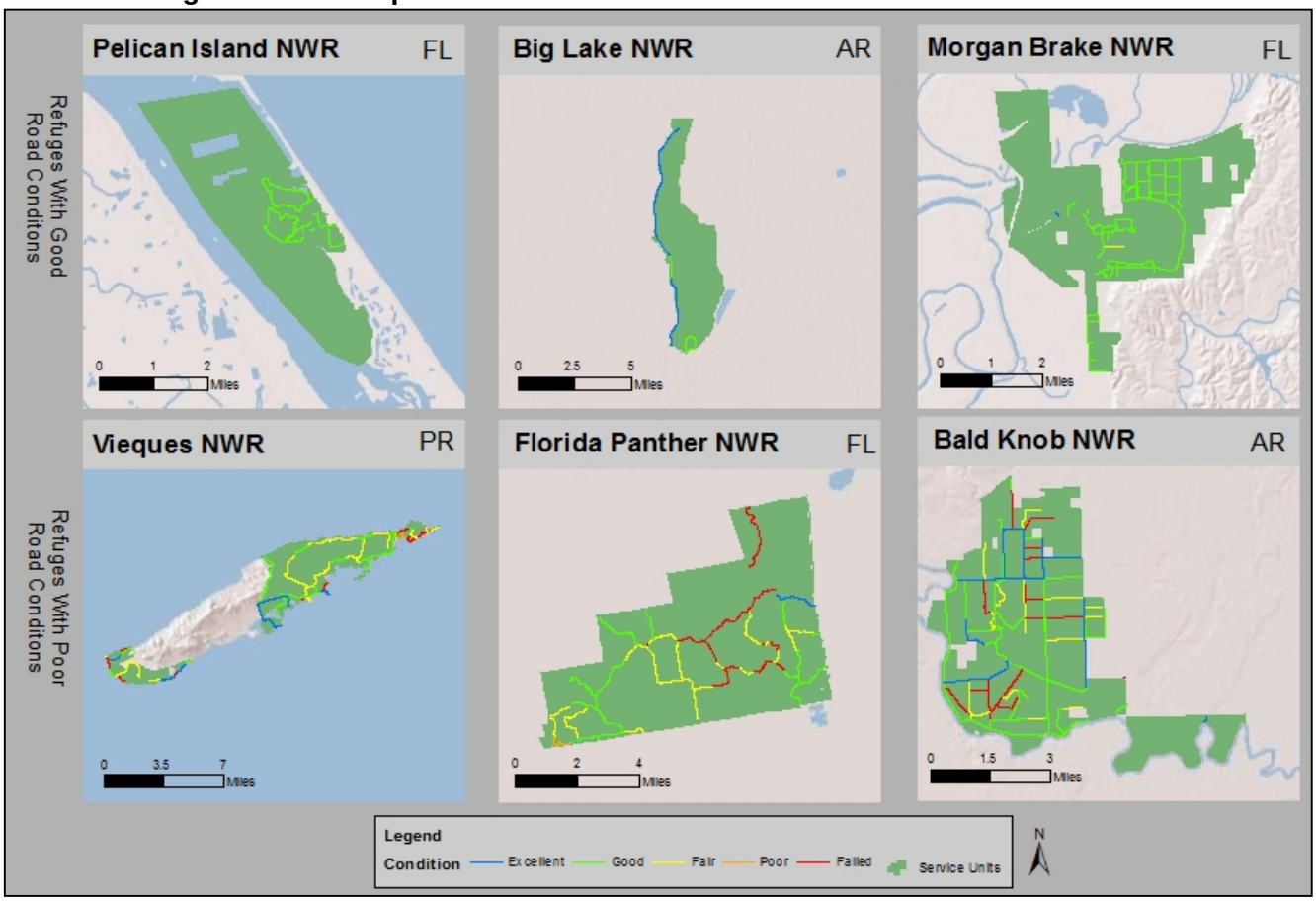
Station (units considered had at least five miles of roads)	State	Miles of Road by Pavement Condition					Total Miles	Percent Good / Excellent
		Excellent	Good	Fair	Poor	Failed		
Big Lake NWR	AR	9.5	3.0				12.6	100.0%
Tallahatchie NWR	MS	5.0	5.7				10.7	100.0%
Pelican Island NWR	FL		7.6				7.6	100.0%
Pond Creek NWR	AR	22.3	25.8	0.2			48.3	99.6%
Morgan Brake NWR	MS	0.1	22.1	0.4			22.6	98.1%

Table 2-27: Service Units with Worst Overall Service Road Condition

Station (units considered had at least five miles of roads)	State	Miles of Road by Pavement Condition					Total Miles	Percent Good / Excellent
		Excellent	Good	Fair	Poor	Failed		
Clarks River NWR	KY		2.0	1.6		1.8	5.4	32.5%
Florida Panther NWR	FL	1.5	16.1	17.0	1.0	10.9	46.5	25.5%
Bald Knob NWR	AR	12.6	30.5	11.2		12.0	66.4	18.1%
Atchafalaya NWR	LA	3.2	9.9	1.9	2.4		17.3	13.8%
Vieques NWR	PR	8.2	20.1	21.0	0.8	6.5	56.7	12.9%

A comprehensive list of both public and administrative roads by Service unit and condition data can be found in Appendix A2.2.

Figure 2-19: Sample Service Units with Best and Worst Road Conditions



Highway Pavement Management System Conditions

The Highway Pavement Management System (HPMS) is the official government source of data on the extent, condition, performance, use, and operating characteristics of the nation's highways.[45] All public roads eligible for federal aid highway funds have three data points that

[45] HPMS Field Manual http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/

must be reported: length, lane miles, and total vehicle miles traveled (VMT). The National Highway System (NHS) additionally has VMT and the International Roughness Index collected for its full extent. Some additional data is reported on a sampling basis, including Average Annual Daily Traffic (AADT) volumes.

The International Roughness Index (IRI) is a standardized pavement measurement that was developed by the World Bank in the 1980s and used to define the roughness of a roadway. Pavement roughness can indicate ride comfort because it measures the response to vibrations due to irregularities in the pavement surface. Thus, a sampled understanding of the overall pavement ride quality can be understood through the analysis of HPMS segments that intersect or fall within one mile of refuges and fish hatcheries.

Slightly more than 310 HPMS roadway miles intersect Service lands directly, while 2,626 miles are located within one mile of the network of refuges and hatcheries. Fewer than 50% of the total HPMS road miles were evaluated for pavement condition utilizing IRI measurements. Intersecting HPMS segments have 70.2% of their mileage rated in "fair" or better condition, while 49% of the mileage is rated in "good" or "very good" condition. Only 9.0% of the evaluated roads were considered to be in "very poor" condition. These numbers are similar for roadways located within a mile of a Service unit's boundary, where 66.7% of roadway miles were recorded as being in "fair" or better condition, 49.4% in "good" or "very good" conditions, and a slight increase to 11.8% of road miles rated in "very poor" condition.

Table 2-28 and Table 2-29 outline the refuge and fish hatchery areas with the best and worst overall HPMS segment conditions, for those refuges that have at a minimum five miles of IRI segments within one mile of the refuge boundary.

Table 2-28: Units with Overall Best HPMS-Collected IRI Ratings

Station (units considered had at least five miles of HPMS segments)	State	HPMS Miles		Miles of Road by Pavement Condition					Percent Good / Excellent
		Total	IRI	Excellent	Good	Fair	Poor	Failed	
Catahoula NWR	LA	30.3	14.6	0.0	14.6	0.0	0.0	0.0	100.0%
Cameron Prairie NWR	LA	6.1	5.2	0.0	5.2	0.0	0.0	0.0	100.0%
Lake Woodruff NWR	FL	19.4	5.7	3.0	2.6	0.0	0.1	0.0	98.3%
Archie Carr NWR	FL	18.6	18.3	9.4	8.0	0.8	0.2	0.0	94.8%
Ten Thousand Islands NWR	FL	12.7	5.7	1.0	4.4	0.1	0.2	0.0	94.7%

The areas of most concern would be those road segments with overall poor roadway conditions. These segments could offer great opportunities for partnerships with local agencies, and both the Service and other agencies would mutually benefit from the improvement of roadway surfaces. Nine refuges have 100% of their public roads rated as either "poor" or "very poor" for those HPMS segments calculated for IRI. With the exception of the two noted below, refuges with 100% of their mileage with "poor" condition generally have fewer than three miles of IRI-computed segments from the HPMS database.

Table 2-29: Units with Overall Worst HPMS-Collected IRI Ratings

Station (units considered had at least five miles of HPMS segments)	State	HPMS Miles		Miles of Road by Pavement Condition					Percent Good / Excellent
		Total	IRI	Excellent	Good	Fair	Poor	Failed	
Bayou Teche NWR	LA	27.1	9.1	0.0	0.0	0.0	9.1	0.0	100.0%
Black Bayou Lake NWR	LA	8.6	6.7	0.0	0.0	0.0	3.3	3.4	100.0%
Natchitoches NFH	LA	7.5	5.2	0.0	0.4	0.0	1.3	3.4	92.3%
Overflow NWR	AR	13.2	8.7	0.0	0.4	0.6	4.0	3.7	88.6%
Bogue Chitto NWR	LA/MS	20.3	11.3	0.0	1.7	0.2	9.4	0.0	83.3%

Road Miles

TIGER/Line Shapefiles were the most comprehensive set of roadway data available that would be consistent across the entire Region. While some states were able to provide inventoried roadway network data, collection efforts and collected records varied widely and, in some cases, were not available. TIGER/Line Shapefiles informed a total number of road miles for all functional classifications to give a better understanding of the overall roadway network surrounding each refuge and hatchery. TIGER routes include all major interstates and highways, as well as much smaller local roads.

Overall, roads identified in TIGER run through or immediately adjacent to 110 refuges and all 17 fish hatcheries. As noted previously, while 18 refuges do not directly intersect the TIGER lines network, two are located within a half mile and are connected by refuge roads to the TIGER network. Sixteen refuges do not directly connect to the roadway network. Those refuges with the highest number of directly intersecting road miles are shown in Table 2-30.

Table 2-30: Service Units with the Highest Number of Directly Intersecting Road Miles

Unit Name	State	TIGER Miles
Merritt Island NWR	FL	226.5
Alligator River NWR	NC	195.0
Pocosin Lakes NWR	NC	177.2
Carolina Sandhills NWR	SC	176.3
White River NWR	AR	170.7
Vieques NWR	PR	137.1
Tensas River NWR	LA	133.9
Okefenokee NWR	FL/GA	120.8
Lower Suwannee NWR	FL	107.2
St. Marks NWR	FL	106.0

Some refuge areas contain an immense amount of road miles. As shown on Table 2-31, ten refuges have more than 100 miles of inventoried routes within their boundaries, with a maximum of 226.5 miles in Merritt Island NWR and 195 miles in Alligator River NWR. An additional 21 refuges contain between 50 and 100 miles of the roadway network intersecting their boundaries. With so many roads passing through these areas, the wildlife habitat likely has some discontinuity and there is greater potential for safety concerns throughout.

A total of 138 Service units, including all 17 fish hatcheries, contain or could access TIGER roads within one mile from their outer boundaries. This leaves seven island refuges located more than one mile from the nearest land mass that has roadways, while the remaining island refuges are close enough to a main land mass to be within a mile of some TIGER roadways.

Table 2-31: Service Units with the Highest Number of Road Miles within One Mile

Unit Name	State	TIGER Miles
Okefenokee NWR	FL/GA	940.9
Cache River NWR	AR	688.5
Wheeler NWR	AL	667.3
Pocosin Lakes NWR	NC	486.9
Merritt Island NWR	FL	459.4
White River NWR	AR	456.7
Tensas River NWR	LA	425.6
Theodore Roosevelt NWR	MS	372.1
St. Marks NWR	FL	368.8
Mississippi Sandhill Crane NWR	MS	359.7

COLLISIONS

The inventory of TIGER road miles also helps inform collision rates per mile in the refuge and fish hatchery system. While there are certainly specific intersections and route segments that have safety hot spots, a better general understanding of safety hot spots for the Service can be derived by considering the total number of collisions that occur within and just outside of the refuges and hatcheries, based on the total number of roadway miles where collisions occur.[46]

Collision data was collected by state for the most recent three-year period of collision data that was available with geospatial information.[47] Additionally, the Fatality Analysis Reporting System (FARS) contains data derived from a census of all fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico. To be entered in the FARS database, crashes must result in the death of a person within 30 days of a crash that involves a motor vehicle traveling on a traffic way customarily open to the public. A summary of all collision information from both the FARS database as well as state-reported data is provided in Appendix A2.5. Please note that some statewide collection effort years are the same as years analyzed from the FARS database. Discrepancies in the number of fatal events or fatalities could be caused by faulty GPS coordinates.

It is difficult to maintain consistency with the types of information that each state provides. Collision data items typically are collected and reported by police officers who arrive at the scene. Every state has different data collection forms with distinct characteristics. Each state also has different regulations on the data they are allowed to share. Some agencies have better technology for collecting GPS coordinates, and some have better adherence to collecting geographic information. With the size of Region 4 and the challenges associated with reported collision data, it was not

[46] Typical analysis of collision rates consider road miles, AADT, and collisions that occur along roadways; however, AADTs were not available for all roadway segments, nor were collisions completely precise or accurate, which caused concern for the validity of a typical analysis consider the potential discrepancies across states.
[47] Years collected were not uniform across states; not all data points were analyzed due to faulty GPS coordinate information.

feasible to ensure that every collision was mapped in the correct location and included in the correct study boundary. However, the following general findings reflect collisions in the Southeast region, processed and analyzed with the information and tools available at this time.

State-reported Collision Data

State-reported vehicle collisions were considered in 96 refuges and all fish hatcheries based on data collected from nine states.[48] Depending on reporting procedures, some state data included details on the number of injuries and fatalities. Some data included incidents that may have occurred on private roadways instead of only public, while others included information on whether the incident was the result of a vehicle-animal strike. These additional details can be found in the overall collision table in Appendix A2.5.

Inside Service lands, 55 refuges and three fish hatcheries had at least one collision reported, with a regional total of 984 collisions. Mississippi Sandhill Crane NWR and Wheeler NWR experienced the highest number of collisions, with 176 and 159 collisions reported, respectively, from 2009-11. Mississippi Sandhill Crane NWR did not experience any fatalities, in spite of the high crash rate observed inside the refuge's boundaries. However, this unit reported 65 collisions that resulted in a total of 93 injuries. One fatality was reported at Wheeler NWR, but very few injuries (33 events resulted in 38 total injuries).

Within one mile of the Service unit boundaries, collisions were reported near 84 refuges and 11 hatcheries. The regional total within one mile of refuges and hatcheries was nearly 14,000 collisions over the three-year reporting period. Wheeler NWR and Mississippi Sandhill Crane NWR again experienced the highest number of collisions within one mile (2,244 and 1,693 events, resulting in 15 and 12 fatalities, respectively). Table 2-32 presents those refuges with the highest reported number of vehicular crashes over the three-year time period.

Table 2-32: Refuges with the Highest Number of Reported Collisions within a Three-Year Period

Unit Name	State[49]	Years	Events within 1 mile	Total Crash Events		Total Resultant:	
				Injury	Fatality	Injury	Fatality
Wheeler NWR	AL	2009-11	2,244	406	13	531	15
Mississippi Sandhill Crane NWR	MS	2009-11	1,693	493	7	744	12
Clarks River NWR	KY	2009-11	1,485	259	9	372	9
Private John Allen NFH	MS	2009-11	1,093	234	4	316	5
Waccamaw NWR	SC	2008-10	851	259	7	393	7

It is important to note that a large number of collisions does not necessarily mean a particular refuge is less safe than one with fewer collisions. Refuges and fish hatcheries vary greatly in size and have varying connectivity with the surrounding roadway network. As will be discussed further in the Hot Spot section of this chapter, a collision rate based on overall road miles was utilized to maintain a consistent baseline. The typical collision rate calculation requires AADT values, which were not available for all roadways.

FARS Reported Collisions

[48] No state-collected collision data was available for a total of 31 refuges and one hatchery located in Louisiana, Puerto Rico and the U.S. Virgin Islands.

[49] DOT-reported crashes by State and years noted in the table were used for the analysis necessary to create this table.

According to FARS data collected from 2008-2010, 21 events resulted in 27 fatalities inside of 15 refuges and one fish hatchery. No more than two events happened at any one of these areas. However, the largest single fatal event occurred at Ten Thousand Islands NWR, resulting in four fatalities.

Within a one-mile radius, 255 fatal events occurred resulting in 284 fatalities within and near 68 refuges and eight hatcheries. Wheeler NWR experienced 18 fatal events with as many fatalities, the largest number for a single refuge location. This location was followed by Mississippi Sandhill Crane NWR, which had 14 reported events resulting in 16 fatalities. Private John Allen NFH experienced a large number of fatal events for its small size (four events resulted in five fatalities). Fatality data for all of the Service's Region 4 units and surrounding one-mile radii can be found in Appendix A2.5.

Wildlife-Vehicle Collisions

According to the *2008 Wildlife Vehicle Collision Reduction Study*, estimates for animal-vehicle collisions in the United States indicate that between one and two million collisions between cars and large animals occur each year, and that the occurrences are increasing. Animal-vehicle collisions are both a human safety threat as well as a major threat to the survival of a significant number of federally listed threatened or endangered animal species across the nation (21 species in 2008).[50] Unless there is significant damage to a person or personal property, it is very likely that a majority of animal-vehicle collisions are not reported, and the loss of wildlife goes undocumented. While some police units document and share information about animal-vehicle collisions, many do not.

FARS data has several fields that could indicate the presence of an animal as a relating factor to an event that led to a human fatality. From the FARS data analyzed for this report, only one of the 255 fatal events (human fatality) in the three-year period within one mile of Region 4 units took place due to the presence of an animal. For this single instance of animal-vehicle interaction, documentation noted that the avoidance of a live animal in the road was a factor that contributed to this single fatal crash. This particular event occurred in 2009 within one mile of Ernest F. Hollings Ace Basin NWR. No instances of direct animal-vehicle collisions or indications of loss of animal life were documented in FARS during this time period.

It is likely that many more animal-vehicle collisions occurred during this time period that either did not lead to a loss of human life, or simply went undocumented due to the lack of adequate data collection and reporting.

The *2008 Wildlife Vehicle Collision Reduction Study* provided a list of actions for consideration when implementing a statewide wildlife vehicle collision (WVC) reduction program, along with a list of tasks that could be considered when incorporating WVC into corridor planning and design.

The statewide list of actions includes several items that the Service should consider adopting at a Regional level:

- Establish a multiagency coalition to oversee the program. The makeup and structure of the oversight committee should be tailored to include the appropriate agencies and to most effectively integrate into the organizational structure of these agencies.
- Determine the baseline magnitude of the problem for the [Region] (i.e., annual WVCs, threatened and endangered species, etc.).
- Implement a regionwide data collection and monitoring plan.
- Identify regional priority locations.

[50] FHWA Wildlife Vehicle Collision Reduction Study: Report to Congress, October 2008

- Establish annual goals, potential funding sources, and a program guidance strategy.
- Identify specific improvements/ mitigations.
- Educate [station] staff and incorporate considerations of WVCs into the [refuge road] design process.
- Establish an evaluation and monitoring program for specific mitigation implementations.

Incorporating WVC reduction in asset management and the infrastructure design and planning process can also aid the Service with its Environment objective to ensure transportation facilities and activities can be altered, eliminated or enhanced to reduce environmental degradation, habitat fragmentation, and vehicle collisions with wildlife, fish, and their habitats. The study noted the following tasks to help aid the transportation planning and design processes:

- Identify the magnitude of the WVC problem and determine the target species for WVC reduction.
- For existing roadways, identify locations of wildlife crossings and WVC hotspots.
- For designing new or realigned roadways, incorporate WVC considerations into the alignment selection.
- Throughout the road design process, consider designs that may minimize the potential for WVCs.
- For WVC problem locations that cannot be avoided through alternative alignment or road design techniques, consider mitigations for the entire corridor, or at problem locations.
- For the corridor project, consider alternative funding sources to increase the level at which WVCs can be mitigated.
- If WVC mitigation strategies are included in the corridor, develop an evaluation plan to track the success of the mitigation.[51]

The study provides specific mitigation strategies, including design guidelines, for the mitigation of animal-vehicle collisions. Some items include fencing design and implementation; animal detection systems (for larger animals); vegetation management strategies; and safe crossing opportunities such as wildlife underpasses and overpasses, as well as shared-use (bicycle, pedestrian, vehicle, livestock) wildlife underpasses and overpasses.

TRAFFIC VOLUMES

High values of Average Annual Daily Traffic (AADT) volume can indicate a greater risk for safety concerns due to the high volume of vehicles on a particular segment or route. AADT data was collected for all contiguous states in the Southeast Region. The HPMS dataset included a sampling of 2011 AADTs for some of the segments specifically collected for that dataset. However, more comprehensive data was collected state-by-state from the respective state departments of transportation (DOTs) for the most recent year available.

In Region 4, routes intersecting and passing within at least one mile of 34 Service units had state-reported point AADTs or HPMS-reported segment volumes greater than 20,000 vehicles per day.[52] The maximum AADT recorded within one mile of any Service unit was near Bayou Sauvage NWR in Louisiana, where 92,400 average vehicles per day were reported on Interstate 10 through the HPMS database for the year 2011. Caloosahatchee NWR in Florida and Mississippi Sandhill Crane NWR in Mississippi are situated near the next-highest volume roadways, with as many as 68,000 (Interstate 75) and 63,921 (Interstate 10) average vehicles per day, reported by their respective DOTs, also in 2011.

[51] FHWA Wildlife Vehicle Collision Reduction Study: Report to Congress, October 2008
[52] AADT was not considered for Puerto Rico or the U.S. Virgin Islands

SAFETY HOT SPOTS

The Service supports safe and reliable access to its lands, regardless of roadway ownership. Indicators of safety, as noted in the sections above, can help identify areas of potential safety concerns on both Service and non-Service routes, and potentially initiate partnerships with non-Service agencies to improve safety issues of mutual interest.

"Hot Spots" are generally identified as those locations along public highway routes that satisfy at least one of the following in the list of safety concerns:

- **Criteria**: High AADTs, greater than 20,000 vehicles per day, within one mile of a unit
- **Criteria**: High vehicle collision rates, or fatalities, within one mile of a unit
    - State-reported collision data
        - Threshold: 75th percentile of state-reported crashes to TIGER miles is 1.2 crashes per mile
    - **Or**: FARS-reported incidents that caused fatalities
        - Threshold: 75th percentile of FARS-reported crashes that involved a fatality to TIGER miles is 0.0455 collisions per mile
- **Criteria**: Road conditions considered "poor" or "very poor"
    - Service assets – RIP road segments with 'poor' or worse condition ratings
        - Threshold: 75th percentile of poor condition RIP segments is 24.7% of public-use miles
    - **Or**: Non-Service assets – HPMS segments IRI ratings of 'poor' or worse
        - Threshold: 75th percentile of poor condition IRI segments is 55.3% of IRI miles
- **Criteria**: High Asset Priority Index (API) – Service assets
        - Threshold: 75th percentile refuge with high-priority assets contains more than 75.7% roadway assets that are high priority within a single Service unit

In Region 4, 51 refuges and four fish hatcheries qualified for at least one of the criteria above. Of those, 35 refuges and three hatcheries each have one criterion that falls within the 95th percentile for that specific criterion. Twenty-two total units qualified for at least two criteria, with three, Mississippi Sandhill Crane NWR, Pinckney Island NWR and Waccamaw NWR, qualified for three criteria including high AADTs, high vehicle collision rates, and high API. Crash and pavement conditions for the three units named above are shown on the next three pages, starting with Figure 2-20.

Only one unit qualified for all four categories, and managed to do so in the 95th percentile of reported data for three of the four. Private John Allen National Fish Hatchery, while only 30.6 acres in size, had 1,093 collisions over 48.5 TIGER road miles within a mile of its boundaries, as reported by the state of Mississippi from 2009-11. Four FARS events were reported (all outside of but within one mile of the fish hatchery's boundaries), and each of the two assets in SAMMS were noted as high priority. AADTs, while greater than 20,000 vehicles per day, were not as high as those reported in the surrounding areas of other refuges and hatcheries. Pavement conditions and collisions for the one-mile study area around Private John Allen NFH are shown in Figure 2-23.

A full list of all refuges and fish hatcheries and with respect to the criteria that helped with the designation of safety hot spots, with all relevant safety-related data, can be found in Appendix A2.5.

Figure 2-20: Safety Hot Spot: Mississippi Sandhill Crane NWR

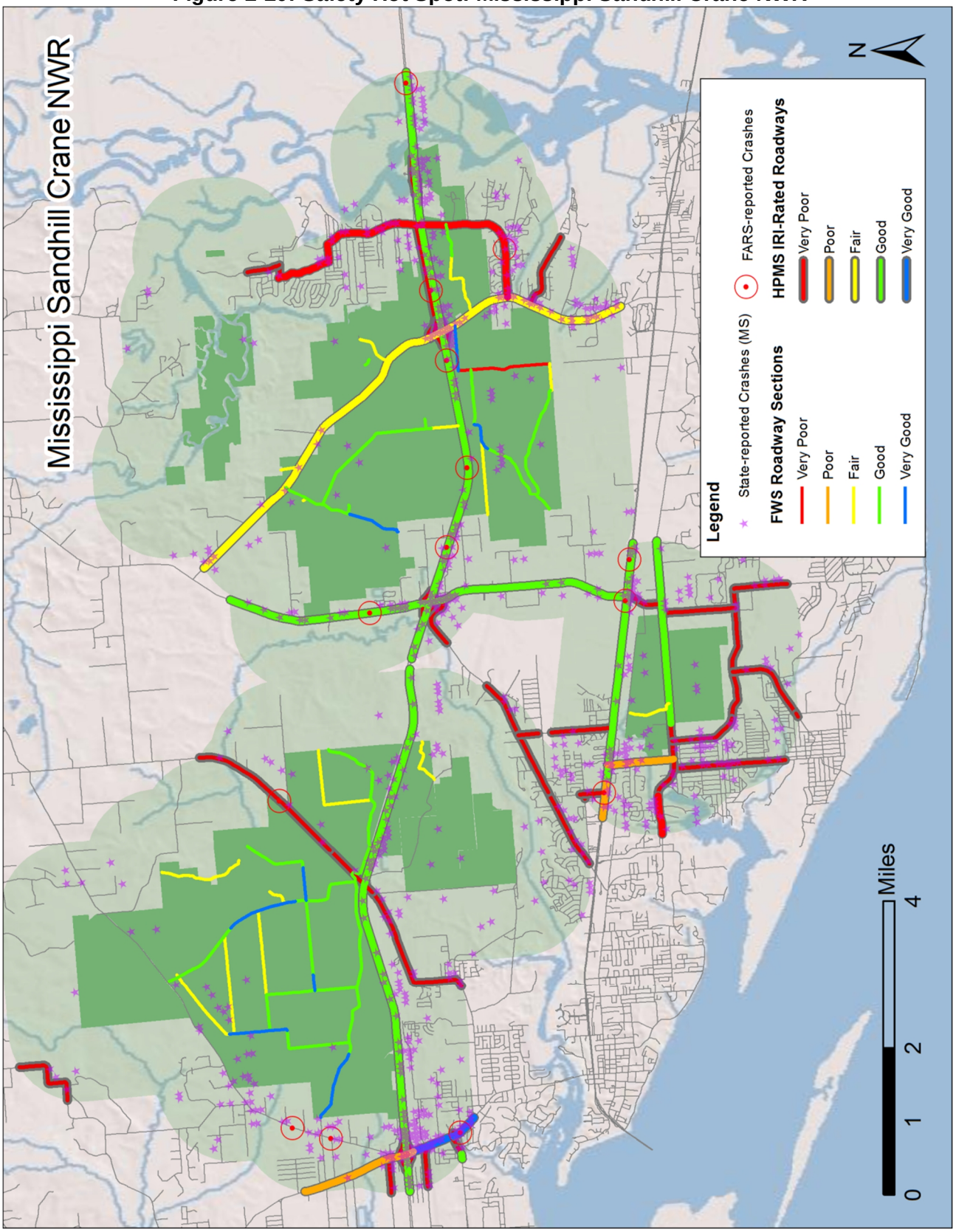


Figure 2-21: Safety Hot Spot: Pinckney Island NWR

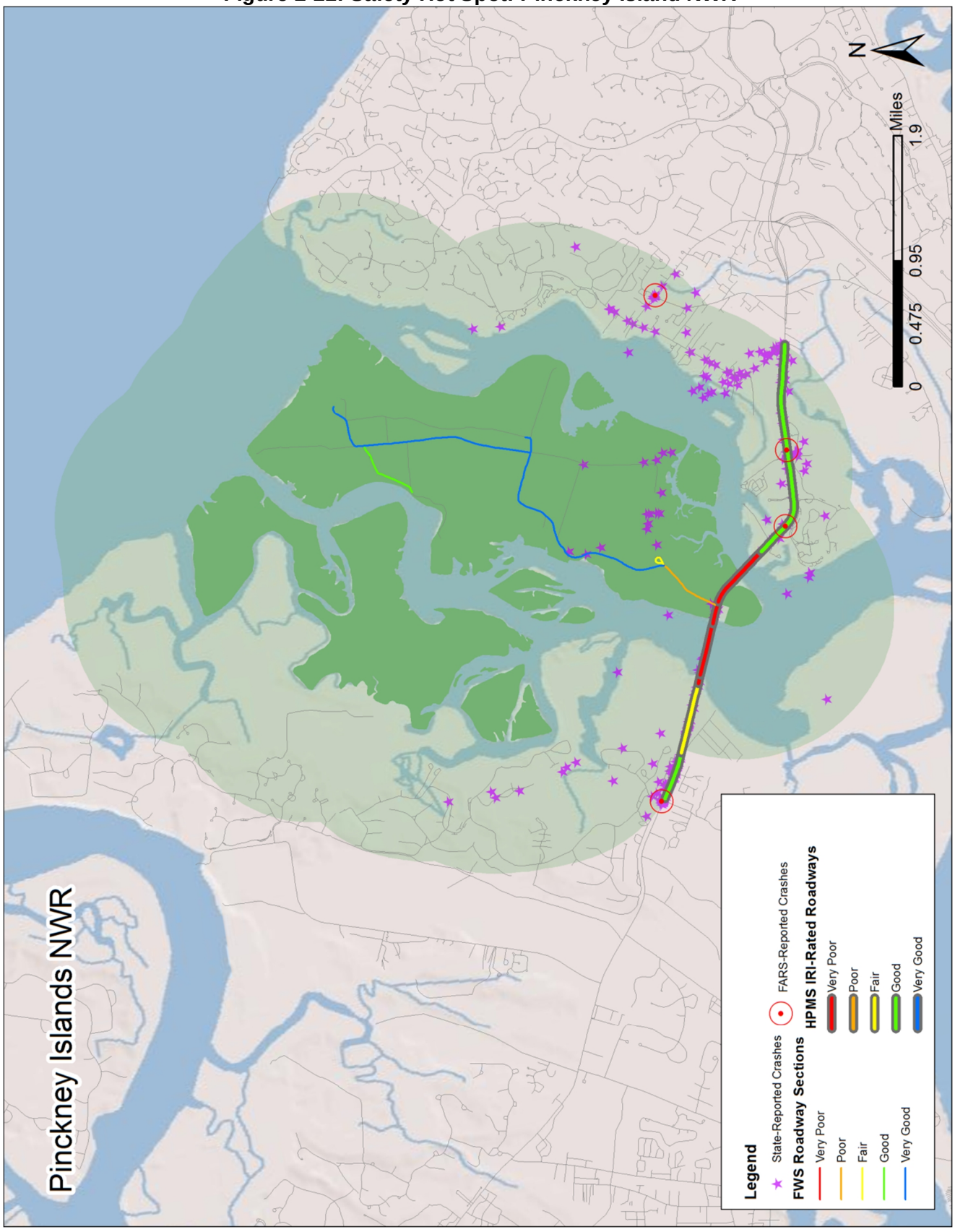


Figure 2-22: Safety Hot Spot: Waccamaw NWR

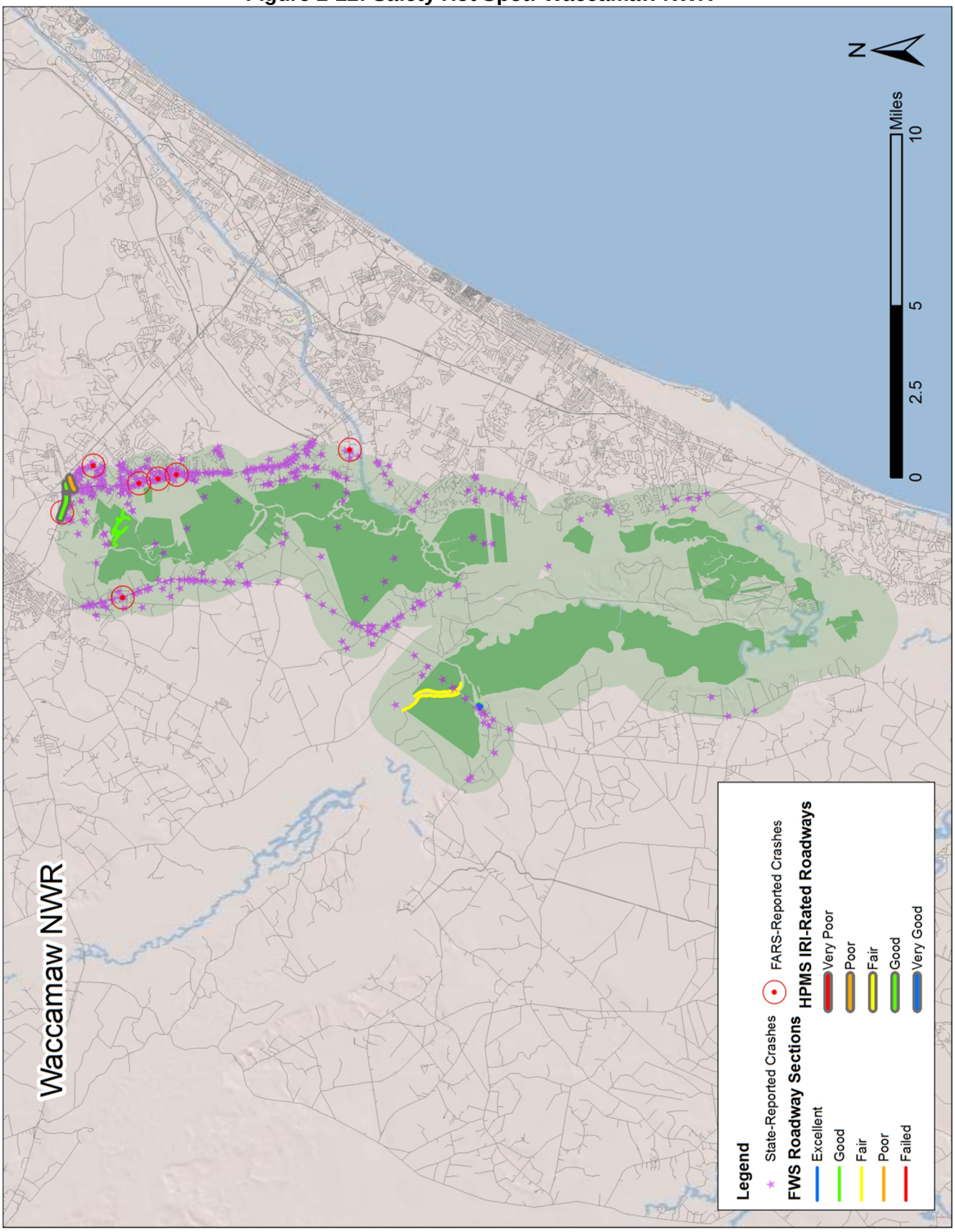
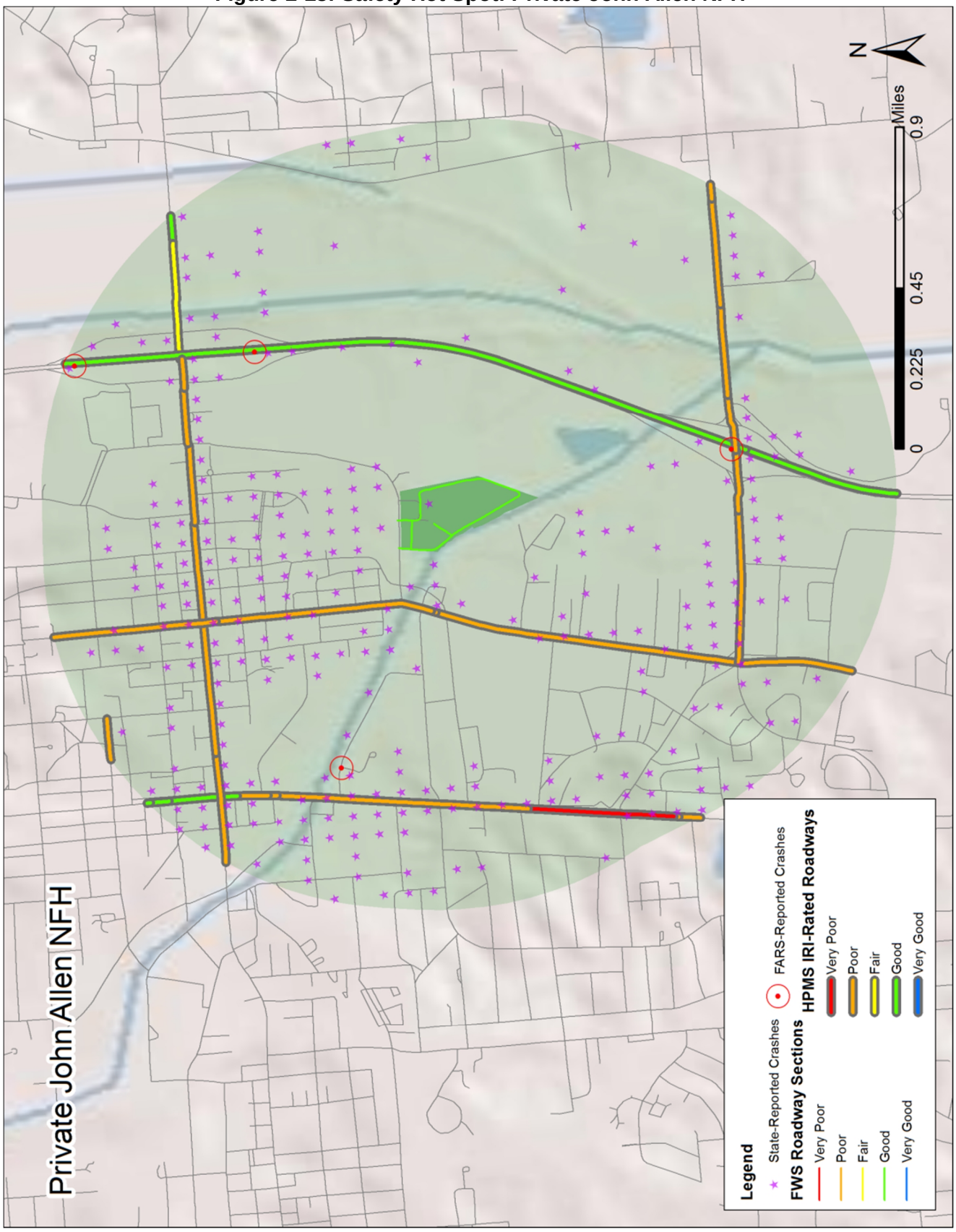


Figure 2-23: Safety Hot Spot: Private John Allen NFH



GOAL 6 – VISITOR EXPERIENCE

Visitation is one way the Service can support its mission to grant current and future generations the opportunity to interact with wild lands, fish, wildlife, and plant species, where appropriate. People care about what they can experience, and the knowledge that they gain from the experiences. Thus, in the end, promoting the relevance of the U.S. Fish and Wildlife Service to the lives of Americans is about access. Wildlife refuges should be accessible to all, regardless of an individual's location or physical abilities.[53]

***Goal**: Create and sustain enjoyable and welcoming transportation experiences for all visitors.*

Objective 1: Improve traveler information for both internal (on Service lands) as well as external (off Service lands) wayfinding and orientation for all modes of travel.

Objective 2: Integrate interpretation, education, and stewardship into the transportation experience.

Objective 3: Assess and improve the external accessibility of all Service lands in all future planning endeavors.

Objective 4: Evaluate the feasibility of alternative transportation systems at all refuges at a regional level and promote connections with other existing and planned public and private transportation service providers.

Objective 5: Integrate materials and adaptations that will help refuges specifically cater to populations that already visit often, or populations that the Service would like to target. Seek to get more individuals interested in the benefits of engaging in outdoor activities and in support of a national network of lands and waters for present and future generations to enjoy.

Objective 6: Ensure that refuges are welcoming, safe, and accessible and that the transportation program will provide visitors with clear information so they can easily determine where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities.

Objective 7: Implement a comprehensive and uniform sign plan that promotes a consistent image and branding for the agency.

TRANSPORTATION SYSTEMS

For many of the refuges and fish hatcheries, developing and maintaining a transportation network that welcomes and orients visitors is an important aspect of public education. Access to each of the stations varies from roadways (and personal vehicles), transit systems and shuttles, trails for use by cyclists and pedestrians, and waterway trails. The purpose of this section is to understand some of the current visitors and the potential population that may spurn future growth. In particular, the FWS has been trying to increase visitation from minority, low-income, student, and mobility-impaired populations.[54]

[53] *Conserving the Future: Wildlife Refuges and the Next Generation*, USFWS October 2011.
[54] From Volpe *Transit and Trails* report: http://www.fta.dot.gov/documents/Transit_Trails_Layout_Final_123010.pdf

Wayfinding and Signage

According to the RATE report's preliminary findings, 44 percent of the FWS stations do not believe that their refuge or fish hatchery has sufficient signage present on access roads and trails.[55] While signage inside the refuges and fish hatcheries are generally the responsibility of the Service, signs located on public use roadways and trails require a certain amount of coordination with local, regional, and state DOTs.

In conjunction with the Highway Safety Act, the *Highway Safety Program Standard 13*[56] requires states and federal agencies with jurisdiction over public roadways to reduce the likelihood and severity of traffic accidents by complying with modern traffic engineering measures and uniform standards for traffic control. The Highway Safety Program Standard requires both states and federal agencies to have a program for applying standards, and for maintenance and upgrades, when needed, for traffic control devices. In response to this Standard, the U.S. Fish and Wildlife Service maintains a Sign Policy and program that includes a sign manual and catalogue, guidelines for effective sign program management, and a system for regular inventory, inspection, and maintenance of signs. This policy document serves not only to direct the Service to conform to uniform traffic design standards, but also provides a guideline for providing signage and wayfinding to direct visitors to destinations on Service lands. While traffic control devices must conform to federal standards, guide signs and interpretive signs can be influenced by the Service.

Guide and information signs can be placed on or off Service lands and can be utilized to direct visitors to destinations on Service lands, or indicate destination distance, direction, or route of travel. Interpretive signs provide educational information, and may include trail markers and exhibit or orientation panels.

Guide signs, information signs, and interpretive signs should conform to Service guidelines, but are open to interpretation. Region 4, for example, has a sizeable Spanish-speaking population, particularly in Florida, Puerto Rico, and the U.S. Virgin Islands. While some areas have already taken the initiative to add Spanish language information to their signs, it may behoove the Region to consider adding information and wayfinding material in languages appropriate to the surrounding communities, in order to provide a welcoming environment for visitors who do not speak English as a first language.

The Service headquarters office is currently leading the effort to prepare an update for the Sign Policy. It is the policy of the U.S. Fish and Wildlife Service to provide a uniform system of signs and markers, and the Service provides the policy document as guidance for managing field station sign programs and signs throughout the Service. However, unique local characteristics, including differences in language, and differing levels of coordination with adjacent transportation authorities, for example, have caused units to have different types of signs, sign/wayfinding frequency on adjacent routes, state of repair, and materials and reflectivity.

POPULATION AND DEMOGRAPHIC TRENDS

While a closer analysis of individual refuges and fish hatcheries is necessary to determine the changing needs of local populations, in general, local populations within 25 miles of Service units are growing. Growing populations can lead to an increase in traffic and visitation and will create additional demands on the existing transportation system. Identifying areas where the population has

[55] *U.S. Fish and Wildlife Service Regional Alternative Transportation Evaluation Report – Region 4* (Volpe Center, 2013)
[56] Administered by the Federal Highway Administration

changed greatly or is projected to change more than the average area will be helpful in considering the long-range planning necessary to sustainably grow and change to meet future needs. Figure 2-24 shows population density from the 2010 Census, mapped with each open-to-the-public refuge and fish hatchery's visitation numbers from 2012. While some densely populated areas in Florida have equally large numbers of visitors, some refuges, such as Okefenokee NWR between Florida and Georgia, have high visitation despite being located farther from urban centers than other refuges.

Overall Population Change[57]

For the system of refuges and fish hatcheries that are open to the public, Table 2-33 illustrates that the local population within a 25-mile radius of the Region 4 system increased from 24.3 to 26.8 million people (10.4%) from 2000 to 2010, excluding residents of the U.S. Virgin Islands where population counts were not immediately available for comparison.[58] Population within a 25-mile radius is expected to grow from 26.0 to 30.5 million people (17.2%) from 2010 to 2030 in areas that have available population projections (excluding the residents of the U.S. Virgin Islands and Puerto Rico).[59]

Table 2-33: Highest Percent Population Growth 2000-2010 within 25 Miles

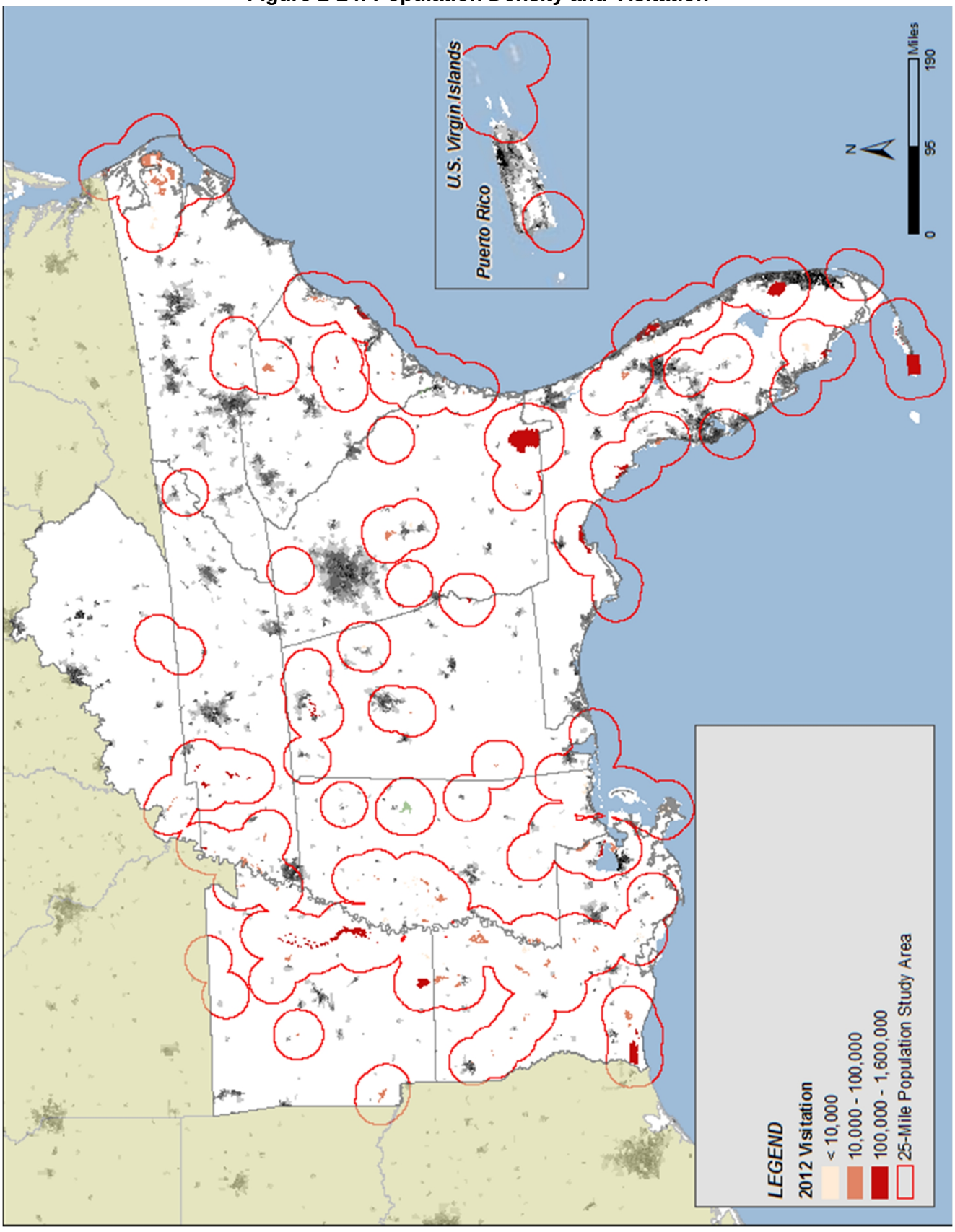
Service Unit	State	2000 Population	2010 Population	Percent Increase
J. N. "Ding" Darling NWR	FL	406,391	561,256	38%
Chassahowitzka NWR	FL	399,707	520,445	30%
Florida Panther NWR	FL	295,883	382,823	29%
Chattahoochee Forest NFH	GA	137,358	177,172	29%
Welaka NFH	FL	294,311	375,066	27%
Ten Thousand Islands NWR	FL	176,175	224,067	27%
Lake Wales Ridge NWR	FL	753,789	956,725	27%
Crystal River NWR	FL	277,371	351,449	27%

Table 2-34: Highest Percent Population Decline 2000-2010 within 25 Miles

Service Unit	State	2000 Population	2010 Population	Percent Decrease
Yazoo NWR	MS	93,349	76,447	-18%
Delta NWR	LA	21,007	17,245	-18%
Dahomey NWR	MS	105,907	88,802	-16%
Bayou Sauvage NWR	LA	908,432	774,764	-15%
Breton NWR	LA	150,793	130,965	-13%
Mathews Brake NWR	MS	81,642	71,262	-13%

[57] Population change and projections are based on county-level population data.
[58] Using 2000 and 2010 county-level census data; excluding the U.S. Virgin Islands, for which data has only been collected in 2000.
[59] State Population Predictions by county – various sources

Figure 2-24: Population Density and Visitation



Changes in population can be good indicators of changes in visitation. Of the highest growth areas within 25 miles of a refuge, J.N. "Ding" Darling NWR has the greatest visitation (approximately 660,000 in 2012). Chassahowitzka NWR had about 28,000 visitors, while Florida Panther NWR hosted slightly more than 3,000 visitors in that same year. The refuges with decreasing population within the surrounding 25 miles had small to medium visitation in 2012: Yazoo NWR (39,000); Delta NWR (9,000); Dahomey NWR (10,000); Bayou Cocodrie NWR (50,000); Breton NWR (3,000); and Mathews Brake NWR (10,000). Full documentation of visitation according to the Refuge Annual Performance Plan (RAPP) report is provided in Appendix A2.6.

Table 2-35: Highest Projected Population Growth from 2010-2030 within 25 Miles

Service Unit	State	2010 Population	2030 Projection	Percent Increase
J. N. "Ding" Darling NWR	FL	561,256	830,014	48%
Banks Lake NWR	GA	156,244	221,110	42%
Florida Panther NWR	FL	382,823	529,404	38%
Chassahowitzka NWR	FL	520,445	718,886	38%
Lake Wales Ridge NWR	FL	956,725	1,319,963	38%

Table 2-36: Highest Projected Population Decline from 2010-2030 within 25 Miles

Service Unit	State	2000 Population	2030 Projection	Percent Decrease
Yazoo NWR	MS	76,447	60,591	-21%
Bayou Cocodrie NWR	LA	75,731	62,091	-18%
Tensas River NWR	LA	117,344	96,656	-18%
St. Catherine Creek NWR	MS	84,099	72,165	-14%
Dahomey NWR	MS	88,802	76,548	-14%

As shown in Table 2-33, several areas surrounding some refuges and fish hatcheries have experienced substantial population growth between 2000 and 2010. Some areas should continue to experience growth based on projections through 2030, as shown in Table 2-35. Three of the areas that grew the most between 2000 and 2010, J.N. "Ding" Darling NWR, Chassahowitzka NWR, and Florida Panther NWR, also are projected to experience considerable growth through 2030. These areas should garner special attention when considering outreach and improvements to wayfinding, connectivity, and access to maintain a transportation network that welcomes and orients visitors, provided the increased visitation supports the mission of each individual unit.

Inversely, some units that have experienced a local population decline or will in the near future (Table 2-34 and Table 2-36), including Yazoo, Bayou Cocodrie, and Dahomey NWRs, should be carefully considered for measures to ensure that the American public is still aware of and can enjoy visiting a refuge in these locations. Figure 2-25 and Figure 2-26 show the percentages of projected population change, as well as total projected population change, for the studied counties within that portion of the United States that defines FWS Region 4.

Figure 2-25: Projected County Population Change 2010-2030, Percent Change

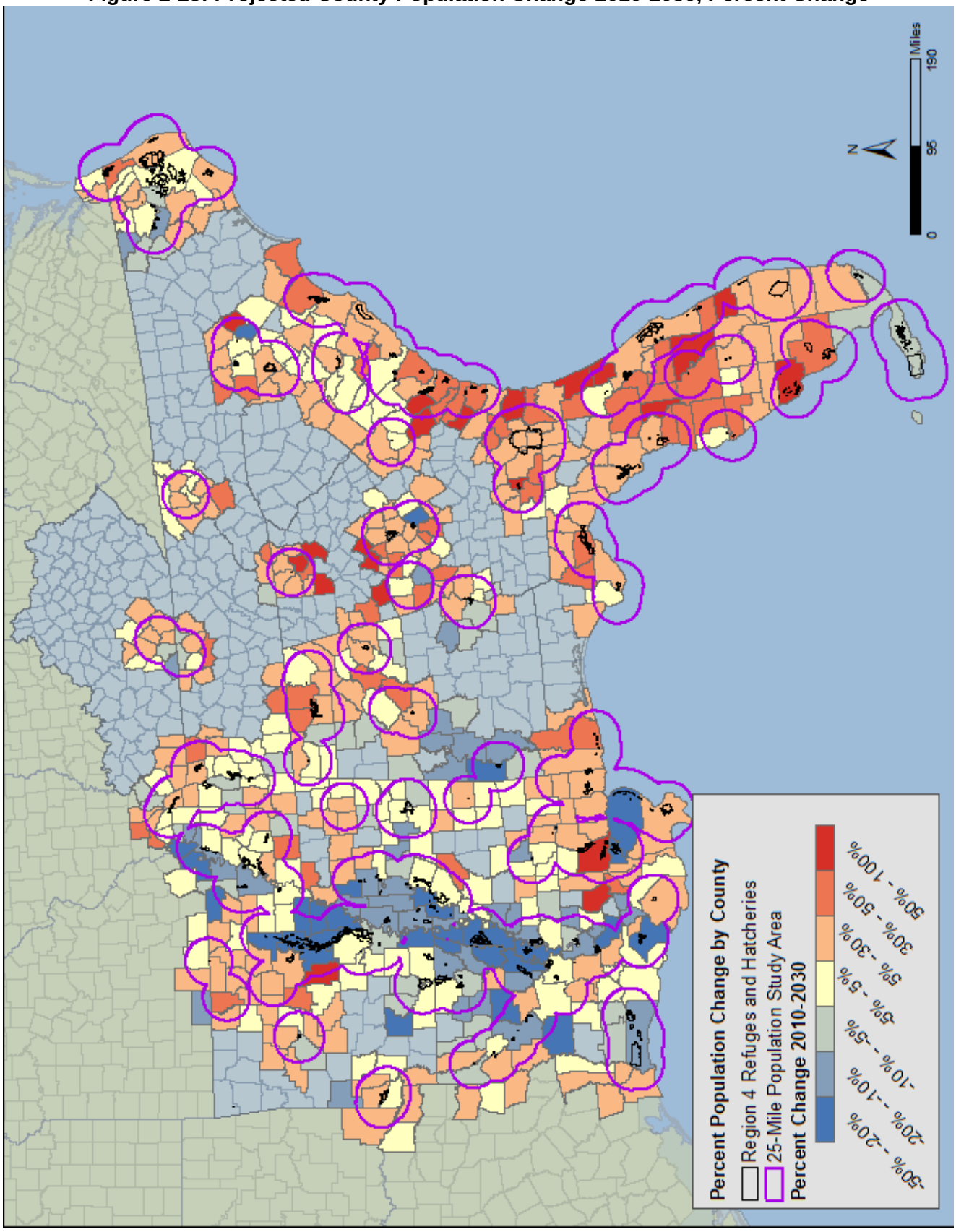
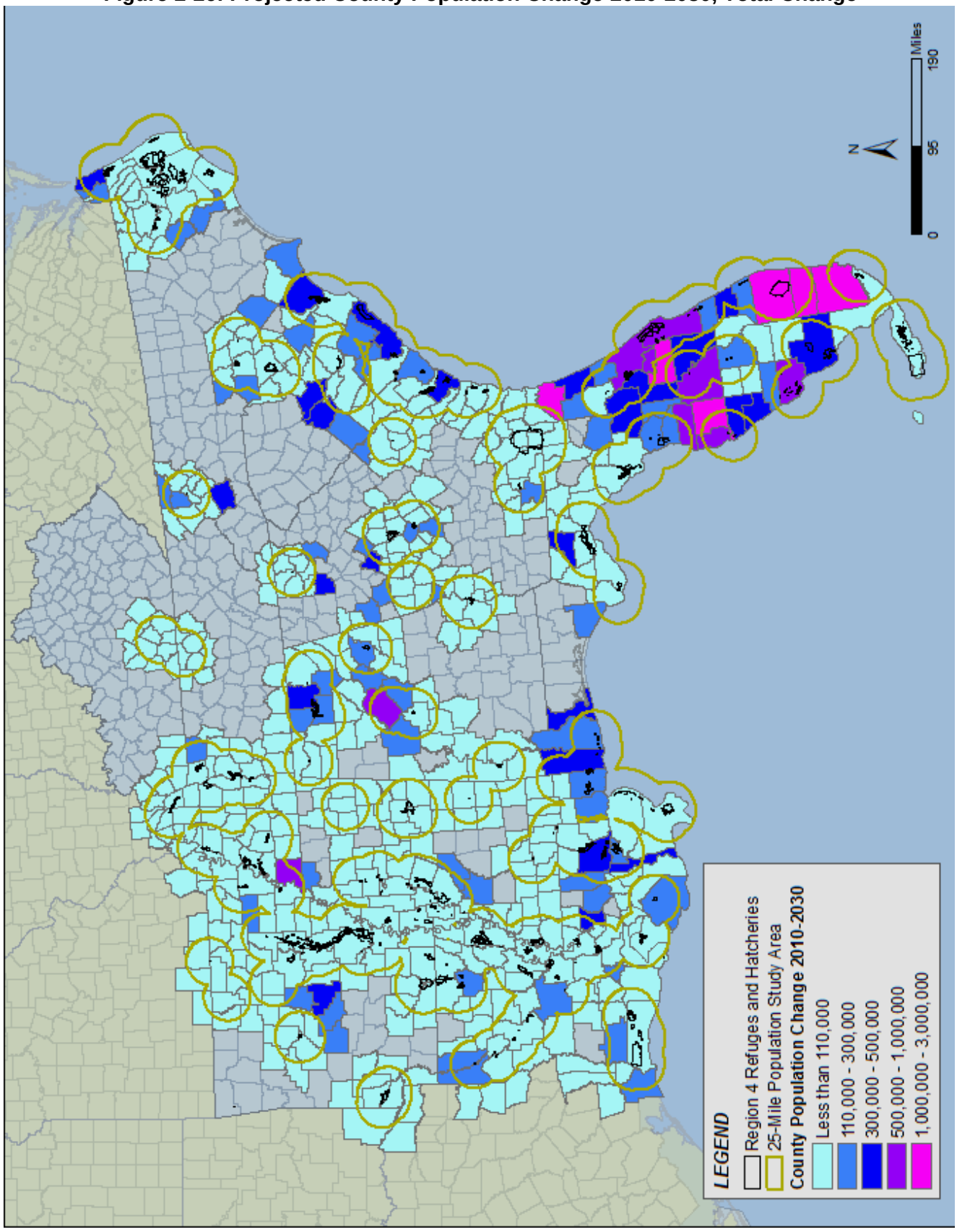


Figure 2-26: Projected County Population Change 2010-2030, Total Change



Poverty and Minority Populations[60]

Disparity exists across Region 4 when considering the percentage of local residents who live in poverty surrounding each refuge and fish hatchery. The extremes are shown in Table 2-37 and Table 2-38. The five stations whose nearby populations illustrate the highest percentage living in poverty (both overall and in the continental United States) should be paid particular attention with regard to poverty and visitation, because a correlation is likely between poverty levels and those able to easily access refuges. The total percent of population in poverty residing within a 25-mile radius of all refuges and fish hatcheries in the Southeast Region is 17.3%,[61] which is higher than the overall national poverty rate of 15.9%[62]. In addition, it is significant to note that the top five impoverished surrounding areas for refuges and hatcheries have at least double the average rate of poverty for the overall population surrounding the Region, as shown in Figure 2-27.

Table 2-37: Lowest Percent in Poverty within 25 Miles[63]

Service Unit	State	2010 Population	Percent in Poverty
Currituck NWR	NC	475,889	7.0%
Mackay Island NWR	NC/VA	658,265	7.8%
Ten Thousand Islands NWR	FL	295,605	10.3%
Merritt Island NWR	FL	818,490	10.5%
National Key Deer Refuge	FL	49,550	10.7%

Table 2-38: Highest Percent in Poverty within 25 Miles

Service Unit Overall Region 4	State	2010 Population	Percent in Poverty
Overall Region 4			
Laguna Cartagena NWR	PR	532,387	53.5%
Cabo Rojo NWR	PR	407,412	52.9%
Vieques NWR	PR	327,625	46.2%
Culebra NWR	PR	92,732	44.4%
Buck Island NWR	USVI	509	40.7%
Contiguous United States			
Morgan Brake NWR	MS	78,677	40.0%
Mathews Brake NWR	MS	76,340	38.3%
Hillside NWR	MS	72,846	38.1%
Yazoo NWR	MS	77,269	34.6%
Dahomey NWR	MS	104,427	34.3%

According to the *National Wildlife Refuge Visitor Survey Results: 2010/2011*,[64] 96% of visitors to refuges and fish hatcheries around the country are white. However, as illustrated in Figure 2-28, the overall percent of non-white populations within a 25-mile radius for all refuges and hatcheries in the

[60] Demographic data taken from tract-level American Community Survey data as well as the Census.
[61] US 2010 Decennial Census and American Community Survey data, excluding U.S. Virgin Islands
[62] US Census 2011: http://www.census.gov/prod/2012pubs/acsbr11-01.pdf
[63] Demographic data taken from tract-level American Community Survey data as well as the Census.
[64] U.S. Geological Survey Data Series: *National Wildlife Refuge Survey Results: 2010/2011*.

region is 30.08%. Table 2-39 and Table 2-40 show the local populations surrounding refuges and fish hatcheries that have the lowest and highest non-white populations.

The top five surrounding populations that are predominantly white happen to all be fish hatcheries, with as little as 3.26% non-white population in the surrounding area of the Norfork National Fish Hatchery. The highest non-white population surrounds Holt Collier NWR, with nearly three quarters of its population non-white. Four out of the five highest non-white populations also have a poverty level over 34%. Recognizing that poverty, race, and ethnicity likely impact knowledge of and visitation to the refuges, the stations whose adjacent communities exhibit high poverty rates and a large percentage of non-white populations should be considered for further study to assist with the education and outreach to large nearby population groups that may not otherwise choose to visit U.S. Fish and Wildlife Service units.

Table 2-39: Lowest Percent Non-White Population within 25 Miles

Service Unit	State	2010 Population	Percent Non-White
Norfork NFH	AR	71,656	3.3%
Mammoth Spring NFH	AR	46,743	3.6%
Wolf Creek NFH	KY	85,033	4.1%
Dale Hollow NFH	TN	96,121	4.6%
Chattahoochee Forest NFH	GA	173,200	4.9%

Table 2-40: Highest Percent Non-White Population within 25 Miles

Service Unit	State	2010 Population	Percent Non-White
Holt Collier NWR	MS	87,017	74.1%
Morgan Brake NWR	MS	82,422	73.2%
Mathews Brake NWR	MS	76,685	73.0%
Hillside NWR	MS	77,450	72.2%
Dahomey NWR	MS	106,604	71.1%

Refuges and fish hatcheries with a large percent of Hispanic/Latino populations within 25 miles of the units (as illustrated in Figure 2-29) should consider tailoring the refuge to include improvements that would be inclusive to this community. Options could include signage in both English and Spanish and advertising in Hispanic/Latino cultural publications.

As is fairly obvious in Figure 2-29, the largest percentage of Hispanic/Latino populations is located in and around refuges in Puerto Rico and the U.S. Virgin Islands. The five FWS stations with the lowest percent of Hispanic/Latino population are noted in Table 2-41. When only the continental United States is considered, the largest percentage of Hispanic/Latino population is centered on five refuges in Florida, shown in Table 2-42.

Table 2-41: Lowest Percent Hispanic/Latino Population within 25 Miles

Service Unit	State	2010 Population	Percent Hispanic/ Latino
Choctaw NWR	AL	39,312	0.74%
Noxubee NWR	MS	149,215	1.17%
Cat Island NWR	LA	165,458	1.42%
Mammoth Spring NFH	AR	46,743	1.43%
Tensas River NWR	LA	121,304	1.51%

Table 2-42: Highest Percent Hispanic/Latino Population within 25 Miles

Service Unit Overall Region 4	State	2010 Population	Percent Hispanic/ Latino
Overall Region 4			
Laguna Cartagena NWR	PR	531,014	99.2%
Cabo Rojo NWR	PR	408,960	99.2%
Vieques NWR	PR	331,834	98.8%
Desecheo NWR	PR	150,908	98.7%
Culebra NWR	PR	92,827	97.8%
Contiguous United States			
Crocodile Lake NWR	FL	608,780	59.1%
Lake Wales Ridge NWR	FL	1,025,412	29.5%
Florida Panther NWR	FL	386,651	25.8%
Key West WNR	FL	37,920	22.3%
Arthur R. Marshall Loxahatchee NWR	FL	2,878,708	21.7%

Figure 2-27: Population Demographics: Population in Poverty

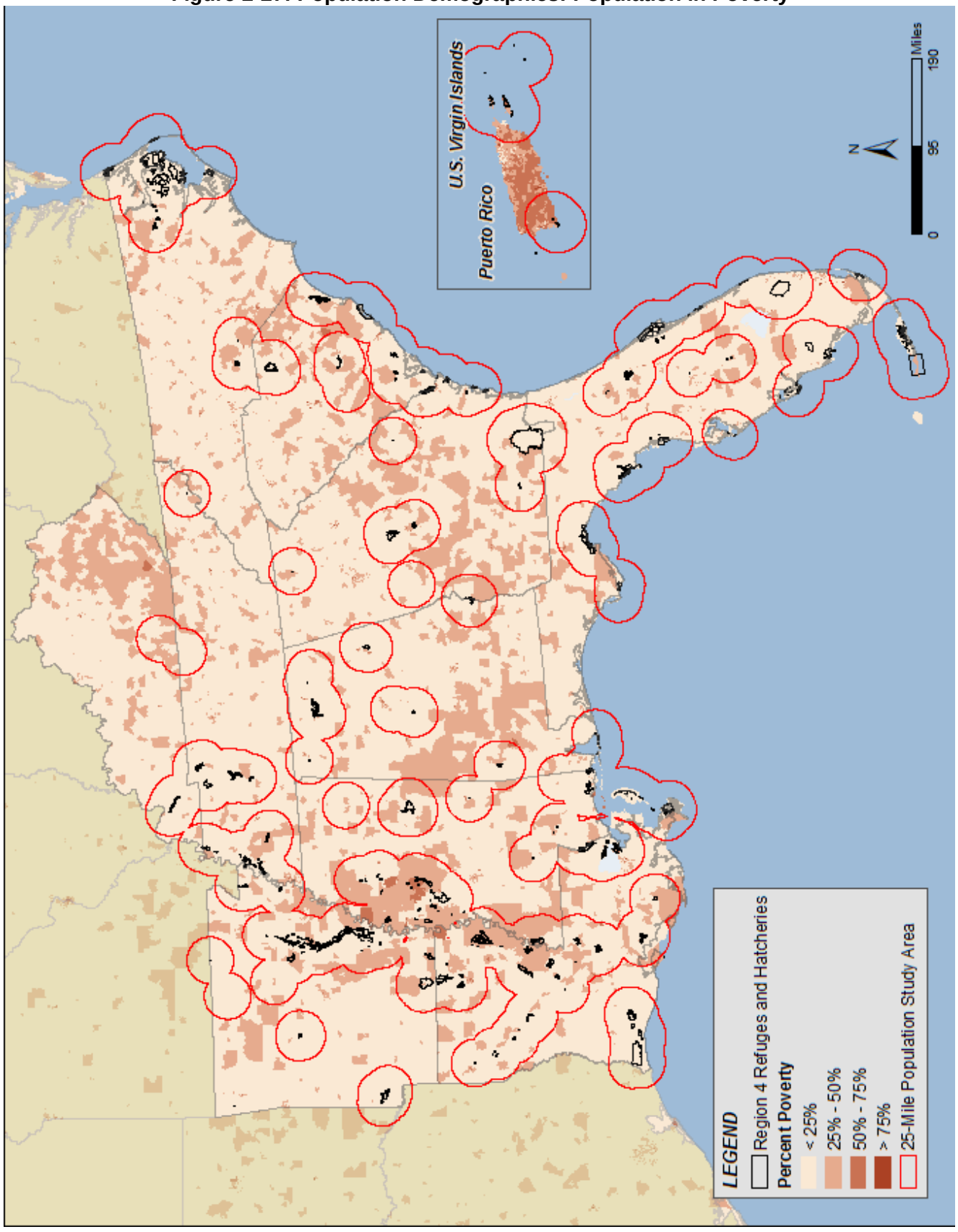


Figure 2-28: Population Demographics: Non-White Population within 25 Miles of Service Units

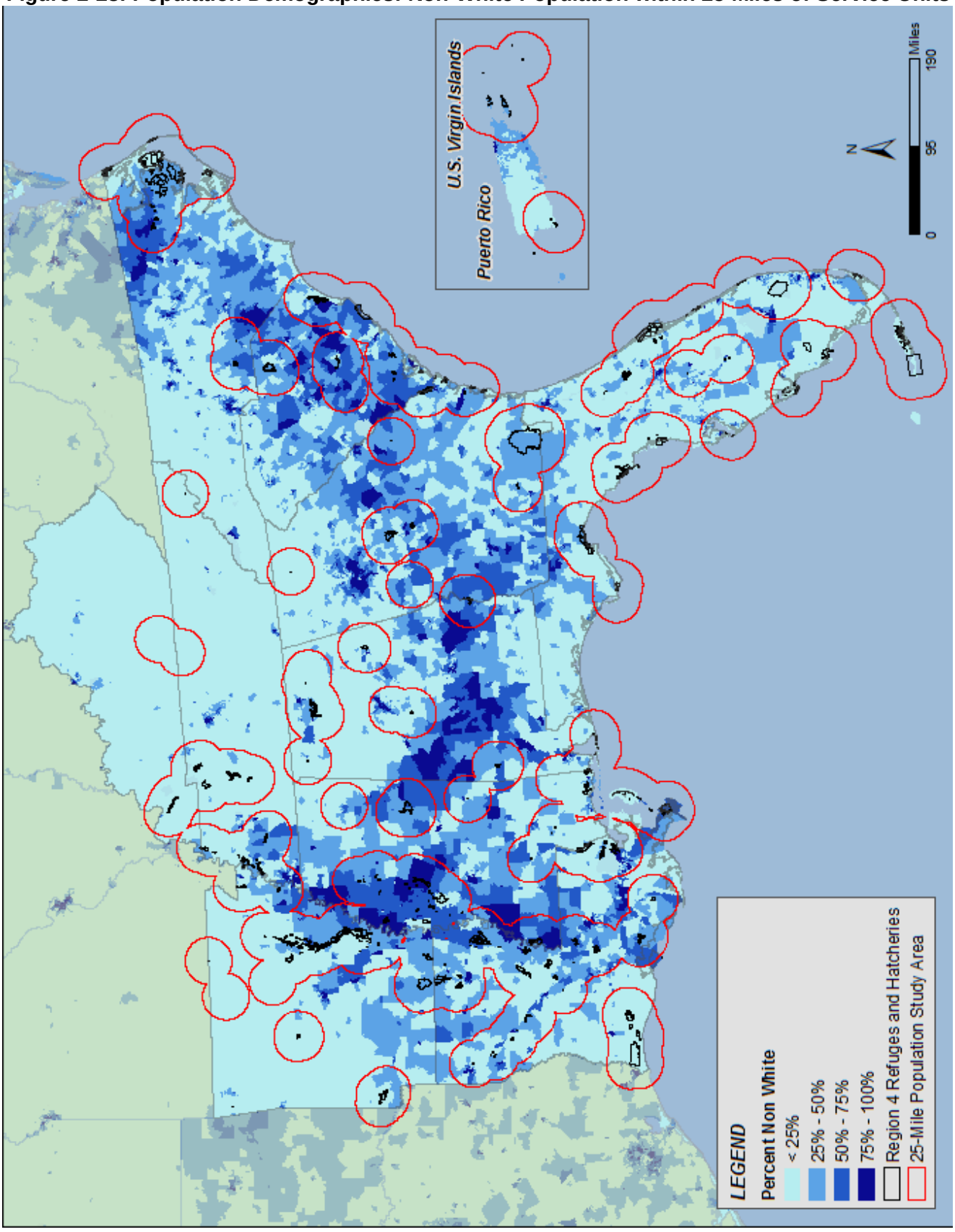
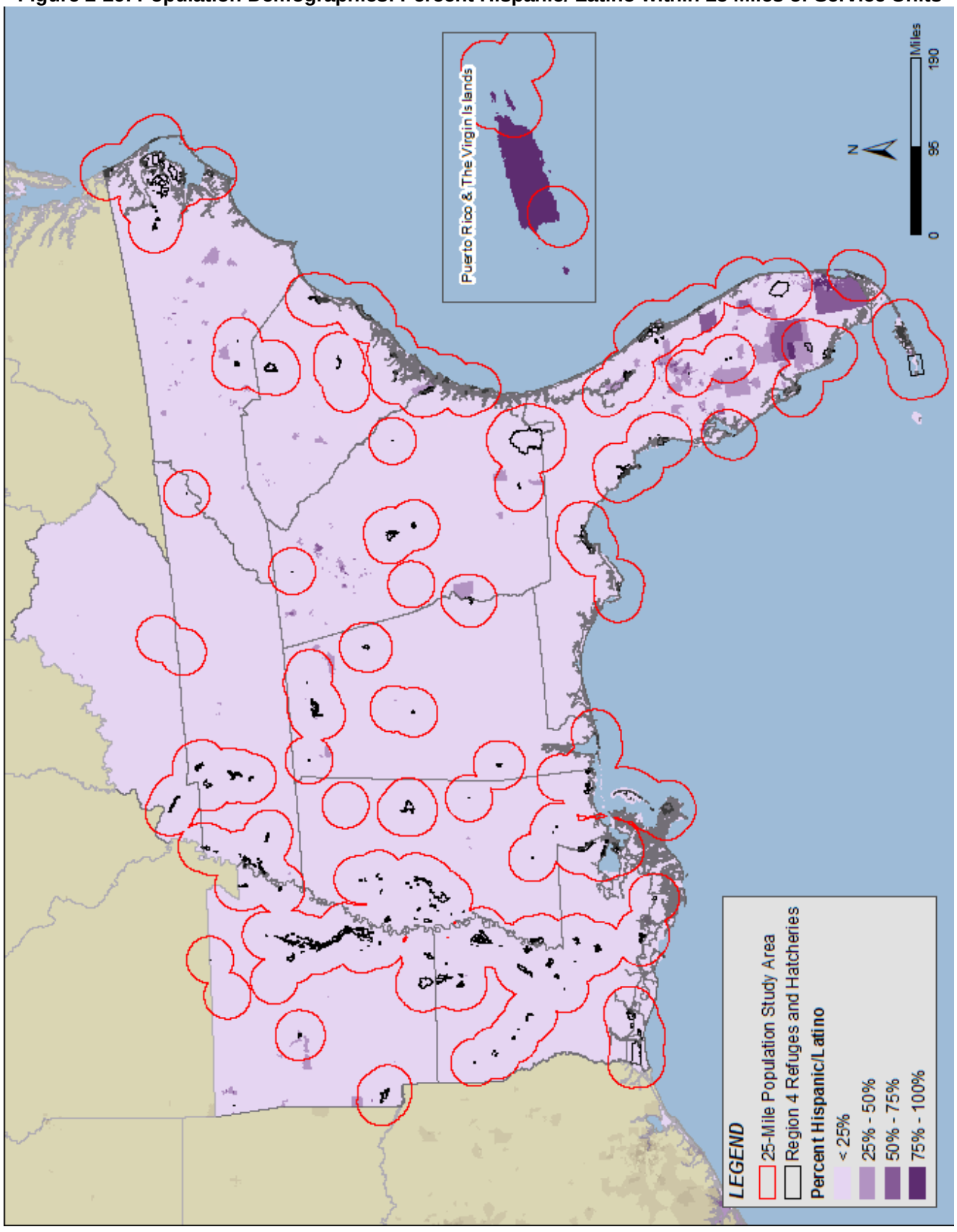


Figure 2-29: Population Demographics: Percent Hispanic/ Latino within 25 Miles of Service Units



Households without Access to Vehicles

In addition to demographics relating to income, race, and ethnicity, it is also important to consider accessibility to automobiles as an important element for refuge and fish hatchery visitation. Some stations are located in more urban areas, as discussed before, and access to a personal vehicle may not be a critical component for access. Others may be located on islands or in areas most accessible by water, where cars are not needed. Some land-accessible refuges may be too far away from the established routes of community transit or transit systems, however, and access may be significantly more difficult for those without a car. Some of these refuges may be good candidates for expanded alternative transportation systems.

Table 2-43 and Table 2-44, respectively, show the refuges with the lowest and highest percentage of the population without access to a personal vehicle. The five refuges with the highest percentages are located in Puerto Rico or the U.S. Virgin Islands. Four of the five highest continental refuges are concentrated in Mississippi, with the other one in Alabama. It is important to note the overlap in those refuges with the highest percentage of nearby residents living in poverty and the percent of nearly residents with no access to vehicles. If an increased level of visitation to these refuges is desired, targeted outreach and addressing of transportation needs to those living around the stations may be particularly necessary.

Table 2-43: Lowest Percent No Vehicle Households within 25 Miles

Service Unit	State	2011 Households	Percent No-Vehicle
Pea Island NWR	NC	13,007	2.7%
Bon Secour NWR	AL	110,732	3.7%
Currituck NWR	NC	179,830	3.8%
Alligator River NWR	NC	26,048	3.9%
Sauta Cave NWR	AL	88,472	4.0%

Table 2-44: Highest Percent No Vehicles Households within 25 Miles

Service Unit	State	2011 Households	Percent No-Vehicle
Overall Region 4			
Buck Island NWR	USVI	147	33.9%
Culebra NWR	PR	31,307	21.1%
Cabo Rojo NWR	PR	134,093	19.9%
Laguna Cartagena NWR	PR	171,859	19.7%
Vieques NWR	PR	105,494	18.3%
Contiguous United States			
Morgan Brake NWR	MS	27,235	13.6%
Dahomey NWR	MS	37,479	13.5%
Hillside NWR	MS	25,297	13.3%
Yazoo NWR	MS	28,341	13.2%
Eufaula NWR	AL/GA	39,059	13.1%

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Existing Conditions and Future Trends Report

U.S. Fish & Wildlife Service
1 800/344 WILD
http://www.fws.gov

May 2013

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Recommendations Report

Southeast Region

February 2015

Front page photo Credits (clockwise from top left): Paul Tritaik, J.N. "Ding" Darling NWR; Cristina Pastore, J.N. "Ding" Darling NWR; Steve Suder, Alligator River NWR; Paul Tritaik, J.N. "Ding" Darling NWR; Joe Saenz, Black Bayou Lake NWR.

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Abbreviations and Acronyms

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
API	Asset Priority Index
APTA	American Public Transportation Association
ATS	Alternative Transportation System
BLM	Bureau of Land Management
BMP	Best Management Practices
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resource System
CCA	Comprehensive Conditions Assessment
CCP	Comprehensive Conservation Plan
CFLHD	Central Federal Lands Highway Division
CFR	Code of Federal Regulations
CHMP	Comprehensive Hatchery Management Plan
CLIR	Climate Leadership in Refuges
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CRV	Cost of Replacement Value
CVI	Coastal Vulnerability Index
DM	Deferred Maintenance
DOD	Department of Defense
DOI	Department of the Interior
DOT	Department of Transportation
EFLHD	Eastern Federal Lands Highway Division
ERFO	Emergency Relief for Federally Owned (Roads)
FAA	Federal Aviation Administration
FARS	Fatality Analysis Reporting System
FCI	Facility Condition Index
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program (MAP-21)
FLH	Office of Federal Lands Highway, FHWA
FLMA	Federal Land Management Agency
FLTP	Federal Lands Transportation Program (MAP-21)
FTA	Federal Transit Administration
FWS	U.S. Fish and Wildlife Service
HPMS	Highway Pavement Management System
HPP	High Priority Projects
INCA	Inventory and Condition Assessment
IPaC	Information, Planning, and Consultation
IRI	International Roughness Index
ITS	Intelligent Transportation System
LCTA	Low Country Regional Transportation Authority
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century
MPO	Metropolitan Planning Organization
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NBIS	National Bridge Inventory System

NFH	National Fish Hatchery
NFIP	National Flood Insurance Program (FEMA)
NGO	Nongovernmental Organization
NHPN	National Highway Planning Network
NHS	National Highway System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NSBP	National Scenic Byways Program
NTAD	National Transportation Atlas Database
NWI	National Wetlands Inventory
NWN	National Waterway Network
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
OPA	Otherwise Protected Area (of the CBRS)
PAD-US	Protected Areas Database of the United States
PCR	Pavement Condition Rating
PMS	Pavement Management System
RAPP	Refuge Annual Performance Plans
RATE	Regional Alternative Transportation Evaluation
RIP	Road Inventory Program
RITA	Research and Innovative Technology Administration (U.S. DOT)
RRP	Refuge Roads Program
RSA	Road Safety Audit
RSL	Remaining Service Life
RTCA	Rivers, Trails, and Conservation Assistance
RTP	Regional Trails Program
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAMMS	Service Asset Maintenance Management System
Service	U.S. Fish and Wildlife Service
SMS	Safety Management System
STIP	Statewide Transportation Improvement Program
TIGER	Topically Integrated Geographic Encoding and Referencing
TIP	Transportation Improvement Program
TNC	The Nature Conservancy
TVA	Tennessee Valley Authority
UNESCO	United Nations Educational, Scientific and Cultural Organization
U.S.	United States
USC	United States Code
USFS	United States Forest Service
USGS	United States Geological Survey
VOLTRAN	Volusia County Public Transit System
WFLHD	Western Federal Lands Highway Division
WVC	Wildlife Vehicle Collision

3. Summary of Current Stakeholder Outreach

The Region 4 LRTP has included multiple levels of stakeholder outreach, resulting in valuable insight into the processes, operations, and transportation considerations of the Southeast Region of the Fish and Wildlife Service and its individual stations.

PROJECT MANAGEMENT TEAM

The Project Management Team (PMT) consisted of representatives from FWS Region 4, FWS Headquarters, and Eastern Federal Lands Highway Division (EFLHD) of the Federal Highway Administration (FHWA). This team coordinated on a regular basis with the Consultant Team to guide the completion of the LRTP document. This included monthly conference calls, periodic in-person meetings, and regular email coordination.

COORDINATION TEAM

The Coordination Team was comprised of national, regional, refuge, and hatchery leaders from across the Southeast Region along with the members of the Project Management Team. Serving as a sounding board for the PMT, they provided feedback on the overall planning process, plan Goals and Objectives, productive ways to engage the individual stations for data collection and input, and opinions on final deliverables and their value to the region and stations.

The Coordination Team participated in a conference call, followed by an initial 2-day in-person kick-off meeting in September and October of 2012, respectively. During that meeting, the team discussed the direction of federal transportation funding, challenges with the Road Inventory Program and adequately calculating the deferred maintenance backlog of regional roadway assets, and the concurrent National Planning effort. They also reviewed the National Plan Goals and vetted the Objectives specific to Region 4, outlined the overall planning process, and discussed input methods for effective stakeholder outreach.

The Coordination Team was engaged again following the completion of a draft *Existing Conditions and Future Trends Report*. In March/April 2013, the team reviewed the report and provided detailed comments to the PMT for incorporation prior to the release of the document to the station leadership. Their perspective, either as regional or station leadership, was tremendously valuable in creating a meaningful, representative document.

Finally, the Coordination Team was again engaged for the review of and comment on the draft *Recommendations Report* and supplementary deliverables, including the Comprehensive Conservation Plan (CCP) transportation incorporation documents, the Stations for Further Transportation Study Tool, and the Project Evaluation Tool. Their valuable input throughout the process helped to shape the overall plan and its final deliverables.

REGIONAL LEADERSHIP COORDINATION

Key members of regional leadership were engaged at different points along the planning process. The Division Chief of Budget & Facility Management and the Branch Chief of Facility Management participated in some Coordination Team meetings and provided input into the process and supplementary tools along the way. A formal presentation was made to regional leadership on October 27, 2014 to provide an overview of the results of the planning process, supplementary tools, and strategic next steps for the region following the completion of the LRTP.

AREA CALLS AND STATION FEEDBACK

Three rounds of webinar presentations were conducted for refuge and hatchery leadership in each of the following project deliverable action Areas: 1) Kick-off, 2) Draft *Existing Conditions and Future Trends Report*, and 3) Draft *Recommendations Report*. These webinars allowed for both the dissemination of information to station managers about the planning process and the gathering of valuable feedback from them on report deliverables.

KICK-OFF

The project Kick-off webinar was meant to provide an introduction to the LRTP process to the station management. A number of key topics were discussed including the purpose of the plan and how it relates to the National LRTP, the Goals and Objectives of the plan, timelines and opportunities for input along the way, and the upcoming RATE survey and the importance of its completion by the refuges and hatcheries.

EXISTING CONDITIONS AND FUTURE TRENDS

This webinar provided an overview of the results of the *Existing Conditions and Future Trends Report* as well as the results of the *Regional Alternative Transportation Evaluation (RATE*) survey and more information on key federal funding programs such as the Federal Lands Access Program (FLAP). The station managers had the opportunity to provide feedback to the PMT during the webinar as well as over the course of the following weeks. The comments provided by the station managers were incorporated into the final version of the *Existing Conditions and Future Trends Report*.

RECOMMENDATIONS

The final webinar for *Recommendations* focused on the report itself and even more importantly on the supplementary tools that were created for use by the region and by the stations. These tools include: the CCP revisions to more explicitly include transportation considerations, the Stations for Further Transportation Study Tool, and the Project Evaluation Tool. These webinars provided an opportunity for the project team to explain the tools to station leadership so each refuge and hatchery can understand how to improve transportation planning and project selection at each of their stations.

REGIONAL SURVEY DATA EFFORTS

One substantial data call was made during this multi-year planning process. The RATE surveys were conducted in all Service regions across the United States, and the timing of Region 4's RATE survey happened to coincide with the LRTP process. The RATE survey focused primarily on Alternative Transportation Systems (ATS) such as bicycle and pedestrian trails, water/ferries, transit and other non-single occupant vehicle trips, etc. Because of the opportune timing of the Region 4 RATE, some additional questions were added to the end of the survey that dealt more directly with broad transportation planning considerations such as general transportation challenges, special events traffic, parking capacity, safety concerns, and issues with dust. This information was a valuable addition to the LRTP efforts and provided a qualitative aspect to a relatively quantitative process.

4. Funding and Financial Gap

Moving Ahead for Progress in the 21st Century (MAP-21) replaced the previous surface transportation bill, SAFETEA-LU, to authorize two years of transportation funding, starting October 1, 2012 and ending September 30, 2014. MAP-21 included approximately $54 billion in infrastructure spending per year for FY 2013 and FY 2014. The two most relevant programs for the FWS include the Federal Lands Transportation Program (FLTP), which replaces the Refuge Roads Program, and the Federal Lands Access Program (FLAP). The Transportation Alternatives Program (TAP) is another major new program that the Service should consider as a potential funding source under MAP-21.

MAP-21 eliminates funding and grant monies from several key discretionary grant programs, including the National Scenic Byways Program and the Paul S. Sarbanes Transit in Parks Program, as well as other special funds that were provided to the FWS over the past 14-year period which totaled approximately $100 million. However, focusing on the three new programs noted above, the Service may have opportunities for funding eligibility that were previously unattainable based on limits and requirements under SAFETEA-LU that differ from those in MAP-21. While these three new programs require FWS to compete with additional agencies and organizations, the Service is poised to use the data-driven approaches required by MAP-21 and could potentially be a more viable competitor for different sources of transportation funding.

Activities to support reauthorization of the original MAP-21 bill scheduled to expire in September 2014 are ongoing. A series of Continuing Resolutions (CRs) have been approved to extend and continue the basic MAP-21 surface transportation legislation programs at their originally authorized funding levels. Although reauthorization activities continue to be under discussion as of the date of this report, it will be important to keep track of the reauthorization status moving forward, in order to be better prepared to compete for any additional funds which may become available.

The magnitude of future funding levels to support the FWS transportation program may change due to the reauthorization of MAP-21; however, Region 4 funding levels have not changed dramatically since 2006 when the initial SAFETEA-LU allocations were set. It is anticipated that future surface transportation bills will likely continue to provide Region 4 with an amount comparable to the current $5.8 million annual allocation. Funding for Region 4 from FY 2010 though anticipated funding levels in FY 2017 is shown below in Table 4-1. Note that variances in funding levels, such as the jump to $7.8 million in 2014, come from additional funds awarded for discretionary projects including urgent bridge repair projects.

Table 4-1: Previous and Anticipated Funding Levels for Region 4 Transportation Projects

Fiscal Year	Funding
2010	$ 6,760,470
2011	$ 6,041,790
2012	$ 4,948,120
2013	$ 5,037,681
2014	$ 7,807,684
2015	$ 5,784,693
2016	$ 5,786,593
2017	$ 5,794,000

STATE OF EXISTING REGION 4 TRANSPORTATION ASSETS

REGION 4 ASSET CONDITIONS

As noted in the *Existing Conditions* chapter of the LRTP, Region 4 contains a very large share of both public-use and overall national FWS transportation assets as inventoried in the RIP and SAMMS databases. Of the Region's 227 miles of public use trails noted in Table 4-2, 93.7% (212.50 miles) are rated as being in 'good' or 'excellent' condition and only 1.3% (2.94 miles) are classified as being in 'poor' or 'very poor' condition.

Table 4-2: Public Use Service Trails Regional Totals[1]

Surface Condition Rating	Length (mi)	Percentage Public Trails	Cumulative Percentage
Excellent	199.00	87.7%	87.7%
Good	13.50	6.0%	93.7%
Fair	11.38	5.0%	98.7%
Poor	1.93	0.9%	99.6%
Very Poor	1.01	0.4%	100.0%
Total:	*226.9*		

As shown on Table 4-3, the 1,464 public-use road miles in Region 4 are in similar condition to the public-use trails with 75.5% (1,105.4 miles) being rated in 'good' or 'excellent' condition, and with a backlog of only 5.3% (77.9 miles) rated in 'poor' or 'failing' conditions. 'Fair' condition roadways currently account for about 19% of the total public use road miles. This condition could leave the Region with slightly under a quarter of public road facilities in 'poor' or worse condition if maintenance schedules are unable to address the continued deterioration of these assets in the coming years.

Table 4-3: Cycle 4 RIP Public Use Sections Conditions by Region 4 Area[2]

Condition Rating	Length (mi)	Percentage of Public Roads	Cumulative Percentage
Excellent	272.4	18.6%	18.6%
Good	833.0	56.9%	75.5%
Fair	280.7	19.2%	94.7%
Poor	30.7	2.1%	96.8%
Failed	47.2	3.2%	100.0%
Total:	1,463.9		

As shown on Table 4-4, vehicle Parking areas in the Region are faring worse than trails or roads. Only slightly more than half (57.1% or about154.8 acres) are identified as being in 'good' or 'excellent' condition. While parking surfaces rated as being in either 'poor' or 'failed' condition currently account for just 7.9% (22.5 acres) of the Region's total surface parking areas, 35.1% (101.2 acres) of these facilities are in 'fair' condition and will likely need improvements in the next five to ten years.

[1] Region 4 – U.S. Fish and Wildlife Service Long Range Transportation Plan: *Existing Conditions and Future Trends Report*

[2] Region 4 – U.S. Fish and Wildlife Service Long Range Transportation Plan: *Existing Conditions and Future Trends Report*

Table 4-4: Parking Surface Conditions by Area[3]

Condition Rating	Area (Acres)	Percentage of Public Parking	Cumulative Percentage
Excellent	15.6	5.4%	5.4%
Good	149.2	51.7%	57.1%
Fair	101.2	35.1%	92.2%
Poor	21.2	7.4%	99.5%
Failed	1.3	0.5%	100.0%
Total:	288.6		

While current inventories show that Region 4 is managing its public road and trail facilities well, maintaining funding levels for routine maintenance to keep these assets in 'good' or better condition ratings is essential to sustaining and improving public transportation facilities for the long term.

DEFERRED MAINTENANCE BACKLOG

Region 4 is underway with a new initiative to better handle the identified Deferred Maintenance (DM) backlog for the Region. The DM backlog became a high-profile topic during Congressional hearings in 2011 due to the magnitude of funds indicated in the national DM backlog. At that time, road repair and maintenance costs for assets were estimated without much differentiation between asset design, use, and maintenance needs, which resulted in an inflated bottom line.

The FWS Road Tiers and Decision Tree for determining tiers are discussed in the *Asset Management* chapter of the *Existing Conditions and Future Trends Report.* The system of tiers will complement existing asset classifications and address additional critical aspects of design, usage and maintenance such as helping to identify how each asset supports the overall mission and purpose of each station and how each asset should be maintained. Existing classifications (Class I – Class V) identify the types of routes and intended uses. The new tiers also will identify the standard of operations required for that roadway type, as well as the funding programs for which the roadway is eligible. Assignment of tiers to each roadway began in 2012 and will be completed in 2014 with assistance from the FHWA during current and future inspection cycles (as described in the attachment *Guidance for Reducing the NWRS Deferred Maintenance (DM) Backlog* dated November 13, 2012), portions of which are reproduced below.

- *Tier 1 Roads - Paved with a continuous surface of asphalt or concrete material. Tier 1 roads are primarily the main thoroughfare, main auto tour routes, loop drive, and spur roads for visitors or critical administrative/management functions. They may be routes leading to maintenance shops, quarters, public concessionaire facilities, education centers, scientific or cultural interest, or visitor facilities. These roads must be accessible by standard two wheel drive passenger or commercial vehicles including low clearance cars, vans, light trucks, and heavy trucks. Other than the main access to the station headquarters or visitor center, Tier 1 roads should have average to above average traffic levels for a refuge setting. Tier 1 roads may be maintained and repaired through the expenditure of Operations, Annual Maintenance, Deferred Maintenance (DM), Construction (CI), FWS Transportation Program, Emergency Relief for Federally-Owned Roads (ERFO) program funds or other fund sources.*

[3] Region 4 – U.S. Fish and Wildlife Service Long Range Transportation Plan: *Existing Conditions and Future Trends Report*

- *Tier 2 Roads - Improved roads constructed with natural or aggregate surfaces, continuously or with mixed surface types, and provide primary access to or as a main thoroughfare, auto tour route, loop drive, and spur road. They may be routes leading to station facilities, scientific or cultural interest locations, and recreational areas. Tier 2 roads will normally have at least two of the following attributes: road crowns or cross slope, road side ditches, berms, bridges, geotextile fabric, engineered base materials, or culverts installed to enhance the performance of the road. Regular maintenance allows passage by standard two wheel drive passenger and commercial vehicles including low clearance cars. Tier 2 roads could have varying levels of traffic depending on use. Tier 2 roads may be maintained or repaired through the expenditure of Operations, Annual Maintenance, DM, CI, FWS Transportation Program, or ERFO program funds or other fund sources.*

- *Tier 3 Roads - Natural or improved roads containing native soils, asphalt, concrete, aggregate, sand, or any other surface or combination of surfaces. To qualify as a road, these roads must have been physically constructed and are being maintained as described in Section 4 of this guidance. Tier 3 roads typically receive below average traffic use in a refuge setting. Even an administrative paved road that is passable at all times may be a Tier 3 road if it is rarely used; for example, a paved road around abandoned structures that is only used during the Annual Condition Assessment. Maintenance and repair of these roads is performed only as necessary, not in accordance with a regular schedule or industry standard practices. Tier 3 roads are normally repaired only by routine operations and Annual Maintenance funds, and are not routinely eligible for DM, FWS Transportation Program, or ERFO program. Tier 3 roads receive no regular or extended Deferred Maintenance or Transportation funding. Tier 3 roads may be eligible for emergency and DM funding for repairs on a case-by-case basis when failure to complete the required repairs would seriously impair the ability of the field station to fulfill mission requirements. Any expenditure of DM funds or contribution to DM backlog due to emergency repair needs approval by the Regional Program Chief or Roads Coordinator on a case-by-case basis. Tier 3 roads condition could vary from sometimes passable by a two wheel drive vehicle to only suitable for high-clearance four wheel drive vehicles. Seasonal conditions or wet weather may render these roads impassable. Comprehensive Condition assessments for Tier 3 roads will not be completed by either FWS or FHWA except to review their classification. Only Annual Condition Assessments by the field station will be completed to verify the inventory and to ensure the road is still passable as necessary to meet mission needs.*

Photo Credit: Joe Saenz, Hollands Bluff Road (Tier 2 road), D'Arbonne NWR.

CURRENT KEY FUNDING SOURCES

Three new major programs under MAP-21 are specifically relevant for the FWS. The Federal Lands Transportation Program authorizes funding for improvements on assets within the Federal estate. While Federal Agencies are not eligible to receive funds directly, the Federal Lands Access Program authorizes improvements on State or Local access facilities that connect to Federal Lands, benefitting the FLMAs. Finally, the Transportation Alternatives Program combines several previous funding programs, including the Transportation Enhancements and Recreational Trails Programs.

FEDERAL LANDS TRANSPORTATION PROGRAM

The **Federal Lands Transportation Program** (FLTP) provides funds for Federal Lands transportation facilities, which include those that are public access and are located on, adjacent to, or providing access to Federal Lands and are owned and maintained by the Federal Government. The FLTP program expands upon the predecessor Refuge Roads Program, which could only be utilized for roads documented as part of the Refuge Roads System. However, facilities eligible for FLTP program funding must be included on the Federal Lands transportation facility inventory, which is described in Section 203(c) of MAP-21. FLTP funds can be used to pay the costs of any of the following activities:

- Program administration
- Transportation planning
- Operation and maintenance of transit facilities
- Research
- Preventative maintenance
- Engineering
- Rehabilitation
- Restoration
- Construction
- Reconstruction

Funds are limited to the above activities on defined Federal Lands Transportation Facilities, including:

- Adjacent vehicular parking areas;
- Acquisition of necessary scenic easements and scenic or historic sites;
- Provision for pedestrians and bicycles;
- Environmental mitigation in or adjacent to Federal Land open to the public to (1) improve public safety and reduce vehicle-caused wildlife mortality while maintaining habitat connectivity; and to (2) mitigate the damage to wildlife, aquatic organism passage, habitat, and ecosystem connectivity, including the costs of constructing, maintaining, replacing, or removing culverts and bridges, as appropriate;
- Construction and reconstruction of roadside rest areas;
- Congestion mitigation; and
- Other appropriate public road facilities as determined by the Secretary of the Department of Transportation.[4]

Table 4-5: FLTP Allocations for FY 2013-2014

Authorized FLTP Funds	FY 2013	FY 2014
Total Authorization	$ 300 million	$ 300 million
Authorization for FWS	$ 30 million	$ 30 million
Allocation for FWS Region 4*	$ 5.83 million	$ 5.83 million

** After set-asides. FLTP funds are legislatively allocated to the National Park Service, the U.S. Forest Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the U.S. Army Corps of Engineers.*

[4] MAP-21 Factsheet - https://www.fhwa.dot.gov/map21/factsheets/fltp.cfm

As shown in Table 4-5, Region 4 has the largest allocation of FLTP funds in the FWS. Allocations of FLTP funds to the FWS (after set-asides) totaled $24.6 million nationally in FY 2013 and FY 2014. Of these totals, Region 4 received $5.83 million in each fiscal year, or nearly a quarter of the total funds that were distributed to the nine FWS regions. The large suballocation to Region 4 is a reflection of the magnitude of public access transportation facilities maintained by the Region as compared to National FWS total transportation infrastructure assets.

THE FEDERAL LANDS ACCESS PROGRAM

The **Federal Lands Access Program** (FLAP) provides funds for projects on facilities designated as Federal Lands access facilities that are located on, are adjacent to, or which provide access to Federal Lands. While the FLTP provides funds for projects that are located inside the FLMAs and which are owned and maintained by a federal land management agency, FLAP provides funds for transportation facilities and services that are predominantly external to the FLMA boundaries and for which title or maintenance responsibility is vested in a state, county, or local government or entity.

The annual national FLAP allocation defined in MAP-21 (prior to any set-asides) is $250 million. These funds are distributed to all of the states and territorial areas which contain any Federal Land management areas. These include, but are not limited to, those units administered by the U.S. Fish and Wildlife Service, the National Park Service, the U.S. Forest Service, the Bureau of Land Management, and the U.S. Army Corps of Engineers. The formula for FLAP allocations provides 80% of the total annual authorized $250 million to those states that each contain a minimum of 1.5% of the total public lands in the United States. The twelve states that meet this criteria and fall into the 80% category are:

- Alaska
- Arizona
- California
- Colorado
- Idaho
- Montana
- Nevada
- New Mexico
- Oregon
- Utah
- Washington
- Wyoming

The remaining $50 million (20%) is allocated to the other 38 states plus Washington D.C. and Puerto Rico. Following the 80/20 funding split of the total national allocation, the state specific suballocations are developed via the use of a formula that includes four basic factors:

- 30% based on the state's share of total recreational visitation in all states.
- 5% based on the state's share of total Federal Land area in all states.
- 55% based on the state's share of total Federal public road miles in all states.
- 10% based on the state's share of total number of Federal public bridges in all states.[5]

The annual authorization for all of the FWS Region 4 States is approximately $20 million, as noted below in Table 4-6. Note that Puerto Rico is included in the FLAP state level suballocation while the U.S. Virgin Islands is excluded from this formula.

Table 4-6: FLAP Allocations for FY 2013-2014

Authorized FLAP Funds	FY 2013	FY 2014
Total Authorization	$ 250 million	$ 250 million
Authorization for Region 4 States*	$ 20.42 million	$ 20.58 million

** Although Puerto Rico is included in FLAP formulae, the U.S. Virgin Islands (as a United States Territory) does not currently receive an allocation of funds. Eligible recipients of FLAP funding include state or local government entities, but FLMAs are not eligible recipients.*

[5] FLAP Map-21 factsheet - https://www.fhwa.dot.gov/map21/factsheets/flap.cfm

Eligible activities for FLAP funding for Federal Lands access transportation facilities and services located on, adjacent to, or that provide access to Federal Lands, including activities such as:

- Transportation planning
- Research
- Engineering
- Preventative maintenance
- Rehabilitation
- Restoration
- Construction
- Reconstruction
- Operation and maintenance of transit facilities

Additional facilities eligible for FLAP funding include:

- Adjacent vehicular parking areas;
- Acquisition of necessary scenic easements and scenic or historic sites;
- Provisions for pedestrians and bicycles;
- Environmental mitigation in or adjacent to Federal Lands to improve public safety and reduce vehicle-caused wildlife mortality while maintaining habitat connectivity;
- Construction and reconstruction of roadside rest areas, including sanitary and water facilities; and
- Other appropriate public road facilities, as determined by the Secretary of the Department of Transportation.[6]

Because available FLAP funds go directly to non-FLMA agencies, it is important (and the intention of MAP-21) that FLMAs coordinate and collaborate opportunities with adjacent state, county, or local government agencies to better leverage funds for mutually beneficial projects. FLAP funding incorporates activities associated with the former National Scenic Byways Program, which is described in further detail in the *Previous Funding Sources* section below.

TRANSPORTATION ALTERNATIVES PROGRAM

The **Transportation Alternatives Program** (TAP) replaces previous programs such as Transportation Enhancements and Recreational Trails programs, as well as several other discretionary programs, by wrapping them into a single funding source. The national total is divided among states based on each state's proportional share of FY 2009 Transportation Enhancements funding. Fifty percent of the state's TAP apportionment is available for use anywhere in the state (likely the proportion of funds available to the Service), while the other fifty percent is suballocated to areas based on their relative share of the total state population in the same manner as the suballocation of Surface Transportation Program (STP) funds. As shown in Table 4-7, the Region 4 states collectively received TAP allocations of about $201 million in FY2013 and about $204 million in FY2014. In general, the state DOT administers TAP funds. It is important to note that the 50% of the total state TAP allocation available for use anywhere in the state can be transferred by the state to fund projects through the four major federal aid highway funding programs and/or the Metropolitan Planning program.

Table 4-7: TAP Allocations for FY 2013-2014

Authorized TAP Funds	FY 2013	FY 2014
Total Authorization	$ 809 million	$ 820 million
Authorization for Region 4 States	$ 201 million	$ 204 million

[6] FLAP Map-21 factsheet - https://www.fhwa.dot.gov/map21/factsheets/flap.cfm

Recreational Trails Program

The **Recreational Trails Program** (RTP) remains largely unchanged as a set-aside within the TAP program. The set-aside from TAP for RTP is equal to the FY 2009 RTP apportionment unless the Governor of an individual state elects to opt out in advance, which leaves the equivalent value of FY 2009 RTP apportionment in the larger pool of TAP funds. States that elect to opt out may not use any TAP funds for RTP administrative costs for that fiscal year. For FY 2013, two states opted out: Florida from FWS Region 4 and Kansas from FWS Region 6. Florida also opted out of FY 2014 and was the only state to do so. The RTP provisions and requirements remain otherwise unchanged.

Table 4-8: RTP Set-Aside from TAP

RTP Set-Aside from TAP	FY 2013	FY 2014
Total Eligible RTP Set-Aside (Equal to FY 2009 RTP)	$ 84.2 million	$ 84.2 million
Total Actual RTP Set-Aside (After State(s) Elect to Opt-Out)	$ 80.1 million	$ 81.6 million
RTP Set-Aside for Region 4 States*	$ 13.7 million	$ 13.7 million

As shown on Table 4-8, the total national allocation of RTP funds was about $84.2 million in both FY2013 and fY2014. The amount of RTP funds set aside for use in the Region 4 states was about $13.7 million in each of these two fiscal years.

OTHER FUNDING SOURCES

There are a number of funding mechanisms that are allocated on a case-by-case basis that have been productive for Service transportation project funding in the past. Some programs still exist today, while others have been rolled into FLAP, FLTP or other funding programs under MAP-21. Region 4 has successfully leveraged non-traditional funding sources for Service transportation projects in recent years. Some programs are highly specialized and awarded sparingly, while others are in place to assist with unforeseen circumstances.

EMERGENCY RELIEF FUNDING SOURCES

The Federal Government has three emergency relief programs which provide repair and reconstruction relief for facilities that have been seriously damaged as a result of presidentially declared natural disasters or catastrophic failure from an external cause. Most pertinent to the US FWS, the **Emergency Relief for Federal Roads Program** (ERFO) provides financial assistance for the repair of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to the general public for use with a standard passenger vehicle. Some ERFO eligible roads are also Federal-aid highways and are eligible for the **Emergency Relief Program** (ER), which provides funds for emergency and permanent repairs for roads and bridges on Federal-aid highways including public roads classified as arterials, urban collectors, and rural major collectors (local roads and rural minor collectors are not eligible for ER funds). For facilities that are both ERFO and ER eligible, the state transportation department and/or local highway agency are the eligible applicants and may elect to receive reimbursement for eligible repairs under either program. The **Robert T. Stafford Disaster Relief and Emergency Assistance Act, Federal Emergency Management Agency** is an alternative funding source for local government entities to repair damage that is not eligible under ERFO or ER programs.

While the funding authorization for ER has been set to $100 million for each FY 2013 and FY 2014, the original authorization for ER under SAFETEA-LU included provisions to provide sums, as necessary, to supplement funding above the authorized limit (appropriate legislation is required to make the additional funds available for use). MAP-21 has changed the ER funding mechanism to

remove the previous $100 million cap on obligations for a single event. FWS Region 4 currently has $2.3 million in active emergency relief projects. Some recent projects funded through ERFO are described below.

Reelfoot NWR (Tennessee)– Restoration of Grassy Island Auto Tour Road

Extreme weather and significant storm flooding events that occurred in the last two weeks of January 2013 damaged roads at Reelfoot NWR. Region 4 requested ERFO Funding for erosion repair and head cutting of the upstream end of a road culvert, which had caused a hole in the culvert. Repairs included the replacement of a 30 inch diameter culvert that was 30 feet long. The refuge was awarded $13,752 to perform the repairs.

Lake Isom NWR (Tennessee) – Restoration of Boundary Line Road (Route 010)

Lake Isom NWR experienced erosion of gravel at seven different locations along Route 010 due to extreme weather and significant storm flooding resulting from 6.5 inches of rain from January 9-14, 2013. Region 4 requested ERFO Funding to repair the road damages and the refuge was awarded $8,688 to perform the necessary repairs to Route 010.

PREVIOUS FUNDING SOURCES

The previously authorized **Refuge Roads Program** (RRP) has been absorbed into the MAP-21 created FLTP. The RRP was utilized for expenditures on existing roads specifically documented as part of the Refuge Roads System. RRP funding could be used for the design, construction, reconstruction, maintenance or improvement of refuge roads and bridges that provide access to or are within a unit of the National Wildlife Refuge System. Funding could not be applied to the design or construction of new roads. A representative RRP funded project in Region 4 is described below.

Carolina Sandhills NWR (South Carolina) – Road Rehabilitation and Erosion Control[7]

The Carolina Sandhills NWR is located in a region of rolling sandy hills and longleaf pine forests as well as a geology that is susceptible to erosion. As a result, the Refuge has experienced maintenance challenges on its roadways. As part of the Refuge Roads Program, EFLHD worked to correct ongoing maintenance problems by rehabilitating several roadways in the Refuge. Rehabilitation activities included grading, widening roadway lanes, placing additional aggregate surface material, stabilizing slopes through a new and innovative seeding and erosion control method, installing new and replacing/extending existing pipe culverts, and cutting ditches for better drainage.

[7] Refuge Roads Sample Projects, July 2012. <http://flh.fhwa.dot.gov/programs/rr/documents/rr.pdf>

The **National Scenic Byways Program** (NSBP) was established under the Intermodal Surface Transportation Equity Act (ISTEA) of 1991. The program is a discretionary grant program whose goal was the recognition, preservation, and enhancement of roads throughout the United States that had one or more archeological, cultural, historic, natural, recreational, and/or scenic qualities. Although MAP-21 has not eliminated the program, it no longer receives direct funding or grant program funds in this new bill. In Region 4, the Sabine NWR received NSBP Funds. Many other refuges in the Southeast intersect or are near scenic byways. Identifying proximity to nationally significant roadways could potentially assist the Service with leveraging transportation dollars for projects in and around Service lands. Some NSBP projects that benefitted specific FWS Region 4 are noted below.

Tamiami Trail Scenic Highway Corridor Master Plan – Ten Thousand Islands NWR (Florida)[8]

The National Scenic Byways Program funded the development of a detailed master plan for the Tamiami Trail Scenic Byway, which provides primary road access to the Ten Thousands Islands NWR as well as several other FLMAs. In 2000, the Florida DOT sponsored the NSBP project, which was allocated a total of $240,000 to identify key locations along the 50 mile Tamiami Trail roadway for improved safety and access to the FLMAs along its corridor. The plan provided site plans and engineering drawings in order to construct necessary visitor centers, pull-offs, parking areas, kiosks, boardwalks, canoe access points, trailheads and picnic areas along the roadway to benefit access to the FLMAs along this corridor, including the Ten Thousand Islands NWR.

Florida Key Deer Habitat Preservation – National Key Deer NWR (Florida)[9]

In 2008 the Monroe County Planning Department was awarded $1,400,000 to preserve 20 specific parcels in Big Pine Key along the Florida Keys Scenic Highway to provide additional critical habitat for the Florida Key Deer species, which are only found on these islands. The project intent is to preserve the delicate ecosystem on Big Pine Key, where the National Key Deer NWR is also located, while preserving a beautiful viewshed and controlling and directing growth in the popular vacation destination.

The **Paul S. Sarbanes Transit in Parks Program** was established to address the challenge of vehicular congestion in and around national parks and other federal lands. The program was originally authorized under SAFETEA-LU and provided grants for alternative transportation in federal lands management areas from 2006 to 2013 when it was repealed under MAP-21. The FLTP and FLAP programs carry the same basic eligibility requirements and potential for funds to complete similar projects through MAP-21 that were associated with the Sarbanes Transit in the Parks Program. J.N. “Ding” Darling NWR was a recipient of Transit in Parks program funding in both 2006

[8] Tamiami Trail Scenic Highway Corridor Master Plan (SB-2000-FL-02) <http://www.fhwa.dot.gov/hep/scenic_byways/>

[9] Florida Keys Scenic Highway FL: Key Deer Habitat Preservation (SB-2008-FL-10) <http://www.fhwa.dot.gov/hep/scenic_byways/>

and 2009 with funds awarded to Lee County and to the local transit agency, LeeTran, to assist with the provision of improved transit access to Sanibel Island and the J.N. "Ding" Darling NWR. Additionally, the Merritt Island NWR benefitted from the Transit in Parks Program in 2012. The use of the Sarbanes funding at both J.N. "Ding" Darling NWR and Merritt Island NWR is detailed below.

Merritt Island NWR – Titusville, Merritt Island, and Surrounding Communities Transit Service

In FY 2012 Merritt Island, Florida received funds to develop a mass transit plan to provide transit service between the City of Titusville, surrounding communities, and the Merritt Island NWR. Merritt Island is also home to the John F. Kennedy Space Center and to the Canaveral National Seashore. Transit will improve access to the NWR and space center and has the potential to mitigate some traffic concerns by helping visitor share trips rather than take individual personal vehicles to the island. Space Coast Area Transit (SCAT), the local Brevard County transit agency, provides fixed route bus service between the mainland and Merritt Island, including Route 3, which runs on Merritt Island and Route 4, which connects Merritt Island and Port Canaveral to the mainland and adjacent communities.

J.N. "Ding" Darling NWR – "Ding" Darling Alternative Transportation Study

J.N. "Ding" Darling NWR working with Lee County's DOT (LeeTran) and as a collaborative effort with the City of Sanibel, has been working to address traffic congestion issues on and leading to Sanibel Island. The selected transportation alternatives included a Refuge-only approach that incorporated the expansion of tram service and non-motorized, multi-use paths inside or accessing the Refuge. Transportation alternatives that were also considered included an Islands-only alternative that would implement tram service to connect the gateway community to the Refuge's existing tram service and a combination Refuge and Island approach that would implement both the Refuge-only and Island-only approaches. Those two latter alternatives were removed from further consideration as a result of overwhelming public opposition. The study also addresses concerns from high visitation numbers on the refuge and the impacts that high visitation may have on wildlife and wildlife habitat.

POSSIBLE FUTURE FUNDING SOURCES

While the majority of future transportation funds for Region 4 are anticipated to come directly through either the FLAP or FLTP programs, it is important to consider alternative means to fill funding gaps and finance transportation projects. Whether through other programs in MAP-21 or from non-Federal

sources at the state or local levels, transportation funding can be leveraged from a variety of programs throughout the country.

Federal Land transportation projects are eligible for a number of programs, beyond FLAP and FLTP, whether by partnering with other agencies or competing directly for funds. The following are a number of programs available through MAP-21 and other non-federal sources that could benefit the FWS.

The **Technology and Innovation Deployment Program** aims to accelerate the implementation and delivery of new technologies and innovations from highway research and development. Nationally $62.5 million has been authorized for this program for each FY 2013 and FY 2014 and is available until expended. The FWS should pay particular attention to the new business practices in highway construction processes that are taking place in various parts of the country. "Green Streets" and sustainable highway design and rating programs are found all over the United States. Examples include the New York State DOT GreenLITES (Green Leadership in Transportation Environmental Sustainability) transportation environmental sustainability-rating program and the Oregon Greenroads sustainable planning toolkit. These programs present roadway designers with a set of sustainability best practices to enhance, promote, and prioritize projects that consider better practices in roadway construction and maintenance, not unlike the LEED program for building design. The Georgia DOT has funded research to begin a Georgia rating system and will likely start a pilot program and solicit pilot projects in the near future.

The Service could greatly benefit from the context-sensitive and environmentally minded innovations that have come out of these types of programs. Projects that serve the Service's mission will likely be competitive in this regard when compared to other transportation projects evaluated using these tools. Moreover, the Service could benefit from pilot projects on innovative best roadway construction or maintenance practices that particularly target environmental concerns. Keeping abreast of innovations and advances in sustainable roadway design could provide the Service with opportunities to fund projects with state-of-the-art environmental and sustainable construction and design elements.

The **Construction of Ferry Boats and Ferry Terminal Facilities** program has the potential to benefit the Service in areas where alternative transportation by water is a viable consideration, and a public entity is the majority or sole owner of the Ferry system. The Ferry program has been authorized for $67 million for FY 2013 and FY 2014 and the funds have been allocated based on a ratio that includes the number of passengers, number of vehicles, and total route miles served by ferry systems throughout the states, territories, and Puerto Rico. Unlike the former Ferry Boat Discretionary program, there are no set-asides for specific states, and funding under the program is no longer discretionary, although eligibilities for funds remain the same. Construction of ferry boats and ferry terminal facilities will likely benefit existing routes serving the general population need. It is unlikely that construction of a new ferry terminal will serve a refuge directly. However, the Service should consider locations where transportation by ferry to a refuge has the potential to be mutually beneficial to both the Service and ferry provider.

Travel by ferry could be considered an extension of nature observation for visitors to an island refuge. Terminal facilities may not need to be located directly on or adjacent to the refuge if, for example, there were trail facilities or a shuttle to continue transportation to refuges via alternative modes. Distribution of Ferry program funds depends on a ratio of 20% based on number of ferry passengers, 45% based on total vehicles carried, and 35% based on total route miles. Refuges with high visitation could coordinate with the ferry service provider to promote additional ridership or even a new route to assist with eligibility for additional funds.

The **Highway Safety Improvement Program** (HSIP) is a SAFETEA-LU created program that has been continued under MAP-21 to achieve a significant reduction in traffic fatalities and serious injuries on public roads. It is important for the Service to recognize locations in and around refuges and hatcheries that could benefit from this program. There may not always be a case where safety concerns in and around refuges will qualify or be competitive for HSIP funds, but the estimated total national apportionments are sizeable at $2.39 billion for FY 2013 and $2.41 billion for FY 2014. HSIP provides funds for strategies, activities, or projects on public roads that are consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous condition. Projects that receive funds will need to be part of an updated SHSP, which will require the Service to coordinate with local and state agencies, if a safety improvement project is to be implemented with funds through this program.

The **Railway-Highway Crossings** program is nationally funded at approximately $220 million annually for FY 2013 and FY 2014 as a set-aside from the HSIP totals. FWS Region 4 has a number of railway-highway at-grade crossings either inside or adjacent to refuges and Service-owned transportation facilities. Each state is required to conduct a survey of highway-railroad crossings that may require separation, relocation, or the installation of enhanced protective devices at public grade crossings. It may behoove the Service to consider if any crossings in or adjacent to Service lands and facilities could benefit from safety improvements to reduce any fatalities, injuries or crashes at these locations.

Photo Credit: Joe Saenz, Railroad Crossing at Black Bayou Lake NWR

The **Statewide and Nonmetropolitan Transportation Planning** (SNTP) program is funded by a 2% set-aside from each state's apportionment for the four core highway surface transportation funding programs (i.e. – National Highway Performance Program, Surface Transportation Program, Highway Safety Improvement Program, Congestion Mitigation and Air Quality Improvement Program). Similar to many MAP-21 programs, the SNTP requires performance-based planning as part of the statewide planning process. For the Service to benefit from SNTP funds, it will have to present projects to the state that are competitive based on state or local performance targets. The Service could benefit from incorporating transportation projects into the Statewide Transportation Improvement Program (STIP), when possible. As the Service continues to integrate performance measurements, it should consider how Service performance goals and available data could integrate with Statewide performance-based planning and give Service projects a competitive edge for SNTP funding. Where possible, the Service should work to incorporate transportation projects in the STIP.

In specific circumstances, Region 4 should consider how funds could be leveraged for Service benefit from the **Territorial and Puerto Rico Highway Program** for transportation enhancements leading to refuges in Puerto Rico or the U.S. Virgin Islands. The Territorial Highway Program includes $40 million for both FY 2013 and FY 2014 to assist the governments of the U.S. territories with construction and improvement of the system of arterial and collector highways and necessary inter-island connections. Because the U.S. Virgin Islands are not included in current funding calculations through FLAP, it is important to consider other funding mechanisms for Service transportation projects inside or adjacent to the refuges in this territory.

The Rivers, Trails, and Conservation Assistance Program (RTCA) is not a funding program, but rather a community assistance branch of the National Park Service. It offers staff assistance for local project planning for all levels of public agencies. The RCTA Program provides assistance with planning, project development, and project construction that relate to resource conservation activities and outdoor recreation. While there have been no projects with RTCA assistance in Region 4, the RCTA Program is associated with a Region 3 project to preserve over 5,000 acres of land to be protected by the Service and could be a resource to Region 4 in the future.

FINANCIAL GAP: NEEDS VERSUS REVENUES

Financial needs for Region 4 transportation assets have traditionally been evaluated based on the level of asset deficiencies (roadways, parking facilities, trails, etc.) or associated with asset repair and reconstruction. The focus on asset deficiencies as encompassing transportation needs could be expanded to a broader discussion that includes new capital opportunities such as new auto-tour routes, new trails or roadways connecting refuges and hatcheries to the local public, or public transit shuttles that can improve multimodal access. The additional consideration for new assets could grow financial need considerations considerably from traditional asset-deficiency based financial calculations.

The consideration of new asset planning in the financial needs discussion for transportation is one supporting reason for encouraging more transportation planning at the station level, including more targeted transportation step-down plans at stations warranting further study. Some things are known at this time about need and funding at the regional level:

- The current estimated backlog for FWS Region 4 to bring public use transportation assets (specifically roads and parking lots) to the desired “good” condition rating is $121 million. This includes routes in the 000, 100, 200, and 900 categories as estimated in the FWS Cycle 4 RIP database, which is separate from the newly established Tiering System for FWS Region 4. This does not account for any further deterioration of these assets after the present time.
- Funding for projects in Puerto Rico and the U.S. Virgin Islands can be a challenge since these outlying U.S. territories are not included in the formulae for many of the major MAP-21 funding allocations.
- Fish hatcheries in Region 4 have historically funded transportation projects with some combination of Deferred Maintenance (DM), Construction funds, and Visitor Enhancement funds, rather than working with transportation dollars.

NATIONAL FWS NEEDS VS. FUNDING ANALYSIS

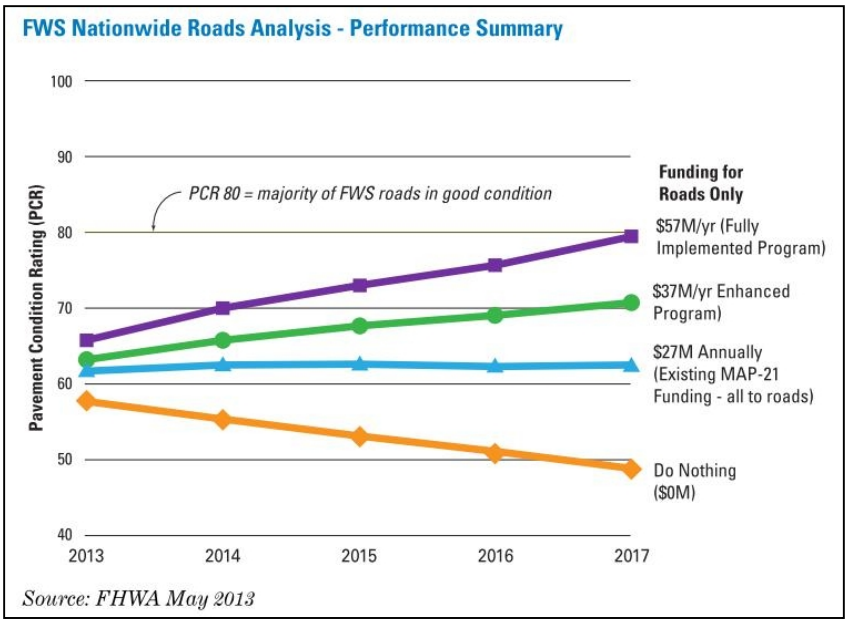
On the National level, the U.S. FWS has partnered with the FHWA for the past 15 years to manage the FWS Transportation Program. The *Fish and Wildlife Service National Reauthorization 2013 Prioritization Pilot and Work Optimization Analyses Report* (*2013 Prioritization Pilot*) provides an understanding of the state-of-repair and financial needs necessary to bring all assessed paved assets

to a desired Pavement Condition Rating (PCR) of 80. Data collected as a part of the FHWA Road Inventory Program (RIP) provided the baseline for paved asset conditions for the *2013 Prioritization Pilot*. An enhanced optimization analysis considered the current conditions for paved assets for the FWS as a whole, and separately for each individual Region. This report and its findings contributes to the National FWS LRTP, which includes not only the state-of-repair and financial needs necessary to bring paved assets to a desired condition, but also bridges, trails, transit, deferred maintenance, and the costs associated with transportation planning activities.

Under MAP-21, the FLTP funding allocation for the Service is $30 million annually in dedicated funding. According to current RIP data, that budgetary allocation is only enough to maintain pavement conditions at existing levels. There are not any remaining funds for other improvements to trails, bridges, or environmental enhancements or to implement new large projects. The analysis and funding scenarios considered for the *2013 Prioritization Pilot* have been incorporated in the National FWS LRTP. The scenarios shown below in Figure 4-1 illustrate that a $27 million annual budget would barely keep paved assets at current PCR condition. The Fully Implemented Program to bring all paved assets to a PCR of 80 by 2017 would require a funding level of about $57 million annually. This translates into an annual national level funding "gap" between identified needs and likely available funding of approximately $30 million.

Similar to the *2013 Prioritization Pilot* prepared for paved assets, the FWS National LRTP undertook a detailed analysis of the remaining items – bridges, trails, transit, deferred maintenance, and transportation planning activities – to prepare a comprehensive estimate of the overall financial need for FWS transportation assets. A desired future condition considered the funds needed to bring the overall condition for each type of asset/area to a desired condition level as well as funding allocations for environmental enhancements and the delivery of large projects.

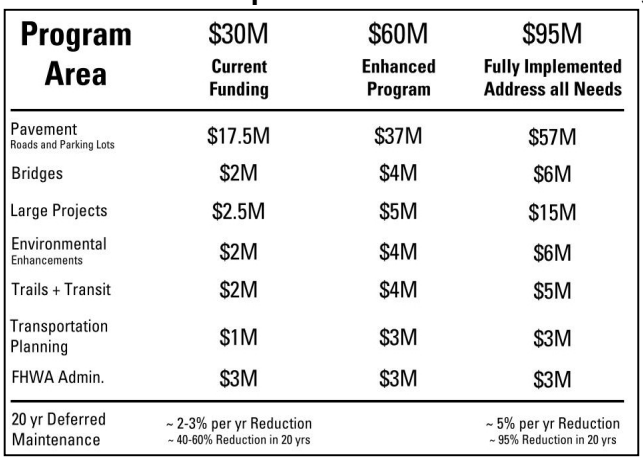
Figure 4-1: FWS National Road Performance Analysis and Funding Scenarios



Source: Fish and Wildlife Service National Reauthorization 2013 Prioritization Pilot and Work Optimization Analyses Report

This initial version of the Region 4 LRTP does not include a similarly detailed analysis of the financial need for transportation assets, but rather it builds upon the information prepared at the National level. Based on the needs identified in the National analysis for paved assets, bridges, trails, large new projects, environmental enhancements, transit, and deferred maintenance, the FWS National Transportation Program would require about $95 million annually for a Fully Implemented program. This level of funding would not just maintain FWS paved assets at current levels but allow aggressive improvement of assets, address additional projects for transit and trail needs, and successfully deliver 2 or 3 large new transportation projects per year nationally.

Figure 4-2: FWS National Transportation Needs and Funding Scenarios[10]



Program Area	$30M Current Funding	$60M Enhanced Program	$95M Fully Implemented Address all Needs
Pavement (Roads and Parking Lots)	$17.5M	$37M	$57M
Bridges	$2M	$4M	$6M
Large Projects	$2.5M	$5M	$15M
Environmental (Enhancements)	$2M	$4M	$6M
Trails + Transit	$2M	$4M	$5M
Transportation Planning	$1M	$3M	$3M
FHWA Admin.	$3M	$3M	$3M
20 yr Deferred Maintenance	~ 2-3% per yr Reduction ~ 40-60% Reduction in 20 yrs		~ 5% per yr Reduction ~ 95% Reduction in 20 yrs

The *2013 Prioritization Pilot* determined that 24.4% of the overall National financial need would be comprised of paved assets in Region 4. While there are a total of eight regions nationally across the Service, Region 4 by far has the largest share of public use road miles accounting for nearly 30% of the Service's total road miles (1,454 of 4,948 as inventoried for the *2013 Prioritization Pilot*). Thus, the extensive system of paved assets in Region 4 plus the difference between existing paved conditions and the costs to bring paved assets to the desired PCR 80 means that Region 4 requires nearly a quarter of the total estimated financial need. Although it is not known if the bridge, trails and transit assets in Region 4 equate to the same share of the identified National financial need for roadways, this LRTP assumes the 25% estimate of the National LRTP financial need areas to provide an approximate overall financial need for Region 4 transportation assets. The estimated funding required for Region 4 to prepare a program comparable to the one described in the National LRTP would include the dollar amounts by program area shown below in Table 4-9.

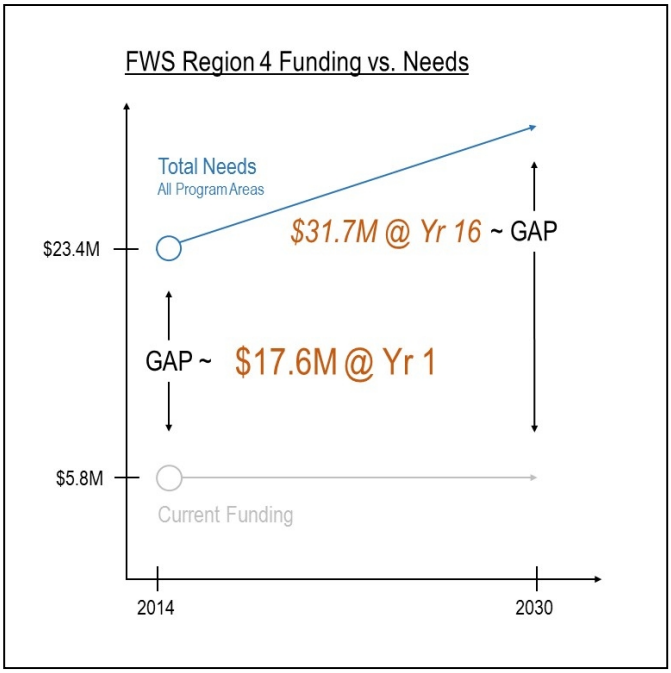
Table 4-9: Estimated Annual Region 4 Funding Need by National LRTP Program Area

Program Area	Current Funding	Enhanced Program	Fully Implemented (Address all Needs)
Pavement (24.4% from 2013 Prioritization Pilot)	$5.83 Million	$9.03M	$13.91M
Bridges (25% estimate from National LRTP)		$1.00M	$1.50M
Large Projects (25% estimate from National LRTP)		$1.25M	$3.75M
Environmental Enhancements (25% estimate from National LRTP)		$1.00M	$1.50M
Trails + Transit (25% estimate from National LRTP)		$1.00M	$1.25M
Transportation Planning (25% estimate from National LRTP)		$0.75M	$0.75M
FHWA Admin. (25% estimate from National LRTP)		$0.75M	$0.75M
Total	*$5.83 M*	*Approx. $14.8M*	*Approx. $23.4 M*

[10] *Fish and Wildlife Service National Reauthorization 2013 Prioritization Pilot and Work Optimization Analyses Report (Stantec, 2013)*

Considering the percentage distribution provided by the *Optimization Analysis Report* and the $95 million annual need nationally as identified in the National LRTP, approximately $23.4 million annually would be needed to fund Region 4 in a Fully Implemented funding program. Similar to the paved asset analysis completed for the *2013 Prioritization Pilot*, an Enhanced Program with approximately $14.8 million annually would still improve paved assets and would be a progressive climb towards the desired PCR rating of 80. Although the anticipated overall PCR for FWS paved assets nationally is anticipated to reach just over a PCR of 70 by 2017, the Enhanced Program likely would reach or come close to a PCR rating of 80 for paved assets by 2030. Figure 4-3 depicts the anticipated funding shortfall for the Fully Implemented funding program which would have an initial $17.6 million funding shortfall in Year 1, which will continue to grow to an anticipated $31.7 million funding gap in 2030 due to an assumed inflation rate of 3% per year and if a consistent $5.83 million available funding is spent in Region 4 annually.

Figure 4-3: Region 4 Transportation Funding Gap for a Fully Implemented Funding Plan



As shown in Table 4-10, the total anticipated need (through 2030) of the Enhanced Plan is $321.6 million while the need associated with completing the Fully Implemented Plan is $509.4 million. These cumulative values assume the 2014 baseline needs of $14.8 million and $23.4 million for the Enhanced and Fully Implemented Plans, respectively, grown at an inflation rate of 3.0% per year to account for inflation through 2030. With a constant funding level of $5.83 million per year assumed, a total of just under $100 million will be available to Region 4 through 2030. This results in a funding shortfall of between $222.5 million and $410.3 million depending on the level of plan implementation that is assumed.

Table 4-10: Anticipated FY 2014 - FY 2030 Region 4 Transportation Needs Versus Funding

Existing Funding for Region 4 (annually)	Anticipated Need through 2030	Anticipated Funding Available through 2030*	Funding Gap through 2030
$ 5.83 M	Enhanced: $321.6 M	$ 99.1 M	Enhanced: $222.5 M
	Fully Implemented: $509.4 M		Fully Implemented: $410.3 M

The current level of transportation funding available to Region 4 limits the Service's ability to maintain current assets and to implement new innovative and meaningful projects now and in the future. New sources of funding should be explored wherever possible, including opportunities to partner with neighboring jurisdictions on mutually beneficial projects.

5. Project Selection Process

The culmination of the LRTP effort is the development of a project selection process. In light of guidance set forth by MAP-21, performance-based planning will be at the core of funding decision-making. It is imperative that the refuges and hatcheries in Region 4 develop creative and impactful transportation projects that can compete not only within the region but also at the federal level within the FWS, with other FLMAs, and within regions and states across the country.

PROJECT IDENTIFICATION AND SELECTION

The Southeast Region of the Service develops a 5-year project plan for transportation improvements which includes both asset management projects and more substantial capital projects. Asset management projects focus on the state of good repair of existing infrastructure, including such things as regraveling or resurfacing of roads, trails, and parking lots as well as bridge upgrades. Of the $5.8 million that the region receives through MAP-21, $250,000 is set aside for regraveling projects and an additional $140,000 is set aside for urgent bridge repairs. The remaining funding is used for larger capital projects.

Currently, stations notify the region of various project needs, and the region creates a list of potential projects. This list is then submitted to area managers for their review and feedback. With the assistance of area managers, the region creates a 5-year project plan for implementation. The plan is not updated annually; however, area supervisors are able to review the list of projects annually to ensure that no emergency changes need to be made or that a project has been completed with another funding source. Projects are then administered by the Service or by EFLHD through an interagency agreement and coordinated with the states through the State Transportation Improvement Program.

Much of the project identification process will remain the same as it has historically been; however, performance-based consideration of projects required by MAP-21 means that the selection of projects will become more quantitative. The FWS National LRTP has created the framework for a Project Evaluation Tool that should be used to select the most competitive transportation projects within each region. Additionally, the National FWS has adopted Roadway Design Guidelines that should be referenced during the creation of roadway projects. Both the Project Evaluation Tool and Road Design Guidelines documents can be found in the Appendix. The following section provides more information on the criteria and tool and how it will be integrated into the traditional project selection process.

PROJECT EVALUATION CRITERIA AND TOOL

The Project Evaluation Criteria and Tool provides station, region, and national leadership with a more quantitative process for evaluating transportation projects. MAP-21 places a greater emphasis on performance-based selection of projects than SAFETEA-LU and other prior federal transportation bills. The projects that provide higher transportation value should be funded before those that provide lower value. The National LRTP for the Fish and Wildlife Service outlines six primary metric categories for the evaluation and selection of projects. Region 4 has maintained those six categories and has included subcategory metrics using National Plan guidance, analysis conducted through the regional LRTP process, and RATE survey responses from station leadership. The six primary categories and focal points of the subcategories are provided below:

1. **Improves transportation safety** – focuses on crash history, improvements that will reduce crashes, and/or other safety enhancements and countermeasures

2. **Improves "state of good repair" of transportation assets** – considers the type and priority level of the asset, the Facility Condition Index (FCI) rating, and/or whether the project includes a cost savings plan for reducing operations and maintenance costs
3. **Enhances transportation choices to, from, and within FWS stations** – provides points to projects that improve roadway connectivity, provide alternative transportation options, enhance way-finding, and/or are located in areas with substantial underserved or underrepresented populations
4. **Enhances environmental conditions in the field and/or helps to meet programmatic goals** – considers projects that protect, avoid, or address environmentally sensitive areas, include educational components, and/or improve Alternative Transportation System or Intelligent Transportation System options
5. **Meets a local priority: (a) documented in a Comprehensive Conservation Plan (CCP), (b) other transportation plan; (c) is within a Region's high-use or urban station; or (d) provides economic benefit to local partners** – includes points for projects that are included in FWS or other partner agency plans, are in areas with high visitation rates or in urban areas, improve congestion hot-spots, and/or provide a positive impact to the local economy
6. **Supports transportation partnerships and leveraging of transportation funds/programs to benefit FWS** – provides points for projects that have partner agency buy-in or financial support and/or that are deferred maintenance projects for Visitor Facility Enhancement

This tool will be used to assist Regional leadership with the identification of priority projects across the Region. Technical merit is part of the prioritization process, as it is in all planning processes, but stakeholder involvement also will play an important role. Qualitative considerations for project prioritization will include availability of funds, project development delivery schedules, and time constraints for right-of-way and environmental work. Area, regional, and national leadership will discuss high-scoring projects from a qualitative perspective to determine which projects should be advanced for implementation. Figure 5-1 shows the scoring criteria for *Category 1: Improves transportation safety*. The entire list of criteria and associated points are included in Appendix A3.1.

Figure 5-1: Project Evaluation Tool - Criteria Excerpt

1. Improves transportation safety of humans and wildlife	**National Plan Recommended Points = 20**
Goal	***Points***
Existing Conditions / Crash History (choose all that apply, maximum of 10 points)	***(max 10 points)***
Documented or anecdotal crash history where the project is planned	
High numbers of human or wildlife injuries (may include station staff anecdotal information)	/3 points
High number of human or wildlife fatalities (may include station staff anecdotal information)	/5 points
Station identified as a safety hot spot (crash) in the Region 4 LRTP (Table 14 of the Appendix)	/4 points
Project Safety Improvement (choose if applicable, maximum of 10 points)	***(max 10 points)***
Project improves safety of location *(examples - adding turn lanes, flattening horizontal curves, sight distance improvements or enhancements/countermeasures such as road safety audits, safety edge, signs and markings, traffic calming and movement restrictions, wildlife crossing, barriers, vegetation control, surface improvement, visiting hours, tools such as Highway Safety Manual, Interactive Highway Safety Design Mode, etc.))*	/10 ***points***
Goal #1 Total Points	***0 /20 points***

= Project score determined using data from the Long Range Transportation Plan

6. Plan Implementation and Future Use

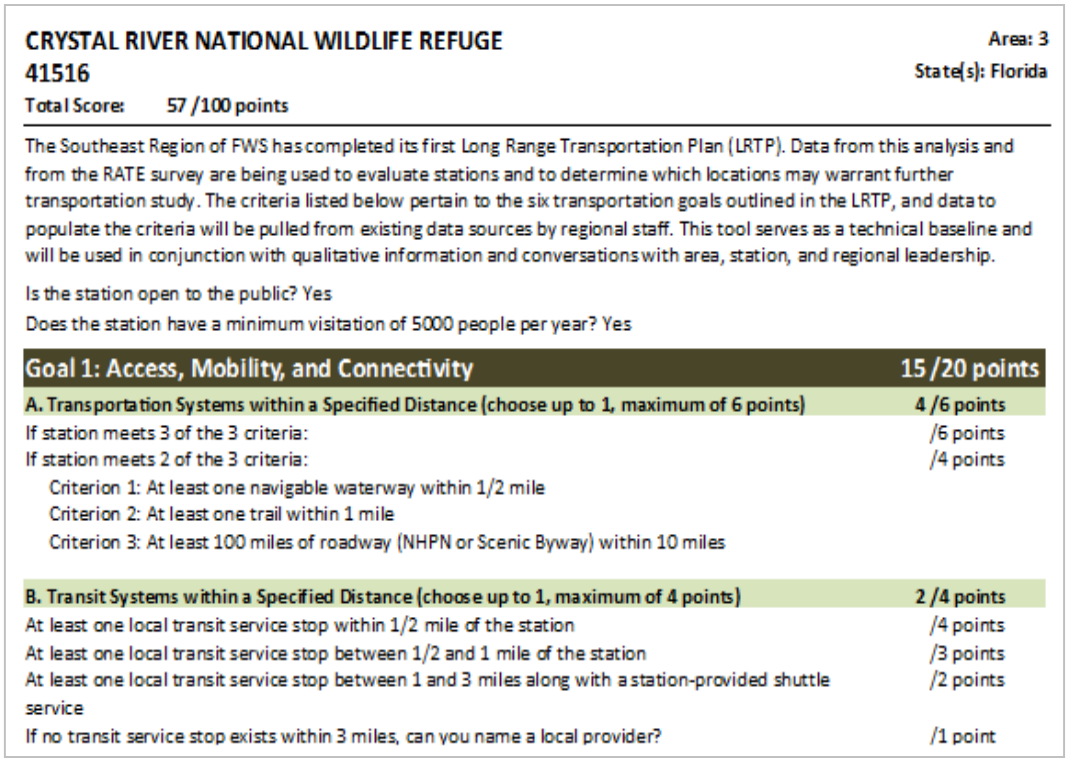
LRTP USE BY THE REGION

This initial Region 4 Long Range Transportation Plan is meant primarily to serve as a regional planning document. The *Existing Conditions and Future Trends Report* provides a regional snapshot of transportation assets and needs with additional detail listed by station in Appendix A2.2. This *Recommendations Report* includes policy guidance and evaluation tools that the region can use to prioritize projects in light of new federal funding guidance and the FWS National LRTP Plan that seeks to fund projects that will provide a strong return on investment. Recommendations include suggested data collection efforts that the region or individual stations should consider over the next few years and before the next update of the Region 4 LRTP.

STATIONS FOR FURTHER TRANSPORTATION STUDY: REGIONAL EVALUATION TOOL

The Project Evaluation Tool is an important resource for prioritizing transportation projects within the region by determining which projects provide the greatest value. Another tool has been created as part of the Region 4 LRTP effort that provides value at an earlier stage of the transportation planning process. A handful of refuges have conducted step-down transportation plans in addition to their traditional CCP efforts; however, most of the refuges and hatcheries in the Southeast Region have not studied transportation within and around their stations. This is acceptable for many stations due to smaller land areas and lower visitation levels. At the same time, some other stations may benefit from additional study. The Stations for Further Transportation Study tool is meant primarily as an evaluation tool that can be used by regional staff to determine which refuges and hatcheries may warrant a further more detailed transportation study.

Figure 6-1: Stations for Further Transportation Study – Sample Report



CRYSTAL RIVER NATIONAL WILDLIFE REFUGE — Area: 3
41516 — State(s): Florida
Total Score: 57 /100 points

The Southeast Region of FWS has completed its first Long Range Transportation Plan (LRTP). Data from this analysis and from the RATE survey are being used to evaluate stations and to determine which locations may warrant further transportation study. The criteria listed below pertain to the six transportation goals outlined in the LRTP, and data to populate the criteria will be pulled from existing data sources by regional staff. This tool serves as a technical baseline and will be used in conjunction with qualitative information and conversations with area, station, and regional leadership.

Is the station open to the public? Yes

Does the station have a minimum visitation of 5000 people per year? Yes

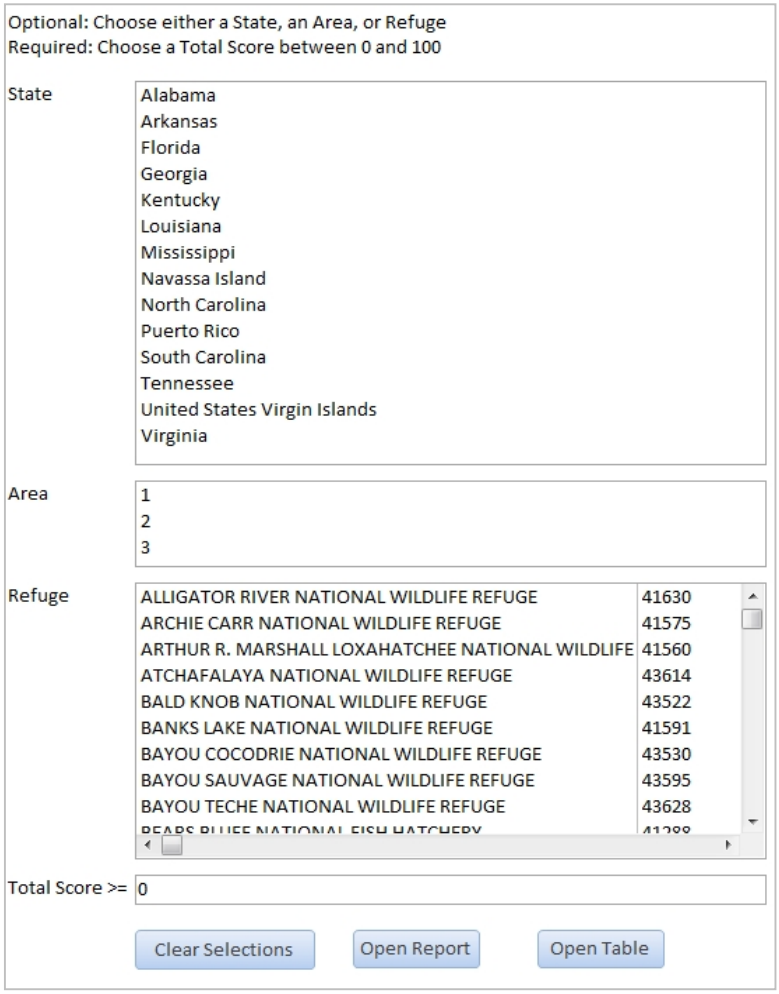
Goal 1: Access, Mobility, and Connectivity	15 /20 points
A. Transportation Systems within a Specified Distance (choose up to 1, maximum of 6 points)	**4 /6 points**
If station meets 3 of the 3 criteria:	/6 points
If station meets 2 of the 3 criteria:	/4 points
Criterion 1: At least one navigable waterway within 1/2 mile	
Criterion 2: At least one trail within 1 mile	
Criterion 3: At least 100 miles of roadway (NHPN or Scenic Byway) within 10 miles	
B. Transit Systems within a Specified Distance (choose up to 1, maximum of 4 points)	**2 /4 points**
At least one local transit service stop within 1/2 mile of the station	/4 points
At least one local transit service stop between 1/2 and 1 mile of the station	/3 points
At least one local transit service stop between 1 and 3 miles along with a station-provided shuttle service	/2 points
If no transit service stop exists within 3 miles, can you name a local provider?	/1 point

The tool uses only information that has been analyzed or gathered as a part of the Region 4 LRTP or the voluntary RATE survey responses collected from station management. The decision to use only this data was made for multiple reasons:

- Increases the value of the data collected and analysis pertaining to the LRTP
- Eliminates the need for an additional data call to the stations
- Reduces the effort of regional leadership to determine next steps

The tool scores each refuge on a scale of up to 100 points. Metrics are broken down into the six main goal areas of the LRTP: 1) Access, Mobility, and Connectivity; 2) Asset Management; 3) Coordinated Opportunities; 4) Environmental; 5) Safety; and 6) Visitation. Each goal has multiple metrics for which the refuges can score points, as shown in Figure 6-1 (full evaluation criteria and tool can be found in Appendix A6). Awarded points identify areas where there is a need or challenge that could be rectified with transportation enhancements that would require further analysis. Thus, stations with the highest scores can be considered for additional transportation study. Additionally, the breakdown of evaluation in this tool could provide a more targeted focus toward specific goal areas. For instance, stations with particularly challenging asset management issues could be considered for a detailed review of their roadway, parking, and trail facilities. Likewise, a station with a high safety score (meaning the station has a number of identified safety challenges) may warrant the application of one or more Road Safety Audits (RSAs).

Figure 6-2: Stations for Further Study – User Interface



The user interface for the tool, as shown in Figure 6-2, allows regional staff to select and view stations from one state, from one multistate, subregional area, all stations throughout the region, or simply an individual refuge or hatchery. Additionally, the tool will allow the user to select a minimum evaluation score. The output possibilities include either a series of reports (one for each station selected as shown in Figure 6-1) or a table that provides the scores for each metric by refuge, which can be sorted and analyzed separately. The station reports and summary tables can be provided to station, area, or regional leadership as needed. The complete list of evaluation criteria for this tool is included in Appendix A3.1.

Looking forward to the update of the LRTP in four to five years, new sources of data may be available that can be used to improve this tool. For example, the *FLMA Collaborative Visitor Transportation Survey* is being developed and tested by the Alaska Multi-Agency FLMA LRTP team. This is an effort

to develop a toolkit of transportation survey questions and collection methods that can be used by the FLMAs over many years. The consistent questions, pre-approved by the Office of Management and Budget (OMB), will streamline the process of administering future surveys and provide a baseline of results across which all FLMAs can be compared. Surveys such as these can be used in the next LRTP and potentially in LRTP tools such as the *Stations for Further Study Tool*.

LRTP USE BY STATIONS

The LRTP document is valuable for regional-level planning; however, it can be challenging for stations to extract relevant local-level information that is useful for their planning efforts. Recognizing this difficulty, as well as a lack of time and resources to consider the full LRTP process at the station and regional levels, some additional tools and resources were developed as a part of the initial Region 4 LRTP process to provide greater value at the station level.

INCORPORATING TRANSPORTATION INTO CCPS

The primary resource that the LRTP will provide at the station level is an amendment to the Comprehensive Conservation Plan process for refuges to incorporate transportation considerations. While regional funding for CCPs has been discontinued at this time; refuges have the option to update their CCPs on their own. While CCP updates may not be done regularly, the PMT decided to amend the necessary documents to more explicitly include transportation considerations so that any refuge deciding to update their plan will have the tools to adequately consider transportation. Additionally, it is important to remember that the LRTP is a long range planning document. Future federal funding levels are not known at this time, and it is practical to anticipate changes that may occur 5-10 years from now. A similar process can be undertaken to update Comprehensive Hatchery Management Plans (CHMPs) as well. A User Guide that details how to incorporate transportation into CCPs can be found in Appendix A6.

Station Fact Sheets

One valuable product of the LRTP is a series of fact sheets for each of the stations (both refuges and hatcheries). Analysis contained in the Appendix (from the *Existing Conditions and Future Trends Report* catalogs metrics at a station level. Reviewing the appendices can be a time-consuming and tedious task for station managers, so the information was gathered into a database and formatted into a concise fact sheet report for each station. These station-level data are valuable pieces of information for managers considering transportation as a part of the CCP/CHMP process and/or developing transportation projects submitted to the region for funding consideration.

User Guide

The User Guide provides refuge leadership with an overview of how to incorporate transportation considerations into their CCP using information gathered and analyzed in the LRTP document. It encourages the refuges to first work with the Regional Transportation Program Manager to discuss the process and to acquire their refuge-specific fact sheet. It then breaks guidance down into the major chapters of the CCP and asks sample questions that each refuge can consider relative to transportation in the development of its CCP.

Work Plan

The Work Plan is an existing CCP development resource that provides step-by-step details and time frames for components of the CCP process. The Work Plan has been modified to include steps associated with transportation.

Template

The Template also is an existing CCP development resource that provides the baseline text from which a refuge can begin its CCP document. The Template has been modified to include important text related to transportation, a list of relevant acronyms and definitions, and transportation legal mandates of interest.

USE OF THE CLIMATE CHANGE TOOL

As discussed in the *Existing Conditions and Future Trends Report*, a parallel effort to the LRTP has been conducted to develop a Climate Change Tool for use by the U.S. Fish and Wildlife Service and the National Park Service. Two components, the *Vulnerability Assessment* and *Adaptation Planning*, are being considered as a part of the tool. The *Vulnerability Assessment* takes into account a large amount of currently available national database information to determine which park and refuge transportation assets are the most vulnerable to climate change. Then, the staff from the parks and refuges were able to work with the FHWA and ICF International team (consultant team leading the tool development) to determine the best adaptation options for each asset and unit. Workshops were conducted at a total of four stations in the Southeast Region—two national parks and two national wildlife refuges—to refine the tool and discuss possible adaptation strategies.

Moving forward, the Climate Change Tool can be another valuable resource both at the refuge/hatchery level as well as at the regional level to determine which assets may be most vulnerable to climate change (and mitigation strategies) and potentially which assets are able to be decommissioned. Station leaders should work with the FWS regional and national staff and FHWA staff to refine the tool for their specific location. In particular, the list of specific assets and their characteristics will require refinement at the station staff level. Using the Climate Change tool in conjunction with the LRTP tools will assist the stations in developing high priority transportation projects that will compete well at a regional and potentially national level.

STAKEHOLDER OUTREACH AND COMMUNICATION PLAN

Stakeholder input is critical to the success of any planning project, no matter the size. It is important to recognize that different types of outreach are applicable to different types of planning efforts. The following guidance is provided to assist the region and its stations with tailoring outreach to the scale and intensity of the plan.

LRTPS FOR FLMAS

LRTPs are by nature multi-decade plans that consider large geographic areas. In the case of the Region 4 FWS LRTP, the plan covers ten states, Puerto Rico, and the U.S. Virgin Islands, and it is thus prohibitively expensive and time consuming to conduct traditional outreach through public meetings and open houses in multiple locations. As noted in the *Stakeholder Outreach* summary, the predominant focus of outreach efforts for this plan was internal to the Service and EFLHD. Service staff from individual refuges and hatcheries all the way to the regional leadership team had the opportunity to provide input into the plan. In-person meetings were used to engage the Project Management Team, Coordination Team, and regional leadership. Conference calls, webinars, electronic surveys, and emails were the primary media for communication with the station and area managers.

Following the completion of this plan, the Regional Transportation Program Manager, with support from other regional, area, and station staff should reach out to key state and regional transportation

planning agencies and other FLMAs to advertise the completion of the plan. The roll-out of the first ever Service LRTP in the Southeast Region is an important opportunity to build and grow relationships between the FWS and its planning partners. The plan should be posted on the Region 4 website as well as the websites of individual refuges and hatcheries where they exist. The LRTP will also be published in the Federal Register, which will provide some broad public access to the plan.

TRANSPORTATION STEP-DOWN PLANS AND OTHER SMALL AREA STUDIES

Small area plans allow for more localized outreach efforts than the higher-level LRTP due to the shorter planning horizon and smaller study area. Some of these plans include subregional plans between stations or in partnership with other FLMAs as well as transportation step-down plans at individual refuges or hatcheries. In addition to gathering input within the Service and EFLHD, it is also prudent to engage relevant local, regional, and state agencies whose boundaries overlap with Service boundaries.

Stations conducting these smaller planning studies can look to participate in other sponsored planning efforts such as the development of State Transportation Improvement Programs (STIP) by State DOTs, the updates of Metropolitan Planning Organization LRTPs, county and city transportation plans, and corridor studies. This can occur through continued development of relationships with Service planning partners. Outreach to the general public as well as to refuge and hatchery visitors and Friends Groups is not only feasible but strongly encouraged at this scale as well. Visitor surveys and information kiosks, telephone and web surveys, focus groups, and public meetings are all practical and valuable media at this scale.

PROJECT STUDIES

Project-level studies are the smallest and most focused of all the planning studies and therefore encourage a more targeted outreach plan than some of the broader studies. In addition to the general public meetings and surveys, stakeholders directly impacted by the project must also be involved. At this scale, all projects using federal funding must comply with the NEPA process, which includes requirements for explicit public outreach during project scoping and feasibility, the draft environmental document, and the final environmental document. In the case of a project deemed eligible for receipt of a Categorical Exclusion (CE) determination, less public outreach may be required.

Not all stakeholders will be interested in or concerned with all levels of planning. In many cases, individuals may not take interest in a long range plan because it is too large of a geographic scale and too far into the future before it will be completed to warrant the expenditure of their personal time and energy. However, a new trail connection that is planned near their neighborhood, for example, has a much more immediate relevance and typically generates a greater level of public interaction. It is important that planners recognize the scale and timeframe of their planning efforts and use the appropriate public outreach styles and media to gain the maximum benefit.

RECOMMENDATIONS FOR FUTURE PLAN ACTIVITIES

This is the first ever Long Range Transportation Plan for the Southeast Region of the Service, and many opportunities for additional data collection, process and policy refinement, and outreach and partnership have been identified for future planning activities. Additionally, transportation conditions and needs change over time, so aspects that were not considered as a part of this plan may need to be studied in the future.

One overarching data collection item will be the continued search for updates in available geospatial information (GIS). Cataloging resources in GIS is an ongoing process throughout the U.S., including

updates to keep up with changes in the landscape of the built environment. The following items outline recommendations for efforts that can be initiated before the next long range planning effort is conducted in five years (approximately 2018 or 2019).

Table 6-1: LRTP Action Plan

#	Action Item	Description
1	Complete update of the LRTP within 5 years	In accordance with MAP-21 requirements for LRTP processes, an update of this plan will need to be conducted within 5 years. In addition to regulatory requirements, it is also important to revisit regional transportation conditions and needs on a regular interval to ensure the plan is always relevant.
2	Include transportation in CCP Updates (for stations)	Incorporate transportation into refuge CCPs if they are updated. Use the revised CCP documents (work plan, template, and user guide) along with the new station fact sheets for guidance on how to incorporate transportation elements. Use the process to develop innovative transportation projects.
3	Conduct step-down plans or further transportation study (for stations)	Work with the Regional Transportation Program Manager to understand how a refuge scores in the Stations For Further Study Tool and consider conducting a targeted study or a larger transportation step-down plan.
4	Develop creative / innovative transportation projects for inclusion in the five-year plan (for stations)	Work with the Regional Transportation Program Manager to acquire station fact sheets and Stations For Further Study evaluation results. Think proactively about innovative transportation projects including exploring opportunities for shared funding with neighboring communities. Test the projects using the project evaluation criteria to see how they score (and potentially compete with other projects across the region).
5	Improve data collection efforts / analysis relating to Access, Mobility, and Connectivity	Use the latest version of FWS station boundary data in GIS in order to accurately capture the proximity and intersection of important adjacent facilities and infrastructure.
		Search for new and updated infrastructure data in GIS (both Service-owned as well as public and non-service). Some types of infrastructure have been cataloged more thoroughly in GIS than others, but current gaps in data may be complete in the future. Be sure to consider the most up-to-date infrastructure datasets including roads, bridges, airports, trails, navigable waterways and ferry routes, etc.
		Consider implementation of data collection efforts for information such as traffic counts (vehicular, pedestrian, bicycle, etc.).
6	Improve data collection efforts / analysis relating to Asset Management	Complete the reconciliation of asset IDs within SAMMS so that a one-to-one match can be made between SAMMS and the Road Inventory Program (RIP) database.
		Better coordinate data collection methodology between FWS and FLH for the RIP.
		Determine a standard costing methodology to be used for determining the cost to bring an asset to good condition.
		Consider the collection of additional condition detail regarding parking and trail facilities to ensure more accurate repair costing.
		Consider an update to RIP and SAMMS GIS inventories to reconcile extents and geometry and to provide a more accurate spatial representation of assets; consider assets that can be decommissioned and update both databases accordingly.
7	Improve data collection efforts / analysis relating to Coordinated Opportunities	Similar to data collection efforts for Access, Mobility and Connectivity, maintaining updated GIS information can help identify modifications in city and MPO boundaries, for example, or can assist with the identification of new potential partner organizations located nearby.
		Use the latest versions of any political, private conservation area or organizational boundary in order to determine if there have been any changes to the proximity of station with organizations or entities with which the Service could mutually benefit from a coordinated opportunity.
8	Improve data collection efforts / analysis relating to Environment	Use the most recent versions of any habitat or species-related GIS data. Identification of habitat diversity, location of critical habitats and critical species populations is an ongoing research process. It is important to keep abreast of shifting landscapes to be aware of changing environmental needs, or even the potential for funding assistance to mitigate and manage future needs.

#	Action Item	Description
9	Improve data collection efforts / analysis relating to Safety	Safety information is challenging to collect over a variety of state, regional, and local agencies. Analysis of metrics relating to safety is not consistent throughout agencies, and can provide a challenge when comparing similar types of information that have been collected in very different ways. Crash data is a perfect example of this challenge. Information available in crash data, and even general reliability of reporting, varies widely by city, county, and state. It is likely that information gathered for crashes that involved an injury or fatality will be much more robust than a property-damage-only crash since it is likely that the involved parties will consider some form of legal action post-event. Even still, crash records remain largely incomplete and may not provide accurate way-finding text or GPS location. As best as possible, the Service should consider building relationships with entities that collect safety-related information. For example, if information on animal-vehicle crashes is truly important, and the local authorities are aware of a need to document that type of crash better, then, the Service may get better, more accurate, and more relevant updates from their local agencies.
		Consider coordinating with local police to obtain better collision records, particularly for animal-vehicle collisions. Discussing the desire for targeted changes to record-keeping with local authorities may provide an opportunity for further analysis and study of safety-concerns in and around habitats and FWS stations.
		Work with internal station staff to build a data collection/reporting program for documentation of crashes, particularly with wildlife.
10	Improve data collection efforts / analysis relating to Visitor Experience	Census data will continue to be readily available and can provide a snapshot of demographics and changes in populations surrounding Service lands.
		Consider an update to visitor survey questionnaires or visitor survey dissemination. It will be important for the Service to consider how visitor surveys and visitation documentation may aid the identification of needed improvements, particularly considering transportation-related desires. This includes the new Collaborative Visitor Transportation Survey (CVTS).
		Consider a system to account for the number of visitors and how they access the station. Accurately documenting how visitors arrive at the station and if visitors would be interested or willing to travel differently if infrastructure or services were available may help a station prioritize transportation projects or goals that also serve the agency's Mission.
11	Improve the stakeholder outreach and communication plan	Engage key state and regional partners as feasible in the next round of the LRTP update to ensure that the processes and procedures assumed by the Service align well with partner agencies.
		Determine a stakeholder outreach plan for step-down plans and other special studies to provide guidance to stations wishing to conduct more transportation study.
		Consider the development of newsletters, a website, and email comments sent to a database of station visitors and Friends Groups during the next LRTP update for a broader public engagement that does not require in-person meetings.
12	Explore new possible funding sources for transportation	Given limited funding availability, the region should explore opportunities to find new funding both regionally and locally with partner stations. Some of this occurs currently, so continued growth in funding will benefit the Service.
13	Use the Climate Change Tool	Work with the Regional Transportation Program Manager to use the Climate Change Tool to understand vulnerability of transportation assets and opportunities for adaptation and mitigation.

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Recommendations Report

U.S. Fish & Wildlife Service
1 800/344 WILD
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February 2015

Region 4 – U.S. Fish and Wildlife Service

Long Range Transportation Plan

Appendix

Southeast Region

Front page photo credits (clockwise from top left): Paul Tritaik, J.N. "Ding" Darling NWR; Cristina Pastore, J.N. "Ding" Darling NWR; Steve Suder, Alligator River NWR; Paul Tritaik, J.N. "Ding" Darling NWR; Joe Saenz, Black Bayou Lake NWR.

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A2 – Existing Conditions and Future Trends

SUMMARY OF DATA COLLECTION AND ANALYSIS

Due to the amount and varying nature of the data needed for this project, it was imperative that data collection and analysis be streamlined and documented. This was accomplished with a series of folders and files indicating data sources and manipulations (including GIS functions such as clips, re-projections, joins, etc.). Data was collected from many sources including:

- State and National Departments of Transportation
- National Highway Traffic Safety Administration (NHTSA)
- USGS Geospatial Data Gateway
- U.S. Census Bureau and TIGER
- Fish and Wildlife Service (FWS)
- National Transportation Atlas Database (NTAD)

Data was received either in GIS shapefile format or in excel or text files that were converted to GIS shapefiles. A more detailed list of data collected for this study and their sources can be found in Table 1.

GIS analysis was completed in USA Contiguous Albers Equal Area Conic projection. This projection was most accurate for area and location analysis for Region 4. Most GIS shapefiles had to be converted to the Albers Equal Area Conic projection using the ArcCatalog Projections and Transformations tool, as many of them were in a state plane or another projection.

Table 1: Data Sources

Data	Source
Access, Mobility, and Connectivity	
Airports	NTAD
Navigable Waterways	NTAD
Roads - National Highway Planning Network (NHPN)	NTAD
Topically Integrated Geographic Encoding and Referencing (TIGER) Roads	US Census Bureau
Scenic Byways	Byways.Org
Railroads	NTAD
Fixed Guideway Transit (2004)	Florida DOT
Rubber Tire Transit	Florida DOT
Volpe Transit and Trails Study	FWS/ Volpe
Trails (FWS Refuges)	FWS
Bicycle Facilities Florida (Recreation Trails) Georgia (Bike Paths) Kentucky (Bike Routes) North Carolina (State Bike Routes)	State DOTs/ Planning

Data	Source
Trails, Multi-Use Paths, Recreation Trails Florida (Recreation Trails) Kentucky (Local Recreation Trails)	State DOTs/ Planning
Regional Alternative Transportation Evaluation (RATE)	FWS/ Volpe
Asset Management	
Parking (FWS Refuges)	FWS
Roads (FWS Refuges)	FWS
Trails (FWS Refuges)	FWS
Coordinated Opportunities	
State	NTAD
County	US Census Bureau
MPO	NTAD
Protected Areas Database of the United States	USGS PADUS
Environmental	
Endangered and At-Risk Species	FWS
Critical Habitat (FWS Refuges)	FWS
Wilderness Areas	FWS
Biosphere Reserves	UNESCO
Wetlands	FWS
Ramsar Wetlands of International Importance	FWS
Coastal Barrier Resources System	FWS
FEMA Flood Maps	FEMA
Non-Attainment Areas	NTAD
Alternative Fueling Stations	NTAD
Climate Change & Transportation (ICF)	FWS/ ICF
Safety	
Highway Pavement Management System (HPMS) 2011	FHWA - HPMS
Crashes Alabama 2009-2011 Arkansas 2008-2010 Florida 2008-2010 Georgia 2009-2011 Kentucky 2010-2012 Mississippi 2009-2011 North Carolina 2009-2011 South Carolina 2008-2010 Tennessee 2009-2011	State/County DOTs *(Louisiana, Puerto Rico and US Virgin Islands - Not available)*
FARS 2008-2010	NHTSA

Data	Source
AADT Alabama 2011 Arkansas 2010 Florida 2011 Georgia 2011 Kentucky 2011 Louisiana 2011 Mississippi 2011 North Carolina 2010 South Carolina 2011 Tennessee 2011	State DOTs *(Puerto Rico and US Virgin Islands not available)*
Asset Priority Index (API)	FWS
Safety Management Information System (FWS)	FWS
Visitation	
RATE Signage Survey	FWS
2000 Census Data (Tracts)	US Census Bureau
2010 Census Data (Tracts)	US Census Bureau
2010 Census Data (Counties)	US Census Bureau
2030 Population Projections	State Planning Organizations

ACCESS, MOBILITY, AND CONNECTIVITY (A2.1 – ACCESS, MOBILITY AND CONNECTIVITY)

This goal focuses on how people and goods travel to, from, and within the Fish and Wildlife Service refuges and hatcheries.

A 10 mile boundary was used to analyze the lengths of road (interstate, highway, scenic byway, and other roads) and number of alternative fueling stations near the refuges and hatcheries. This 10 mile boundary can help determine how accessible a park is. For example, if there are no interstates within 10 miles, it would be assumed that visitors would have to make plans to visit the park, and may not impulsively visit the park upon seeing signage during their travel.

A one-half mile boundary was used to determine the proximity of navigable waterways to the refuges, assuming that those traveling by water would have to walk or use a transit system from where they left a canoe/kayak/ferry or other mode of water transportation to the park.

The number of airports near the refuges and hatcheries was also considered. First, the airports were narrowed down to public use airports and those with 250,000 or more enplanements per year, and then clipped to the 25 mile boundary of refuges and hatcheries.

ASSET MANAGEMENT (A2.2 – ASSET MANAGEMENT)

The Fish and Wildlife Service's assets include the roads, trails, bridges, and parking lots within the refuges and hatcheries. Data provided by the FWS website indicates the surface type, remaining service life, and condition descriptions of their assets. This information can guide the funds available to repair and maintain these roads and identify refuges and hatcheries that need the most assistance. It also allows the refuges and hatcheries to determine if there are any assets that are no longer in use, which they could allow to deteriorate and remove from their data collection lists.

COORDINATED OPPORTUNITIES (A2.3 – COORDINATED OPPORTUNITIES)

Many refuges intersect different entities that provide an opportunity for coordination such as the shared costs of roads, transit systems, bike and pedestrian paths, etc.

One group of entities considered are administrative boundaries, including Metropolitan Planning Organizations (MPOs), counties, cities, and states. It can be determined if partnerships could be formed between the refuges and hatcheries and these administrative bodies, or if some currently exist.

Non-Attainment Areas were also considered. These are areas where the air quality for one or more of certain pollutants is below the National Ambient Air Quality Standards set by the EPA. Because these areas have limits on the pollutants discharged into the air, there may be funding available to implement environmentally friendly infrastructure, such as bike lanes or transit systems. The Non-Attainment Areas and the administrative boundaries were intersected with the refuges and hatchery boundaries.

The intersection between the 5 mile buffer around refuge and hatchery boundaries and the Protected Areas Database of the US was also analyzed. This database contains the boundaries of many different federally-owned lands from the Department of Defense to the Bureau of Land Management and other various groups. Some of these groups already participate in coordination with the FWS.

ENVIRONMENTAL (A2.4 – ENVIRONMENTAL)

Environmental aspects considered in this analysis include the intersection of FWS boundaries with Critical Habitats and FEMA floodplain areas. Critical Habitats are areas designated as specific areas essential to the conservation of a threatened or endangered species. These areas may have restrictions on what types of structures may be built. Existing structures may also pose a threat to the species.

The FEMA floodplain areas considered were those with moderate or high risk of flooding. This provides helpful information for existing or future roads or other assets that may be in danger of flooding.

SAFETY (A2.5 – SAFETY)

Average Annual Daily Traffic (AADT) and crash data were used to determine the safety of the roads near the refuges and hatcheries.

Each state and county collects AADT and crash data differently. Several types of data were received including excel documents, shapefiles, and text files for a varying range of years. The data had to be converted to a shapefile format.

Annual Average Daily Traffic (AADT) measurements helped develop a better understanding of the volume of traffic on roadways that run in and around FWS Units. Local, regional, and state-level departments of transportation (DOT) collect this information to assist with traffic planning at strategic points along roadways. Typically local roadways are not targeted for AADT measurements, which meant the majority of AADT volumes collected for this study were on major thoroughfares. A summary of the sources and data collection years for AADT used for this project is noted in Table 1.

Due to the expansive geographic area of Region 4 that spans a multitude of political boundaries, it was certain that data collected on the local level would be both collected and reported differently based on differences between data collection among agencies. Crash data is collected by individual jurisdictions with little to no conformity of collection techniques or data processing. Even though GPS technology is becoming a staple for collision data collection, it is not widespread and often unavailable or underutilized at actual crash site locations. It became obvious that some of the crash data collected was spatially inaccurate based on the GPS coordinates provided. To help reduce the inaccuracies, the data points were clipped to the county they were recorded for. This reduced the inaccuracy of some of the crash locations that fell at the wrong coordinates.

This data was then clipped to the 1 mile boundary around the refuges and hatcheries to determine safety "hot spots." A summary of the crash data collected and sources for the crash data is noted in Table 1.

VISITATION (A2.6 – VISITATION)

Visitation analysis was completed using the 2010 census data, clipped to the 25 mile buffer around the refuge and hatchery boundaries. The following population characteristics were considered:

- Percent nonwhite and percent poverty – this data helps determine the amount of the population that may use public transportation
- Percent school age children (ages 5 – 18 years) – indicates potential visitors to the parks, this could include school trips
- Percent seniors (age 65+ years) – many refuges and hatchery volunteers are seniors, this data also indicates if special considerations should be made for handicapped people

A2.1 – ACCESS, MOBILITY AND CONNECTIVITY

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Alligator River NWR		X	X					103.4	26.2			114.0			
Archie Carr NWR			X	X	X		28.5	38.4	61.9	24.5	13.0	70.4		43.6	
Arthur R. Marshall Loxahatchee NWR				X			22.7	70.0	146.7	18.6	29.0		23.6	44.8	2
Atchafalaya NWR							24.3	29.8	11.2			43.7		57.7	
Bald Knob NWR								55.7	50.3		0.9		25.9	55.9	
Banks Lake NWR			X					68.2	38.0					38.4	
Bayou Cocodrie NWR								40.2	54.9		15.4	155.3		60.5	
Bayou Sauvage NWR	X	X					34.7	61.8	40.6		54.8	34.3	30.7	129.2	1
Bayou Teche NWR	X	X						30.1	48.5			104.9	29.2	81.7	
Bears Bluff NFH		X						10.5	22.9			20.0	11.4	33.0	1
Big Branch Marsh NWR	X	X					59.3	87.7	23.2		27.5	49.8	23.1	96.2	1
Big Lake NWR							13.4	17.4	60.2		3.9	5.6		38.9	
Black Bayou Lake NWR							18.6	52.6	22.9		11.1	56.3		118.5	
Blackbeard Island NWR									10.3			4.7			
Bo Ginn NFH And Aquarium								21.7	40.1			39.5		33.7	
Bogue Chitto NWR	X						46.4	39.3	119.7		12.2	56.5	31.7	125.5	
Bon Secour NWR	X	X						9.9	41.1	1.7	0.6	79.6		2.1	
Bond Swamp NWR	X						50.6	100.6	36.6		23.0			143.1	
Breton NWR	X														

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Buck Island NWR															1
Cabo Rojo NWR		X							99.0		3.3				
Cache River NWR	X						37.3	236.2	196.6		23.6	51.9	11.5	257.2	
Cahaba River NWR								23.3	62.9				8.3	70.3	
Caloosahatchee NWR	X		X	X	X		21.1	16.1	46.6		42.3			26.2	1
Cameron Prairie NWR		X							34.1		2.0	48.4		8.2	
Cape Romain NWR		X						41.0	11.7			0.7		2.0	1
Carolina Sandhills NWR								33.3	84.7				33.7	54.8	
Cat Island NWR	X							20.6	58.9			179.4		74.8	1
Catahoula NWR	X							31.6	82.2			100.0		34.5	
Cedar Island NWR		X	X					16.3	21.0		3.4	41.3			
Cedar Keys NWR					X				13.8						
Chassahowitzka NWR	X	X			X			43.4	15.7	22.8		9.5		9.4	
Chattahoochee Forest NFH								2.1	31.1						
Chickasaw NWR	X						19.6	53.0	40.2		1.2	82.4	33.7	84.5	
Choctaw NWR	X							23.8	28.1					21.8	
Clarks River NWR			X				27.4	132.9	47.6		6.1	43.4		134.1	
Coldwater River NWR									56.1				22.0	26.3	
Crocodile Lake NWR		X	X	X	X			27.2		27.0	3.0	13.2			
Cross Creeks NWR	X							29.7	60.6			6.8		26.5	
Crystal River NWR	X		X	X	X			32.7	11.2	16.7	4.1			17.7	
Culebra NWR															1

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Currituck NWR			X					17.4	9.5						
D 'Arbonne NWR							22.4	48.4	61.2		11.1	56.1		96.7	
Dahomey NWR								17.0	45.0		4.5	50.3		44.6	
Dale Hollow NFH									62.4						
Delta NWR	X								12.7			29.0			
Desecheo NWR															
Edenton NFH	X		X					33.3	25.5			33.4		25.3	
Egmont Key NWR	X	X		X	X		12.5	0.6				8.2			2
Ernest F. Hollings Ace Basin NWR	X	X					22.8	86.1	44.6			17.5	49.1	116.7	1
Erwin NFH							21.9	12.4	25.0					63.7	
Eufaula NWR	X		X					54.1	49.6			8.5		70.4	
Felsenthal NWR	X							63.9	93.5		45.2	50.9		136.4	
Fern Cave NWR								31.6	11.8					25.8	
Florida Panther NWR			X	X			29.7		27.7	8.7				19.6	
Grand Bay NWR							26.0	28.8	37.1		20.1	14.1		75.4	1
Grand Cote NWR								12.9	93.7			58.8		67.8	
Great White Heron NWR		X	X	X	X			47.2			3.0	47.1			1
Green Cay NWR															
Greers Ferry NFH									52.9						
Handy Brake NWR								40.7	20.9		0.1	42.9		62.8	
Harris Neck NWR							15.1	14.2	3.8					1.1	
Hatchie NWR							26.9	39.1	46.9					23.4	

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Hillside NWR								33.7	35.3		0.5		32.8	37.2	
Hobe Sound NWR		X	X	X	X		24.1	30.2	44.8	18.2	18.1	1.2		34.2	1
Holla Bend NWR	X						15.7	18.1	84.5			22.2		47.8	
Holt Collier NWR								25.1	28.2		5.3			23.6	
Island Bay NWR					X				3.6	28.9		19.2		17.8	
J.N. Ding Darling NWR	X	X	X	X	X				3.0	11.8	10.4				1
Key Cave NWR								37.0	45.8	1.8	6.6	6.6		88.9	
Key West NWR		X	X	X	X			10.3			3.0	10.2			1
Lacassine NWR	X	X							60.6			56.5		26.0	
Laguna Cartagena NWR							18.0		166.9		3.5				
Lake Isom NWR									57.5			13.1		27.2	
Lake Ophelia NWR	X						22.5	53.3	86.4			82.5		85.0	
Lake Wales Ridge NWR				X			7.9	89.4	24.1	9.4	20.6	9.3	49.7	83.8	1
Lake Woodruff NWR	X		X	X	X	X	12.4	40.1	77.3	14.0	6.4	125.3	31.1	41.3	2
Logan Cave NWR								24.8	64.4		6.8	0.8		21.1	1
Lower Hatchie NWR	X							49.7	38.3			87.9	27.8	69.8	
Lower Suwannee NWR	X				X			23.3	18.8	23.6	1.4			20.7	
Mackay Island NWR			X					10.2	16.5					11.6	
Mammoth Spring NFH								23.8	19.7					29.0	
Mandalay NWR		X						24.7	90.5		2.2	27.1		19.5	
Mathews Brake NWR	X							40.2	20.1		1.7		23.3	47.5	
Matlacha Pass NWR		X	X	X	X			11.4	5.6	30.4	26.3			12.9	1

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Mattamuskeet NWR			X					50.2	18.8			70.8			
Mckinney Lake NFH			X					58.5	11.3		10.7	5.6	21.6	79.8	
Meridian NFH							32.5	49.8	33.6		9.9		22.7	100.9	
Merritt Island NWR	X	X	X	X	X		49.6	53.2	101.3	9.1	59.1	80.8		128.9	1
Mississippi Sandhill Crane NWR	X						59.4	77.6	184.3		18.0		22.1	185.6	2
Morgan Brake NWR								26.4	39.2		0.5		26.1	29.6	
Mountain Longleaf NWR							22.2	50.5	65.9	0.9	6.6	36.6	30.5	126.5	
Natchitoches NFH							19.2	23.5	57.0			48.1		43.8	
National Key Deer Refuge		X	X	X	X			40.9				40.9			1
Navassa Island NWR		X													
Norfork NFH								22.6	29.6					23.5	
Noxubee NWR								41.2	92.1		26.9			61.9	
Okefenokee NWR								110.8	96.7	10.3	8.1		29.5	146.2	
Orangeburg NFH							16.9	77.0	15.1					48.6	
Overflow NWR								69.4	27.1					41.7	
Panther Swamp NWR	X							64.9	51.0		2.8		36.7	51.9	
Passage Key NWR		X			X		11.2					10.3		0.8	2
Pea Island NWR	X	X	X						32.8			32.8			
Pee Dee NWR								44.7	6.0			37.7		70.0	
Pelican Island NWR	X	X	X	X	X		20.5	26.7	33.8	32.6	17.3	36.6		32.9	
Piedmont NWR							31.6	78.3	124.7		2.7	26.8		97.2	
Pinckney Island NWR		X						29.4	36.8		13.1	49.6		3.7	1

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Pine Island NWR	X	X			X			2.6	5.6	22.9	15.4	1.6		8.6	1
Pinellas NWR		X	X	X	X		27.5	19.5	9.9	1.6	9.3	3.6		32.6	3
Pocosin Lakes NWR	X	X						91.3	53.0			101.0		22.3	
Pond Creek NWR								47.0	74.8					134.1	
Private John Allen NFH								45.5	57.2	1.0	31.5	20.2		58.7	
Red River NWR	X						129.0	139.5	258.4		42.5	114.0		351.5	1
Reelfoot NWR			X						81.5		3.4	28.8		36.2	
Roanoke River NWR	X		X					125.9	33.4			80.7		92.2	
Sabine NWR	X	X					8.7	8.0	138.2	29.3	4.8	118.1	11.5	73.9	
Sandy Point NWR		X													
Santee NWR							25.8	42.2	32.6	0.7				38.7	
Sauta Cave NWR								22.4	57.9	16.3				32.0	
Savannah NWR	X						52.4	83.6	78.1		58.0	42.9	64.3	258.5	1
Shell Keys NWR															
St. Catherine Creek NWR	X							49.5	35.7		16.4	195.6		52.7	
St. Johns NWR			X	X			31.0	29.6	111.2	12.7	23.2	47.6		50.5	2
St. Marks NWR	X	X	X	X	X			94.8	44.8	14.2		92.5		14.5	1
St. Vincent NWR		X		X	X			29.9	2.3			4.4		53.0	
Swanquarter NWR	X		X					35.4	7.1			44.3			
Tallahatchie NWR								11.7	68.3				22.9	26.2	
Ten Thousand Islands NWR			X	X	X			29.8	12.4	23.9					
Tennessee NWR	X						29.2	129.5	61.2		0.4	1.5		96.4	

Table 2: Transportation Systems within a Specified Distance from Region 4 Units

Unit Name	Navigable Waterways within ½ mile		FL, GA, KY, NC Trails within 1 mile				Roads within 10 miles						Rail within 10 miles		Airports within 25 miles
							National Highway Planning Network					Scenic Byways			
	Inland	Marine	Bike	Hike	Paddle	Other	Interstate	U.S. Route	State Route	County Route	Other		Passenger	Overall	
Tensas River NWR							34.7	64.1	89.3			171.9		87.7	
Theodore Roosevelt NWR	X							225.9	203.8		21.3	163.6	70.1	233.0	
Tybee NWR	X						0.6	23.6	8.8		32.8			23.7	1
Upper Ouachita NWR	X							48.0	71.5		0.1	58.7		103.7	
Vieques NWR							0.9		5.1		16.3				1
Waccamaw NWR	X	X						131.5	50.3		1.2			25.2	1
Wapanocca NWR							25.4	32.8	15.2		1.0	31.1		54.5	1
Warm Springs NFH			X					26.1	87.0		7.6	32.5		84.9	
Wassaw NWR	X						6.0	21.4	20.5		38.7		5.6	49.6	1
Watercress Darter NWR							42.1	18.6	14.8		31.0		20.4	197.7	1
Welaka NFH	X		X	X	X	X		24.1	34.6	6.5		29.2	23.7	25.7	
Wheeler NWR	X						51.6	117.7	79.1		15.7			167.6	1
White River NWR	X							70.2	68.3		31.9	106.0		119.3	
Wolf Creek NFH	X							27.9	13.4			14.1			
Wolf Island NWR	X	X					13.1	18.3	18.4		4.3	13.7			
Yazoo NWR								20.8	61.9			69.0		24.6	

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Table 3: Transportation Systems Directly Intersecting Region 4 Units															
Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Alligator River NWR		X		X		X				33.9		195.0		
Archie Carr NWR										0.8	0.1	2.4		
Arthur R. Marshall Loxahatchee NWR				X			X					54.4		
Atchafalaya NWR				X								16.9		
Bald Knob NWR												38.6	0.2	0.2
Banks Lake NWR				X		X						0.4		
Bayou Cocodrie NWR				X								7.3		
Bayou Sauvage NWR	X	X		X						4.2		21.8	5.8	10.5
Bayou Teche NWR				X								11.9	0.7	0.7
Bears Bluff NFH												0.8		
Big Branch Marsh NWR	X			X								6.0	0.2	0.7
Big Lake NWR				X						0.2		12.0		
Black Bayou Lake NWR				X								1.5		0.4
Blackbeard Island NWR												16.8		
Bo Ginn NFH And Aquarium												0.3		
Bogue Chitto NWR				X								15.2		
Bon Secour NWR				X						0.9	2.6	8.0		
Bond Swamp NWR	X			X						3.8		0.2		3.2
Breton NWR	X													
Buck Island NWR														
Cabo Rojo NWR		X	X	X								9.5		
Cache River NWR	X									6.3		91.0		3.6

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Cahaba River NWR				X								13.5		0.9
Caloosahatchee NWR												0.1		
Cameron Prairie NWR										3.8	3.6	13.1		
Cape Romain NWR		X		X								15.0		
Carolina Sandhills NWR				X						1.0		176.3	0.4	0.4
Cat Island NWR				X								11.7		
Catahoula NWR				X						0.2		34.8		
Cedar Island NWR		X				X				6.7	6.6	8.4		
Cedar Keys NWR				X				X						
Chassahowitzka NWR	X	X						X				1.7		
Chattahoochee Forest NFH												0.6		
Chickasaw NWR	X			X							0.4	25.0		
Choctaw NWR	X			X								10.1		
Clarks River NWR										0.3		10.4		4.1
Coldwater River NWR												5.3		
Crocodile Lake NWR										9.8	0.3	15.7		
Cross Creeks NWR				X						1.0		34.5		
Crystal River NWR	X											0.5		
Culebra NWR												2.8		
Currituck NWR												3.4		
D 'Arbonne NWR												29.3		
Dahomey NWR				X								11.2		
Dale Hollow NFH												0.3		

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Delta NWR												0.1		
Desecheo NWR														
Edenton NFH	X											*		
Egmont Key NWR				X			X							
Ernest F. Hollings Ace Basin NWR		X		X						1.0		20.8	0.2	2.1
Erwin NFH												0.6		0.1
Eufaula NWR	X			X		X				1.9		23.5		
Felsenthal NWR	X			X						7.5		51.4		
Fern Cave NWR												0.7		
Florida Panther NWR				X			X			6.0		62.8		6.6
Grand Bay NWR				X						1.2		5.9		1.3
Grand Cote NWR				X								2.7		
Great White Heron NWR										0.1	0.1	9.1		
Green Cay NWR														
Greers Ferry NFH												0.3		
Handy Brake NWR												0.7		
Harris Neck NWR				X								12.7		
Hatchie NWR				X						1.2		20.9		
Hillside NWR				X						1.6		27.8		
Hobe Sound NWR				X				X		0.3		0.7		0.4
Holla Bend NWR				X								23.8		
Holt Collier NWR												5.7		
Island Bay NWR														

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
J.N. Ding Darling NWR						X	X					6.2		
Key Cave NWR														
Key West NWR		X												
Lacassine NWR	X	X										20.5		
Laguna Cartagena NWR												3.5		
Lake Isom NWR				X								4.8		
Lake Ophelia NWR				X								26.0		
Lake Wales Ridge NWR												2.3		0.8
Lake Woodruff NWR	X			X		X	X	X	X			5.0	2.9	2.9
Logan Cave NWR												0.6		
Lower Hatchie NWR	X			X							1.1	15.0		
Lower Suwannee NWR	X			X				X		1.2		107.2		
Mackay Island NWR				X		X						13.4		
Mammoth Spring NFH												0.1		0.1
Mandalay NWR		X		X						0.1				
Mathews Brake NWR												2.9		
Matlacha Pass NWR								X						
Mattamuskeet NWR						X				5.5		27.4		
Mckinney Lake NFH						X						0.9		
Meridian NFH														
Merritt Island NWR	X	X		X		X	X	X		28.2	15.9	226.5		25.0
Mississippi Sandhill Crane NWR	X			X						0.9		28.9		0.8
Morgan Brake NWR										0.4		15.4	0.2	0.2

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Mountain Longleaf NWR				X								72.9		
Natchitoches NFH										0.1		1.2		
National Key Deer Refuge				X		X	X			1.4	1.0	22.1		
Navassa Island NWR		X												
Norfork NFH				X								0.4		
Noxubee NWR				X						2.6		90.6		
Okefenokee NWR				X						0.1		120.8		1.1
Orangeburg NFH										0.3		0.8		
Overflow NWR												4.6		
Panther Swamp NWR				X	X					1.2		46.7		
Passage Key NWR														
Pea Island NWR				X		X				11.9	11.9	20.0		
Pee Dee NWR				X						1.1		22.7		
Pelican Island NWR	X	X		X		X	X	X		0.2	0.6	2.2		
Piedmont NWR				X						1.8		65.2		
Pinckney Island NWR				X						0.1		11.0		
Pine Island NWR														
Pinellas NWR														
Pocosin Lakes NWR		X	X	X						5.0		177.2		
Pond Creek NWR				X						0.3		48.0		0.6
Private John Allen NFH				X								0.2		
Red River NWR										2.7		21.1		1.0
Reelfoot NWR				X						0.8		7.7		

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Roanoke River NWR	X			X		X				1.6		11.9		
Sabine NWR				X						9.3	9.3	12.9		
Sandy Point NWR												2.5		
Santee NWR				X								31.3		
Sauta Cave NWR												0.4		
Savannah NWR	X									6.1		27.2	0.2	1.2
Shell Keys NWR														
St. Catherine Creek NWR	X			X								45.9		
St. Johns NWR										0.6		1.0		
St. Marks NWR	X	X					X	X		0.9	10.3	106.0		
St. Vincent NWR				X			X					44.9		
Swanquarter NWR	X					X						2.4		
Tallahatchie NWR										0.7		5.4		
Ten Thousand Islands NWR								X		1.8		5.5		
Tennessee NWR				X						2.5		64.2		
Tensas River NWR				X						0.6		133.9		
Theodore Roosevelt NWR	X									0.1		21.2		
Tybee NWR														
Upper Ouachita NWR	X											91.2		2.0
Vieques NWR				X								137.1		
Waccamaw NWR	X	X								0.6		9.2		
Wapanocca NWR												8.7		0.5
Warm Springs NFH				X						0.3		0.9		0.1

Table 3: Transportation Systems Directly Intersecting Region 4 Units

Unit Name	Navigable Waterways		Trails							Roads			Rail	
			FWS			FL, GA, KY, NC								
	Inland	Marine	Bike	Hike	Other	Bike	Hike	Paddle	Other	NHPN	Scenic Byways	TIGER	Passenger	Overall
Wassaw NWR					X							9.5		
Watercress Darter NWR												*		
Welaka NFH				X					X			2.7		
Wheeler NWR				X						4.7		96.4		2.5
White River NWR	X			X						4.2	4.1	170.7		3.3
Wolf Creek NFH												0.2		
Wolf Island NWR														
Yazoo NWR				X						0.2		42.4		

Table 4: Scenic Byways within 10 Miles of Region 4 Units

Table 4: Scenic Byways within 10 Miles of Region 4 Units		
Unit Name	Scenic Byway Name	
Alligator River NWR	Alligator River Route Outer Banks Scenic Byway	Pamlico Scenic Byway Roanoke Voyages Corridor
Archie Carr NWR	Indian River Lagoon National Scenic Byway	
Atchafalaya NWR	Bayou Teche Scenic Byway Louisiana Scenic Bayou Byway	Promised Land Scenic Byway Zydeco Cajun Prairie Scenic Byway
Bayou Cocodrie NWR	Great River Road Bienville Trace Scenic Byway Colonial Trails Scenic Byway	River Road Scenic Byway Lower Mississippi Historic Scenic Byway
Bayou Sauvage NWR	Great River Road	San Bernardo Scenic Byway
Bayou Teche NWR	Bayou Teche Scenic Byway	
Bears Bluff NFH	Bohicket Road Scenic Highway	Edisto Island National Scenic Byway
Big Branch Marsh NWR	Louisiana Scenic Bayou Byway	NASA Scenic Byway to Space
Big Lake NWR	Great River Road	
Black Bayou Lake NWR	Bienville Trace Scenic Byway	
Blackbeard Island NWR	Altamaha Historic Scenic Byway	
Bo Ginn NFH And Aquarium	Millen-Jenkins County Scenic Byway	
Bogue Chitto NWR	Louisiana Scenic Bayou Byway	NASA Scenic Byway to Space
Bon Secour NWR	Alabama's Coastal Connection	
Cache River NWR	Great River Road	
Cameron Prairie NWR	Creole Nature Trail	Jean Lafitte Scenic Byway
Cape Romain NWR	Long Point Road Scenic Highway	
Cat Island NWR	Great River Road Louisiana Scenic Bayou Byway	River Road Scenic Byway Tunica Trace Scenic Byway
Catahoula NWR	Colonial Trails Scenic Byway	
Cedar Island NWR	Outer Banks Scenic Byway	
Chassahowitzka NWR	Suncoast Scenic Parkway	
Chickasaw NWR	Great River Road	
Clarks River NWR	Ohio River Scenic Byway US 68 Scenic Byway	Woodlands Trace
Crocodile Lake NWR	Florida Keys Scenic Highway	
Cross Creeks NWR	Woodlands Trace	
Crystal River NWR	Suncoast Scenic Parkway	
D 'Arbonne NWR	Bienville Trace Scenic Byway	
Dahomey NWR	Great River Road	Mississippi Delta Great River Road
Delta NWR	Great River Road	River Road Scenic Byway
Edenton NFH	Edenton-Windsor Loop	
Egmont Key NWR	Bradenton Beach Scenic Highway	Palma Sola Scenic Highway
Ernest F. Hollings Ace Basin NWR	Edisto Island National Scenic Byway	Old Sheldon Church Road Scenic Highway
Eufaula NWR	Barbour County Governor's Trail	
Felsenthal NWR	Great River Road	Bienville Trace Scenic Byway
Grand Bay NWR	Alabama's Coastal Connection	
Grand Cote NWR	Colonial Trails Scenic Byway	
Great White Heron NWR	Florida Keys Scenic Highway	
Handy Brake NWR	Bienville Trace Scenic Byway	
Hobe Sound NWR	Indian River Lagoon - Treasure Coast Scenic Highway	
Holla Bend NWR	Arkansas Scenic 7 Byway	

Table 4: Scenic Byways within 10 Miles of Region 4 Units

Unit Name	Scenic Byway Name	
Island Bay NWR	Lemon Bay/Myakka Trail	
Key Cave NWR	Natchez Trace Parkway	
Key West NWR	Florida Keys Scenic Highway	
Lacassine NWR	Creole Nature Trail	Jean Lafitte Scenic Byway
Lake Isom NWR	Great River Road	
Lake Ophelia NWR	Great River Road Colonial Trails Scenic Byway	River Road Scenic Byway Zydeco Cajun Prairie Scenic Byway
Lake Wales Ridge NWR	The Ridge Scenic Highway	
Lake Woodruff NWR	Florida Black Bear Scenic Byway Heritage Crossroads: Miles of History	Heritage Highway River of Lakes Heritage Corridor Scenic Highway
Logan Cave NWR	Cherokee Hills Byway	
Lower Hatchie NWR	Great River Road	
Mandalay NWR	Wetlands Cultural Trail	
Mattamuskeet NWR	Alligator River Route	Pamlico Scenic Byway
Mckinney Lake NFH	Indian Heritage Trail	
Merritt Island NWR	Indian River Lagoon National Scenic Byway	
Mountain Longleaf NWR	Appalachian Highlands Scenic Byway	Talladega Scenic Drive
Natchitoches NFH	Colonial Trails Scenic Byway	Toledo Bend Forest Scenic Byway
National Key Deer Refuge	Florida Keys Scenic Highway	
Passage Key NWR	Bradenton Beach Scenic Highway	Palma Sola Scenic Highway
Pea Island NWR	Outer Banks Scenic Byway	
Pee Dee NWR	Grassy Island Crossing Indian Heritage Trail	Pee Dee Valley Drive
Pelican Island NWR	Indian River Lagoon National Scenic Byway	
Piedmont NWR	Monticello Crossroads Scenic Byway	Ocmulgee-Piedmont Scenic Byway
Pinckney Island NWR	Andrew Pickens Scenic Parkway Hilton Head Scenic Highway James Edwin McTeer Bridge & The Causeways Scenic Highway S-13 Scenic Highway	S-163 Scenic Highway SC-170 Scenic Highway SC-46 Scenic Highway US-278 Scenic Highway
Pine Island NWR	Lemon Bay/Myakka Trail	
Pinellas NWR	Tamiami Trail - Windows to the Gulf Coast Waters Scenic Highway	
Pocosin Lakes NWR	Alligator River Route Edenton-Windsor Loop	Pamlico Scenic Byway
Private John Allen NFH	Natchez Trace Parkway	
Red River NWR	Colonial Trails Scenic Byway Longleaf Trail Scenic Byway	Northwest Louisiana Scenic Byway Toledo Bend Forest Scenic Byway
Reelfoot NWR	Great River Road	
Roanoke River NWR	Edenton-Windsor Loop	Tar Heel Trace
Sabine NWR	Creole Nature Trail	
Savannah NWR	Historic Effingham-Ebenezer Scenic Byway Hilton Head Scenic Highway	SC-46 Scenic Highway US-278 Scenic Highway
St. Catherine Creek NWR	Natchez Trace Parkway Great River Road Bienville Trace Scenic Byway	Colonial Trails Scenic Byway River Road Scenic Byway Lower Mississippi Historic Scenic Byway
St. Johns NWR	Indian River Lagoon National Scenic Byway	
St. Marks NWR	Big Bend Scenic Byway	
St. Vincent NWR	Big Bend Scenic Byway	
Swanquarter NWR	Alligator River Route	Pamlico Scenic Byway

Table 4: Scenic Byways within 10 Miles of Region 4 Units

Unit Name	Scenic Byway Name	
Tennessee NWR	Woodlands Trace	
Tensas River NWR	Great River Road Bienville Trace Scenic Byway	Colonial Trails Scenic Byway River Road Scenic Byway
Theodore Roosevelt NWR	Great River Road Lower Mississippi Historic Scenic Byway	Mississippi Delta Great River Road
Upper Ouachita NWR	Bienville Trace Scenic Byway	
Wapanocca NWR	Great River Road	
Warm Springs NFH	Meriwether-Pike Scenic Byway	
Welaka NFH	Florida Black Bear Scenic Byway	
White River NWR	Great River Road	Mississippi Delta Great River Road
Wolf Creek NFH	Cumberland Cultural Heritage Highway	
Wolf Island NWR	Altamaha Historic Scenic Byway	
Yazoo NWR	Great River Road	Mississippi Delta Great River Road

Table 5: Volpe Transit and Trails Study: Region 4 Results[1]

Table 5: Volpe Transit and Trails Study: Region 4 Results														
REFUGE	Transit			Trails			Rank						Potential	
	Mode	Distance (Miles)	Transit Agency	Names of Trail(s)	Length (Miles)	Distance from NWR	Urban Area	Transit Distance	Transit Quality	Trail Distance	Trail Quality	Total	Future Transit Potential	Future Trail Potential
Big Branch Marsh NWR	None			Tammany Trace	27.5	Adjacent	5	1	1	5	4	16		
Pelican Island NWR	Bus	12	GoLineIRT	Jungle Trail	7.8	Through refuge	5	1	2	5	3	16		
Archie Carr NWR	Bus	4	Space Cost Area Transit	Jungle Trail	7/8	0.5-mi	5	1	2	4	3	15		
J.N. 'Ding' Darling NWR	None			Surfsound Ct/ Locke Ave/ unnamed	All < 0.5 miles	Adjacent	5	1	1	5	3	15		
Lake Woodruff NWR	Bus	0.8 ?	VOTRAN				5	4	2	1	1	13		
Mountain Longleaf NWR	Bus	5	Areawide Community Transportation System (Anniston, AL)	Chief Ladiga Trail	33	4.3-mi	5	1	1	2	4	13		
Arthur R. Marshall Loxahatchee NWR	Bus & Rail	7 / 11.5	PalmTran and Tri-Rail				5	1	3	1	1	11		
Bayou Sauvage NWR	Bus	4.5	NORTA				5	1	3	1	1	11		
Mississippi Sandhill Crane NWR	Bus	1.5 (approx.)	Coast Transit				5	2	2	1	1	11		
Hobe Sound NWR	Bus	8	PalmTran				5	1	2	1	1	10		
Merritt Island NWR	Bus	5.9	Space Cost Area Transit				5	1	2	1	1	10		
Red River NWR	Bus	4	SPORTRAN				5	2	1	1	1	10	High	
St. Marks NWR	None			Tallahassee-St. Marks Historic Railroad Trail	20	2-mi	1	1	1	2	5	10		
Black Bayou Lake NWR	Bus	7					5	1	1	1	1	9		
Caloosahatchee NWR							5	1	1	1	1	9		
D'Arbonne NWR	Bus?		Monroe Transit System				5	1	1	1	1	9		
Laguna Cartagena NWR	None						5	1	1	1	1	9		
Lake Wales Ridge NWR							5	1	1	1	1	9		

[1] Taken from *Transit and Trails Connections: Assessment of Visitor Access to National Wildlife Refuges* conducted by Volpe in December, 2010.

Table 5: Volpe Transit and Trails Study: Region 4 Results

REFUGE	Transit			Trails			Rank						Potential	
	Mode	Distance (Miles)	Transit Agency	Names of Trail(s)	Length (Miles)	Distance from NWR	Urban Area	Transit Distance	Transit Quality	Trail Distance	Trail Quality	Total	Future Transit Potential	Future Trail Potential
Mandalay NWR	None						5	1	1	1	1	9		
National Key Deer Refuge	Intercity bus	0-2.5	Greyhound				3	3	1	1	1	9		
Pinellas NWR	None						5	1	1	1	1	9		
Savannah-Pinckney NWR	Bus	Unknown	Lowcountry Regional Transit Authority				5	1	1	1	1	9		
St. Johns NWR							5	1	1	1	1	9		
Waccamaw NWR	None						5	1	1	1	1	9		
Wassaw NWR							5	1	1	1	1	9		
Watercress Darter NWR							5	1	1	1	1	9		
Wheeler NWR	On-demand rural transit		MCATS - Morgan County Area Transportation System; TRAM - Transportation for Rural Areas of Madison County				5	1	1	1	1	9		
Alligator River NWR	None						3	1	1	1	1	7		
Bayou Teche NWR							3	1	1	1	1	7		
Great White Heron NWR							3	1	1	1	1	7		
Key West NWR							3	1	1	1	1	7		
Felsenthal NWR							1	1	1	1	1	5		
Grand Bay NWR							1	1	1	1	1	5		
Handy Brake NWR							1	1	1	1	1	5		
Mattamuskeet NWR							1	1	1	1	1	5		
Overflow NWR							1	1	1	1	1	5		
Pea Island NWR							1	1	1	1	1	5		
Pocosin Lakes NWR							1	1	1	1	1	5		
St. Catherine Creek NWR	Internal tram						1	1	1	1	1	5		
Swanquarter NWR							1	1	1	1	1	5		
Upper Ouachita NWR							1	1	1	1	1	5		

Table 6: RIP Cycle 4 Roadway Sections

Table 6: RIP Cycle 4 Roadway Sections

Unit Name	Road Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed	Not Rated			
ALLIGATOR RIVER NWR	38.8	41.2	31.0	6.2	9.0		126.2	63.4%	12.0%
ARCHIE CARR NWR			0.1					100.0%	0.0%
ARTHUR R. MARSHALL LOXAHATCHEE NWR	0.6	11.4	1.1	0.1			13.2	91.0%	0.5%
ATCHAFALAYA NWR	3.2	9.9	1.9	2.4			17.3	75.4%	13.8%
BALD KNOB NWR	12.6	30.5	11.2		12.0		66.4	65.0%	18.1%
BANKS LAKE NWR			0.3					100.0%	0.0%
BAYOU COCODRIE NWR	0.1	15.4	3.1				18.6	83.2%	0.0%
BAYOU SAUVAGE NWR	4.6	0.3		0.4			5.3	92.5%	7.5%
BAYOU TECHE NWR	5.0	10.0	2.5				17.5	85.7%	0.0%
BEARS BLUFF NFH			1.5					100.0%	0.0%
BIG BRANCH MARSH NWR	0.8	3.5	1.1				5.5	79.1%	0.0%
BIG LAKE NWR	9.5	3.0					12.6	100.0%	0.0%
BLACK BAYOU LAKE NWR	1.5	2.0	0.2	0.2			3.9	88.4%	5.9%
BLACKBEARD ISLAND NWR	1.0	11.2	3.0				15.3	80.1%	0.0%
BO GINN NFH AND AQUARIUM	0.1	3.3	0.8	0.3			4.5	75.4%	6.4%
BOGUE CHITTO NWR	0.5	0.9					1.5	100.0%	0.0%
BON SECOUR NWR	0.0	1.4	3.0				4.4	31.6%	0.0%
BOND SWAMP NWR			11.0	5.0		0.1		68.2%	0.7%
BRETON NWR									
BUCK ISLAND NWR									
CABO ROJO NWR	0.3	11.8	1.4				13.5	89.8%	0.0%
CACHE RIVER NWR	16.5	39.6	27.0	3.7	2.3		89.2	63.0%	6.7%
CAHABA RIVER NWR	3.0	5.9	4.0		0.2		13.2	67.9%	1.8%
CALOOSAHATCHEE NWR									
CAMERON PRAIRIE NWR	1.1	28.0	16.8				45.9	63.4%	0.0%
CAPE ROMAIN NWR			12.6	4.5				73.5%	0.0%
CAROLINA SANDHILLS NWR	9.7	69.4	57.5		15.6		152.2	52.0%	10.3%
CAT ISLAND NWR			5.1	8.1				38.5%	0.0%
CATAHOULA NWR	10.6	21.4	11.9				43.9	72.9%	0.0%
CEDAR ISLAND NWR			2.0	2.3				46.8%	0.0%
CEDAR KEYS NWR									
CHASSAHOWITZKA NWR	0.2	0.1	0.0				0.4	91.5%	0.0%
CHATTAHOOCHEE FOREST NFH			0.3	0.9				24.1%	0.0%
CHICKASAW NWR			7.1	7.9	0.2			46.7%	1.5%
CHOCTAW NWR	1.3	6.6	4.8		0.6		13.4	59.3%	4.8%
CLARKS RIVER NWR			2.0	1.6		1.8		37.4%	32.5%
COLDWATER RIVER NWR			10.6	1.9				85.0%	0.0%
CROCODILE LAKE NWR								0.0%	0.0%
CROSS CREEKS NWR	4.1	22.3	2.5	0.4	0.8		30.1	87.7%	4.0%
CRYSTAL RIVER NWR	1.0						1.0	100.0%	0.0%

Table 6: RIP Cycle 4 Roadway Sections

Unit Name	Road Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed	Not Rated			
CULEBRA NWR	0.1	0.1					0.2	100.0%	0.0%
CURRITUCK NWR					0.6			0.0%	0.0%
D 'ARBONNE NWR	3.9	15.8	1.4				21.1	93.2%	0.0%
DAHOMEY NWR			10.7	0.7				93.6%	0.0%
DALE HOLLOW NFH	0.2	0.0	1.6				1.8	12.3%	0.0%
DELTA NWR			0.2					100.0%	0.0%
DESECHEO NWR									
EDENTON NFH	2.0	1.4					3.4	100.0%	0.0%
EGMONT KEY NWR	0.1		1.7				1.8	4.2%	0.0%
ERNEST F. HOLLINGS ACE BASIN NWR			22.1	27.8				44.2%	0.0%
ERWIN NFH	0.0		0.4	0.2			0.6	4.3%	33.2%
EUFAULA NWR	0.7	27.7	1.2				29.6	96.0%	0.0%
FELSENTHAL NWR	0.7	20.3	3.7	1.0			25.8	81.6%	3.9%
FERN CAVE NWR									
FLORIDA PANTHER NWR	1.5	16.1	17.0	1.0	10.9		46.5	37.9%	25.5%
GRAND BAY NWR			1.1	1.1	0.7			38.5%	23.0%
GRAND COTE NWR	4.4	22.2	12.6				39.2	67.8%	0.0%
GREAT WHITE HERON NWR									
GREEN CAY NWR									
GREERS FERRY NFH			0.2	0.7	0.5			16.2%	36.6%
HANDY BRAKE NWR					0.1			0.0%	0.0%
HARRIS NECK NWR	2.2	8.4	5.5	1.2			17.2	61.5%	6.7%
HATCHIE NWR	0.7	22.5	6.7		1.5		31.5	73.9%	4.9%
HILLSIDE NWR			2.9	0.6				82.6%	0.0%
HOBE SOUND NWR									
HOLLA BEND NWR	9.0	6.7	2.4				18.0	86.9%	0.0%
HOLT COLLIER NWR									
ISLAND BAY NWR									
J.N. Ding Darling NWR	0.0	3.1	4.5	0.2			7.9	39.6%	2.8%
KEY CAVE NWR		3.8	1.0				4.8	80.0%	0.0%
KEY WEST NWR									
LACASSINE NWR	7.6	26.8	10.6	1.1			46.1	74.6%	2.4%
LAGUNA CARTAGENA NWR		4.8	1.0				5.8	83.2%	0.0%
LAKE ISOM NWR		6.9	0.8				7.7	90.1%	0.0%
LAKE OPHELIA NWR	7.0	33.4	8.2		2.5		51.1	78.9%	4.9%
LAKE WALES RIDGE NWR		14.1	5.6				19.7	71.6%	0.0%
LAKE WOODRUFF NWR		11.7	8.2	0.1			20.1	58.6%	0.6%
LOGAN CAVE NWR									
LOWER HATCHIE NWR	3.7	8.1	4.9		0.2		17.0	69.6%	1.4%
LOWER SUWANNEE NWR	5.8	54.0	24.1	1.5	5.1		90.5	66.0%	7.4%
MACKAY ISLAND NWR	1.3	7.4	5.9				14.5	59.7%	0.0%
MAMMOTH SPRING NFH	0.1	1.0	0.8				1.9	58.6%	0.0%
MANDALAY NWR		0.6					0.6	100.0%	0.0%
MATHEWS BRAKE NWR		2.0					2.0	100.0%	0.0%

Table 6: RIP Cycle 4 Roadway Sections

Unit Name	Road Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed	Not Rated			
MATLACHA PASS NWR									
MATTAMUSKEET NWR	4.0	10.9	1.9	0.3			17.1	87.1%	1.5%
MCKINNEY LAKE NFH	0.6	2.7					3.3	100.0%	0.0%
MERIDIAN NFH	0.1	1.5	1.1	0.1			2.8	59.0%	2.6%
MERRITT ISLAND NWR	8.8	153.6	65.0	11.6	1.1		240.1	67.7%	5.3%
MISSISSIPPI SANDHILL CRANE NWR	5.2	18.9	11.2		1.3		36.6	65.8%	3.4%
MORGAN BRAKE NWR	0.1	22.1	0.4				22.6	98.1%	0.0%
MOUNTAIN LONGLEAF NWR	1.9	13.3	10.8				25.9	58.4%	0.0%
NATCHITOCHES NFH	1.5	0.1	0.2	0.2			1.9	84.1%	7.9%
NATIONAL KEY DEER REFUGE	0.2	1.1	2.3				3.5	36.1%	0.0%
NAVASSA ISLAND NWR									
NORFORK NFH		0.1	1.0	0.9			2.0	4.1%	46.1%
NOXUBEE NWR	17.4	49.5	16.7				83.6	80.0%	0.0%
OKEFENOKEE NWR	1.8	111.2	58.2	4.0	0.2		175.4	64.4%	2.4%
ORANGEBURG NFH	0.8	1.1	0.3	0.1			2.3	80.5%	5.1%
OVERFLOW NWR	3.2	8.7	3.6		0.3		15.9	75.4%	2.2%
PANTHER SWAMP NWR	2.5	23.1	20.6	1.0			47.1	54.2%	2.0%
PASSAGE KEY NWR									
PEA ISLAND NWR		3.5	1.3				4.8	73.4%	0.0%
PEE DEE NWR	10.3	13.2	2.6				26.1	90.0%	0.0%
PELICAN ISLAND NWR		7.6					7.6	100.0%	0.0%
PIEDMONT NWR	3.4	125.7	27.9	0.3			157.4	82.1%	0.2%
PINCKNEY ISLAND NWR	3.6	0.5	0.2	0.5			4.8	85.9%	10.6%
PINE ISLAND NWR									
PINELLAS NWR									
POCOSIN LAKES NWR	13.5	105.2	44.0		2.9		165.6	71.7%	1.8%
POND CREEK NWR	22.3	25.8	0.2				48.3	99.6%	0.0%
PRIVATE JOHN ALLEN NFH		1.0					1.0	100.0%	0.0%
RED RIVER NWR	1.4	21.0	10.0	0.2			32.7	68.6%	0.6%
REELFOOT NWR	3.8	7.5	2.9	1.0			15.2	74.4%	6.5%
ROANOKE RIVER NWR	0.5	10.7	3.7		0.4		15.3	73.2%	2.4%
SABINE NWR	2.2	1.1		0.0			3.3	99.1%	0.9%
SANDY POINT NWR		0.1			2.1		2.2	3.2%	96.8%
SANTEE NWR	18.5	51.5	8.0				78.0	89.8%	0.0%
SAUTA CAVE NWR			0.3		0.2		0.5	0.0%	45.5%
SAVANNAH NWR	1.2	19.0	6.1				26.4	76.8%	0.0%
SHELL KEYS NWR									
ST. CATHERINE CREEK NWR	0.6	28.2	19.3	0.2	0.1		48.4	59.4%	0.8%
ST. JOHNS NWR		3.5	2.7				6.2	57.1%	0.0%
ST. MARKS NWR	9.3	116.2	23.8		0.0		149.2	84.1%	0.0%
ST. VINCENT NWR	4.1	23.6	5.6	0.5			33.7	82.1%	1.4%
SWANQUARTER NWR		1.9	2.2				4.2	46.7%	0.0%
TALLAHATCHIE NWR	5.0	5.7					10.7	100.0%	0.0%
TEN THOUSAND ISLANDS NWR			0.1				0.1	0.0%	0.0%

Table 6: RIP Cycle 4 Roadway Sections

Unit Name	Road Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed	Not Rated			
TENNESSEE NWR	5.3	37.2	22.0	2.8			67.3	63.2%	4.2%
TENSAS RIVER NWR	4.5	48.9	28.6	4.0	0.7		86.7	61.5%	5.4%
THEODORE ROOSEVELT NWR									
TYBEE NWR									
UPPER OUACHITA NWR	4.5	37.3	17.9	6.1	0.4		66.1	63.2%	9.8%
VIEQUES NWR	8.2	20.1	21.0	0.8	6.5		56.7	50.1%	12.9%
WACCAMAW NWR	0.4	2.8	3.3				6.4	49.0%	0.0%
WAPANOCCA NWR		17.2	3.3	0.7	0.6		21.8	79.0%	6.0%
WARM SPRINGS NFH	0.3	3.0	0.4				3.7	89.1%	0.0%
WASSAW NWR		4.3	2.1				6.4	67.1%	0.0%
WATERCRESS DARTER NWR									
WELAKA NFH		6.3	0.1				6.4	97.8%	0.0%
WHEELER NWR	3.5	76.1	13.7	0.2			93.6	85.1%	0.3%
WHITE RIVER NWR	12.1	93.0	30.7	6.2	0.3		142.3	73.8%	4.6%
WOLF CREEK NFH			1.2				1.2	0.0%	0.0%
WOLF ISLAND NWR									
YAZOO NWR	5.1	31.3	11.5	3.4			51.2	71.1%	6.6%

Table 7: RIP Cycle 4 Parking

Table 7: RIP Cycle 4 Parking

Unit Name	Parking Surface Condition (Acres)					Total Acres	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed			
ALLIGATOR RIVER NWR	0.27	3.32	1.18			4.77	75.3%	0.0%
ARCHIE CARR NWR		0.07		0.03		0.10	69.4%	30.6%
ARTHUR R. MARSHALL LOXAHATCHEE NWR	0.71	3.96	2.61			7.27	64.1%	0.0%
ATCHAFALAYA NWR		0.65	0.61	1.04		2.30	28.1%	45.2%
BALD KNOB NWR		2.82	0.22	0.27		3.31	85.1%	8.2%
BANKS LAKE NWR		0.07	0.40			0.48	15.2%	0.0%
BAYOU COCODRIE NWR	0.50	3.45	0.10			4.05	97.4%	0.0%
BAYOU SAUVAGE NWR	0.25	1.13	0.77			2.14	64.0%	0.0%
BAYOU TECHE NWR		0.21	0.54			0.75	28.2%	0.0%
BEARS BLUFF NFH		0.18	0.14			0.32	56.7%	0.0%
BIG BRANCH MARSH NWR	1.00	3.51	0.44	0.31		5.27	85.8%	6.0%
BIG LAKE NWR		2.38	0.88	0.13		3.40	70.1%	3.9%
BLACK BAYOU LAKE NWR	0.26	2.93	0.31	0.31		3.81	83.8%	8.2%
BLACKBEARD ISLAND NWR								
BO GINN NFH AND AQUARIUM			0.65			0.65	0.0%	0.0%
BOGUE CHITTO NWR		0.57	0.61			1.18	48.3%	0.0%
BON SECOUR NWR		0.25	2.00	0.16		2.41	10.2%	6.7%
BOND SWAMP NWR		0.84	0.64	0.28		1.77	47.7%	15.9%
BRETON NWR								
BUCK ISLAND NWR								
CABO ROJO NWR	0.33	0.90	0.83	0.15		2.22	55.6%	6.9%
CACHE RIVER NWR		4.38	2.09	0.66		7.14	61.4%	9.3%
CAHABA RIVER NWR		0.25	0.32	0.03		0.60	40.9%	5.5%
CALOOSAHATCHEE NWR								
CAMERON PRAIRIE NWR	3.76	1.56	0.69	0.17		6.18	86.1%	2.7%
CAPE ROMAIN NWR		2.79	0.79			3.58	78.0%	0.0%
CAROLINA SANDHILLS NWR	0.09	4.97	0.99	0.09		6.14	82.5%	1.4%
CAT ISLAND NWR		0.75	0.74	0.58		2.07	36.2%	27.8%
CATAHOULA NWR	0.13	2.33	0.49	0.14		3.10	79.6%	4.6%
CEDAR ISLAND NWR		0.37	0.51			0.88	42.5%	0.0%
CEDAR KEYS NWR								
CHASSAHOWITZKA NWR		1.33				1.33	100.0%	0.0%
CHATTAHOOCHEE FOREST NFH		0.69				0.69	100.0%	0.0%
CHICKASAW NWR		1.34	1.83		0.48	3.65	36.7%	13.2%
CHOCTAW NWR	0.74	2.08	0.15			2.97	95.0%	0.0%
CLARKS RIVER NWR	0.05	2.74	1.01	0.14		3.92	70.9%	3.5%
COLDWATER RIVER NWR			0.17			0.17	0.0%	0.0%
CROCODILE LAKE NWR		0.11	0.19			0.30	37.6%	0.0%
CROSS CREEKS NWR	0.64	2.10	1.34	0.30		4.38	62.6%	6.7%
CRYSTAL RIVER NWR	0.01	0.33	0.08			0.41	81.4%	0.0%
CULEBRA NWR	0.11		0.08			0.19	58.6%	0.0%
CURRITUCK NWR								
D 'ARBONNE NWR		2.68	1.32			3.99	67.0%	0.0%
DAHOMEY NWR	0.07	1.89	0.35			2.30	84.9%	0.0%
DALE HOLLOW NFH	0.09		0.81			0.89	9.9%	0.0%
DELTA NWR	0.04	0.45	0.05			0.54	90.9%	0.0%
DESECHEO NWR								
EDENTON NFH		0.32	0.63	0.08		1.02	31.1%	7.4%

Table 7: RIP Cycle 4 Parking

Unit Name	Parking Surface Condition (Acres)					Total Acres	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed			
EGMONT KEY NWR								
ERNEST F. HOLLINGS ACE BASIN NWR		2.30	1.16			3.46	66.5%	0.0%
ERWIN NFH		0.59	0.19			0.77	76.0%	0.0%
EUFAULA NWR	0.01	1.30	0.76	0.08		2.15	60.9%	3.6%
FELSENTHAL NWR		12.47	3.41	0.32		16.20	77.0%	2.0%
FERN CAVE NWR								
FLORIDA PANTHER NWR	1.09	0.77	2.44			4.31	43.3%	0.0%
GRAND BAY NWR			0.38	0.35		0.73	0.0%	47.9%
GRAND COTE NWR		2.02	0.60	0.90		3.52	57.4%	25.6%
GREAT WHITE HERON NWR								
GREEN CAY NWR								
GREERS FERRY NFH		0.17	0.99			1.16	14.9%	0.0%
HANDY BRAKE NWR				0.11		0.11	0.0%	100.0%
HARRIS NECK NWR	0.14	2.57	2.15	0.15		5.02	54.1%	3.0%
HATCHIE NWR	0.66	4.29	0.66	0.04		5.66	87.5%	0.8%
HILLSIDE NWR		1.71	0.39	0.10		2.21	77.7%	4.5%
HOBE SOUND NWR		1.57				1.57	100.0%	0.0%
HOLLA BEND NWR	0.15	1.42	0.69			2.26	69.6%	0.0%
HOLT COLLIER NWR								
ISLAND BAY NWR								
JN Ding Darling NWR		3.05	1.40	0.15		4.60	66.3%	3.2%
KEY CAVE NWR		0.08	0.15			0.23	35.0%	0.0%
KEY WEST NWR								
LACASSINE NWR	0.54	1.93	1.93	0.33		4.73	52.3%	6.9%
LAGUNA CARTAGENA NWR		0.11	0.47			0.58	18.9%	0.0%
LAKE ISOM NWR		0.32	0.06			0.38	84.1%	0.0%
LAKE OPHELIA NWR		2.72	1.04	0.82	0.14	4.73	57.5%	20.5%
LAKE WALES RIDGE NWR								
LAKE WOODRUFF NWR	0.02	1.35	0.27			1.64	83.7%	0.0%
LOGAN CAVE NWR								
LOWER HATCHIE NWR		2.84	0.28	0.12	0.02	3.26	87.1%	4.2%
LOWER SUWANNEE NWR	2.22	1.68	1.35	0.18		5.42	71.8%	3.3%
MACKAY ISLAND NWR		1.55	0.36			1.91	80.9%	0.0%
MAMMOTH SPRING NFH		0.37	0.31			0.68	54.8%	0.0%
MANDALAY NWR		0.17	0.27			0.45	38.9%	0.0%
MATHEWS BRAKE NWR		0.09	0.39			0.48	18.4%	0.0%
MATLACHA PASS NWR								
MATTAMUSKEET NWR	0.70	2.11	0.52			3.32	84.5%	0.0%
MCKINNEY LAKE NFH			0.79			0.79	0.0%	0.0%
MERIDIAN NFH				1.01		1.01	0.0%	100.0%
MERRITT ISLAND NWR	1.06	7.71	0.57	0.15		9.49	92.4%	1.6%
MISSISSIPPI SANDHILL CRANE NWR	0.15	1.16	1.98			3.29	39.8%	0.0%
MORGAN BRAKE NWR		1.62	0.57	0.19		2.38	67.9%	8.2%
MOUNTAIN LONGLEAF NWR		0.16	0.40	0.59		1.15	13.5%	51.4%
NATCHITOCHES NFH			1.32			1.32	0.0%	0.0%
NATIONAL KEY DEER REFUGE	0.12	1.23	0.47			1.82	74.4%	0.0%
NAVASSA ISLAND NWR								
NORFORK NFH			1.12	0.06		1.18	0.0%	5.0%
NOXUBEE NWR	0.33	6.26	1.11	0.10		7.80	84.4%	1.3%

Table 7: RIP Cycle 4 Parking

Unit Name	Parking Surface Condition (Acres)					Total Acres	Percent Excellent / Good	Percent Poor / Failed
	Excellent	Good	Fair	Poor	Failed			
OKEFENOKEE NWR	1.45	7.86	0.06			9.37	99.4%	0.0%
ORANGEBURG NFH	0.32	1.64	0.28	0.57		2.82	69.8%	20.4%
OVERFLOW NWR		1.99	0.89	0.10		2.99	66.6%	3.5%
PANTHER SWAMP NWR	1.98	2.77	1.78			6.53	72.7%	0.0%
PASSAGE KEY NWR								
PEA ISLAND NWR		1.71	1.16	0.58		3.45	49.6%	16.8%
PEE DEE NWR	0.08	1.81	1.48	0.05		3.41	55.4%	1.3%
PELICAN ISLAND NWR	0.02	1.06				1.08	100.0%	0.0%
PIEDMONT NWR	0.12	2.56	1.93	0.32		4.93	54.4%	6.5%
PINCKNEY ISLAND NWR		0.30	0.04			0.33	89.1%	0.0%
PINE ISLAND NWR								
PINELLAS NWR								
POCOSIN LAKES NWR	0.22	2.17	2.03			4.42	54.2%	0.0%
POND CREEK NWR		2.61	2.30	0.32		5.22	49.9%	6.0%
PRIVATE JOHN ALLEN NFH	0.10	0.54	0.16			0.79	80.3%	0.0%
RED RIVER NWR		0.17	0.96			1.13	14.9%	0.0%
REELFOOT NWR	0.27	2.43	0.24	0.48		3.41	78.9%	14.1%
ROANOKE RIVER NWR		0.21	1.04			1.25	16.9%	0.0%
SABINE NWR	1.15	4.74	0.35			6.24	94.4%	0.0%
SANDY POINT NWR		0.17	0.08	0.36		0.62	27.8%	58.4%
SANTEE NWR	1.39	3.25	0.70			5.35	87.0%	0.0%
SAUTA CAVE NWR								
SAVANNAH NWR	0.59	1.72	2.69			5.00	46.2%	0.0%
SHELL KEYS NWR								
ST. CATHERINE CREEK NWR		2.16	1.99	0.11	0.11	4.38	49.3%	5.2%
ST. JOHNS NWR								
ST. MARKS NWR	0.67	6.00	0.55			7.23	92.3%	0.0%
ST. VINCENT NWR		1.11	0.33			1.44	77.4%	0.0%
SWANQUARTER NWR		0.39				0.39	100.0%	0.0%
TALLAHATCHIE NWR	0.30	2.30	0.49			3.09	84.0%	0.0%
TEN THOUSAND ISLANDS NWR	0.46					0.46	100.0%	0.0%
TENNESSEE NWR		9.05	5.73	1.46	0.26	16.51	54.8%	10.4%
TENSAS RIVER NWR		1.74	5.45	0.43	0.07	7.69	22.7%	6.4%
THEODORE ROOSEVELT NWR								
TYBEE NWR								
UPPER OUACHITA NWR		1.96	2.95	0.81		5.72	34.2%	14.2%
VIEQUES NWR	0.91	1.24	3.07	0.26		5.48	39.3%	4.8%
WACCAMAW NWR	0.09	0.23	0.17			0.49	65.7%	0.0%
WAPANOCCA NWR		2.15	0.25	0.02		2.41	89.1%	0.7%
WARM SPRINGS NFH		0.84	0.22			1.05	79.5%	0.0%
WASSAW NWR								
WATERCRESS DARTER NWR								
WELAKA NFH		0.16	1.22	0.14		1.53	10.8%	9.3%
WHEELER NWR		5.63	3.36	0.75		9.74	57.8%	7.7%
WHITE RIVER NWR	0.47	13.87	30.25	7.11	0.26	51.95	27.6%	14.2%
WOLF CREEK NFH	0.02	0.68	0.90			1.61	43.9%	0.0%
WOLF ISLAND NWR								
YAZOO NWR	0.30	1.57	0.83	0.15		2.85	65.7%	5.2%

Table 8: RIP Cycle 4 Trail Condition

Table 8: RIP Cycle 4 Trail Condition

Unit Name	Trail Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Very Poor
	Excellent	Good	Fair	Poor	Failed	Not Rated			
ALLIGATOR RIVER NWR	1.2						1.2	100.0%	0.0%
ARCHIE CARR NWR									
ARTHUR R. MARSHALL LOXAHATCHEE NWR	0.3					1.4	1.7	100.0%	0.0%
ATCHAFALAYA NWR	0.6						0.6	100.0%	0.0%
BALD KNOB NWR									
BANKS LAKE NWR	0.3						0.3	100.0%	0.0%
BAYOU COCODRIE NWR	25.8						25.8	100.0%	0.0%
BAYOU SAUVAGE NWR	3.2		0.2	0.9			4.3	74.6%	20.0%
BAYOU TECHE NWR						3.8	3.8	0.0%	0.0%
BEARS BLUFF NFH									
BIG BRANCH MARSH NWR	0.2					2.4	2.7	100.0%	0.0%
BIG LAKE NWR	0.8		0.4				1.2	69.7%	0.0%
BLACK BAYOU LAKE NWR	0.8						0.8	100.0%	0.0%
BLACKBEARD ISLAND NWR									
BO GINN NFH AND AQUARIUM									
BOGUE CHITTO NWR	0.7						0.7	100.0%	0.0%
BON SECOUR NWR	1.4		0.4		0.0	1.3	3.1	78.6%	1.7%
BOND SWAMP NWR	3.6					0.2	3.8	100.0%	0.0%
BRETON NWR									
BUCK ISLAND NWR									
CABO ROJO NWR	5.7	1.2	1.6				8.4	81.6%	0.0%
CACHE RIVER NWR									
CAHABA RIVER NWR	5.0					1.6	6.7	100.0%	0.0%
CALOOSAHATCHEE NWR									
CAMERON PRAIRIE NWR									
CAPE ROMAIN NWR	0.3		1.1				1.4	21.1%	0.0%
CAROLINA SANDHILLS NWR	0.0						0.0	100.0%	0.0%
CAT ISLAND NWR	3.0						3.0	100.0%	0.0%
CATAHOULA NWR	1.0						1.0	100.0%	0.0%
CEDAR ISLAND NWR									
CEDAR KEYS NWR	0.4						0.4	100.0%	0.0%
CHASSAHOWITZKA NWR									
CHATTAHOOCHEE FOREST NFH									
CHICKASAW NWR						8.1	8.1	0.0%	0.0%
CHOCTAW NWR	0.2						0.2	100.0%	0.0%
CLARKS RIVER NWR									
COLDWATER RIVER NWR									
CROCODILE LAKE NWR									
CROSS CREEKS NWR			0.9				0.9	0.0%	0.0%
CRYSTAL RIVER NWR									
CULEBRA NWR									
CURRITUCK NWR									
D 'ARBONNE NWR									
DAHOMEY NWR	0.9						0.9	100.0%	0.0%
DALE HOLLOW NFH									
DELTA NWR									
DESECHEO NWR									
EDENTON NFH									

Table 8: RIP Cycle 4 Trail Condition

Unit Name	Trail Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Very Poor
	Excellent	Good	Fair	Poor	Failed	Not Rated			
EGMONT KEY NWR	1.0	0.1					1.1	100.0%	0.0%
ERNEST F. HOLLINGS ACE BASIN NWR	2.1					3.2	5.3	100.0%	0.0%
ERWIN NFH									
EUFAULA NWR		0.5				6.8	7.3	100.0%	0.0%
FELSENTHAL NWR	3.4	0.4					3.8	100.0%	0.0%
FERN CAVE NWR									
FLORIDA PANTHER NWR	0.3	1.2					1.5	100.0%	0.0%
GRAND BAY NWR	1.7						1.7	100.0%	0.0%
GRAND COTE NWR	0.5						0.5	100.0%	0.0%
GREAT WHITE HERON NWR									
GREEN CAY NWR									
GREERS FERRY NFH									
HANDY BRAKE NWR									
HARRIS NECK NWR						4.8	4.8	0.0%	0.0%
HATCHIE NWR						0.4	0.4	0.0%	0.0%
HILLSIDE NWR	3.5					1.7	5.2	100.0%	0.0%
HOBE SOUND NWR	0.6						0.6	100.0%	0.0%
HOLLA BEND NWR	0.9						0.9	100.0%	0.0%
HOLT COLLIER NWR									
ISLAND BAY NWR									
J.N. Ding Darling NWR	4.6						4.6	100.0%	0.0%
KEY CAVE NWR									
KEY WEST NWR									
LACASSINE NWR									
LAGUNA CARTAGENA NWR									
LAKE ISOM NWR	3.4						3.4	100.0%	0.0%
LAKE OPHELIA NWR	1.1		1.4		0.4		2.9	38.4%	13.4%
LAKE WALES RIDGE NWR									
LAKE WOODRUFF NWR	1.1					8.2	9.2	100.0%	0.0%
LOGAN CAVE NWR									
LOWER HATCHIE NWR	0.2					1.0	1.2	100.0%	0.0%
LOWER SUWANNEE NWR	1.8						1.8	100.0%	0.0%
MACKAY ISLAND NWR	0.4						0.4	100.0%	0.0%
MAMMOTH SPRING NFH									
MANDALAY NWR	0.4						0.4	100.0%	0.0%
MATHEWS BRAKE NWR									
MATLACHA PASS NWR									
MATTAMUSKEET NWR									
MCKINNEY LAKE NFH									
MERIDIAN NFH									
MERRITT ISLAND NWR	7.7						7.7	100.0%	0.0%
MISSISSIPPI SANDHILL CRANE NWR	1.4						1.4	100.0%	0.0%
MORGAN BRAKE NWR									
MOUNTAIN LONGLEAF NWR	4.4					14.2	18.6	100.0%	0.0%
NATCHITOCHES NFH									
NATIONAL KEY DEER REFUGE	2.4					1.7	4.1	100.0%	0.0%
NAVASSA ISLAND NWR									
NORFORK NFH	0.2						0.2	100.0%	0.0%
NOXUBEE NWR	7.2						7.2	100.0%	0.0%

Table 8: RIP Cycle 4 Trail Condition

Unit Name	Trail Condition (Miles)						Total Miles	Percent Excellent / Good	Percent Poor / Very Poor
	Excellent	Good	Fair	Poor	Failed	Not Rated			
OKEFENOKEE NWR	7.1		1.2	1.1	0.1		9.4	75.2%	12.2%
ORANGEBURG NFH									
OVERFLOW NWR									
PANTHER SWAMP NWR	4.0					11.6	15.6	100.0%	0.0%
PASSAGE KEY NWR									
PEA ISLAND NWR	0.7					1.7	2.5	100.0%	0.0%
PEE DEE NWR	1.5		0.3				1.8	85.1%	0.0%
PELICAN ISLAND NWR	5.6						5.6	100.0%	0.0%
PIEDMONT NWR	3.7	0.6	0.8		0.5	0.3	6.0	76.3%	9.1%
PINCKNEY ISLAND NWR	5.1					5.6	10.8	100.0%	0.0%
PINE ISLAND NWR									
PINELLAS NWR									
POCOSIN LAKES NWR	0.5					3.4	3.9	100.0%	0.0%
POND CREEK NWR	3.1		0.7				3.8	82.1%	0.0%
PRIVATE JOHN ALLEN NFH	0.2					0.0	0.2	100.0%	0.0%
RED RIVER NWR									
REELFOOT NWR	2.4						2.4	100.0%	0.0%
ROANOKE RIVER NWR	0.6	1.7	0.6				3.0	78.4%	0.0%
SABINE NWR	1.0		0.1				1.1	90.4%	0.0%
SANDY POINT NWR									
SANTEE NWR	3.2		0.7				4.0	81.4%	0.0%
SAUTA CAVE NWR									
SAVANNAH NWR									
SHELL KEYS NWR									
ST. CATHERINE CREEK NWR	2.9						2.9	100.0%	0.0%
ST. JOHNS NWR									
ST. MARKS NWR	19.1	5.6	2.1			37.6	64.4	92.1%	0.0%
ST. VINCENT NWR	1.8					0.0	1.9	100.0%	0.0%
SWANQUARTER NWR									
TALLAHATCHIE NWR									
TEN THOUSAND ISLANDS NWR	1.2						1.2	100.0%	0.0%
TENNESSEE NWR	2.6		1.1			0.4	4.1	70.5%	0.0%
TENSAS RIVER NWR	3.9						3.9	100.0%	0.0%
THEODORE ROOSEVELT NWR									
TYBEE NWR									
UPPER OUACHITA NWR									
VIEQUES NWR						0.8	0.8	0.0%	0.0%
WACCAMAW NWR									
WAPANOCCA NWR									
WARM SPRINGS NFH	1.0						1.0	100.0%	0.0%
WASSAW NWR	11.3						11.3	100.0%	0.0%
WATERCRESS DARTER NWR									
WELAKA NFH	0.4						0.4	100.0%	0.0%
WHEELER NWR	3.6						3.6	100.0%	0.0%
WHITE RIVER NWR	1.4						1.4	100.0%	0.0%
WOLF CREEK NFH									
WOLF ISLAND NWR									
YAZOO NWR	0.3					0.2	0.5	100.0%	0.0%

A2.3 – COORDINATED OPPORTUNITIES

Table 9: Refuges and Hatcheries by State, County, and MPO

Table 9: Refuges and Hatcheries by State, County, and MPO			
Unit Name	State Name(s)	County Name(s)	MPO Name(s)
Alligator River NWR	North Carolina	Dare County	Indian River County MPO, Space Coast Transportation Planning Organization
		Hyde County	
Archie Carr NWR	Florida	Brevard County	
		Indian River County	
Arthur R. Marshall Loxahatchee NWR	Florida	Broward County	Palm Beach MPO
		Palm Beach County	
Atchafalaya NWR	Louisiana	Iberville Parish	
		Pointe Coupee Parish	
		St. Martin Parish	
Bald Knob NWR	Arkansas	White County	
Banks Lake NWR	Georgia	Lanier County	
Bayou Cocodrie NWR	Louisiana	Concordia Parish	
Bayou Sauvage NWR	Louisiana	Orleans Parish	Regional Planning Commission
Bayou Teche NWR	Louisiana	St. Mary Parish	
Bears Bluff NFH	South Carolina	Charleston County	Charleston Area Transportation Study
Big Branch Marsh NWR	Louisiana	St. Tammany Parish	Regional Planning Commission
Big Lake NWR	Arkansas	Mississippi County	
Black Bayou Lake NWR	Louisiana	Ouachita Parish	Ouachata Council of Governments
Blackbeard Island NWR	Georgia	McIntosh County	
Bo Ginn NFH And Aquarium	Georgia	Jenkins County	
Bogue Chitto NWR	Louisiana	St. Tammany Parish	Regional Planning Commission
		Washington Parish	
	Mississippi	Pearl River County	
Bon Secour NWR	Alabama	Baldwin County	
		Mobile County	
Bond Swamp NWR	Georgia	Bibb County	Macon Area Transportation Study
		Twiggs County	
Breton NWR	Louisiana	Plaquemines Parish	
		St. Bernard Parish	
Buck Island NWR	United States Virgin Islands		
Cabo Rojo NWR	Puerto Rico	Cabo Rojo Municipio	UZA's MPO
Cache River NWR	Arkansas	Arkansas County	
		Jackson County	
		Jefferson County	
		Monroe County	
		Prairie County	
		Woodruff County	
Cahaba River NWR	Alabama	Bibb County	
Caloosahatchee NWR	Florida	Lee County	Lee County MPO
Cameron Prairie NWR	Louisiana	Cameron Parish	
Cape Romain NWR	South Carolina	Charleston County	
Carolina Sandhills NWR	South Carolina	Chesterfield County	
		Kershaw County	
Cat Island NWR	Louisiana	West Feliciana Parish	

Table 9: Refuges and Hatcheries by State, County, and MPO

Unit Name	State Name(s)	County Name(s)	MPO Name(s)
Catahoula NWR	Louisiana	Catahoula Parish	
		La Salle Parish	
Cedar Island NWR	North Carolina	Carteret County	
Cedar Keys NWR	Florida	Levy County	
Chassahowitzka NWR	Florida	Citrus County	Hernando County MPO
		Hernando County	
Chattahoochee Forest NFH	Georgia	Fannin County	
Chickasaw NWR	Tennessee	Dyer County	
		Lauderdale County	
Choctaw NWR	Alabama	Choctaw County	
Clarks River NWR	Kentucky	Graves County	
		McCracken County	
		Marshall County	
Coldwater River NWR	Mississippi	Quitman County	
		Tallahatchie County	
Crocodile Lake NWR	Florida	Monroe County	
Cross Creeks NWR	Tennessee	Stewart County	
Crystal River NWR	Florida	Citrus County	
Culebra NWR	Puerto Rico	Culebra Municipio	
Currituck NWR	North Carolina	Currituck County	
D 'Arbonne NWR	Louisiana	Ouachita Parish	Ouachata Council of Governments
		Union Parish	
Dahomey NWR	Mississippi	Bolivar County	
Dale Hollow NFH	Tennessee	Clay County	
Delta NWR	Louisiana	Plaquemines Parish	
Desecheo NWR	Puerto Rico	Mayagüez Municipio	
Edenton NFH	North Carolina	Chowan County	
Egmont Key NWR	Florida	Hillsborough County	
Ernest F. Hollings Ace Basin NWR	South Carolina	Beaufort County	
		Charleston County	
		Colleton County	
		Hampton County	
Erwin NFH	Tennessee	Unicoi County	
Eufaula NWR	Alabama	Barbour County	
		Russell County	
	Georgia	Quitman County	
		Stewart County	
Felsenthal NWR	Arkansas	Ashley County	
		Bradley County	
		Desha County	
		Union County	
Fern Cave NWR	Alabama	Jackson County	
Florida Panther NWR	Florida	Collier County	Collier County MPO
Grand Bay NWR	Alabama	Mobile County	Gulf Regional Planning Commission, Mobile Area Transportation Study
	Mississippi	Jackson County	
Grand Cote NWR	Louisiana	Avoyelles Parish	
Great White Heron NWR	Florida	Monroe County	
Green Cay NWR	United States Virgin Islands		
Greers Ferry NFH	Arkansas	Cleburne County	

Table 9: Refuges and Hatcheries by State, County, and MPO

Unit Name	State Name(s)	County Name(s)	MPO Name(s)
Handy Brake NWR	Louisiana	Morehouse Parish	
Harris Neck NWR	Georgia	McIntosh County	
Hatchie NWR	Tennessee	Haywood County	
Hillside NWR	Mississippi	Holmes County	
		Yazoo County	
Hobe Sound NWR	Florida	Martin County	Martin County MPO
Holla Bend NWR	Arkansas	Pope County	
		Yell County	
Holt Collier NWR	Mississippi	Washington County	
Island Bay NWR	Florida	Charlotte County	Charlotte County - Punta Gorda MPO
J.N. Ding Darling NWR	Florida	Lee County	Lee County MPO
Key Cave NWR	Alabama	Lauderdale County	
Key West NWR	Florida	Monroe County	
Lacassine NWR	Louisiana	Cameron Parish	
		Jefferson Davis Parish	
Laguna Cartagena NWR	Puerto Rico	Cabo Rojo Municipio	UZA's MPO
		Lajas Municipio	
Lake Isom NWR	Tennessee	Lake County	
		Obion County	
Lake Ophelia NWR	Louisiana	Avoyelles Parish	Alexandria MPO
		Evangeline Parish	
		Rapides Parish	
		St. Landry Parish	
Lake Wales Ridge NWR	Florida	Highlands County	Polk County Transportation Planning Organization
		Polk County	
Lake Woodruff NWR	Florida	Lake County	Lake-Sumter MPO
		Volusia County	Volusia County MPO
Logan Cave NWR	Arkansas	Benton County	Northwest Arkansas Regional Transportation Study
Lower Hatchie NWR	Tennessee	Lauderdale County	
		Tipton County	
Lower Suwannee NWR	Florida	Dixie County	
		Levy County	
Mackay Island NWR	North Carolina	Currituck County	Hampton Roads Transportation Planning Organization
	Virginia	Virginia Beach city	
Mammoth Spring NFH	Arkansas	Fulton County	
Mandalay NWR	Louisiana	Terrebonne Parish	Houma-Thibodaux MPO
Mathews Brake NWR	Mississippi	Holmes County	
		Leflore County	
Matlacha Pass NWR	Florida	Lee County	Lee County MPO
Mattamuskeet NWR	North Carolina	Hyde County	
Mckinney Lake NFH	North Carolina	Richmond County	
Meridian NFH	Mississippi	Lauderdale County	
Merritt Island NWR	Florida	Brevard County	Space Coast Transportation Planning Organization, Volusia County MPO
		Volusia County	
Mississippi Sandhill Crane NWR	Mississippi	George County	Gulf Regional Planning Commission
		Jackson County	
		Jefferson Davis County	
		Lamar County	
		Marion County	

Table 9: Refuges and Hatcheries by State, County, and MPO

Unit Name	State Name(s)	County Name(s)	MPO Name(s)
		Pearl River County	
Morgan Brake NWR	Mississippi	Holmes County	
Mountain Longleaf NWR	Alabama	Calhoun County	Calhoun Area Transportation Study
Natchitoches NFH	Louisiana	Natchitoches Parish	
National Key Deer Refuge	Florida	Monroe County	
Navassa Island NWR	*Navassa		
Norfork NFH	Arkansas	Baxter County	
Noxubee NWR	Mississippi	Noxubee County	
		Oktibbeha County	
		Winston County	
Okefenokee NWR	Florida	Baker County	
		Columbia County	
	Georgia	Charlton County	
		Clinch County	
		Ware County	
	South Carolina	Orangeburg County	
	Arkansas	Ashley County	
Orangeburg NFH			
Overflow NWR	Arkansas	Ashley County	
Panther Swamp NWR	Mississippi	Humphreys County	
		Yazoo County	
Passage Key NWR	Florida	Manatee County	
Pea Island NWR	North Carolina	Dare County	
Pee Dee NWR	North Carolina	Anson County	
		Richmond County	
Pelican Island NWR	Florida	Indian River County	Indian River County MPO
Piedmont NWR	Georgia	Jasper County	
		Jones County	
Pinckney Island NWR	South Carolina	Beaufort County	
Pine Island NWR	Florida	Lee County	Lee County MPO
Pinellas NWR	Florida	Pinellas County	
Pocosin Lakes NWR	North Carolina	Hyde County	
		Tyrrell County	
		Washington County	
Pond Creek NWR	Arkansas	Little River County	
		Sevier County	
Private John Allen NFH	Mississippi	Lee County	
Red River NWR	Louisiana	Bossier Parish	Northwest Louisiana COG
		Caddo Parish	
		De Soto Parish	
		Natchitoches Parish	
		Red River Parish	
Reelfoot NWR	Kentucky	Fulton County	
	Tennessee	Lake County	
		Obion County	
Roanoke River NWR	North Carolina	Bertie County	
Sabine NWR	Louisiana	Cameron Parish	
Sandy Point NWR	United States		

Table 9: Refuges and Hatcheries by State, County, and MPO

Unit Name	State Name(s)	County Name(s)	MPO Name(s)
	Virgin Islands		
Santee NWR	South Carolina	Clarendon County	
		Orangeburg County	
Sauta Cave NWR	Alabama	Jackson County	
Savannah NWR	Georgia	Chatham County	Coastal Region MPO
		Effingham County	
	South Carolina	Jasper County	
Shell Keys NWR	Louisiana	Iberia Parish	
St. Catherine Creek NWR	Mississippi	Adams County	
		Wilkinson County	
St. Johns NWR	Florida	Brevard County	Space Coast Transportation Planning Organization
St. Marks NWR	Florida	Jefferson County	
		Taylor County	
		Wakulla County	
St. Vincent NWR	Florida	Franklin County	
		Gulf County	
Swanquarter NWR	North Carolina	Hyde County	
Tallahatchie NWR	Mississippi	Grenada County	
		Tallahatchie County	
Ten Thousand Islands NWR	Florida	Collier County	Collier County MPO
Tennessee NWR	Tennessee	Benton County	
		Decatur County	
		Henry County	
		Humphreys County	
Tensas River NWR	Louisiana	Franklin Parish	
		Madison Parish	
		Richland Parish	
		Tensas Parish	
Theodore Roosevelt NWR	Mississippi	Holmes County	
		Humphreys County	
		Issaquena County	
		Leflore County	
		Sharkey County	
		Warren County	
		Washington County	
		Yazoo County	
Tybee NWR	South Carolina	Jasper County	
Upper Ouachita NWR	Louisiana	Morehouse Parish	
		Union Parish	
Vieques NWR	Puerto Rico	Vieques Municipio	
Waccamaw NWR	South Carolina	Georgetown County	Grand-Strand Area Transportation Study
		Horry County	
Wapanocca NWR	Arkansas	Crittenden County	
Warm Springs NFH	Georgia	Meriwether County	
Wassaw NWR	Georgia	Chatham County	Coastal Region MPO
Watercress Darter NWR	Alabama	Jefferson County	Birmingham MPO
Welaka NFH	Florida	Putnam County	

Table 9: Refuges and Hatcheries by State, County, and MPO

Unit Name	State Name(s)	County Name(s)	MPO Name(s)
Wheeler NWR	Alabama	Limestone County	Decatur MPO, Huntsville Area Transportation Study
		Madison County	
		Morgan County	
White River NWR	Arkansas	Arkansas County	
		Desha County	
		Monroe County	
		Phillips County	
Wolf Creek NFH	Kentucky	Russell County	
Wolf Island NWR	Georgia	McIntosh County	
Yazoo NWR	Mississippi	Washington County	

Table 10: Endangered and At-Risk Species

Table 10: Endangered and At-Risk Species		
Unit Name	Species	Federal Status
Alligator River NWR	Red-cockaded Woodpecker (Bird)	Endangered
	Red Wolf (Mammal)	Endangered
Archie Carr NWR	Hawksbill Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Arthur R. Marshall Loxahatchee NWR	Everglade Snail Kite (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Audubon's Crested Caracara (Bird)	Threatened
	Florida Panther (Mammal)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
Atchafalaya NWR	Pallid Sturgeon (Fish)	Endangered
	Louisiana Black Bear (Mammal)	Threatened
Bald Knob NWR	Least Tern (Interior) (Bird)	Endangered
	Piping Plover (Bird)	Threatened
Banks Lake NWR	Wood Stork (Bird)	Endangered
Bayou Cocodrie NWR	Louisiana Black Bear (Mammal)	Threatened
Bayou Sauvage NWR	Brown Pelican (Bird)	Endangered
	Piping Plover (Bird)	Threatened
Bayou Teche NWR	Louisiana Black Bear (Mammal)	Threatened
Big Branch Marsh NWR	Brown Pelican (Bird)	Endangered
	Piping Plover (Bird)	Endangered
	Red-cockaded Woodpecker (Bird)	Endangered
Blackbeard Island NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Bogue Chitto NWR	Gulf Sturgeon (Fish)	Threatened
	Gopher Tortoise (Reptile)	Threatened
	Ringed Sawback Turtle (Reptile)	Threatened
Bon Secour NWR	Piping Plover (Bird)	Threatened
	Alabama Beach Mouse (Mammal)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Bond Swamp NWR	Wood Stork (Bird)	Endangered
Breton NWR	Brown Pelican (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	Green Sea Turtle (Reptile)	Endangered

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Cabo Rojo NWR	Yellow-shouldered Blackbird (Bird)	Endangered
	Aristida chaseae, no common name (Plant)	Endangered
	Eugenia woodburyana, no common name (Plant)	Endangered
	Stahlia monosperma, Cobana negra (Plant)	Threatened
Cahaba River National Wildlife Refuge	Triangular kidneyshell (Clam)	Endangered
	upland combshell (Clam)	Endangered
	Finelined pocketbook (Clam)	Threatened
	Cahaba shiner (Fish)	Endangered
	Goldline darter (Fish)	Threatened
	Cylindrical lioplax (Snail)	Endangered
	Round rocksnail (Snail)	Threatened
Caloosahatchee NWR	Wood Stork (Bird)	Endangered
Cape Romain NWR	Bachman's Warbler (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	Red Wolf (Mammal)	Endangered
	Amaranthus pumilus, Seabeach Amaranth (Plant)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Carolina Sandhills NWR	Red-cockaded Woodpecker (Bird)	Endangered
	Eastern Puma (probably extinct) (Mammal)	Endangered
Cat Island NWR	Louisiana Black Bear (Mammal)	Threatened
Cedar Island NWR	Piping Plover (Bird)	Endangered
Cedar Keys NWR	Piping Plover (Bird)	Threatened
Chassahowitzka NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Chickasaw NWR	Least Tern (Interior) (Bird)	Endangered
Choctaw NWR	Wood Stork (Bird)	Endangered
Coldwater River NWR	Louisiana Black Bear (Mammal)	Threatened
Crocodile Lake NWR	Wood Stork (Bird)	Endangered
	Schaus Swallowtail Butterfly (Insect)	Endangered
	Key Largo Cotton Mouse (Mammal)	Endangered
	Key Largo Woodrat (Mammal)	Endangered

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	American Crocodile (Reptile)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
Cross Creeks NWR	Least Tern (Interior) (Bird)	Endangered
	Eastern Puma (probably extinct) (Mammal)	Endangered
	Gray Bat (Mammal)	Endangered
	Indiana Bat (Mammal)	Endangered
Crystal River NWR	West Indian (=Florida) Manatee (Mammal)	Endangered
Culebra NWR	Brown Pelican (Bird)	Endangered
	Roseate Tern (Bird)	Threatened
	Peperomia wheeleri, Wheeler's Peperomia (Plant)	Endangered
	Culebra Island Giant Anole (Reptile)	Endangered
	Hawksbill Sea Turtle (Reptile)	Endangered
Currituck NWR	Piping Plover (Bird)	Threatened
	Amaranthus pumilus, Seabeach Amaranth (Plant)	Endangered
	Loggerhead Sea Turtle (Reptile)	Endangered
D'Arbonne NWR	Red-cockaded Woodpecker (Bird)	Endangered
Delta NWR	Brown Pelican (Bird)	Endangered
	Piping Plover (Bird)	Endangered
	Pallid Sturgeon (Fish)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Green Sea Turtle (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Desecheo NWR	Harrisia portorricensis, Higo Chumbo (Plant)	Threatened
	Green Sea Turtle (Reptile)	Endangered
	Hawksbill Sea Turtle (Reptile)	Endangered
Egmont Key NWR	Loggerhead Sea Turtle (Reptile)	Threatened
Ernest F. Hollings ACE Basin NWR	Bachman's Warbler (Bird)	Endangered
	Red-cockaded Woodpecker (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Shortnose Sturgeon (Fish)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Oxypolis canbyi, Canby's Dropwort (Plant)	Endangered
Eufaula NWR	Wood Stork (Bird)	Endangered
Felsenthal NWR	Red-cockaded Woodpecker (Bird)	Endangered
Fern Cave NWR	Gray Bat (Mammal)	Endangered
	Indiana Bat (Mammal)	Endangered
	Asplenium scolopendrium var. americana, American Hart's-tongue Fern (Plant)	Threatened
Florida Panther NWR	Everglade Snail Kite (Bird)	Endangered

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	Red-cockaded Woodpecker (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Florida Panther (Mammal)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
Grand Cote NWR	Louisiana Black Bear (Mammal)	Threatened
Great White Heron NWR	Rice (=Silver Rice) Rat (Mammal)	Endangered
Green Cay NWR	Brown Pelican (Bird)	Endangered
	St. Croix Ground Lizard (Reptile)	Endangered
Harris Neck NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
Hillside NWR	Least Tern (Interior) (Bird)	Endangered
Hobe Sound NWR	Wood Stork (Bird)	Endangered
	Florida Scrub Jay (Bird)	Threatened
	Piping Plover (Bird)	Threatened
	Asimina tetramera, Four-petal Pawpaw (Plant)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Island Bay NWR	West Indian (=Florida) Manatee (Mammal)	Endangered
J. N. "Ding" Darling NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
	American Crocodile (Reptile)	Endangered
Key Cave NWR	Alabama Cavefish (Fish)	Endangered
	Gray Bat (Mammal)	Endangered
	Roseate Tern (Bird)	Threatened
	Green Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Laguna Cartagena NWR	Yellow-shouldered Blackbird (Bird)	Endangered
Lake Isom NWR	Least Tern (Interior) (Bird)	Endangered
Lake Ophelia NWR	Louisiana Black Bear (Mammal)	Threatened
Lake Wales Ridge NWR	Florida Scrub Jay (Bird)	Threatened
	Chionanthus pygmaeus, Pygmy Fringe-tree (Plant)	Endangered
	Dicerandra christmanii, Garett's Mint (Plant)	Endangered
	Liatris ohlingerae, Scrub Blazingstar (Plant)	Endangered
	Polygonella basiramia (= P. ciliata var. b.), Wireweed (Plant)	Endangered
	Prunus geniculata, Scrub Plum (Plant)	Endangered
	Bonamia grandiflora, Florida Bonamia (Plant)	Threatened
	Clitoria fragrans, Pigeon Wings (Plant)	Threatened

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	Eriogonum longifolium var. gnaphalifolium, Scrub Buckwheat (Plant)	Threatened
	Paronychia chartacea (= Nyachia pulvinata), Papery Whitlow-wort (Plant)	Threatened
	Eastern Indigo Snake (Reptile)	Threatened
	Sand Skink (Reptile)	Threatened
Lake Woodruff NWR	Everglade Snail Kite (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Florida Scrub Jay (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
Logan Cave NWR	Cambarus aculabrum (crayfish with no common name) (Crustacean)	Endangered
	Ozark Cavefish (Fish)	Threatened
	Gray Bat (Mammal)	Endangered
	Indiana Bat (Mammal)	Endangered
Lower Hatchie NWR	Least Tern (Interior) (Bird)	Endangered
Lower Suwannee NWR	Wood Stork (Bird)	Endangered
	Florida Scrub Jay (Bird)	Threatened
	Piping Plover (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Blue-tailed Mole Skink (Reptile)	Threatened
	Eastern Indigo Snake (Reptile)	Threatened
	Green Sea Turtle (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Mathews Brake NWR	Least Tern (Interior) (Bird)	Endangered
Matlacha Pass NWR	West Indian (=Florida) Manatee (Mammal)	Endangered
Mattamuskeet NWR	Aeschynomene virginica, Sensitive Joint-vetch (Plant)	Threatened
Merritt Island NWR	Wood Stork (Bird)	Endangered
	Florida Scrub Jay (Bird)	Threatened
	Piping Plover (Bird)	Threatened
	Roseate Tern (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Southeastern Beach Mouse (Mammal)	Threatened
	Cereus eriophorus var. fragrans, Fragrant Prickly-apple (Plant)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Hawksbill Sea Turtle (Reptile)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Atlantic Salt Marsh Snake (Reptile)	Threatened
	Eastern Indigo Snake (Reptile)	Threatened

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	Loggerhead Sea Turtle (Reptile)	Threatened
Mississippi Sandhill Crane NWR	Mississippi Sandhill Crane (Bird)	Endangered
	Red-cockaded Woodpecker (Bird)	Endangered
	Gopher Tortoise (Reptile)	Threatened
National Key Deer Refuge	Wood Stork (Bird)	Endangered
	Key Deer (Mammal)	Endangered
	Lower Keys Rabbit (Mammal)	Endangered
	Rice (=Silver Rice) Rat (Mammal)	Endangered
	Cereus robinii, Key Tree-cactus (Plant)	Endangered
	Chamaesyce garberi, Garber's Spurge (Plant)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
	Stock Island Tree Snail (Snail)	Threatened
Noxubee NWR	Red-cockaded Woodpecker (Bird)	Endangered
	Schwalbea americana American chaffseed (Plant)	Endangered
Okefenokee NWR	Red-cockaded Woodpecker (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Florida Panther (Mammal)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
Overflow NWR	Least Tern (Interior) (Bird)	Endangered
Panther Swamp NWR	Louisiana Black Bear (Mammal)	Threatened
Passage Key NWR	Green Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Pea Island NWR	Piping Plover (Bird)	Threatened
	Green Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Pee Dee NWR	Red-cockaded Woodpecker (Bird)	Endangered
Pelican Island NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Hawksbill Sea Turtle (Reptile)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Atlantic Salt Marsh Snake (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Piedmont NWR	Red-cockaded Woodpecker (Bird)	Endangered
Pinckney Island NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
Pine Island NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
Pinellas NWR	Wood Stork (Bird)	Endangered

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Pocosin Lakes NWR	Red Wolf (Mammal)	Endangered
Reelfoot NWR	Least Tern (Interior) (Bird)	Endangered
Sandy Point NWR	Brown Pelican (Bird)	Endangered
	Hawksbill Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Green Sea Turtle (Reptile)	Threatened
Santee NWR	Red-cockaded Woodpecker (Bird)	Endangered
Sauta Cave NWR	Gray Bat (Mammal)	Endangered
	Indiana Bat (Mammal)	Endangered
Savannah NWR	Wood Stork (Bird)	Endangered
	Shortnose Sturgeon (Fish)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
Shell Keys NWR	Brown Pelican (Bird)	Endangered
	Piping Plover (Bird)	Endangered
St. Catherine Creek NWR	Least Tern Interior (Bird)	Endangered
	Louisiana Black Bear (Mammal)	Threatened
St. Johns NWR	Wood Stork (Bird)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
St. Marks NWR	Red-cockaded Woodpecker (Bird)	Endangered
	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Kemp's Ridley Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
	Eastern Indigo Snake (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
St. Vincent NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	Eastern Indigo Snake (Reptile)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Ten Thousand Islands NWR	Wood Stork (Bird)	Endangered
	West Indian (=Florida) Manatee (Mammal)	Endangered
	American Crocodile (Reptile)	Endangered
	Green Sea Turtle (Reptile)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened

Table 10: Endangered and At-Risk Species

Unit Name	Species	Federal Status
Tennessee NWR	Orange-footed Pearly Mussel (Clam)	Endangered
	Pink Mucket Pearly Mussel (Clam)	Endangered
	Ring Pink Mussel (Clam)	Endangered
	Rough Pigtoe (Clam)	Endangered
	Pygmy Madtom (Fish)	Endangered
	Eastern Puma (probably extinct) (Mammal)	Endangered
Tensas River NWR	Louisiana Black Bear (Mammal)	Threatened
Tybee NWR	Piping Plover (Bird)	Threatened
Upper Ouachita NWR	Red-cockaded Woodpecker (Bird)	Endangered
Vieques NWR	West Indian (=Florida) Manatee (Mammal)	Endangered
	Calyptranthes thomasiana, Thomas Lidflower (Plant)	Endangered
	Eugenia woodburyana, no common name (Plant)	Endangered
	Goetzea elegans, Beautiful Goetzea (Plant)	Endangered
	Stahlia monosperma, Cobana negra (Plant)	Threatened
	Hawksbill Sea Turtle (Reptile)	Endangered
	Leatherback Sea Turtle (Reptile)	Endangered
Waccamaw NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	Piping Plover (Bird)	Threatened
Wassaw NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	Loggerhead Sea Turtle (Reptile)	Threatened
Watercress Darter NWR	Watercress Darter (Fish)	Endangered
Wheeler NWR	Gray Bat (Mammal)	Endangered
Wolf Island NWR	Wood Stork (Bird)	Endangered
	Piping Plover (Bird)	Threatened
	West Indian (=Florida) Manatee (Mammal)	Endangered
	Loggerhead Sea Turtle (Reptile)	Threatened
Yazoo NWR	Least Tern (Interior) (Bird)	Endangered
	Louisiana Black Bear (Mammal)	Threatened

Table 11: Critical Habitats

Table 11: Critical Habitats

Unit Name	Intersects River Critical Habitat	Acres of Critical Habitat	Total Refuge / Hatchery Acres	Percent Critical Habitat	Species
ARCHIE CARR NWR		23.0	257	9%	North Atlantic Right Whale West Indian Manatee
ARTHUR R. MARSHALL LOXAHATCHEE NWR		140,241.8	143,602	98%	Everglade snail kite
ATCHAFALAYA NWR		15,770	15,770	100%	Louisiana black bear
BAYOU COCODRIE NWR		13,643.3	15,179	90%	Louisiana black bear
BAYOU SAUVAGE NWR		238.9	25,535	1%	Gulf sturgeon
BAYOU TECHE NWR		7,365.9	9,007	82%	Louisiana black bear
BLACKBEARD ISLAND NWR		185.2	5,591	3%	Piping Plover
BOGUE CHITTO NWR	X				Gulf sturgeon
BON SECOUR NWR		1,220.6	7,054	17%	Alabama beach mouse Piping Plover
BRETON NWR		6,561.6	7,542	87%	Piping Plover
BUCK ISLAND NWR		3.2	45	7%	Elkhorn coral Staghorn coral
CABO ROJO NWR		1,861	1,861	100%	Elkhorn coral Staghorn coral
CAHABA RIVER NWR	X				Alabama moccasinshell Finelined pocketbook Orangenacre mucket Ovate clubshell Southern acornshell Southern clubshell Triangular Kidneyshell Upland combshell
CALOOSAHATCHEE NWR		18	18	100%	West Indian manatee
CAPE ROMAIN NWR		706.1	60,123	1%	Piping Plover
CEDAR KEYS NWR		6.4	764	1%	Gulf sturgeon
CROCODILE LAKE NWR		6,795	6,795	100%	American crocodile Elkhorn coral Staghorn coral West Indian manatee
CRYSTAL RIVER NWR		42.1	86	49%	West Indian manatee
CULEBRA NWR		1,488	1,488	100%	Culebra Island giant anole Elkhorn coral Green sea turtle Staghorn coral
DESECHEO NWR		324	324	100%	Elkhorn coral Staghorn coral Yellow-shouldered blackbird
EGMONT KEY NWR		306.7	331	93%	Piping Plover
GRAND BAY NWR		290.4	10,338	3%	Gulf sturgeon Piping Plover
GREAT WHITE HERON NWR		2,299.9	5,940	39%	Elkhorn coral Rice rat Staghorn coral

Table 11: Critical Habitats

Unit Name	Intersects River Critical Habitat	Acres of Critical Habitat	Total Refuge / Hatchery Acres	Percent Critical Habitat	Species
GREEN CAY NWR		12.8	13	100%	Elkhorn coral St. Croix ground lizard Staghorn coral
HOBE SOUND NWR		41.6	1046	4%	Johnson's seagrass West Indian manatee
ISLAND BAY NWR		24.7	28	88%	West Indian manatee
J.N. Ding Darling NWR		6,368	6,368	100%	West Indian manatee
KEY CAVE NWR		0.1	1053	0%	Alabama cavefish
KEY WEST NWR		46,011.6	210,664	22%	Elkhorn coral Piping Plover Staghorn coral
LAGUNA CARTAGENA NWR		1,033	1,033	100%	Elkhorn coral Staghorn coral
LAKE OPHELIA NWR		17,403.4	18,439	94%	Louisiana black bear
LAKE WOODRUFF NWR		315.5	21,584	1%	West Indian manatee
LOWER SUWANNEE NWR	X	766.2	51,743	1%	Gulf sturgeon
MATLACHA PASS NWR		414.8	532	78%	Piping Plover West Indian manatee
MERRITT ISLAND NWR		32,100.3	129,369	25%	North Atlantic Right Whale West Indian manatee
MISSISSIPPI SANDHILL CRANE NWR		18,066.0	21,041	86%	Mississippi sandhill crane
NATIONAL KEY DEER REFUGE		1,794.4	6,262	29%	Piping Plover Rice rat
PELICAN ISLAND NWR		4,541.7	5,425	84%	West Indian manatee
PINE ISLAND NWR		630	630	100%	West Indian manatee
SANDY POINT NWR		518	518	100%	Elkhorn coral Leatherback sea turtle Staghorn coral
ST. MARKS NWR		2,053.0	71,950	3%	Frosted Flatwoods salamander Reticulated flatwoods salamander
ST. VINCENT NWR		12,033.9	12,177	99%	Gulf sturgeon Piping Plover
TEN THOUSAND ISLANDS NWR		16,022.7	34,718	46%	West Indian manatee
TENSAS RIVER NWR		77,124.9	78,108	99%	Louisiana black bear
VIEQUES NWR		17,500	17,500	100%	Elkhorn coral Staghorn coral Yellow-shouldered blackbird
WASSAW NWR		241.7	10,231	2%	Piping Plover
WOLF ISLAND NWR		595.0	4,995	12%	Piping Plover

Table 12: National Wetlands Inventory

Table 12: National Wetlands Inventory

Unit Name	Estuarine and Marine Deepwater	Estuarine and Marine Wetland	Freshwater Emergent Wetland	Freshwater Forested / Shrub Wetland	Freshwater Pond	Lake	Other
ALLIGATOR RIVER NWR	X	X	X	X	X	X	X
ARCHIE CARR NWR	X	X					
ARTHUR R. MARSHALL LOXAHATCHEE NWR			X	X	X		
ATCHAFALAYA NWR			X	X	X		X
BANKS LAKE NWR			X	X	X	X	
BAYOU SAUVAGE NWR	X	X	X	X	X	X	
BAYOU TECHE NWR			X	X	X	X	
BEARS BLUFF NATIONAL FISH HATCHERY		X			X		
BIG BRANCH MARSH NWR	X	X	X	X	X	X	
BLACK BAYOU LAKE NWR			X	X	X	X	
BLACKBEARD ISLAND NWR	X	X	X	X	X		
BO GINN NATIONAL FISH HATCHERY AND AQUARIUM			X	X	X		
BOGUE CHITTO NWR			X	X	X	X	
BON SECOUR NWR	X	X	X	X	X		
BOND SWAMP NWR			X	X	X		
BRETON NWR	X	X					
BUCK ISLAND NWR	X	X					
CABO ROJO NWR	X	X			X		
CAHABA RIVER NWR				X	X		
CALOOSAHATCHEE NWR	X	X					
CAMERON PRAIRIE NWR			X	X	X	X	
CAPE ROMAIN NWR	X	X	X	X	X	X	
CAROLINA SANDHILLS NWR			X	X	X	X	
CEDAR ISLAND NWR	X	X	X	X	X		
CEDAR KEYS NWR	X	X					
CHASSAHOWITZKA NWR	X	X	X	X	X		
CHICKASAW NWR			X	X	X	X	
CHOCTAW NWR			X	X	X	X	
CLARKS RIVER NWR			X	X	X		
CROCODILE LAKE NWR	X	X		X			
CROSS CREEKS NWR			X	X	X	X	
CRYSTAL RIVER NWR	X	X	X	X	X		
CULEBRA NWR	X	X		X			
CURRITUCK NWR	X	X	X	X	X		
D 'ARBONNE NWR			X	X	X	X	
DALE HOLLOW NATIONAL FISH HATCHERY						X	
DELTA NWR	X	X	X	X	X	X	
EDENTON NATIONAL FISH HATCHERY	X			X	X		
EGMONT KEY NWR	X	X					
ERNEST F. HOLLINGS ACE BASIN NWR	X	X	X	X	X	X	X
ERWIN NATIONAL FISH HATCHERY					X		

Table 12: National Wetlands Inventory

Unit Name	Estuarine and Marine Deepwater	Estuarine and Marine Wetland	Freshwater Emergent Wetland	Freshwater Forested / Shrub Wetland	Freshwater Pond	Lake	Other
EUFAULA NWR			X	X	X	X	
FELSENTHAL NWR			X	X	X	X	
FERN CAVE NWR							
FLORIDA PANTHER NWR			X	X	X		
GRAND BAY NWR	X	X	X	X	X		
GREAT WHITE HERON NWR	X	X					
GREEN CAY NWR	X						
HARRIS NECK NWR	X	X	X	X	X	X	
HATCHIE NWR			X	X	X	X	
HOBE SOUND NWR	X	X		X			
ISLAND BAY NWR	X	X					
J.N. Ding Darling NWR	X	X	X	X	X		
KEY CAVE NWR			X	X	X		
KEY WEST NWR	X	X					
LACASSINE NWR			X	X	X	X	X
LAGUNA CARTAGENA NWR			X	X	X		
LAKE ISOM NWR			X	X	X		
LAKE WALES RIDGE NWR			X	X	X	X	
LAKE WOODRUFF NWR			X	X	X	X	
LOWER HATCHIE NWR			X	X	X	X	
LOWER SUWANNEE NWR	X	X	X	X	X		
MACKAY ISLAND NWR	X	X	X	X	X		
MANDALAY NWR			X	X	X	X	
MATLACHA PASS NWR	X	X		X			
MATTAMUSKEET NWR			X	X	X	X	
MCKINNEY LAKE NATIONAL FISH HATCHERY			X	X	X	X	
MERRITT ISLAND NWR	X	X	X	X	X	X	
MISSISSIPPI SANDHILL CRANE NWR	X			X			
MOUNTAIN LONGLEAF NWR			X	X	X		
NATIONAL KEY DEER REFUGE	X	X					
OKEFENOKEE NWR			X	X	X	X	
ORANGEBURG NATIONAL FISH HATCHERY					X		X
PASSAGE KEY NWR	X	X					
PEA ISLAND NWR	X	X	X	X	X	X	
PEE DEE NWR			X	X	X		X
PELICAN ISLAND NWR	X	X	X		X		
PIEDMONT NWR			X	X	X	X	
PINCKNEY ISLAND NWR	X	X	X	X	X		
PINE ISLAND NWR	X	X					
PINELLAS NWR	X	X					
POCOSIN LAKES NWR	X	X	X	X	X	X	
RED RIVER NWR				X	X	X	
REELFOOT NWR			X	X	X	X	
ROANOKE RIVER NWR			X	X	X		
SABINE NWR	X	X	X	X	X	X	
SANDY POINT NWR	X	X			X		

Table 12: National Wetlands Inventory

Unit Name	Estuarine and Marine Deepwater	Estuarine and Marine Wetland	Freshwater Emergent Wetland	Freshwater Forested / Shrub Wetland	Freshwater Pond	Lake	Other
SANTEE NWR			X	X	X	X	
SAVANNAH NWR	X	X	X	X	X	X	
SHELL KEYS NWR	X	X					
ST. CATHERINE CREEK NWR				X			
ST. JOHNS NWR			X	X	X	X	
ST. MARKS NWR	X	X	X	X	X	X	
ST. VINCENT NWR	X	X	X	X	X	X	
SWANQUARTER NWR	X	X	X	X	X		
TEN THOUSAND ISLANDS NWR	X	X		X			
TENNESSEE NWR			X	X	X	X	X
THEODORE ROOSEVELT NWR				X			
TYBEE NWR	X	X	X	X			
UPPER OUACHITA NWR			X	X	X	X	
VIEQUES NWR	X	X	X	X	X		
WACCAMAW NWR			X	X	X		
WAPANOCCA NWR			X	X	X	X	
WARM SPRINGS NATIONAL FISH HATCHERY				X	X		X
WASSAW NWR	X	X	X	X	X		
WATERCRESS DARTER NWR					X		
WELAKA NATIONAL FISH HATCHERY			X	X	X		
WHEELER NWR			X	X	X	X	
WOLF ISLAND NWR	X	X	X				
YAZOO NWR							

Table 13: Coastal Barrier Resource System

Table 13: Coastal Barrier Resource System

Unit Name	CBRS System			Total Service Unit Acres	CBRS Percent of Service Unit Area
	CBRS Unit	Otherwise Protected Area	Total CBRS Acres		
ARCHIE CARR NWR	83.9		83.9	256.5	32.7%
BLACKBEARD ISLAND NWR		5,591.1	5,591.1	5,591.1	100.0%
BON SECOUR NWR	1,836.6	4,323.4	6,160.0	7,053.7	87.3%
BRETON NWR		7,541.8	7,541.8	7,541.8	100.0%
BUCK ISLAND NWR		45.1	45.1	45.1	100.0%
CABO ROJO NWR	785.0	7.2	792.1	1,861.3	42.6%
CAPE ROMAIN NWR		60,095.2	60,095.2	60,122.8	100.0%
CEDAR KEYS NWR	262.4	498.1	760.5	764.0	99.5%
CROCODILE LAKE NWR	2,578.7	4,210.1	6,788.8	6,794.6	99.9%
CULEBRA NWR		315.2	315.2	1,487.6	21.2%
CURRITUCK NWR	6,646.6	2,006.8	8,653.4	8,733.8	99.1%
EGMONT KEY NWR	0.3	329.6	329.9	331.2	99.6%
GREAT WHITE HERON NWR	111.4	3,995.0	4,106.4	5,940.1	69.1%
GREEN CAY NWR		12.8	12.8	12.8	100.0%
HOBE SOUND NWR	37.7	499.7	537.5	1,046.4	51.4%
J.N. Ding Darling NWR	70.8	5,774.6	5,845.4	6,367.9	91.8%
KEY WEST NWR		20,082.1	20,082.1	210,664.0	9.5%
LOWER SUWANNEE NWR	796.9	576.8	1,373.7	51,742.9	2.7%
MATLACHA PASS NWR	138.2		138.2	532.2	26.0%
MERRITT ISLAND NWR		60,163.2	60,163.2	129,369.0	46.5%
NATIONAL KEY DEER REFUGE	264.9	4,203.5	4,468.4	6,262.1	71.4%
PASSAGE KEY NWR		63.1	63.1	63.1	100.0%
PEA ISLAND NWR		4,647.2	4,647.2	4,649.0	100.0%
PELICAN ISLAND NWR	413.0	4,557.9	4,970.9	5,424.9	91.6%
PINE ISLAND NWR	8.0	262.4	270.4	630.4	42.9%
PINELLAS NWR	2.9	388.4	391.3	392.0	99.8%
SABINE NWR	4.2		4.2	141,520.0	0.0%
SANDY POINT NWR	30.9	426.4	457.4	518.0	88.3%
ST. MARKS NWR	1,214.2		1,214.2	71,949.5	1.7%
ST. VINCENT NWR	0.0	12,169.3	12,169.4	12,176.9	99.9%
WASSAW NWR	5.9	10,180.0	10,185.9	10,231.4	99.6%
WOLF ISLAND NWR		4,994.8	4,994.8	4,994.8	100.0%

Table 14: Service Assets that Intersect FEMA Floodways

Table 14: Service Assets that Intersect FEMA Floodways		
Unit Name	RIP Asset Name	Surface Type
GRAND BAY NWR	Pollock Ferry Road	Gravel
	Pollock Ferry Road	Native
LOWER SUWANNEE NWR	Beaver Pond Loop Road	Gravel
	Dixie Compond Road	Gravel
	Gate 14 Road	Native
	Gate 15 Road	Primitive
	Gate 16 Road North	Primitive
	Weeks Landing Road	Gravel
	Weeks Landing Spur	Native
PRIVATE JOHN ALLEN NFH	Hatchery Perimeter Road	Gravel
ROANOKE RIVER NWR	Askew East Road	Gravel
	Askew East Spur Road	Gravel
	Askew West Road	Gravel
	Conine Road	Gravel
	North Conine Road	Native
WHEELER NWR	Banding Site Road	Gravel
	Blackwell Run Road	Gravel
	Briscoe Island Road	Native
	Cut-Off Road	Native
	Dinsmore Slough Road	Gravel
	Eagle Nest Island Road	Gravel
	Garth Slough Islands Road	Gravel
	Garth Slough Islands Road	Native
	Garth Slough Road	Gravel
	Garth Slough Road	Native
	Gray's Field Road	Gravel
	I-65 Dike Access Road	Gravel
	Mussle Camp Road	Gravel
	Rear Shop Access Road	Gravel
	Rockhouse Road	Gravel
	Truck Trail	Gravel
	White Springs Dike Road	Gravel

Table 15: Hot-Spot Criteria and Data-Key

Table 15: Hot-Spot Criteria and Data-Key																		
Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
					State-Reported Events		FARS-Reported Events		Cycle 4 RIP, Sections			HPMS IRI, Road miles			Asset Priority Index		
	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Minimum		0.6	3.9	20,000	0	0.0	1	0.0011	0.0	0.0	0.4%	0.2	1.5	2.2%	1	14	7.1%
Maximum		940.9	403,232.0	92,400	2244	22.6	18	0.1805	15.6	147.0	100%	83.1	121.1	100%	104	104	100%
Average		122.5	24,774.3	35,806	143	1.4	3	0.0319	1.9	25.3	24.9%	6.1	16.6	36.7%	10	18	55.4%
95th percentile		380.1	126,329.4	65,349	515	4.5	8	0.0781	6.5	83.3	100%	19.9	44.7	82.1%	33	33	100%
75th percentile		162.1	21,583.6	46,443	118	1.2	4	0.0455	2.4	40.2	24.7%	6.6	19.3	55.3%	14	19	75.7%
25th percentile		34.4	677.7	23,458	13	0.1	1	0.0131	0.2	1.7	4.5%	1.2	6.3	16.7%	2	6	33.3%

Table 16: Hot-Spot Analysis

Table 16: Hot-Spot Analysis

Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
					State-Reported Events		FARS-Reported Events		Cycle 4 RIP, Sections			HPMS IRI, Road miles			Asset Priority Index		
	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Alligator River NWR	Yes	334.3	148197.0		93	0.3	2	0.0060	6.1	114.0	5.4%	19.8	51.1	38.6%	28	68	41.2%
Archie Carr NWR	Yes	80.4	256.5		74	0.9											
Arthur R. Marshall Loxahatchee NWR	Yes	198.1	143602.0	25,000	99	0.5	4	0.0202	0.1	1.9	3.3%	0.6	8.6	7.4%	5	7	71.4%
Atchafalaya NWR	Yes	46.4	15770.4						2.4	8.3	28.8%				8	13	61.5%
Bald Knob NWR	Yes	125.1	15368.1		33	0.3			12.0	58.2	20.5%	7.3	10.4	70.4%	16	40	40.0%
Banks Lake NWR	Yes	66.1	2980.6				2	0.0303									
Bayou Cocodrie NWR	Yes	83.2	15179.1				2	0.0240							15	20	75.0%
Bayou Sauvage NWR	Yes	156.9	25535.4	92,400			6	0.0382				4.2	23.0	18.0%	3	6	50.0%
Bayou Teche NWR	Yes	191.5	9007.1				3	0.0157									
Bears Bluff NFH	Yes	7.9	30.3												1	1	100%
Big Branch Marsh NWR	Yes	290.1	18023.2	20,710			6	0.0207				7.3	15.4	47.3%	4	8	50.0%
Big Lake NWR	Yes	74.5	10910.7		30	0.4	2	0.0268				2.4	3.6	67.3%	4	6	66.7%
Black Bayou Lake NWR	Yes	57.8	4448.6	28,108					0.2	3.9	5.9%	6.7	6.7	100%			
Blackbeard Island NWR	Yes	40.2	5591.1												2	2	100%
Bo Ginn NFH And Aquarium	Yes	15.6	129.9		0	0.0											
Bogue Chitto NWR	Yes	216.7	35952.0	28,000	31	0.1	3	0.0138									
Bon Secour NWR	Yes	102.6	7053.7		97	0.9	3	0.0292				2.5	21.0	11.7%	10	16	62.5%
Bond Swamp NWR	Yes	58.7	6681.2	22,150	97	1.7	2	0.0341	0.1	0.9	12.4%						
Breton NWR	Yes		7541.8														
Buck Island NWR	Yes		45.1														
Cabo Rojo NWR	Yes	80.4	1861.3												3	7	42.9%
Cache River NWR	Yes	688.5	69259.9	31,000	256	0.4	9	0.0131	5.4	73.0	7.4%	83.1	121.1	68.6%	33	84	39.3%
Cahaba River NWR	Yes	34.2	3543.1		8	0.2	1	0.0292							9	35	25.7%
Caloosahatchee NWR	No	30.1	18.2	68,000	134	4.4	2	0.0664				0.7	4.1	17.1%			
Cameron Prairie NWR	Yes	27.1	9613.4												1	6	16.7%
Cape Romain NWR	Yes	115.3	60122.8		5	0.0											
Carolina Sandhills NWR	Yes	348.5	45449.8		68	0.2	3	0.0086	15.6	147.0	10.6%				29	66	43.9%
Cat Island NWR	Yes	39.6	10497.6												5	7	71.4%
Catahoula NWR	Yes	155.8	24688.7												26	37	70.3%
Cedar Island NWR	Yes	38.7	14282.4		29	0.8						12.2	15.4	79.0%	1	4	25.0%
Cedar Keys NWR	Yes	13.3	764.0		3	0.2						0.3	2.8	10.7%			

Table 16: Hot-Spot Analysis

Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
					State-Reported Events		FARS-Reported Events		Cycle 4 RIP, Sections			HPMS IRI, Road miles			Asset Priority Index		
	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Chassahowitzka NWR	Yes	72.1	36412.7		116	1.6	1	0.0139							1	3	33.3%
Chattahoochee Forest NFH	Yes	3.7	44.5														
Chickasaw NWR	Yes	115.5	26184.8		1	0.0	2	0.0173				6.9	12.4	55.9%			
Choctaw NWR	Yes	34.8	3974.9		2	0.1	1	0.0287	0.6	2.8	23.2%				3	3	100%
Clarks River NWR	Yes	178.2	8742.8	31,800	1485	8.3	8	0.0449	0.2	0.3	87.2%	24.9	57.6	43.2%	3	4	75.0%
Coldwater River NWR	Yes	49.1	2518.2		1	0.0											
Crocodile Lake NWR	Yes	63.4	6794.6	23,410	91	1.4	3	0.0473				0.2	3.3	6.5%			
Cross Creeks NWR	Yes	169.7	8769.3		25	0.1						1.3	22.4	5.7%			
Crystal River NWR	Yes	97.3	86.2	28,500	246	2.5	2	0.0206									
Culebra NWR	Yes	53.5	1487.6												2	4	50.0%
Currituck NWR	Yes	76.7	8733.8				1	0.0130				1.0	1.5	66.4%	1	1	100%
D 'Arbonne NWR	Yes	125.4	17638.8				1	0.0080							1	11	9.1%
Dahomey NWR	Yes	75.6	9794.2		5	0.1									1	8	12.5%
Dale Hollow NFH	Yes	19.4	38.6		2	0.1	1	0.0517									
Delta NWR	Yes	14.9	48872.4				1	0.0670							1	1	100%
Desecheo NWR	No		324.1														
Edenton NFH	Yes	19.3	60.9		19	1.0						3.0	7.0	42.5%	2	3	66.7%
Egmont Key NWR	Yes		331.2														
Ernest F. Hollings Ace Basin NWR	Yes	172.5	12070.8	37,900	61	0.4	1	0.0058							9	47	19.1%
Erwin NFH	Yes	41.6	31.4	20,040			1	0.0240	0.2	0.2	100%	1.2	5.8	20.4%	2	2	100%
Eufaula NWR	Yes	216.1	11005.5		53	0.2						0.5	7.9	6.3%	18	21	85.7%
Felsenthal NWR	Yes	170.0	67571.8		13	0.1	1	0.0059	1.0	24.7	4.1%	6.0	15.7	38.3%	28	30	93.3%
Fern Cave NWR	Yes	14.3	203.4		12	0.8											
Florida Panther NWR	Yes	108.5	26939.9		64	0.6	2	0.0184				0.7	19.8	3.5%	10	24	41.7%
Grand Bay NWR	Yes	190.4	10338.2	43,270	124	0.7	4	0.0210	0.7	1.0	67.9%	0.9	15.4	5.9%	1	7	14.3%
Grand Cote NWR	Yes	60.5	5983.4				3	0.0496							1	3	33.3%
Great White Heron NWR	Yes	115.4	5940.1	26,000	112	1.0	7	0.0607				8.0	15.8	50.7%			
Green Cay NWR	No	14.7	12.8														
Greers Ferry NFH	Yes	24.5	32.0		40	1.6			0.2	0.2	100%	0.7	4.6	16.0%	1	2	50.0%
Handy Brake NWR	Yes	12.9	492.3														
Harris Neck NWR	Yes	32.3	2825.1						1.2	6.1	18.9%				4	8	50.0%
Hatchie NWR	Yes	80.1	11425.5	35,601	20	0.2	3	0.0375	1.5	20.5	7.5%	2.7	9.8	28.0%	42	42	100%

Table 16: Hot-Spot Analysis

Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
					State-Reported Events		FARS-Reported Events		Cycle 4 RIP, Sections			HPMS IRI, Road miles			Asset Priority Index		
	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Hillside NWR	Yes	87.2	15611.2		4	0.0	1	0.0115							1	14	7.1%
Hobe Sound NWR	Yes	119.8	1046.4	22,500	173	1.4	8	0.0668				4.8	14.3	33.2%			
Holla Bend NWR	Yes	63.0	6070.9		7	0.1						4.6	11.0	41.6%	4	9	44.4%
Holt Collier NWR	No	47.6	1477.1														
Island Bay NWR	No		28.2														
J.N. Ding Darling NWR	Yes	91.2	6367.9		77	0.8			0.2	4.7	4.6%	3.3	6.0	55.1%	7	10	70.0%
Key Cave NWR	Yes	6.2	1053.1												1	2	50.0%
Key West NWR	Yes	16.7	210664.0		350	20.9											
Lacassine NWR	Yes	61.6	33672.3						1.1	10.3	10.9%				14	18	77.8%
Laguna Cartagena NWR	Yes	42.8	1033.3												1	5	20.0%
Lake Isom NWR	Yes	28.0	1813.3		5	0.2									5	6	83.3%
Lake Ophelia NWR	Yes	81.2	18438.9				2	0.0246	2.5	15.4	16.4%	2.6	5.9	44.7%	6	29	20.7%
Lake Wales Ridge NWR	Yes	89.5	1639.5		52	0.6	2	0.0223							1	1	100%
Lake Woodruff NWR	Yes	93.0	21583.6		152	1.6	8	0.0860							6	9	66.7%
Logan Cave NWR	No	15.9	126.3														
Lower Hatchie NWR	Yes	127.2	14100.0		1	0.0						6.5	17.5	37.3%	4	13	30.8%
Lower Suwannee NWR	Yes	310.4	51742.9		20	0.1			6.2	42.0	14.7%				15	111	13.5%
Mackay Island NWR	Yes	51.9	8351.8		14	0.3						2.6	9.1	28.4%	7	15	46.7%
Mammoth Spring NFH	Yes	32.5	34.5		13	0.4	1	0.0308				0.7	2.5	30.3%	2	5	40.0%
Mandalay NWR	Yes	14.8	4611.5				1	0.0674									
Mathews Brake NWR	Yes	36.5	2390.9				1	0.0274							1	2	50.0%
Matlacha Pass NWR	No	62.4	532.2	20,500	58	0.9	3	0.0481				0.3	3.4	10.2%			
Mattamuskeet NWR	Yes	136.3	49630.0		177	1.3	1	0.0073	0.3	8.4	3.1%	3.9	23.3	17.0%	16	17	94.1%
Mckinney Lake NFH	Yes	7.6	432.5		13	1.7											
Meridian NFH	Yes	14.0	105.9		17	1.2											
Merritt Island NWR	Yes	459.4	129369.0	35,000	240	0.5	7	0.0152	0.8	62.3	1.3%	1.3	14.8	9.0%	33	132	25.0%
Mississippi Sandhill Crane NWR	Yes	359.7	21041.0	63,921	1693	4.7	14	0.0389				9.1	44.4	20.5%	20	25	80.0%
Morgan Brake NWR	Yes	62.7	7486.8		15	0.2									1	7	14.3%
Mountain Longleaf NWR	Yes	183.8	9014.2		115	0.6	1	0.0054							26	96	27.1%
Natchitoches NFH	Yes	40.6	99.6	23,600			1	0.0246	0.2	0.3	50.0%	4.8	5.2	92.3%	2	3	66.7%
National Key Deer Refuge	Yes	167.5	6262.1		153	0.9	6	0.0358				5.5	15.9	34.5%	1	4	25.0%
Navassa Island NWR	No		364147.0														

Table 16: Hot-Spot Analysis

Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
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	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Norfork NFH	Yes	16.5	45.2		17	1.0			0.1	0.2	29.1%	3.0	3.7	81.8%	1	1	100%
Noxubee NWR	Yes	221.8	48104.9		41	0.2	1	0.0045							17	47	36.2%
Okefenokee NWR	Yes	940.9	403232.0		1	0.0	1	0.0011	1.0	15.6	6.3%				104	113	92.0%
Orangeburg NFH	Yes	36.8	49.9		140	3.8	2	0.0543	0.1	0.5	23.4%	1.4	2.2	63.1%	1	2	50.0%
Overflow NWR	Yes	81.7	13584.7		5	0.1	1	0.0122				7.7	8.7	88.6%	5	8	62.5%
Panther Swamp NWR	Yes	189.5	41435.6		22	0.1									36	36	100%
Passage Key NWR	No	0.6	63.1														
Pea Island NWR	Yes	27.1	4649.0		64	2.4						5.3	14.3	37.2%			
Pee Dee NWR	Yes	71.2	8626.1		47	0.7						1.2	9.1	12.8%	12	22	54.5%
Pelican Island NWR	Yes	102.0	5424.9	23,000	185	1.8	5	0.0490				0.8	15.8	4.8%	1	1	100%
Piedmont NWR	Yes	184.9	34949.3		16	0.1									4	38	10.5%
Pinckney Island NWR	Yes	73.8	4038.3	55,400	321	4.4	5	0.0678	0.5	0.7	75.2%				5	5	100%
Pine Island NWR	No	5.6	630.4	20,500	6	1.1											
Pinellas NWR	Yes	43.7	392.0	52,000	403	9.2	4	0.0915				2.9	10.7	27.1%			
Pocosin Lakes NWR	Yes	486.9	114171.0		128	0.3	1	0.0021	0.5	81.6	0.7%	4.9	28.2	17.4%	41	105	39.0%
Pond Creek NWR	Yes	125.7	27501.5		21	0.2	1	0.0080				2.9	11.2	26.1%	22	54	40.7%
Private John Allen NFH	Yes	48.5	30.6	26,263	1093	22.6	4	0.0825				6.4	9.5	67.8%	2	2	100%
Red River NWR	Yes	227.5	12887.2	24,434			8	0.0352				10.1	15.7	64.5%			
Reelfoot NWR	Yes	163.9	10428.7		4	0.0	1	0.0061	1.0	11.1	8.9%	13.5	27.4	49.4%	10	14	71.4%
Roanoke River NWR	Yes	100.2	21308.6		149	1.5	6	0.0599	0.4	6.0	6.0%	5.2	19.1	27.2%	7	13	53.8%
Sabine NWR	Yes	42.7	141520.0						0.0	0.0	100%				2	10	20.0%
Sandy Point NWR	Yes	36.2	518.0						2.1	2.2	96.8%				2	2	100%
Santee NWR	Yes	118.7	12730.1	30,900	62	0.5	3	0.0253							17	24	70.8%
Sauta Cave NWR	Yes	16.6	265.5		20	1.2	3	0.1805							1	1	100%
Savannah NWR	Yes	296.4	28613.0	47,500	235	0.8	10	0.0337							4	10	40.0%
Shell Keys NWR	No		3.9														
St. Catherine Creek NWR	Yes	141.3	25429.5		8	0.1	1	0.0071	0.1	18.3	0.7%				12	23	52.2%
St. Johns NWR	No	84.3	6431.3	53,500	358	4.2	4	0.0475				0.5	22.3	2.2%	3	6	50.0%
St. Marks NWR	Yes	368.8	71949.5		144	0.4	5	0.0136				1.1	30.0	3.7%	27	141	19.1%
St. Vincent NWR	Yes	70.3	12176.9												6	33	18.2%
Swanquarter NWR	Yes	24.2	16641.6		15	0.6						3.5	11.5	30.1%	3	3	100%
Tallahatchie NWR	Yes	57.1	2875.9		14	0.2									1	7	14.3%
Ten Thousand Islands NWR	Yes	29.1	34717.6		18	0.6	1	0.0344							2	3	66.7%

Table 16: Hot-Spot Analysis

Hot-Spot General Analysis	General Unit Details			Criteria 1	Criteria 2				Criteria 3						Criteria 4		
					State-Reported Events		FARS-Reported Events		Cycle 4 RIP, Sections			HPMS IRI, Road miles			Asset Priority Index		
	Open/ Closed	TIGER Miles (within 1 mile)	Acres	Max AADT (AADT> 20,000)	Number	Per TIGER miles	Number	Per TIGER miles	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	Poor/ Failing Miles	Total Miles	Poor/ Failing Percent	High Priority Assets	Total Assets	Percent High Priority
Tennessee NWR	Yes	342.6	48179.9	35,510	21	0.1	3	0.0088	2.5	46.1	5.4%	2.5	14.6	17.3%	22	59	37.3%
Tensas River NWR	Yes	425.6	78107.8	20,000					1.0	39.6	2.5%				19	46	41.3%
Theodore Roosevelt NWR	No	372.1	6807.5		29	0.1	4	0.0107									
Tybee NWR	No	2.5	677.7		3	1.2											
Upper Ouachita NWR	Yes	197.6	46476.9												4	44	9.1%
Vieques NWR	Yes	232.4	17499.9						2.8	18.4	15.2%				21	27	77.8%
Waccamaw NWR	Yes	358.3	26942.6	48,600	851	2.4	7	0.0195							3	3	100%
Wapanocca NWR	Yes	53.1	5624.2		5	0.1			0.2	12.8	1.5%	4.4	6.4	68.6%	8	12	66.7%
Warm Springs NFH	Yes	26.1	89.3		8	0.3	2	0.0766							2	4	50.0%
Wassaw NWR	Yes	30.5	10231.4		5	0.2									2	3	66.7%
Watercress Darter NWR	Yes	79.7	24.1		37	0.5											
Welaka NFH	Yes	53.8	407.9				1	0.0186							3	5	60.0%
Wheeler NWR	Yes	667.3	33876.5	52,390	2244	3.4	18	0.0270	0.2	54.4	0.4%	8.7	39.2	22.2%	32	60	53.3%
White River NWR	Yes	456.7	155777.0		27	0.1	1	0.0022	3.2	79.9	4.0%	23.3	35.4	65.7%	13	130	10.0%
Wolf Creek NFH	Yes	13.5	18.4		15	1.1						1.4	2.9	47.9%	1	3	33.3%
Wolf Island NWR	No	0.7	4994.8														
Yazoo NWR	Yes	111.9	13048.3		12	0.1	2	0.0179	3.4	19.6	17.1%				5	16	31.3%

A2.6 – VISITATION

Table 17: RAPP Visitation Data – 2012

Table 17: RAPP Visitation Data – 2012				
Unit Name	State	Visitation		
		2010	2011	2012
Alligator River NWR	North Carolina	50,000	55,000	52,500
Archie Carr NWR	Florida	-	120,000	120,000
Arthur R. Marshall Loxahatchee NWR	Florida	303,575	335,825	308,694
Atchafalaya NWR	Louisiana	32,632	34,035	45,296
Bald Knob NWR	Arkansas	70,000	72,000	72,000
Banks Lake NWR	Georgia	34,872	55,805	17,692
Bayou Cocodrie NWR	Louisiana	2,217	4,489	4,500
Bayou Sauvage NWR	Louisiana	18,286	25,910	49,544
Bayou Teche NWR	Louisiana	6,000	6,000	6,000
Big Branch Marsh NWR	Louisiana	166,190	313,236	214,233
Big Lake NWR	Arkansas	45,000	45,000	45,000
Black Bayou Lake NWR	Louisiana	37,000	37,000	37,000
Blackbeard Island NWR	South Carolina	6,088	7,627	7,644
Bogue Chitto NWR	Louisiana	42,000	68,165	65,890
Bon Secour NWR	Alabama	35,000	40,000	65,000
Bond Swamp NWR	Georgia	6,000	10,000	10,000
Breton NWR	Louisiana	200	1,750	2,888
Cabo Rojo NWR	Puerto Rico	110,000	100,000	150,000
Cache River NWR	Arkansas	160,000	162,000	170,000
Cahaba River NWR	Alabama	31,000	30,000	30,000
Cameron Prairie NWR	Louisiana	57,064	55,343	55,124
Cape Romain NWR	South Carolina	153,856	222,912	289,328
Carolina Sandhills NWR	South Carolina	75,000	71,500	50,000
Cat Island NWR	Mississippi	25,000	6,305	24,000
Catahoula NWR	Louisiana	20,000	28,000	30,000
Cedar Island NWR	North Carolina	18,680	19,500	18,550
Cedar Keys NWR	Florida	34,500	34,200	32,500
Chassahowitzka NWR	Florida	28,000	28,000	28,000
Chickasaw NWR	Tennessee	76,500	76,500	78,500
Choctaw NWR	Alabama	30,000	30,725	32,694
Clarks River NWR	Kentucky	40,000	40,000	40,000
Coldwater River NWR	Mississippi	2,890	2,800	3,150
Crocodile Lake NWR	Florida	770	800	820
Cross Creeks NWR	Tennessee	132,478	129,000	135,000
Crystal River NWR	Florida	107,000	105,000	167,000
Culebra NWR	Puerto Rico	40,000	50,100	55,100
Currituck NWR	North Carolina	92,000	87,000	104,010
Dahomey NWR	Mississippi	8,620	9,450	9,545
D'Arbonne NWR	Louisiana	22,680	22,680	22,680
Delta NWR	Louisiana	6,093	12,000	9,065
Egmont Key NWR	Florida	183,344	208,845	197,410
Ernest F. Hollings ACE Basin NWR	South Carolina	18,500	25,000	25,000
Eufaula NWR	Alabama	474,537	381,015	276,407
Felsenthal NWR	Arkansas	390,000	390,000	380,000
Fern Cave NWR	Alabama	20	20	20
Florida Panther NWR	Florida	2,677	2,954	3,325
Grand Bay NWR	Mississippi	3,000	2,798	6,200

Table 17: RAPP Visitation Data – 2012

Unit Name	State	Visitation		
		2010	2011	2012
Grand Cote NWR	Louisiana	15,000	15,000	16,000
Great White Heron NWR	Florida	148,552	149,855	140,000
Handy Brake NWR	Louisiana	4,250	4,250	4,250
Harris Neck NWR	South Carolina	87,646	87,412	85,822
Hatchie NWR	Tennessee	61,000	61,000	65,000
Hillside NWR	Mississippi	28,780	28,780	28,780
Hobe Sound NWR	Florida	85,000	113,000	130,000
Holla Bend NWR	Arkansas	23,890	27,974	16,613
Holt Collier NWR	Mississippi	525	525	525
J.N. Ding Darling NWR	Florida	623,149	674,312	657,702
Key Cave NWR	Alabama	5,000	5,000	5,000
Key West NWR	Florida	465,475	350,238	335,000
Lacassine NWR	Louisiana	68,245	54,572	37,702
Laguna Cartagena NWR	Puerto Rico	1,360	1,000	2,459
Lake Isom NWR	Tennessee	16,000	16,000	16,200
Lake Ophelia NWR	Louisiana	20,000	20,000	21,500
Lake Woodruff NWR	Florida	60,000	60,000	60,000
Lower Hatchie NWR	Tennessee	70,000	70,250	71,000
Lower Suwannee NWR	Florida	155,000	145,800	138,500
Mackay Island NWR	North Carolina	33,450	32,500	35,072
Mandalay NWR	Louisiana	19,000	18,000	18,000
Mathews Brake NWR	Mississippi	11,451	10,000	10,000
Mattamuskeet NWR	North Carolina	83,044	81,400	82,500
Merritt Island NWR	Florida	749,770	716,737	1,173,319
Mississippi Sandhill Crane NWR	Mississippi	6,000	7,680	8,034
Morgan Brake NWR	Mississippi	6,000	6,000	6,000
Mountain Longleaf NWR	Alabama	8,000	8,000	8,000
National Key Deer Refuge	Florida	190,045	194,559	180,000
Okefenokee NWR	Georgia	225,099	177,418	188,468
Overflow NWR	Arkansas	7,000	10,000	10,000
Panther Swamp NWR	Mississippi	18,000	18,000	18,000
Pea Island NWR	North Carolina	1,600,000	1,600,000	1,520,100
Pee Dee NWR	North Carolina	35,000	30,000	30,000
Pelican Island NWR	Florida	89,919	90,000	95,000
Piedmont NWR	Georgia	40,000	40,000	44,159
Pinckney Island NWR	South Carolina	140,374	199,598	149,832
Pinellas NWR	Florida	35,000	35,000	35,000
Pocosin Lakes NWR	North Carolina	55,000	55,000	48,808
Pond Creek NWR	Arkansas	45,000	45,000	45,000
Red River NWR	Louisiana	1,400	1,400	12,000
Reelfoot NWR	Tennessee	275,000	275,000	275,000
Roanoke River NWR	North Carolina	4,790	5,080	5,085
Sabine NWR	Louisiana	213,893	214,466	193,293
Sam D. Hamilton Noxubee NWR	Mississippi	158,000	154,000	149,800
Sandy Point NWR	Virgin Islands	7,000	6,500	7,000
Santee NWR	South Carolina	181,987	181,115	193,989
Sauta Cave NWR	Alabama	1,500	1,500	1,500
Savannah NWR	South Carolina	121,754	98,170	149,832
St. Catherine Creek NWR	Mississippi	28,500	23,000	24,000

Table 17: RAPP Visitation Data – 2012

Unit Name	State	Visitation		
		2010	2011	2012
St. Johns NWR	Florida	200	200	200
St. Marks NWR	Florida	249,000	257,000	257,000
St. Vincent NWR	Florida	2,345	1,959	2,312
Swanquarter NWR	North Carolina	12,800	12,000	3,000
Tallahatchie NWR	Mississippi	12,600	12,950	13,100
Ten Thousand Islands NWR	Florida	179,785	180,500	189,000
Tennessee NWR	Tennessee	380,000	378,000	381,500
Tensas River NWR	Louisiana	95,000	96,000	100,000
Upper Ouachita NWR	Louisiana	26,000	26,000	26,000
Vieques NWR	Puerto Rico	210,000	215,000	215,000
Waccamaw NWR	South Carolina	5,398	6,114	11,030
Wapanocca NWR	Arkansas	40,000	61,050	55,000
Wassaw NWR	South Carolina	25,467	36,003	34,006
Watercress Darter NWR	Alabama	75	100	100
Wheeler NWR	Alabama	646,800	640,332	645,000
White River NWR	Arkansas	350,000	305,000	310,000
Yazoo NWR	Mississippi	39,000	39,000	39,000

Recommendations Report Appendices

LRTP Tools for use by Stations and the Region

Long Range Transportation Plan – Tools for use by Stations and the Region

The Long Range Transportation Plan (LRTP) document is focused predominantly at the regional level. In order to increase the usefulness of the LRTP, it is important for stations to gain value from the work that has been done. The following three deliverables are meant to provide guidance to station leadership, serve as decision-making tools for regional leadership, and create minimal additional work for all parties while leveraging previous work to create benefit to the stations and the southeast region as a whole. All tools will be used in conjunction with input from station, Area, and Regional leadership to allow for quantitative and qualitative consideration. Planning for transportation means that stations can create strategic transportation projects, allowing them to be better-positioned for FWS and other Federal funding. The LRTP and associated documents will be used for the next 4-5 years until an update of the plan is completed.

Incorporating Transportation into the CCP process

While recognizing that limited funding for CCPs will result in fewer plans being completed each year, the LRTP team made the following modifications to CCP documents to ensure that when plans are completed, transportation can be included as appropriate. The following three documents have been either created or modified to include transportation:

- *LRTP Report User Guide for Stations* – helps station leadership to use information gathered as a part of the LRTP effort for their station as well as Regional Alternative Transportation Evaluation (RATE) survey results to consider transportation needs at the refuge/hatchery. Better understanding of transportation needs can result in the creation of better projects.
- *CCP Workplan with Transportation* – workplan to guide leadership through the CCP development process now includes aspects of transportation.
- *CCP Template with Transportation* – the template serves as a starting place for CCP creation, and now includes transportation components.

Many refuges and fish hatcheries do not have a recognized process during which to consider transportation needs and develop formal recommendations outside of the traditional call for projects. Thinking about transportation during the CCP process will help stations to create more meaningful transportation projects in advance of the call for projects.

Transportation Evaluation Tool: Stations for Further Transportation Study

The Transportation Evaluation Tool uses data from the LRTP and results of the RATE survey to evaluate stations relative to key transportation metrics. These metrics correspond to the six main goals outlined in the regional LRTP, which are also consistent with the National plan and all other regional plans across the nation. The data used to evaluate stations is stored in a database, and each station is scored based on the results for their refuge/hatchery.

This evaluation tool will be used to help leadership identify which stations may benefit from further transportation study. This is merely a tool to assist in prioritization and not the only way a station may warrant further study.

Transportation Project Evaluation Tool

The Transportation Project Evaluation Tool will be used to score transportation projects recommended by each of the stations. The data used to evaluate the projects are based partially on results from the LRTP analysis and RATE surveys as well as project-specific characteristics. Regional leadership will use these metrics to initially determine high priority projects across the region. Once again, this is a tool used to assist leadership in prioritization. As in all planning processes, technical merit is part of the prioritization, but stakeholder involvement also plays an important role. Projects that perform well in this evaluation may be better positioned to compete for Federal funds outside of the Fish and Wildlife Service as well.

A5 – Project Selection Process

Figure 1: Project Evaluation Tool

SUMMARY PROJECT EVALUATION SCORESHEET

REFUGE: _____

PROJECT: _____

DESCRIPTION:

Goal Area Topic	*Goal Area Points*
1. Improves transportation safety of humans and wildlife	*0*
2. Improves "state of good repair" of transportation assets	*0*
3. Enhances transportation choices to, from, and within FWS stations	*0*
4. Enhances environmental conditions in the field and/or helps to meet programmatic goals	*0*
5. Meets a local priority: (a) documented in a CCP, (b) other transportation plan; (c) is within a Region's high-use or urban station; or (d) provides economic benefit to local partners.	*0*
6. Supports transportation partnerships and leveraging of transportation funds/programs to benefit FWS	*0*
TOTAL PROJECT POINTS	*0*

The Transportation Project Evaluation Tool will be used to score transportation projects recommended by each of the stations. The data used to evaluate the projects are based partially on results from the LRTP analysis and RATE surveys as well as project-specific characteristics. Regional leadership will use these metrics to initially determine high priority projects across the region. *This is a tool used to assist leadership in prioritization. As in all planning processes, technical merit is part of the prioritization, but stakeholder involvement also plays an important role.* Projects that perform well in this evaluation may be better positioned to compete for Federal funds outside of the Fish and Wildlife Service as well.

1. Improves transportation safety of humans and wildlife	National Plan Recommended Points = 20

Goal	*Points*
Existing Conditions / Crash History (choose all that apply, maximum of 10 points)	*(max 10 points)*
Documented or anecdotal crash history where the project is planned	
High numbers of human or wildlife injuries (may include station staff anecdotal information)	/3 points
High number of human or wildlife fatalities (may include station staff anecdotal information)	/5 points
Station identified as a safety hot spot (crash) in the Region 4 LRTP (Table 14 of the Appendix)	/4 points
Project Safety Improvement (choose if applicable, maximum of 10 points)	*(max 10 points)*
Project improves safety of location *(examples - adding turn lanes, flattening horizontal curves, sight distance improvements or enhancements/countermeasures such as road safety audits, safety edge, signs and markings, traffic calming and movement restrictions, wildlife crossing, barriers, vegetation control, surface improvement, visiting hours, tools such as Highway Safety Manual, Interactive Highway Safety Design Mode, etc.))*	/10 *points*
Goal #1 Total Points	*0 /20 points*

= Project score determined using data from the Long Range Transportation Plan

2. Improves "state of good repair" of transportation assets	National Plan Recommended Points = 20

Goal	*Points*
Asset Type of project facility (choose only one, maximum of 6 points)	*(max 6 points)*
Roadway	
Tier 1 Roadway	/6 points
Tier 2 Roadway	/4 points
Tier 3 Roadway - special case	/1 points
Bridge	/5 points
Trail	/2 points
Parking facility	/2 points
Other transportation asset	/2 points
Asset Priority Index of project (choose only one, maximum of 5 points)	*(max 5 points)*
100	/5 points
80-99	/3 points
Less than 80	/0 points
FCI Rating of project (choose only one, maximum of 6 points)	*(max 6 points)*
1 - 0.80	/6 points
0.79 - 0.60	/4 points
0.59 - 0.40	/2 points
< 0.40	/0 points
Cost Savings Plan (choose if applicable, maximum of 3 points)	*(max 3 points)*
Project incorporates a cost-savings plan for operations and maintenance to reduce long-term costs	/3 points
Goal #2 Total Points	*0 /20 points*

3. Enhances transportation choices to, from, and within FWS stations	National Plan Recommended Points = 15

Goal	*Points*
Project improves roadway connectivity (choose all that apply, maximum of 5 points)	*(max 5 points)*
To a local transportation system (external to the station)	/4 points
Within the internal station network	/3 points
Alternative Transportation Project (choose all that apply, maximum of 4 points)	*(max 4 points)*
Improves bike / pedestrian / trail access to, from, or within a station	/3 points
Improves water access to, from, or within a station	/2 points
Improves transit access to, from, or within a station	/2 points
Encourages carpooling or vanpooling	/2 points
Project improves way-finding and management of personal vehicles on-site and/or off-site (choose all that apply, maximum of 4 points)	*(max 4 points)*
Includes a way-finding action plan	/2 points
ITS project that better manages access to and on site including parking management systems	/2 points
Station meets the following criteria relating to underserved or underrepresented populations (choose all that apply, maximum of 2 points)	*(max 2 points)*
> 50% of population within 25-mile buffers is in poverty, is non-white, is Latino, or has no access to a vehicle	/1 points
25-50% of population within 25-mile buffers is in poverty, is non-white, is Latino, or has no access to a vehicle	/1 points
< 25% of population within 25-mile buffers is in poverty, is non-white, is Latino, or has no access to a vehicle	/1 points
Goal #3 Total Points	*0 /15 points*

= Project score determined using data from the Long Range Transportation Plan

4. Enhances environmental conditions in the field and/or helps to meet programmatic goals	National Plan Recommended Points = 15

Goal	*Points*
Transportation project specifically addresses, protects, or avoids environmentally sensitive areas (choose all that apply, maximum of 6 points)	*(max 6 points)*
Station serves as a habitat for endangered or threatened species	/4 points
Station includes a nationally designated wetland	/3 points
Station is part of the Coastal Barrier Resource System	/3 points
Educational Enhancement (choose if applicable, maximum of 3 points)	*(max 3 points)*
Project features enhancements that allow visitors to incorporate environmental interpretation, education, and stewardship into their travel experience (example - educational kiosks along the travel route)	/3 points
ATS or ITS Enhancement (choose if applicable, maximum of 3 points)	*(max 3 points)*
ATS (Alternative Transportation System) or ITS (Intelligent Transportation System) project that will reduce greenhouse gas emissions in and around the station (examples - bike/pedestrian trail, shuttle bus to get patrons to the station, dynamic message signs telling drivers when parking areas are full)	/3 points
Climate Change Component (choose if applicable, maximum of 3 points)	*(max 3 points)*
Project has been identified in the Climate Change Tool or includes a specific climate change mitigation component.	/3 points
Goal #4 Total Points	*0 /15 points*

= Project score determined using data from the Long Range Transportation Plan

5. Meets a local priority: (a) documented in a Comprehensive Conservation Plan, (b) other transportation plan/analysis by FWS or partners; (c) is within a Region's high-use or urban station; or (d) provides economic benefit to local partners.	National Plan Recommended Points = 20

Goal	*Points*	
Project is documented in FWS or partner plan (choose all that apply, maximum of 7 points)	*(max 7 points)*	
Included in CCP, station step-down plan, or Climate Change Tool	/4	points
Included in state or regional transportation plan	/4	points
Included in city, county, or other local plan	/3	points
Station has high visitation or is in an urban area (choose all that apply, maximum of 5 points)	*(max 5 points)*	
Refuge visitation (according to current year RAPP) > 100,000 persons	/4	points
Located within a Metropolitan Planning Organization or a Census defined Urban Area	/3	points
Congestion hot-spot (choose all that apply, maximum of 3 points)	*(max 3 points)*	
Recent count on the project's facility with AADT > 20,000	/3	points
Station identified as a congestion hot spot in the Region 4 LRTP (Table 14 of the Appendix)	/3	points
Project impacts the local economy (choose only one, maximum of 5 points)	*(max 5 points)*	
Positive impact	/5	points
Negative Impact	/0	points
Goal #5 Total Points	*0 /20*	*points*

= Project score determined using data from the Long Range Transportation Plan

6. Supports transportation partnerships and leveraging of transportation funds/programs to benefit FWS	National Plan Recommended Points = 10

Goal	*Points*	
Partner agency buy-in on project. Partner agency may be a local, county, regional, or state government, FLMA, Friends Group, etc. (choose all that apply, maximum of 3 points)	*(max 3 points)*	
Established partnership with another agency, including a previous project or Memorandum of	/2	points
Established Friends Group	/1	points
Partnership opportunity with nearby FLMA (project may be included in their plan)	/1	points
Not in a current plan but has a letter of support from a partner agency	/1	points
Partner agency financial support for project (choose only one, maximum of 6 points)	*(max 6 points)*	
Greater than 50% of the total project funded by partner agency	/6	points
10-50% of the total project funded by partner agency	/3	points
Less than 10% of the total project funded by partner agency or in-kind support of design, etc.	/1	points
No financial or in-kind support from partner agency	/0	points
Deferred Maintenance of Visitor Facility Enhancement (choose if applicable, maximum of 1 point)	*(max 1 point)*	
Project is being completed in conjunction with Deferred Maintenance or Visitor Facility Enhancement projects	/1	points
Goal #6 Total Points	*0 /10*	*points*

A6 – Plan Implementation

Figure 2: Stations for Further Transportation Study Evaluation Tool

TRANSPORTATION EVALUATION TOOL: Stations for further transportation study

The Southeast Region of FWS has completed its first Long Range Transportation Plan (LRTP). Data from this analysis and from the RATE survey are being used to evaluate stations and to determine which locations may warrant further transportation study. The criteria listed below pertain to the six transportation goals outlined in the LRTP, and data to populate the criteria will be pulled from existing data sources by regional staff. This tool serves as a technical baseline and will be used in conjunction with qualitative information and conversations with area, station, and regional leadership.

Goal	*100 max points*	*Notes*
Is the station open to the public?	Yes No	If yes to both, continue scoring. If no to one or more, station does not advance.
Does the station have a minimum visitation of 5000 people per year?	Yes No	

Goal 1: Access, Mobility, and Connectivity — Maximum Points = 20

A. Transportation Systems within a Specified Distance (choose up to 1, maximum of 6 points)	A (max 6 points)	
If station meets 3 of the 3 criteria:	/6 points	These questions should be answered using R4 LRTP Appendix Table 1.
If station meets 2 of the 3 criteria:	/4 points	
Criterion 1: At least one navigable waterway within 1/2 mile		
Criterion 2: At least one trail within 1 mile		
Criterion 3: At least 100 miles of roadway (NHPN or Scenic Byway) within 10 miles		

B. Transit Systems within a Specified Distance (choose up to 1, maximum of 4 points)	B (max 4 points)	
At least one local transit service stop within 1/2 mile of the station	/4 points	These questions should be answered using RATE survey data (Questions 20-21).
At least one local transit service stop between 1/2 and 1 mile of the station	/3 points	
At least one local transit service stop between 1 and 3 miles along with a station-provided shuttle service	/2 points	
If no transit service stop exists within 3 miles, can you name a local provider?	/1 points	

C. Known Transportation Challenges External to the Station (choose up to 1, maximum of 10 points)	C (max 10 points)	
If station meets 3 of the 3 criteria:	/10 points	These questions should be answered using RATE survey data (Questions 8, 9, 28).
If station meets 2 of the 3 criteria:	/9 points	
If station meets 1 of the 3 criteria:	/7 points	
Criterion 1: Insufficient road signage leading to the refuge including entrance signs	Yes No	
Criterion 2: Severe deterioration of roadways/waterways leading up to the station	Yes No	
Criterion 3: Congestion on roadways leading to the station is a major challenge	Yes No	

Goal 2: Asset Management — Maximum Points = 15

A. Roadway Condition (per RIP Cycle 4) - choose up to 1, maximum of 6 points	A (max 6 points)	
If station has > 5 miles roadway total with >10% poor or failing	/6 points	These questions should be answered using R4 LRTP Appendix Tables 5, 6, and 7.
If station has > 5 miles roadway total with >5% poor or failing	/4 points	
If station has >50% of roadways poor or failing	/3 points	

B. Parking Condition (per RIP Cycle 4) - choose up to 1, maximum of 3 points	B (max 3 points)	
If station has > 1 acre parking total and >5% poor or failing	/3 points	These questions should be answered using R4 LRTP Appendix Tables 5, 6, and 7.
If station has >75% of parking poor or failing	/2 points	

C. Trails Condition (per RIP Cycle 4) - choose up to 1, maximum of 3 points	C (max 3 points)	
If station has > 1 mile of trails total and >5% poor or failing	/3 points	These questions should be answered using R4 LRTP Appendix Tables 5, 6, and 7.
If station has >75% of trails poor or failing	/2 points	

D. Overall Maintenance Activities within the Station - chose up to 1, maximum of 3 points	D (max 3 points)	
Are there locations where at least two of the following recurring maintenance activities are required:	/3 points	These questions should be answered using RATE survey data (Question 11).
Criterion 1: Recurring flooding / eroding surfaces	Yes No	
Criterion 2: High use or activity levels	Yes No	
Criterion 3: Other issues	Yes No	

Goal 3: Coordinated Opportunities — Maximum Points = 15

A. Does your station have transportation related partnerships or relationships with any of the following? (choose up to 1, maximum of 10 points)	A (max 10 points)	
If station meets 2 of the 2 criteria:	/10 points	These questions should be answered using RATE survey data (Question 31).
If station meets 1 of the 2 criteria:	/7 points	
Criterion 1: Local, state, or federal governments, Metropolitan Planning Organizations (MPOs), or other Federal Land Management Agencies	Yes No	
Criterion 2: Transportation providers or schools	Yes No	

B. Does your station have special designations related to visitor activities or access? (i.e. Florida Birding Trail, Wetland Birding Trail, etc.) - choose up to 1, maximum 5 points	B (max 5 points)	
Yes	/5 points	These questions should be answered using RATE survey data (Question 27).

Goal 4: Environmental — Maximum Points = 6

A. Critical Habitats/Habitat Fragmentation (maximum 6 points)	A (max 6 points)	
Does your station meet one of the following criteria?	/5 points	These questions should be answered using R4 LRTP Appendix Table 10 and RATE survey data (Questions 34 and 35).
Criterion 1: If station exceeds 20% critical habitat of one or more species	Yes No	
Criterion 2: Are there critical habitats fragmented by transportation assets within or adjacent to your station?	Yes No	
Does the habitat pertain to threatened or endangered species?	/1 points	

Goal 5: Safety — Maximum Points = 20

A. Hot-spot (choose up to 1, maximum of 10 points)	A (max 10 points)	
If station meets 3 or more criteria	/10 points	These questions should be answered using R4 LRTP Appendix Table 14.
If station meets 2 criteria	/8 points	
If station meets 1 criterion	/6 points	
Criterion 1: If station meets Criteria 1 (AADT)	Yes No	
Criterion 2: If station meets Criteria 2 (Crashes)	Yes No	
Criterion 3: If station meets Criteria 3 (RIP)	Yes No	
Criterion 4: If station meets Criteria 4 (Asset Priority)	Yes No	

B. Safety hot-spots according to RATE survey (choose up to 1, maximum of 10 points)	B (max 10 points)	
Does a station meet at least 6 of the following criteria:	/10 points	These questions should be answered using RATE survey data (Question 45).
Does a station meet at least 4 of the following criteria:	/7 points	
Does a station meet at least 2 of the following criteria:	/5 points	
Criterion 1: Animal-Vehicle collisions	Yes No	
Criterion 2: Speeding on roads inside or leading to the station	Yes No	
Criterion 3: Safety issues with turn or acceleration lanes on access roads	Yes No	
Criterion 4: Bicycle and pedestrian safety	Yes No	
Criterion 5: Ingress/egress	Yes No	
Criterion 6: Truck traffic	Yes No	
Criterion 7: Railroad crossings	Yes No	
Criterion 8: Site distance (hidden driveway or side roads)	Yes No	
Criterion 9: Vehicular crashes (run off road, etc.)	Yes No	

Goal 6: Visitation — Maximum Points = 24

A. Annual Visitation (choose up to 1, maximum of 10 points)	A (max 10 points)	
If station has a minimum of 100,000 annual visitors	/10 points	These questions should be answered using R4 LRTP Appendix Table 15 and RATE survey data (Question 39).
If station has a minimum of 40,000 annual visitors	/8 points	
If the station is actively trying to increase station visitation	/4 points	

B. Population Growth (choose up to 1, maximum of 5 points)	B (max 5 points)	
If surrounding area is projected to grow >20% from 2010 to 2030	/5 points	These questions should be answered using R4 LRTP Appendix Table 19.
If surrounding area is projected to grow >10% from 2010 to 2030	/3 points	

C. Visitor Orientation (choose up to 1, maximum of 4 points)	C (max 4 points)	
Visitor Orientation to and within the station poses a significant challenge	/4 points	These questions should be answered using RATE survey data (Question 28).

D. Equitable Target Areas (choose up to 1, maximum of 5 points)	D (max 5 points)	
If station currently has significant low income population visiting the station	/5 points	These questions should be answered using R4 LRTP Appendix Tables 16 and 18 and RATE survey data (Question 14).
If station currently has some low income population visiting the station with significant low income or no access to vehicle population living within 25 miles	/3 points	
Criterion 1: >20% of population within 25 miles is in poverty	Yes No	
Criterion 2: >10% of population within 25 miles has no access to a vehicle	Yes No	
Criterion 3: Significant low income population visiting the station	Yes No	
Criterion 4: Some low income population visiting the station	Yes No	

Figure 3: User Guide – How to Incorporate Transportation into Your CCPs

How to Incorporate Transportation into Your CCPs

A guide to adding transportation needs and projects into your CCPs using the Region 4 Long Range Transportation Plan (LRTP) document.

Prior to incorporating transportation components into your CCP, please contact the Regional Transportation Program Manager to discuss this User Guide and to receive your refuge fact sheet. The information provided by the PM will assist you with the completion of the CCP and the inclusion of transportation components.

Chapter II: Refuge Overview

1. Add a sub-section called "Transportation Assets and Considerations" within the "Refuge Administration and Management" section (be sure to include a map of current refuge trails, roads, and other transportation facilities).
2. Include the six goal subheadings from the *Region 4 U.S. Fish and Wildlife Long Range Transportation Plan Existing Conditions and Future Trends Report.* Include refuge-specific information relevant to each of the goals from the refuge fact sheet created from the master tables included in the LRTP. Include relevant maps showing current transportation structure and issue elements as well as summary information. Structure should be organized as follows:

   Goal: Access, Mobility and Connectivity
   Goal: Asset Management
   Goal: Coordinated Opportunities
   Goal: Environmental
   Goal: Safety
   Goal: Visitation

3. Review the LRTP document and Appendix to find other useful pieces of information relative to the role your refuge plays from a regional perspective.

   Note: do a "Find" search within the document for your refuge name. Refuges that fall within the highest or lowest categories of each analysis may be called out within the main document. It will be valuable to know how your refuge performs relative to other refuges in the Southeast Region.

4. Because the LRTP is a regional document, it is possible that local transportation assets and more detailed transportation information about your refuge was not documented. This is a fitting location to add your local knowledge beyond what was listed in the report.

Chapter III: Plan Development

1. Add a sub-section called "Transportation Assets and Considerations" within the "Refuge Administration" section. Using Existing Conditions content provided in Chapter II, Refuge Overview, determine the areas of greatest need within your refuge. Some questions to consider include:
   - Are many of the roadways within the refuge boundaries in poor or failing condition and do they need to be rehabilitated or could they be considered for decommission?
   - Do you have high numbers of collisions in and around the refuge?
   - Are you lacking sufficient data to understand how wildlife is being impacted by collisions with automobiles?
   - Are there opportunities for coordinated planning with a state, metropolitan planning organization, or county government nearby? Is there another Federal Land Management Agency property nearby with similar priorities and needs?
2. Document the areas of greatest need in this chapter of the report.

Chapter IV: Management Direction

1. Add a sub-section called "Transportation Assets and Considerations" within the "Refuge Administration" section.
    - Include the Goals and Objectives that begin on Page 4 of the *Region 4 U.S. Fish and Wildlife Long Range Transportation Plan Existing Conditions and Future Trends Report* in the discussion section of each CCP objective and strategy. Focus only on the LRTP goals/objectives that are applicable to, or necessary for the consideration of each refuge and its unique conservation effort. The discussion section under each CCP objective may include the LRTP goals and objectives that the CCP objective is addressing. Provide a rationale for how the CCP objective is desirable to the refuge leadership and develop possible strategies for how to address it. Most transportation objectives will fall under the "Refuge Administration" section; however, some transportation objectives may fall under other headings such as "Visitor Services" or "Resource Protection." For transportation objectives that overlap with other goals/objectives discussed in the CCP, provide a reference to the other relevant goals/objectives of interest.

Chapter V: Plan Implementation

1. In some cases, projects that have already been developed under another goal area may meet transportation goals and objectives. Where this is the case, include a link to the transportation goal and objective being met by the project.
2. Determine new projects that focus on transportation and list them under the "Refuge Administration" section. It would also be beneficial for the refuge to follow-up with regional transportation staff to determine feasible project costs. Refer to the project evaluation criteria included in the Final LRTP Recommendations document that will be used for project selection. How well do your transportation projects score relative to the criteria and weighting that have been set by the region?
3. Step-Down Management Plans — if the refuge staff feels that the refuge can benefit from a transportation step-down management plan, they should document that need under the "Step-down Management Plans" section. It would also be beneficial for the refuge to follow-up with regional transportation staff to communicate that need directly and to confer with the regional office to determine if and when a step-down plan is needed.

Abbreviations, Acronyms, and Definitions

AADT	Annual Average Daily Traffic
ATS	Alternative Transportation System
API	Asset Priority Index
EFLHD	Eastern Federal Lands Highway Division
DOT	Department of Transportation
FHWA	Federal Highway Administration
FLAP	Federal Lands Access Program (MAP-21)
FLTP	Federal Lands Transportation Program (MAP-21)
LRTP	Long Range Transportation Plan
MAP-21	Moving Ahead for Progress in the 21st Century
MPO	Metropolitan Planning Organization
RATE	Regional Alternative Transportation Evaluation
RIP	Road Inventory Program
PCR	Pavement Condition Rating
RSA	Road Safety Audit
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAMMS	Service Asset Maintenance Management System
STIP	Statewide Transportation Improvement Program
TIP	Transportation Improvement Program

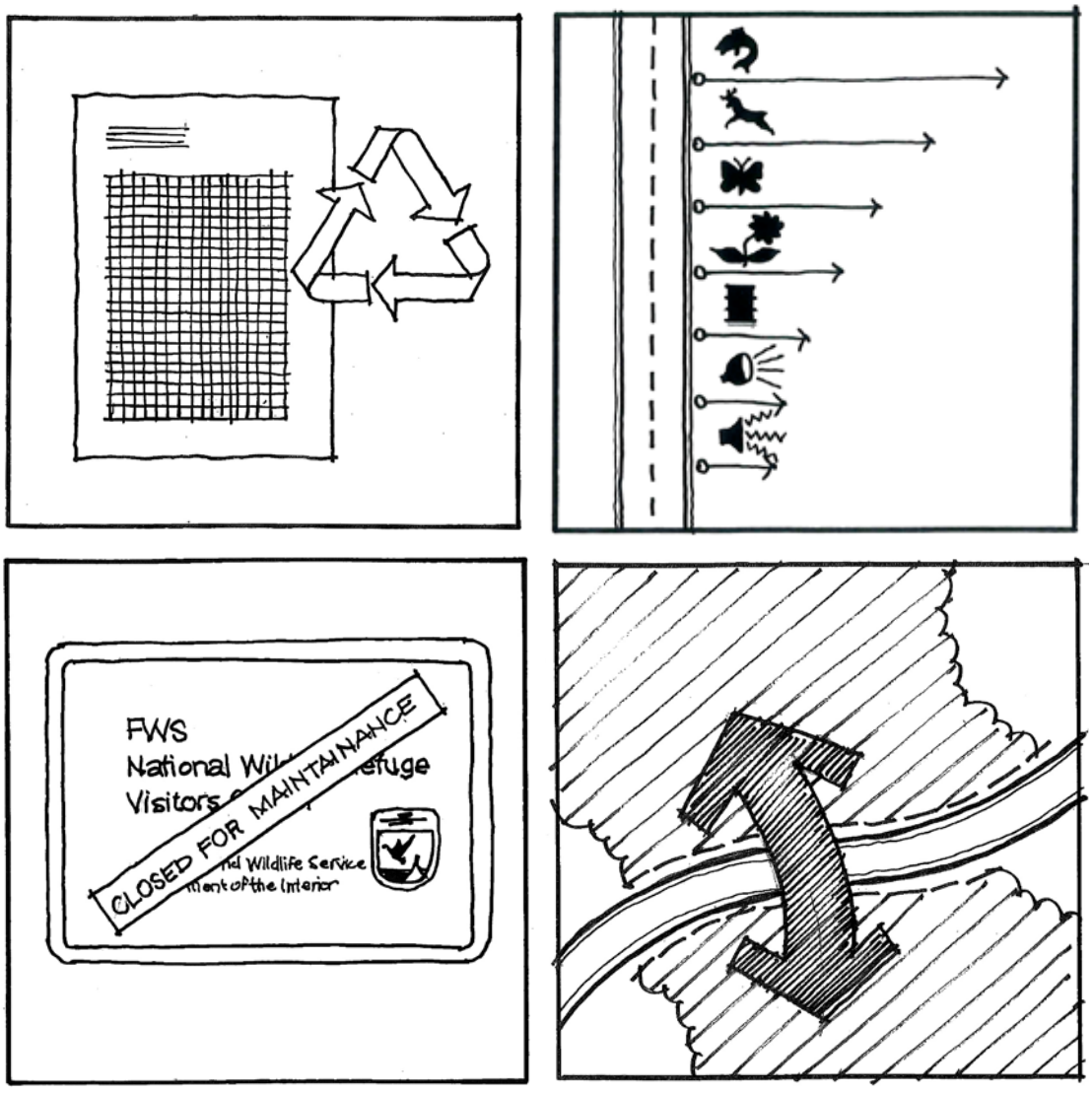
U.S. FWS Service Roadway Design Guidelines

Figure 4: U.S. Fish & Wildlife Service Roadway Design Guidelines

U.S. Fish & Wildlife Service

Roadway Design Guidelines

Project Acknowledgements



Project Information

To be Completed Prior to Project Scoping

Region:

Project Location:

Project Title:

Project Funding Information:

Project Delivered By:

FWS Asset Number:

FWS Route Number:

Step 1 - Designation of Responsibility

The Guidelines Checklist Leader (GCL) for this Project is:

GCL Contact Info:

Agency:

Address:

Phone:

Email:

GCL Signature and Date:

Project Delivery Leader Signature and Date:

Regional Transportation Coordinator Signature and Date:

Step 2 - Selection of Applicable Guidelines [LE]

Landscape Ecology:

The study of the relationship between spatial patterns and ecological processes on a wide spectrum of scales.

To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

LE - 1: Improve habitat connectivity

LE - 2: Reduce impacts to wildlife and habitat

LE - 3: Understand hydrologic processes of regional landscape

LE - 4: Respond to intrinsic qualities of regional landscape

LE - 5: Address climate change

Step 2 - Selection of Applicable Guidelines [PC]

Planning Context:

Consideration of the project in the broader contexts of: engineering, policy, projected usage, practical alternatives and costs.

To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

PC - 1: Review relevant planning, policy and regulatory information

PC - 2: Define level of service for the project

PC - 3: Evaluate multiple siting and alignment alternatives

PC - 4: Assess full costs and impacts of transportation system

PC - 5: Communicate with team and stakeholders

Step 2 - Selection of Applicable Guidelines [DE]

Design and Engineering:

Methods and materials that minimize the environmental impacts of the transportation facility and associated construction work.

To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

DE - 1: Preserve and restore native vegetation and other natural resources

DE - 2: Consider and plan for invasive species management

DE - 3: Minimize cut and fill with existing landscape

DE - 4: Consider road geometries for lower speeds, safety and alertness

DE - 5: Consider construction impacts and best practices

DE - 6: Consider range and sources of materials for sustainable construction

DE - 7: Consider maintenance

Step 2 - Selection of Applicable Guidelines [OP]

Organism Passage:

Ensuring that fish and wildlife can move across (either over or under) transportation infrastructure to maintain continuity of habitat

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To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

OP - 1: Develop your corridor plan for crossing

OP - 2: Provide and enhance aquatic organism crossings

OP - 3: Provide and enhance terrestrial organism crossings

OP - 4: Evaluate the need for wildlife fencing and other guiding features

OP - 5: Consider warning and other safety systems for drivers

Step 2 - Selection of Applicable Guidelines [SM]

Stormwater Management:

Manage and abate the volume, velocity and water quality of runoff from impervious surfaces during and after weather events.

To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

SM - 1: Buffer habitat from polluted runoff

SM - 2: Protect habitat from erosive flows and flooding

SM - 3: Monitor and maintain stormwater facilities

SM - 4: Promote stewardship of aquatic resources

Step 2 - Selection of Applicable Guidelines [VE]

Visitor Experience:

Roadways and other facilities should enhance the visitation experience and highlight the natural resources surrounding them.

To be Completed Prior to Design Work Beginning

I acknowledge that a project checklist has been completed and distributed to all members of the project team and will include the following specific considerations per selected guideline:

VE - 1: Preserve and highlight scenic value

VE - 2: Promote and facilitate multiple modes of transportation

VE - 3: Comply with accessibility standards and guidelines

VE - 4: Facilitate compatible wildlife dependent recreation and education

I acknowledge that all pages of the Selection of Applicable Guidelines are complete.

GCL Signature and Date:

Project Delivery Leader Signature and Date:

Regional Transportation Coordinator Signature and Date:

Step 3 - Incorporate Concepts from Applicable Guides Into Project Design

To be Completed During Project Design

It is the responsibility of the Guidelines Checklist Leader to work with project team members to ensure that information from each applicable guideline is being adequately considered. The GCL will review submittals at each deliverable milestone to ensure specific design responses are reflective of the guidelines.

Completion of this effort is documented during step 4.

Step 4 - Final Acknowledgement of Use

To be Completed Prior to Obligation of Construction Funds

Briefly describe how the use of the FWS Roadway Design Guidelines influenced this project:

I acknowledge that the project team considered and discussed applicable concepts presented in the FWS Roadway Design Guidelines during the course of designing this project which is now ready for construction. I acknowledge that the checklist is fully complete and therein will deliver a transportation improvement consistent with the mission of USFWS.

GCL Signature and Date:

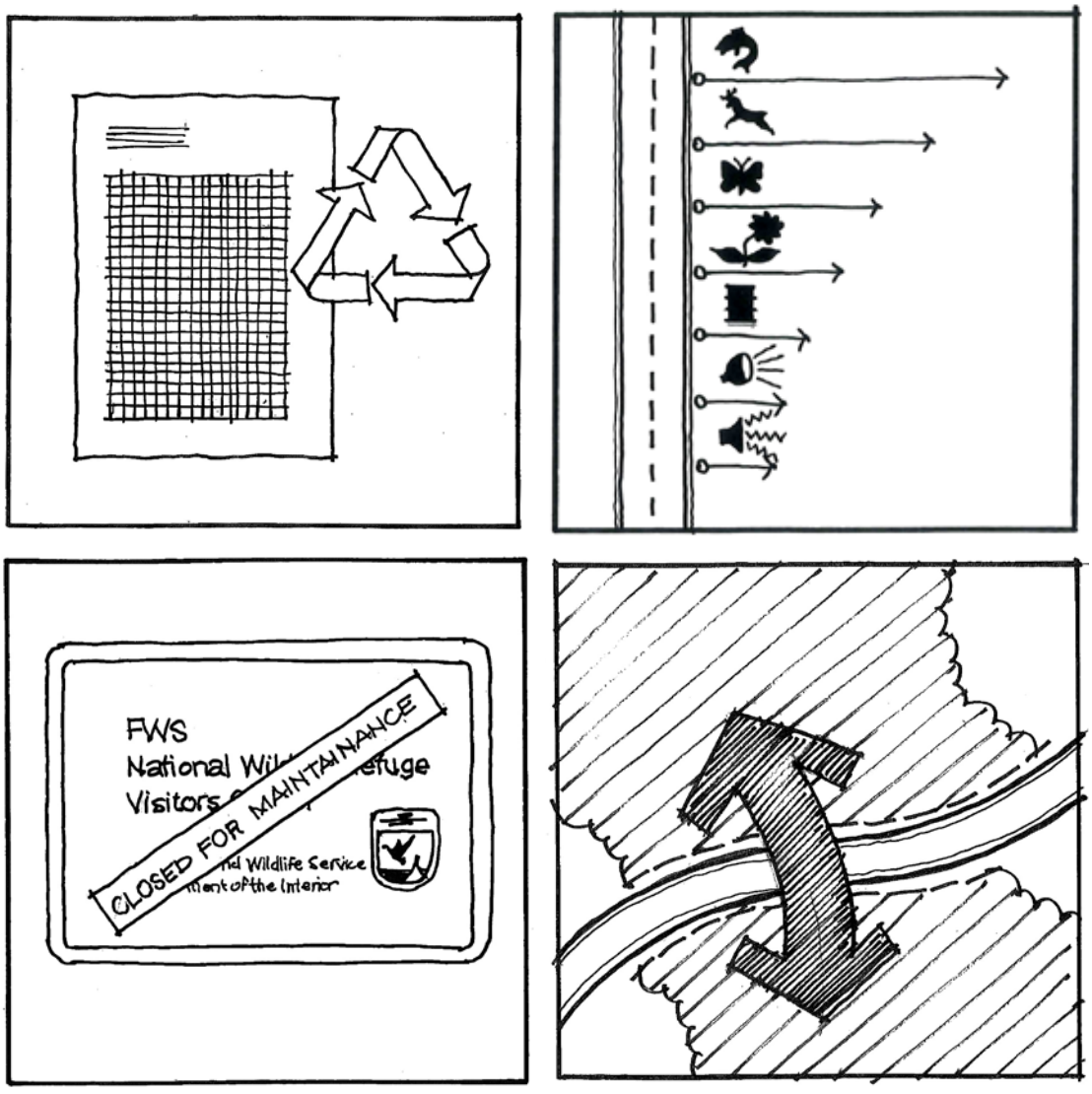
Project Delivery Leader Signature and Date:

Regional Transportation Coordinator Signature and Date:

U.S. Fish & Wildlife Service

Roadway Design Guidelines

Instructions



Introduction and Background on the FWS Roadway Design Guidelines

Purpose and Authority

The purpose of this document is to provide project teams involved with transportation projects on FWS managed lands with instructions on how to document the use of the FWS Roadway Design Guidelines (Guidelines) on a project. FWS policy requires that the Guidelines are used on all FWS transportation projects.

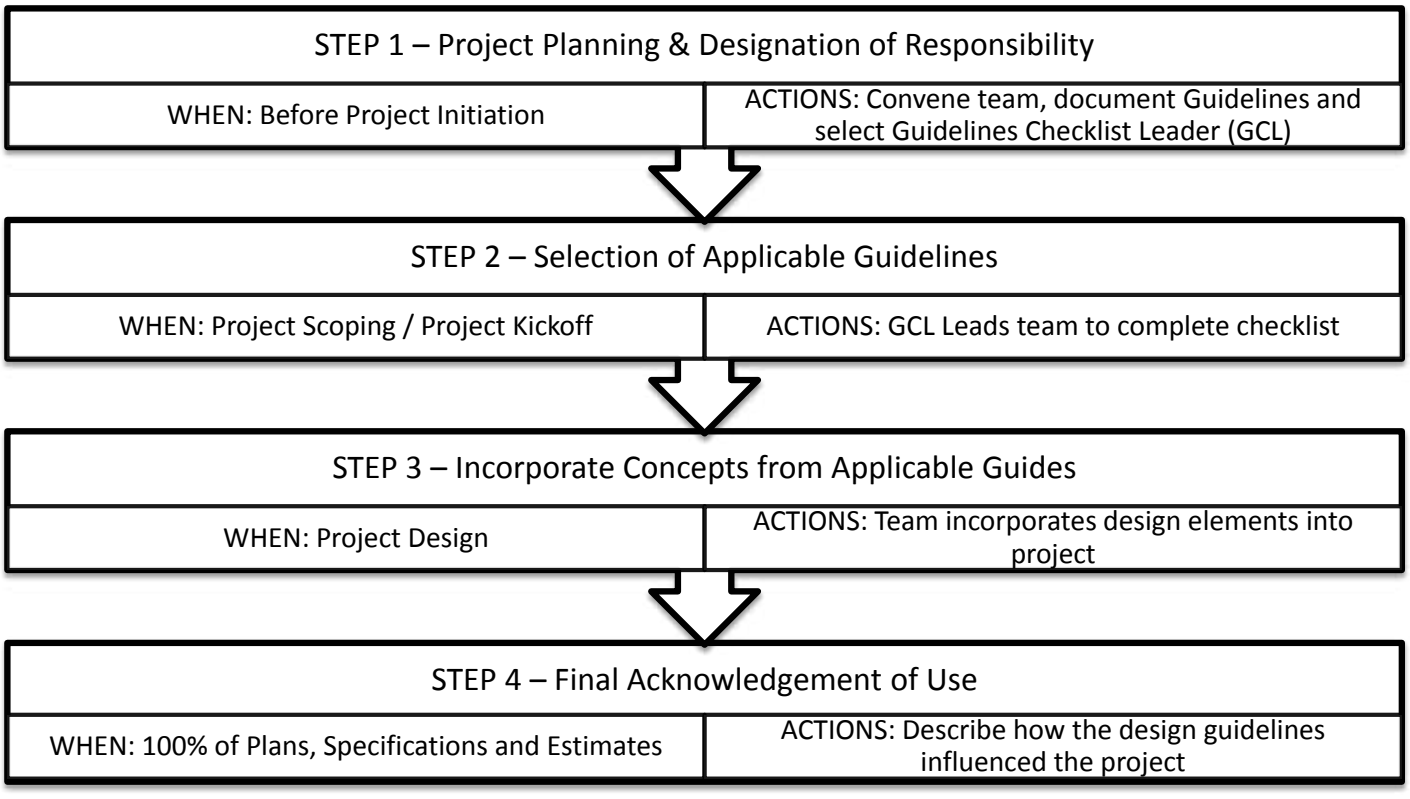
FWS policy requires that the Roadway Design Guidelines are used on all FWS transportation projects. Depending on the project delivery method selected by the FWS Regional Transportation Coordinator, individual FWS Project Management Plans or FHWA Project Agreements, Project Charters, and Project Management Plans will include a statement requiring the use of the FWS Roadway Design Guidelines referencing the specific procedures for use as outlined in these instructions.

Steps and Introduction to the Guidelines

The FWS Roadway Design Guides highlight state of the art ecological, planning, design and engineering considerations for roadway projects that heed both the significant benefits and impacts these projects present. Roadway projects on FWS managed lands should conform to planning and design criteria that have been established to support the FWS mission. The FWS Roadway Design Guides document includes 30 individual project planning and design guidelines, organized around 6 major themes.

The project checklist serves as an overview of these guidelines, and has been provided as a tool to assist in project planning, design and implementation. Using these guidelines is not an end in itself. Rather, the guidelines are a starting point from which to explore solutions to implement a roadway project of the highest standard. As such, projects funded through the FWS Transportation Program will go through a sign-off process at several stages of project development to ensure guideline accountability.

Please refer to the Guidelines document for more detailed information or contact your FWS Transportation Program Regional Coordinator.



Procedure for Using the Guidelines

Step 1 - Project Planning & Designation of Responsibility

Project Planning

The FWS Regional Transportation Coordinator will ensure that a statement requiring the use of the FWS Guides is included in applicable project planning documentation, such as FWS Project Management Plans or FHWA Project Charters, Project Agreements, and Project Management Plans. The following example statement has been provided for use in those documents:

"FWS policy requires that the Roadway Design Guidelines are used on all FWS transportation projects. A copy of the USFWS Roadway Design Guidelines along with instructions for their use is available from the USFWS Regional Transportation Coordinator."

Designation of Responsibility

The FWS Regional Transportation Coordinator will designate a Guidelines Checklist Leader (GCL) for the project. This action should occur after a project is identified for preliminary engineering or schematic design and prior to project scoping or any related project specific investigations or studies beginning. The GCL may be any of the following project team members below. GCL responsibilities may not be designated to contractors or sub-contractors working for FHWA or FWS.

List of Potential Candidates for Project GCL Assignment:

- FWS Transportation Coordinator
- FHWA Program Manager
- FHWA Project Manager
- FHWA Project Designer
- FWS Engineering Project Manager
- FWS Project Leader / Deputy Project Leader
- FWS Refuge Manager
- FWS Station Biologist
- FWS Station Visitor Services Manager
- FWS Project Landscape Architect or Professional Engineer

Procedure for Using the Guidelines

Step 2 - Selection of Applicable Guidelines

The GCL should review the FWS guidelines in order to understand how they will relate to the project ahead. The GCL will present the guidelines and their purpose to the project team during a project's scoping phase. During project scoping, the GCL will complete a project checklist with the team. Specific Instructions for the GCL for Completing the Checklist:

- Become familiar with each guideline in advance of project meetings.
- Review the checklist as a group (i.e. Regional Transportation Coordinator, FWS station staff, FHWA staff, etc.).
- Decide which guides are applicable to the project.
- For guidelines that are applicable, discuss why they are applicable. Brainstorm specific response to applicable guidelines that will occur during the planning and design phase to ensure that the subject guideline was adequately considered.
- Briefly document each applicable guideline to be referenced and a proposed response on the Selection of Applicable Guidelines section of the Project Acknowledgements document.

*If the project requires a scoping field visit by project team members, it is recommended that the GCL completes the above activities at this time. If a field visit is not required, the GCL should convene a meeting or conference call to specifically discuss the Guidelines with the project team.

Step 3 - Incorporate Concepts From Applicable Guidelines Into the Project Design

Once applicable guidelines and related project specific responses have been documented; it is the responsibility of the GCL to work with project team members to ensure that information from each applicable guideline is being adequately considered. The GCL will review submittals at each deliverable milestone to ensure specific design responses are reflective of the guidelines.

Step 4 - Final Acknowledgement of Use

At the conclusion of the design phase 100% PS&E should reflect the spirit of the Guidelines and include specific design responses to applicable guidelines. If this has occurred at final design review, the GCL should complete the statement of use section and route to the FWS Regional Transportation coordinator for a signature.

Roles and Responsibilities on the Project Team

Regional FWS Transportation Coordinator

Once a project has been identified and is ready for project scoping, the Regional FWS Transportation Coordinator will identify and assign a member of the project team to serve as the Guidelines Checklist Leader. The Transportation Coordinator has authority and oversight of all the procedures for use as discussed in these instructions.

Guidelines Checklist Leader (GCL)

The Guidelines Checklist Leader is the responsible team member for monitoring and completing the Checklist. The GCL is responsible for ensuring that all project team members are aware of expectations and specific design goals, strategies and outcomes that result from the consideration of applicable Guidelines identified and documented during project scoping. The GCL is also the responsible team member for routing the completed acknowledgements back to the Regional Transportation Coordinator.

FWS Project Leader or Designee

Ensures that the GCL and Project team have adequately considered applicable design guidelines based on their knowledge of the project and field station needs. FWS National Transportation Coordinator Ensures that Regional Transportation Coordinators have completed all sections of the Project Acknowledgements document prior to the obligation of FWS Transportation funds for project construction.

FHWA Program and Project Manager

On projects where delivery will occur via FHWA, the FHWA program manager and FHWA project manager will insure that the GCL and project team have adequately considered applicable design guidelines based on their knowledge of the project and field station needs.

Project Delivery Leader

Staff / Project Manager responsible for managing the scope, schedule and budget of the project. Ensures that the project is fully completed and compliant with all applicable FWS standards.

U.S. Fish & Wildlife Service

Roadway Design Guidelines

Prepared By
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Portland, Oregon

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Cover: A Great Blue Heron flies off with its catch at William L. Finley NWR in Oregon. Roadways on National Wildlife Refuges provide opportunities for wildlife viewing and photography, two of the Big Six activities supported by the National Wildlife Refuge System.

Photo: George Gentry, USFWS

Purpose

The U.S. Fish & Wildlife Service (FWS) is the world's premier conservation agency, managing over 150 million acres of wildlife habitat on National Wildlife Refuges alone. FWS is in a unique position to demonstrate the land ethic so deeply interwoven in the rich fabric of our national heritage.

This guide highlights state of the art ecological, planning, design and engineering considerations for roadway projects that heed both the significant benefits and impacts these projects present. Roadway projects on FWS managed lands should conform to planning and design criteria that have been established to support the FWS mission. This document provides such criteria in the form of guidelines. These guidelines are summarized in a table of contents that serves as a project checklist.

The Roadway Design Guidelines are a wayfinding tool intended to facilitate dialog and decision making among project teams. The guidelines have been crafted to support the interdisciplinary team typically involved with decision making regarding a roadway project: Project Leaders, Project Managers, and technical experts from various disciplines.

This document includes 30 individual project planning and design guidelines, organized around 6 major themes. The project checklist serves as an overview of these guidelines, and has been provided as a tool to assist in project planning, design and implementation.

In the pages that follow you will find information and resources that will be useful in your work on roadway projects. Using these guidelines is not an end in itself. Rather, the guidelines are a starting point from which to explore solutions to implement a roadway project of the highest standard. Every guideline begins with a brief discussion of the intent for presenting a particular topic, followed by supporting principles central to honoring the guideline, as well as associated metrics. Selected resources are provided to gain a deeper understanding of the topic.

Brian Bainnson

Eva Paredes/USFWS

Visitor contact facilities are often located in close proximity to roadways like this one at McNary National Wildlife Refuge (NWR) (top). Bison herd as viewed from roadway at the National Bison Range (bottom).

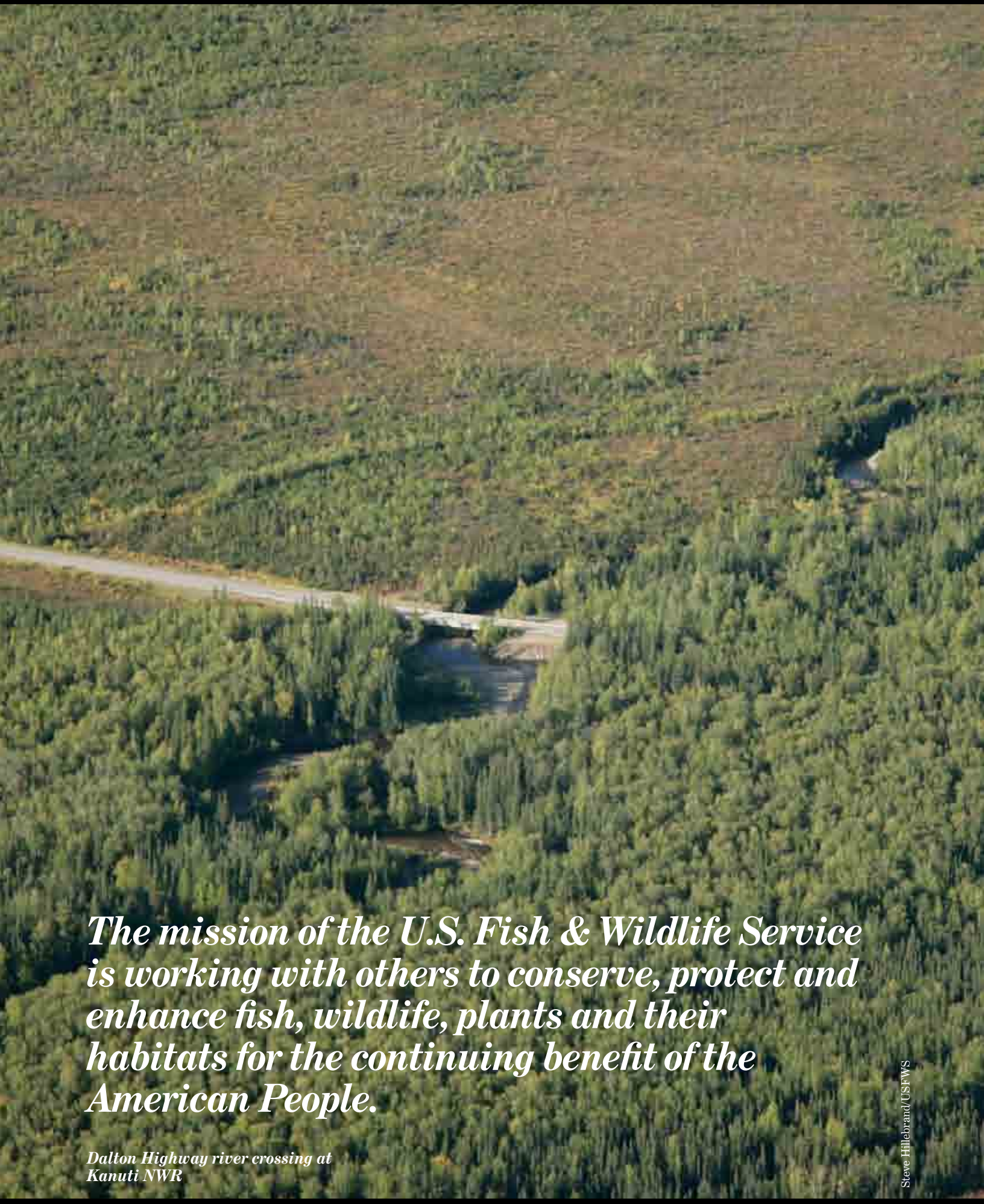
More Than Just A Road

A 'roadway' as referred to in these guidelines encompasses not only the suite of typical improvements associated with a vehicle-focused transportation project, but also related facilities such as parking, overlooks and the zone of ecological impacts from a road. These can be summarized as follows:

- **Typical transportation improvements** extend from the centerline of an existing or proposed road outward and include associated infrastructure components, such as paving, utilities, grading, drainage and planting.
- **Other facilities and infrastructure** commonly associated with vehicular transportation, include parking, visitor contact facilities, and pullouts.
- **Ecological connections and impacts** beyond the edge of the physical road or right of way, such as habitat fragmentation, habitat disturbance, pollution and aquatic and terrestrial species conflicts.

Moving Ahead for Progress in the 21st Century

Effective October 1, 2012, the existing Refuge Roads Program funded through previous Federal transportation authorizations is now called the FWS Transportation Program within the new Federal Lands Transportation Program. These new program details are described in the new transportation legislation called Moving Ahead for Progress in the 21 st Century (MAP-21). While still applicable to all refuge roads, these guidelines are generally applicable to all FWS transportation infrastructure and future improvements performed on this system of facilities and assets.



The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American People.

Dalton Highway river crossing at Kanuti NWR

Steve Hillebrand/USFWS

Project Checklist

LE – Landscape Ecology

- ☐ LE-1 Improve habitat connectivity
- ☐ LE-2 Reduce impacts to wildlife and habitat
- ☐ LE-3 Understand hydrologic processes of regional landscape
- ☐ LE-4 Respond to intrinsic qualities of regional landscape
- ☐ LE-5 Address climate change

PC – Planning Context

- ☐ PC-1 Review relevant planning, policy and regulatory information
- ☐ PC-2 Define level of service for the project
- ☐ PC-3 Evaluate multiple siting and alignment alternatives
- ☐ PC-4 Assess full costs and impacts of transportation system
- ☐ PC-5 Communicate with team and stakeholders

DE – Design and Engineering

- ☐ DE-1 Preserve and restore native vegetation and other natural resources
- ☐ DE-2 Consider and plan for invasive species management
- ☐ DE-3 Minimize cut and fill to fit with existing landscape
- ☐ DE-4 Consider road geometries for lower speeds, safety and alertness
- ☐ DE-5 Consider construction impacts and best practices
- ☐ DE-6 Consider range and sources of materials for sustainable construction
- ☐ DE-7 Consider maintenance

OP – Organism Passage

- ☐ OP-1 Develop your corridor plan for crossing
- ☐ OP-2 Provide and enhance aquatic organism crossings
- ☐ OP-3 Provide and enhance terrestrial wildlife crossings
- ☐ OP-4 Evaluate the need for wildlife fencing and other guiding features
- ☐ OP-5 Consider warning and safety systems for drivers

SM – Stormwater Management

- ☐ SM-1 Buffer habitat from polluted runoff
- ☐ SM-2 Protect habitat from erosive flows and flooding
- ☐ SM-3 Monitor and maintain stormwater facilities
- ☐ SM-4 Promote stewardship of aquatic resources

VE – Visitor Experience

- ☐ VE-1 Preserve and highlight scenic value
- ☐ VE-2 Promote and facilitate multiple modes of transportation
- ☐ VE-3 Comply with accessibility standards and guidelines
- ☐ VE-4 Facilitate compatible wildlife dependent recreation and education

Highway through Siletz Bay NWR provides travelers with visual access to the Refuge. The highway affects habitat connectivity and the landscape's hydrology.

David Pitkin/USFWS

Landscape Ecology

Landscape Ecology
Overview

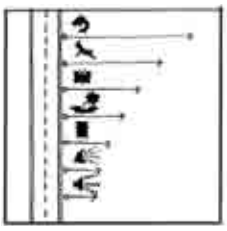
Pattern and Process
Roads and ecological function are intrinsically intertwined. Roadways on FWS managed lands in particular are frequently located in areas of high ecological importance.

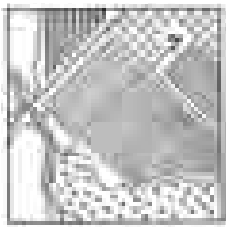
This section, Landscape Ecology, is intended to help you consider the broad-scale environmental impacts of your decisions regarding roadways and transportation infrastructure. It addresses a range of issues, providing you with a set of tools for decision-making.

Any new roadway construction or improvements to existing roadways on FWS managed lands requires unique treatment, consistent with the mission of the Service and supported by a detailed understanding of refuge management goals. Improvements need to be made in a manner consistent with applicable laws such as the Migratory Bird Treaty Act (MBTA), Fish and Wildlife Coordination Act (FWCA), Bald and Golden Eagle Protection Act (BGEPA) and Endangered Species Act (ESA). While the guidelines in this section cover principles which are, in general, applicable across a broad range of environments, take time to consider the guidelines and their specific implications within the unique bioregional context in which your projects will occur.

Research in the field of road ecology demonstrates that the multitude of adverse impacts of roads on landscapes, and the healthy function of the natural systems they traverse, are reduced by designing for slower travel speeds and lower traffic volume.

A significant component of a roadway project may be to remove roads from ecologically sensitive areas and restore those areas.





Landscape Ecology 101

Landscape ecology is the study of the relationship between spatial pattern and ecological processes on a wide variety of landscape scales and organizational levels. Some key landscape ecology concepts are:

Patch - Distinct area of a particular habitat or landscape type. Key considerations include size, number, location, and composition/contents. Small patches have a higher edge-to-interior ratio; some species thrive on edges, while others strictly prefer the qualities of a patch interior.

Edge - The shape, width, straightness, and other qualities of habitat or patch edges affects their performance and utility for various species.

Connectivity - This depends on distance, as well as other factors that may promote or inhibit movement between patches. A roadway may seem relatively narrow, but constitute a greater barrier than a broad field for some species.

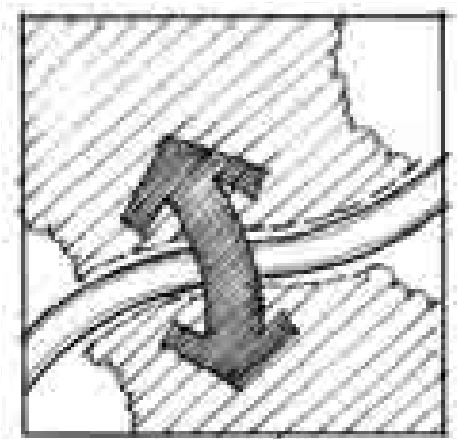
Mosaic - The bigger picture that includes the various patches and the matrix that contains them (e.g. areas of remnant woodland and wetlands, within a matrix of agricultural fields). Key elements include scale, grain (coarseness), patch diversity, and degree of fragmentation.

Roads form a **network**, which may be viewed as a **matrix** that contains a variety of habitat patches. They significantly affect connectivity, creating abrupt and harsh edge conditions, whose effects (such as light, noise, air quality, temperature, hydrology) can extend well into the adjacent habitat patches.

LE-1 Improve Habitat Connectivity

Intent

Roadways should be examined for their potential to impact habitat connectivity. Wherever possible such impacts should be minimized and/or mitigated. When a contiguous habitat area is bisected by a roadway, abrupt edge conditions are created. Such habitat fragmentation is generally undesirable. Hydrologic and soil community connectivity are also affected. Native plantings and other restoration activities associated with roadway improvements can be designed to support multiple habitat objectives, including buffering patch interiors and mitigating roadway impacts. In rare instances, roadway corridors may also serve as habitat connectors, linking otherwise fragmented communities.



Habitat connectivity is disrupted along any road corridor

Principles

- Identify and prioritize habitat restoration and connectivity opportunities at the landscape scale
- Review state habitat connectivity plans as well as applicable recovery plans for listed species
- Consider impacts and footprint of the entire roadway as defined in these guidelines
- Develop partnerships among land management agencies and the local FWS Ecological Services (ES) office
- Partner with neighbors
- Identify opportunities for individual projects to minimize impacts to wildlife and restore habitat connectivity

Metrics

- Trends in species mortality, avoidance, low population survival, sensitive or endangered species populations
- Decreased wildlife-vehicle collisions and/or roadway avoidance
- Distance between habitat patches
- Distribution of species/population along and across roadway

Resources

Overview of road ecology and guidelines for ecological road planning and design.

Forman, Richard, et al. 2003. Road Ecology: Science and Solutions.

Graphic explanations of landscape ecology principles.

Dramstad, Olson, and Forman. 1996. Landscape Ecology Principles in Landscape Architecture and Land-Use Planning.

Discussion of positive and negative impacts of roadways on adjacent vegetation.

Forman, Richard. 2002. "Roadsides and Vegetation." In Proceedings of the International Conference on Ecology and Transportation, Keystone, CO, September 24-28, 2001.

Roadway design guidelines from applied ecology and experiential perspective.

Jones, Grant R., et al. 2007. Applying Visual Resource Assessment for Highway Planning (pp.130-139) and Road Alignment (pp.330-341). In Landscape Architecture Graphic Standards.

Effects of roadways on wildlife (see also entire February 2000 Conservation Biology issue).

Trombulak, Stephen and Christopher Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities.

Wildlife conservation and planning efforts among the western states.

Western Governors' Wildlife Council. http://www.westgov.org/. Resources include the Wildlife Corridors Initiative Report (2008) and Wildlife Sensitivity Maps.

Habitat Connectivity

Habitat connectivity is a term commonly used in landscape ecology to describe the degree of connection between nearby or adjacent habitat areas. Distinct habitat areas are frequently referred to as 'habitat patches'. If the connection between these patches is not good, the resultant fragmentation can lead to loss of diversity within a given population of a species and potentially local extinction of that species from one or both patches. Even for fairly mobile species, a roadway can present a significant barrier to movement between patches.

Terrestrial under-crossing facilitates wildlife movement across a landscape fragmented by a highway in Banff NP, Canada

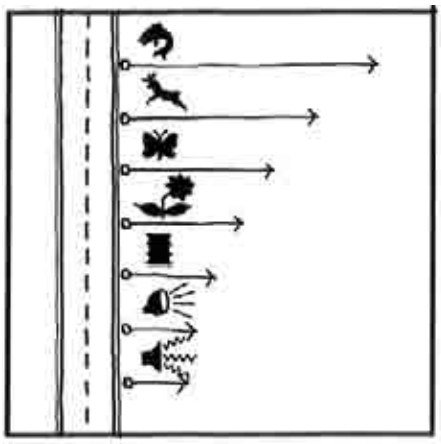
Patricia White/Flickr.com

LE-2 Reduce Impacts to Wildlife and Habitat

Intent

Roads have a significant impact on wildlife populations and habitat. Roads can directly impact wildlife through mortality (e.g. wildlife-vehicle collisions), roadway avoidance, habitat loss and habitat fragmentation. Wildlife-vehicle collisions are a safety concern for motorists. Traffic volume and roadway type directly relate to the severity of wildlife impacts. Roadkill data alone is not an accurate indicator of roadway impacts to wildlife, due to avoidance behavior and other issues. Mortality and avoidance are two species-dependent outcomes that may result from the barrier effect a roadway has on wildlife. In addition, maintenance practices, in combination with abundant edge habitat, can attract certain species of wildlife to a roadway, increasing the potential for conflict.

Consider roadway alignment, design, construction, and future maintenance methods that create the least detrimental impact to wildlife and habitats. Section OP (Organism Passage) discusses terrestrial and aquatic organism passage in more detail.



Impacts to wildlife and habitat extend outward from the roadway in various degrees, creating the 'road-effect zone'.

Principles

- Identify and limit the 'road-effect zone' and determine the potential exposure of ESA listed species and critical habitat to road effects within that zone. Minimize adverse effects to ESA listed species and critical habitat, and ensure any such effects are addressed through the ESA section 7 compliance process, as appropriate.
- Design for lower speeds, in order to minimize disturbance
- Consider management techniques to minimize disturbance to wildlife on auto tour routes
- Examine how road alters wildlife use patterns
- Examine how future effects on wildlife could make a project compatible (or not) with management goals
- Consider effects of noise, light and chemical pollution on habitats and wildlife

Metrics

- Reduction of wildlife-vehicle collisions
- Health of wildlife populations with habitats fragmented by or in proximity to roadways
- Road density (landscape ecology metric, see Definitions)
- Mesh size (landscape ecology metric, see Definitions)

Resources

Overview of road ecology, guidelines for ecological road planning and design. See especially discussion of road-effect zones, pp. 306-16.

Forman, Richard, et al. 2003. Road Ecology: Science and Solutions.

Latest information on road ecology as it relates to mitigating interactions between roads and wildlife.

Beckmann, J. P., et al. 2010. Safe Passages.

Identifying & prioritizing habitat connectivity zones, and guidelines for design solutions.

FHWA. 2008. Best Practices Manual, Wildlife Vehicle Collision Reduction Study (Report to Congress).

Effects of roadways on wildlife (see also entire February 2000 Conservation Biology issue).

Trombulak, Stephen and Christopher Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities.

Buffer design guidelines.

Bentrup, G. 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Access at: http://www.unl.edu/nac/bufferguidelines/

See also:

Section OP - Organism Passage

Roadways have significant impacts on both individuals and populations.

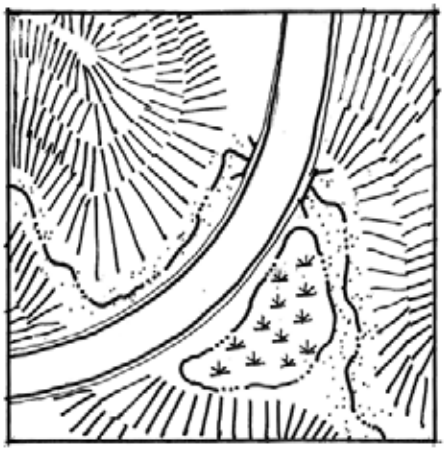
Mac Danzig Photography

Florian Schulz

LE-3 Understand Hydrologic Processes of Regional Landscape

Intent

Roadways can have dramatic impacts on hydrology at local, regional, and watershed scales. Disturbance to local hydrology is one negative impact to habitat caused by roadways. Impervious surfaces have a cumulative effect across a watershed, altering its hydrology and often creating detrimental consequences for wildlife. In some cases, the effects of a roadway on hydrology may be desired as part of a field station's approach to habitat management. Project teams should consider carefully how a roadway will impact local hydrology, or conversely how hydrologic processes can inform design decisions. Roadway improvements might support FWS management goals by addressing known issues and/or restoring historic hydrologic processes.



Roadways disrupt natural hydrology.

Principles

- Consider how road design may protect hydrologic processes
- Consider how to adapt an existing roadway for greater permeability
- Consider what effects the roadway might have on subsurface flows, water tables, and nearby aquifers, as well as how these elements affect construction options and feasibility
- Consider balance between restoring to pre-development conditions and maintaining historic alterations to hydrology
- Consider how development and roadway work will support current hydrologic and habitat management goals

Metrics

- Hydrologic modeling showing potential changes from roadways
- Stream flow data
- Changes in species composition (invasives vs. natives)

Resources

General reference on road ecology. See in particular overview of roadway effects on hydrology in Chapter 7.

Forman, Richard, et al. 2003. Road Ecology: Science and Solutions. Island Press. Washington D.C.

Guidelines that address hydrology impacts of roadways.

Smith, Stacy (Idaho Technology Transfer Center, Univ. of Idaho). 2005. BMP Handbook: Best Management Practices for Idaho Rural Road Maintenance.

Design guidelines for low-use roads, focusing largely on hydrology.

Weaver, William and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

Roadway design guidance for lower impact to hydrology.

Dashiell and Lancaster. Undated. Road Design Guidelines for Low Impact to Hydrology. Five Counties Salmonid Conservation Program. Weaverville, CA.

Guidebook on design and best practices for providing aquatic organism passage.

USDA Forest Service. 2008. Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings.

See also:

Section SM - Stormwater Management

Roads both affect and are affected by hydrology. Floodwaters wash out a road at Flint Hills NWR (top); levee road at Blackwater NWR (bottom).

Eva Paredes/USFWS

Leon Reed/Flickr.com

LE-4 Respond to Intrinsic Qualities of Regional Landscapes

Intent

Every landscape has a rich natural and cultural history, a distinct composition of flora and fauna, unique weather, drainage patterns and views. Such intrinsic qualities contribute to each location's "sense of place," or context, which should be a guiding factor in work there. A contextual approach should be taken when planning and designing all roadways on FWS lands, and should be used for such decisions as road alignment and location of visitor facilities. Consider local vernacular architecture and land management traditions (e.g. local historic and sustainable agricultural practices), aesthetic issues such as viewsheds and practical issues such as seasonal access to recreational opportunities.

Principles

- Consider Context Sensitive Solutions (CSS) for general design guidelines and engage a landscape architect
- Develop benchmarking tools for ecological performance
- Consider what local land use traditions are consistent with FWS goals and management activities
- Respond to visual appearance of regional landforms, vegetation, and other natural features
- Review historic land use patterns and cultural practices
- Consider visitor experience and potential educational and interpretive benefits of road and visitor facility designs

Metrics

- Visitor satisfaction
- Ecological literacy of visitors
- Documentation of visual analysis (visual resource assessment) process (see Resources below)

Resources

Context-sensitive highway planning and design case study.

Kentucky Transportation Center. Undated. Context-Sensitive Design Case Study No. 1: Paris Pike - Kentucky.

Performance metrics for CSS design.

TransTech Mgmt., Oldham Historic Properties Inc., and Parsons Brinckerhoff Quade & Douglas for National Cooperative Highway Research Program. 2004. Performance Measures for Context Sensitive Solutions - A Guidebook for State DOT's.

Items to address or consider.

ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Roadway design guidelines from applied ecology and experiential perspective.

Jones, Grant R., et al. 2007. Applying Visual Resource Assessment for Highway Planning (pp.130-139), and Road Alignment (pp.330-341). In Landscape Architecture Graphic Standards. Available at: http://www.jonesandjones.com/news/publications.html.

Guidelines for visual and context considerations for roadway design.

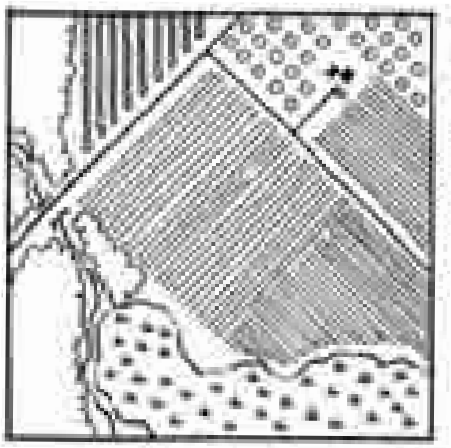
USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Transportation Research Board of The National Academies. 2002. A Guide to Best Practices for Achieving Context Sensitive Solutions (NCHRP Report 480).

Regional design guidelines.

New Mexico Department of Transportation. 2006. Architectural and Visual Quality Design Guidelines for Context Sensitive Design and Context Sensitive Solutions.

Nevada Department of Transportation. 2002. Pattern and Palette of Place: A Landscape and Aesthetic Master Plan for the Nevada State Highway System.



Historic land use patterns and natural features can help drive design.

Context Sensitive Solutions

The term Context Sensitive Solutions (CSS) refers to a decision-making process used by roadway designers and transportation engineers that accounts for many factors of a site's context—from topography and geology to cultural history and the intended users—during the planning, design, and maintenance of transportation facilities. Landscape architects played a leading role in developing this concept and are valuable team members for their expertise in determining how a project can appropriately respond to its context. Fundamental landscape architecture capabilities include identifying and expressing in built form the intrinsic qualities of a project's regional landscape.

Leota Butte overlook at Ouray NWR provides an excellent landscape view.

Eva Paredes/USFWS

LE-5 Address Climate Change

Intent

Responding to climate change is a growing imperative for land managers and natural resource professionals, as well as the transportation and infrastructure sectors. Roadways on FWS managed lands may be particularly impacted because many are often in or near tidal zones, wetlands and floodplains. Factors to consider include how might roadways and visitor facilities be planned to reduce vehicle miles traveled (for visitors and staff); how will the roadways likely be impacted by changing weather and hydrologic patterns; and how might roadways be designed in a resilient and multifunctional manner that serves not only transportation, but perhaps other purposes such as protecting valuable facilities or habitat.

Principles

- Provide alternative modes and means of access to FWS managed lands
- Consider potential climate change impacts when making decisions on location, scale and design life of infrastructure investments
- Consider construction materials and methods that have lower carbon footprints and climate impacts consistent with FWS and Department of the Interior (DOI) policies
- Use climate change research to inform transportation planning efforts at the landscape scale

Metrics

- Regional trends in weather-related damage and maintenance needs
- Vehicle miles traveled (VMT) on FWS roadways and associated greenhouse gas emissions
- Transportation modes used by visitors to reach and use FWS facilities
- Reports and data from the Emergency Relief for Federally Owned Roads (ERFO) program

Resources

Overview of transportation industry connection with climate change.

Transportation Research Board. 1997. Toward A Sustainable Future: Addressing the Long-Term Effects of Motor Vehicle Transportation on Climate and Ecology (SR 251).

Potential climate impacts of transportation sector and work towards reducing them.

Sperling, Daniel and Deborah Gordon. 2008. Two Billion Cars: Transforming a Culture. In: TR News, No. 259 (Nov-Dec).

Overview of general impacts of climate change on transportation infrastructure.

Transportation Research Board. 2008. Potential Impacts of Climate Change on US Transportation (TRB Report 290).

Regionally specific climate change impact information.

Climate Impacts Group. 2009. The Washington Climate Change Impacts Assessment.

Information, resources and organizations relating to sustainable transportation systems.

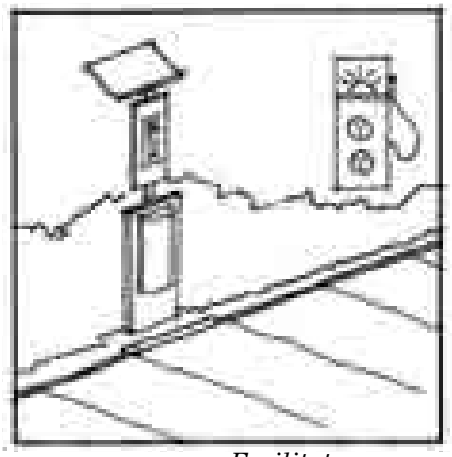
Green Highways Partnership. http://www.greenhighwayspartnership.org.

Assistance with emergencies and data on federally owned roads.

Emergency Relief for Federally Owned Roads (ERFO). http://flh.fhwa.dot.gov/programs/erfo/.

Official FWS climate change information and strategy.

http://www.fws.gov/home/climatechange/.



Facilitate greener transportation options.

Climate change will impact roads on FWS managed lands. Road damage due to flooding at Arrowwood NWR (top); washed out bridge at Flint Hills NWR (bottom).

Eva Paredes/USFWS

Eva Paredes/USFWS

Planning Context

Planning Context
Overview

Planning the Process

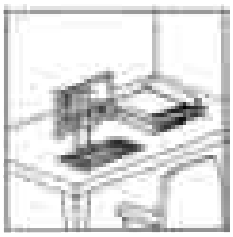
Guidelines in this section are intended to help you consider a roadway project in a broad context before advancing to the specifics of site design and engineering presented in sections DE, OP, SM and VE of these guidelines. It is important to consider how a particular project fits into the region's infrastructure, management and public access priorities, and how it might be most compatible with the conservation of listed species, the recovery function of critical habitat, and/or the conservation of FWS trust resources. Consider how the access a roadway enables and the impacts a roadway creates will fit into the management goals for the FWS managed lands it serves. The planning process can also help ensure that all applicable laws (e.g., FWCA, ESA, etc.) are appropriately addressed.

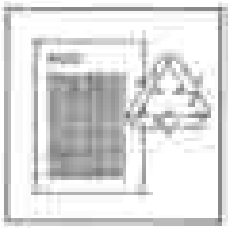
This section will help guide you to resources that will aid with or inform the planning process, as well as relevant documents that should be reviewed. It also serves as a reminder for project elements that are sometimes overlooked, such as developing a communications plan that addresses both internal and external communications about the project. Information regarding project prioritization, selection, and delivery is discussed in the Region's Long Range Transportation Plan (LRTP). Contact your Refuge Roads/FWS Transportation Coordinator for more information.

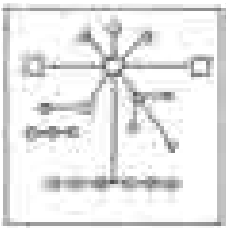
Selected project phases where the Roadway Design Guidelines are used by the project team

- Project identification and establishment
- Project scoping meeting(s)
- Establishing goals for the project
- Establishing scope, schedule, and budget for the project
- Establishing roles and responsibilities for the project
- Preliminary / schematic design phase
- Completed project assessment and monitoring

* Contact your Refuge Roads/FWS Transportation Coordinator for more information regarding how projects are planned and delivered in the region.







PC-1 Review Relevant Planning, Policy and Regulatory Information

Intent

Take advantage of lessons learned and research in relevant fields. Reviewing relevant background information ensures your project team is considering the most advanced and applicable contextual information related to a specific project. Consider what applicable legal and FWS policy requirements your project must respond to in order to be successful.

Principles

- Review local, regional and state transportation plans to determine how efforts by other agencies may inform your project planning and design
- Contact GIS staff to initiate data gathering and discuss mapping and analysis needs
- Review your Comprehensive Conservation Plan (CCP) and step down plan sections on transportation planning
- Conduct survey work and geotechnical investigations
- Review the Regional Long Range Transportation Plan (LRTP)
- Review existing asset management data and any asset management plans
- Review requirements of NEPA as well as other applicable state and local regulations
- Address ESA requirements as applicable
- Ensure consistency with applicable environmental laws such the FWCA, MBTA, and BGEPA.

Metrics

- List of related documents or case studies reviewed
- Concurrence from project team and stakeholders that relevant information has been reviewed and is ready to be applied to future phases of work

Resources

Overview of various systems of performance metrics.

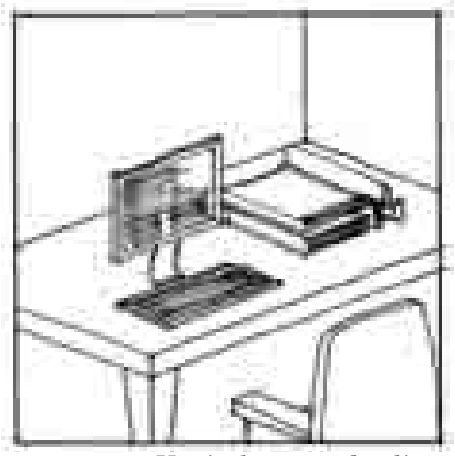
AASHTO. 2008. Guidelines For Environmental Performance Measures. NCHRP 25-25, Task 23. Prepared by Cambridge Systematics, Inc. Cambridge, MA.

NEPA information for EPA Region 10 (Pacific NW).

http://yosemite.epa.gov/R10/ECOCOMM.NSF/webpage/national+environmental+policy+act.

Guidelines for developing projects that work for local communities.

WSDOT. 2003. Building Projects that Build Communities: Recommended Best Practices.



Use in-house and online resources to find relevant case studies and up-to-date regulatory requirements.

Documents are shared and discussed during a project kickoff meeting at Umatilla NWR (top); a multidisciplinary team reviews resource documents during a project meeting in the Regional Office (bottom).

USFWS

Brian Bainson

PC-2 Define Level of Service for the Project

Intent

Your project team should identify what level of service (LOS) will be provided by roadways. This will help to adequately size facilities and ensure facility compatibility with current and anticipated demand. Designing for an appropriate LOS helps avoid over-building facilities, which can be costly. Plan to balance roadway improvements with wildlife conservation and habitat maintenance goals. Good phasing plans and cost estimates should be developed, keeping in mind that these may change over time, in response to changing visitor patterns, management priorities, or adjacent land use.

Principles

- Develop performance based, rather than prescriptive, goals and objectives
- Avoid unnecessarily over-designing facilities
- Consider utilizing partnerships and alternative transportation to accommodate special events that generate traffic or atypical demands on roadways
- Determine jurisdiction
- Decide whether roadways should enable more direct access to facilities or amenities
- Balance needs with resources and intended capacity and vehicle or user types
- Decide if and how it may be appropriate to promote lower design speeds
- Consider seasonal and multi-modal issues
- Examine case studies for other similar facilities in order to "right size" your facility for current and anticipated demands
- Consider Intelligent Transportation Systems (ITS) or other means of sharing traveler information to distribute traffic, inform visitors of seasonal closures and provide more trip planning
- Consider how the roadway can serve as a link to communities – gateways, access, etc.

Metrics

- Visitor use statistics (vehicle and trailhead)
- Visitor satisfaction
- Traffic and parking violations
- Traffic or congestion statistics
- Existing parking and roadway capacity

Resources

Design recommendations for various road types.

National Park Service. 1984. Park Road Standards.

Design recommendations for various road types.

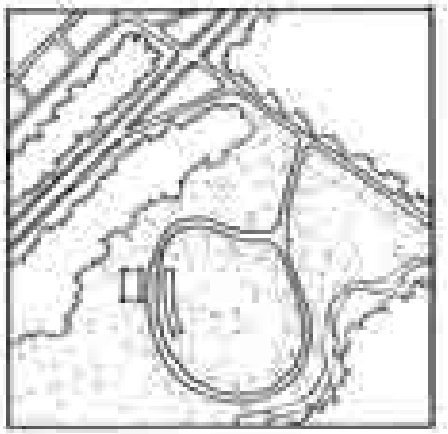
USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Regional guidelines for roadside development.

ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Public involvement may help clarify visitor needs.

Peaks, Harold E. and Sandra Hayes. 1999. "Building Roads in Sync With Community Values." In Public Roads (Mar./Apr. 1999).



Determine the intended vehicles and traffic volumes for the roadway.

Level of Service

The term Level of Service (LOS) is commonly used among transportation planners to refer to the number of vehicles served. However users of these guidelines should also consider the term to include other elements, such as types of users, seasonality of use and modes of transportation that a particular roadway serves. Multimodal access refers to the ability of a transportation facility to provide access via a variety of modes, such as car, bicycle, public transit or walking. In keeping with the FWS mission, consider where it is possible and appropriate to provide multimodal access to FWS facilities, and whether the scale and type of roadway is in line with local management objectives.

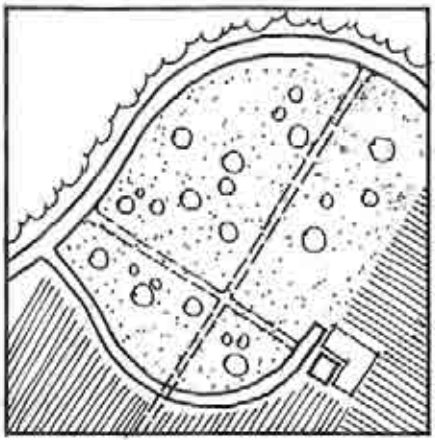
Wide gravel shoulder allows visitors to pull off of a 2-lane highway to view wildlife.

USFWS

PC-3 Evaluate Multiple Siting and Alignment Alternatives

Intent

Project teams should explore multiple design alternatives for roadway projects. A systematic alternatives evaluation process can be effectively used to arrive at a preferred alternative for further development. Alternatives development can reveal opportunities for projects to enhance visitor experience, protect wildlife, reduce ecological impacts to landscapes, minimize habitat fragmentation and provide alternative transportation methods. Reviewing a suite of alternatives will ensure that roadway decisions are compatible with the Service's mission and are made using the best possible information. The evaluation of alternatives will also support your NEPA process.



Explore and assess the effects of alternative road alignments.

Principles

- Determine if a roadway or road improvement is necessary
- Consider whether the roadway is in the right place
- Consider physical elements (e.g. hydrology), ecological effects (e.g. habitat fragmentation) as well as experiential factors (e.g. views, openness, arrival experience)
- Consider appropriateness of existing alignments versus potential alternatives
- Consider benefits or drawbacks of decommissioning existing facilities
- Determine how and when vehicles and people will move through the FWS managed lands
- Consider alternative modes of travel and potential for facility conversion, such as road to trail, trail in lieu of road, etc.
- Determine whether funding is tied to existing facilities

Metrics

- Comparison of road density for options considered
- Analysis of potential habitat fragmentation (e.g. vegetation or habitat mapping, wildlife tracking)

Resources

Case Studies.

Conboy Lake NWR, Visitor Experience Site Plan. Evaluated multiple vehicular and pedestrian circulation routes at HQ site. Contact Alex Schwartz, Project Manager (503/736 4723) for more information.

Umatilla NWR, McCormack Unit, Quarters Area Site Plan. Evaluated multiple roadway realignment concepts in conjunction with a new bunk house and residence. Contact Alex Schwartz, Project Manager.

Roadway design guidelines using applied ecology and experience.

Jones, Grant R., et al. 2007. Applying Visual Resource Assessment for Highway Planning (pp.130-139) and Road Alignment (pp.330-341).

A decommissioned roadway is restored with native vegetation.

SvR Design

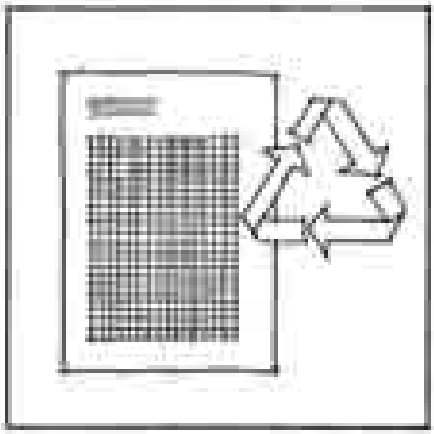
Evaluate Alternatives

Conceptual site planning at Conboy Lake NWR evaluated three different alternatives for roadways on the site.

PC-4 Assess Full Costs and Impacts of Transportation System

Intent

Examine the full suite of costs associated with a roadway project in addition to the traditional design and construction costs. Consider the environmental impacts of the construction process and materials used, as well as future maintenance needs and costs. Projects that make sense in the near-term may not be environmentally beneficial or economically tractable in the long-term. Consider both environmental and monetary costs. Check resources for assigning monetary value to environmental costs.



Examine the characteristics of materials used in a project, including embodied energy and recyclability.

Principles

- Environmental impacts should be considered
- Evaluate the embodied energy of materials used
- Minimize externalization of environmental impacts through emissions and materials used
- Include comparison of costs of facilities for alternative modes of transportation in analysis
- Consider projected maintenance costs (often 65% of life cycle cost of an asset)

Metrics

- Carbon footprint (or ecological footprint)
- Vehicle miles traveled
- Long-term maintenance costs
- Life of pavement and other materials
- Greenroads rating system
- Life cycle costing (of total costs for construction and maintenance of a proposed transportation alternative)

Resources

Overview of various systems of performance metrics.

AASHTO. 2008. Guidelines For Environmental Performance Measures. NCHRP 25-25, Task 23.

Performance metrics for CSS.

TransTech Mgmt., et al. 2004. Performance Measures for Context Sensitive Solutions - A Guidebook for State DOT's.

Info & data on sustainable material.

Calkins, Meg. 2009. Materials for Sustainable Sites.

Overview of climate change impacts on transportation infrastructure.

Transportation Research Board. 2008. Potential Impacts of Climate Change on US Transportation.

Sustainability metrics.

University of Washington and CH2MHill. 2009. Greenroads Rating System, v1.0. http://www.greenroads.us/.

Example of triple bottom line assessment of infrastructure.

Stratus Consulting. 2009. A Triple Bottom Line Assessment of Traditional and Green Infrastructure ... in Philadelphia's Watersheds.

Triple Bottom Line in Transportation Management

The triple bottom line concept originates in business and accounting practices. It stipulates three key areas or 'resources' that should be addressed in measuring sustainability:

- Society (human capital)
- Environment (natural capital)
- Economy (financial capital)

This concept, also known as "people, planet, profit," offers an expanded spectrum of values and criteria for measuring a project or organization's success. Using this perspective in transportation management means that you would not only consider the long-term economic costs and benefits of a project, but also account for potential environmental and social costs and benefits over time.

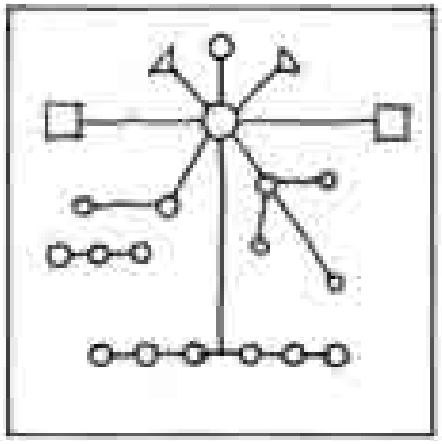
Road construction at Flint Hills NWR.

USFWS

PC-5 Communicate With Team and Stakeholders

Intent

Craft and document your approach for communications among your project team and with stakeholders. Ensure that roles and responsibilities are clearly defined in a project management plan. Carefully coordinate communications to help ensure consideration of a broad range of solutions in support of the best possible design outcome. Interdisciplinary project teams are the modern standard to ensure that work products are comprehensive and meet multiple objectives. Ensure that various elements of design are not overlooked and that there is organizational and public buy-in. Provide appropriate opportunities for involvement and review among your project team and stakeholders.



Develop a communications strategy and network.

Principles

- Address both internal and external communication needs in your project management plan
- Define clear roles and responsibilities for members of the project team
- Designate key agency contact(s) for all agencies/organizations involved
- Create a cross-functional (multi-disciplinary) team
- Develop design visualization and communication tools, such as graphics, plans, models, newsletters, web pages
- Identify the audience and develop solutions for communicating with people who don't read plans or technical documents
- Coordinate with transportation planning partners
- Contact Transportation Biologists in Ecological Services (ES) State Field Office to ensure project delivery is consistent with the mission of the Service
- Schedule project team meetings at regular intervals

Metrics

- Character and amount of public feedback on project
- Level of support and understanding of project within the organization
- Achievement of project goals

Resources

Guidelines for community and interdisciplinary planning process.

Lennertz, Bill, and Aarin Lutzenhiser. 2006. The Charrette Handbook. American Planning Association.

Case studies in collaborative management of wetlands and wildlife areas.

Porter, Douglas, and David Salvesen, eds. 1995. Collaborative Planning for Wetlands and Wildlife: Issues and Examples.

Public involvement for CSS.

Myerson, Deborah L., AICP, 1999. Getting It Right in the Right-of-Way: Citizen Participation in Context-Sensitive Highway Design. Scenic America. Available at: http://www.scenic.org/.

Public involvement for transportation projects.

Florida Department of Transportation. 2003. Public Involvement Handbook. Available at: http://www.dot.state.fl.us/EMO/pubs/public_involvement/pubinvolve.htm.

Members of Your Team

There are many professionals and stakeholder groups that you may want to include as part of your project team. Some possibilities include:

- Professional Engineers (PE)
- Landscape Architects (RLA)
- Transportation and Natural Resource Planners
- Field Biologists
- Project Leaders and Refuge Managers
- Refuge Roads Coordinators
- ES Transportation Biologists
- Representatives of other jurisdictions and agencies with local involvement

USFWS

Project staff and stakeholders meet in the field at Pelican Island NWR (right).

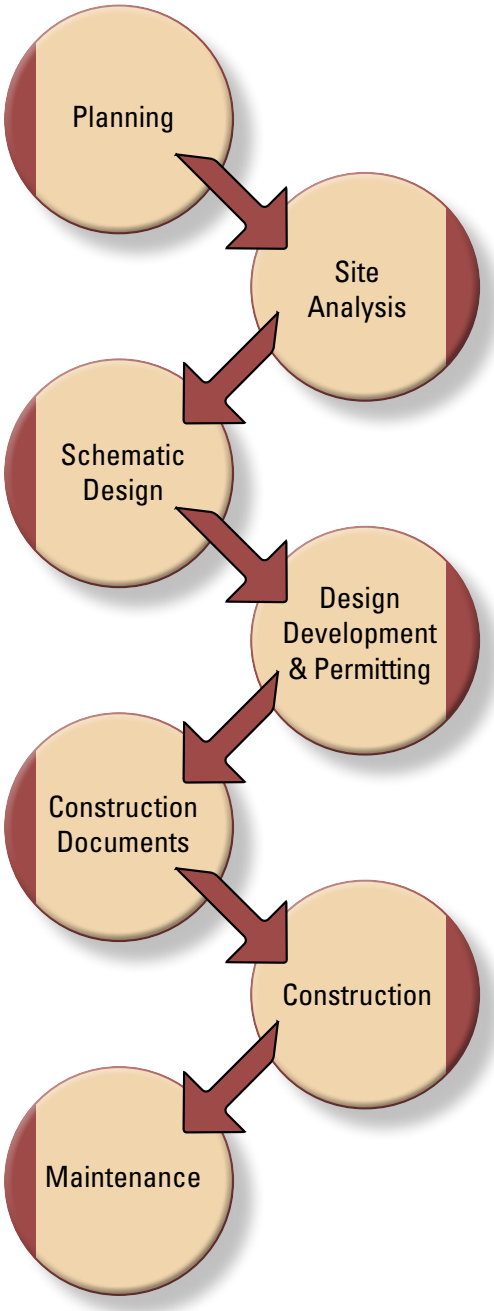
Design and Engineering

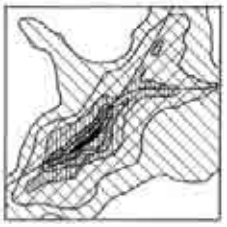
Design and Engineering
Overview

From Concept to Construction
This section recognizes that embedded in the technical aspects of a roadway project is the ability to directly support the mission of the Service. This section will guide you though a suite of considerations regarding the nuts and bolts of a roadway project, such as earthwork, alignment, safety, materials selections, vegetation preservation and management, construction practices and maintenance considerations.

Designing a complete roadway project includes using methods and materials that minimize the environmental impacts of the roadway and associated construction work. It also involves developing a design that leads the roadway to function more often as a restorative system, helping to heal previously impacted or damaged natural environments. Working with an interdisciplinary team can greatly facilitate a holistic design and engineering process. Early coordination through the FWCA, and the ESA can provide valuable insight and expedite permit processes. A roadway design process can be approached methodically, beginning with a broad vision and narrowing down to the technical details and ultimately construction activities to make it happen. In the end, the project should be implemented in a manner consistent with FWS goals, applicable laws, and ideally, such that there is a benefit to the conservation of listed species and other FWS trust resources.

Process - Design to Construction



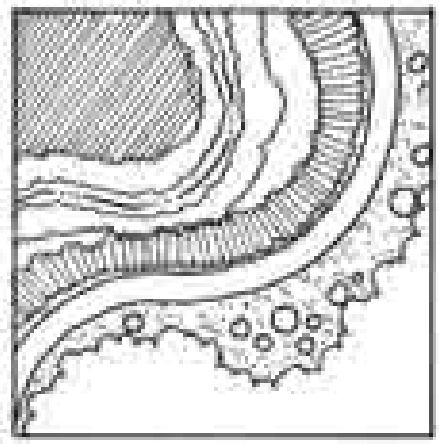






DE-1 Preserve and Restore Native Vegetation and Other Natural Resources

Intent

Roadway projects present opportunities to protect and restore native vegetation. Roadways commonly represent a barrier to wildlife and fragment habitat. However, roadway projects can represent an opportunity to heal historic wounds to a landscape and to ensure no further damage is done. Select roadway sites and alignments that avoid impacts to significant stands of existing vegetation. Look for restoration opportunities and consider what types of vegetation along roadway corridors are compatible with management goals.



Restored vegetation along road corridor can help support management goals.

Principles

- Explore ways to integrate restoration opportunities into project
- Consider how road surface conditions will affect nearby vegetation (e.g. dust, heat, other pollutants generated)
- Consider what types of vegetation and habitat along roadways will be compatible with management goals
- Use site prep and construction methods that protect and conserve existing native vegetation and natural resources
- Protect or stockpile and re-use healthy existing/native soils on site
- Protect heritage and other significant trees during and after construction (e.g. provide fencing, do not dig in or store material on top of root zones)
- Consider irrigation needs for establishing roadway vegetation
- Consider how invasive species will be managed during native vegetation establishment periods

Metrics

- Amount of post-construction restoration planned
- Vegetation surveys
- Reduced invasive species control needs

Resources

Regional guidelines for roadside development.

ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Comprehensive guidebook on roadside revegetation.

FHWA. 2007. Roadside Revegetation: An Integrated Approach to Establishing Native Plants.

New technology to minimize pile-driving construction impacts to aquatic organisms.

Reyff, James. 2009. Reducing Underwater Sounds with Air Bubble Curtains.

Road alignment at Nestucca Bay NWR preserves upland vegetation and forest.

Alex Schwartz/USFWS

This roadway project at Steigerwald NWR required integration of native vegetation restoration (right). The planting plan was prepared by a registered landscape architect. The plants were installed by a licensed landscape contractor. Work included a temporary irrigation system and a 1-year maintenance and warranty period.

Brian Bainnson

DE-2 Consider and Plan for Invasive Species Management

Intent

Invasive species are a major issue for habitat restoration and wildlife management efforts. Roadways often serve as a significant vector for the spread of invasive species. Thus, particular attention must be paid to this issue in the planning, design and maintenance of road corridors and road networks.

Principles

- Inventory invasive species in the region that are already present and what steps have been taken to combat their spread
- Ensure that planting plans feature plant species and densities, as well as establishment techniques to limit future invasive establishment
- Consider latest tools and techniques available to combat spread of invasive species
- Examine relevant state and regional lists of invasive species threats
- Search for and consider lessons from other relevant projects, based on similar ecosystems and/or similar project types
- Develop pre-project baselines to measure success of future management goals
- Address and plan for invasive species management during construction and general use
- Create an invasive species management plan following local Best Management Practices (BMPs), addressing both roadside and adjoining habitats
- Minimize disturbance and project footprint, including mobilization and staging areas

Metrics

- Invasive species survey data
- Staff time dedicated to invasive species management (and how that changes over time)

Resources

Invasive species along roadways from the perspective of road and landscape ecology (see Chapter 4, pp. 75-111).

Forman, Richard, et al. 2003. Road Ecology: Science and Solutions.

Establishment and maintenance of native plants along roadways.

Harper-Lore, Bonnie and Maggie Wilson, editors. 2000. Roadside Use of Native Plants. Available online at: http://www.fhwa.dot.gov/environment/rdsduse/index.htm.

FHWA. 2007. Roadside Revegetation: An Integrated Approach to Establishing Native Plants.

Guidance on roadside weed management.

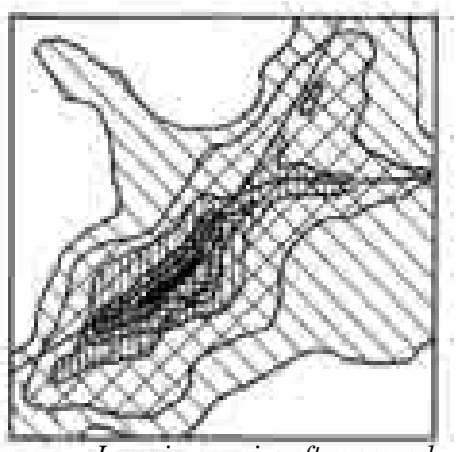
Ferguson, Leslie, C. L. Duncan and K. Snodgrass. 2003. Backcountry Road Maintenance and Weed Management.

Comprehensive list of roadside vegetation management resources.

Center for Environmental Excellence by AASHTO - Invasive Species/Vegetation Management, Reseach, Documents & Reports web page. See: http://environment.transportation.org/environmental_issues/invasive_species/docs_reports.aspx.

List of many resources on controlling invasive species, from construction best practices to ongoing maintenance.

Wisconsin Department of Transportation (WisDOT). 2003. Best Practices for Control of Invasive Plant Species.



Invasive species often spread outward from roadways.

Selected Steps for Invasive Species Management

- Post-construction maintenance plan
- Minimize disturbance
- Retain shade to the extent possible
- Know the quality of topsoil and mulch; avoid importing contaminated topsoils
- Know the quality of seed sources
- Clean equipment that has had contact with weed sources
- Over-sow disturbed areas with native seeds
- Avoid nitrogen fertilizers in the first year

List adapted from FHWA Roadside Revegetation Manual. See section 5.8 in manual.

Ryan Hagerty/USFWS

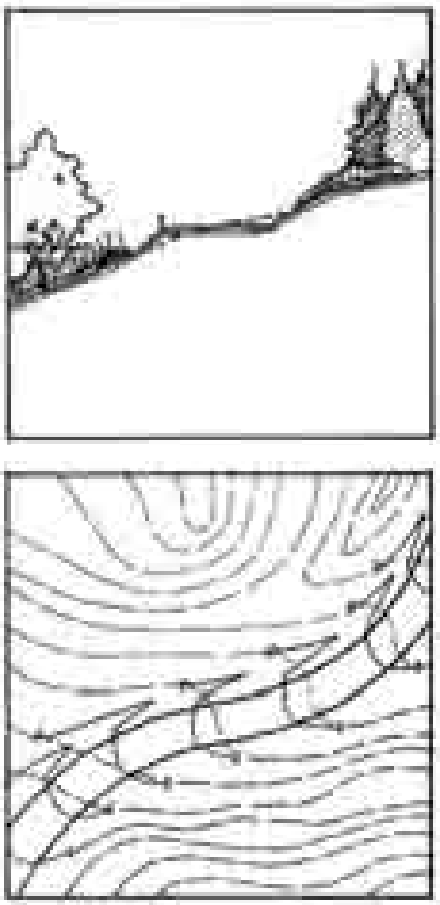
Controlling invasive species after their spread can be labor-intensive; spraying melaluka in FL (right).

DE-3 Minimize Cut and Fill to Fit With Existing Landscape

Intent

Roadways can be designed to fit with natural topography and seamlessly integrate with the landscape character. By studying the natural topography, designers can attempt to select a road alignment that will take advantage of views, while also minimizing the visual impact of the road itself. Conforming to the natural topography can minimize interruptions to the natural hydrology, and may help to preserve other important natural features, vegetation and habitat.

Elevated structures are often preferable for wildlife and habitat connectivity, and should be considered where possible. If that results in a cut/fill imbalance then seek innovative ways to use fill material. Examples include using excess fill material to construct pullouts, scenic viewpoints, and trailheads. Earthwork considerations discussed in this guideline are appropriate for both new construction projects and alterations or improvements to existing roadways.



Fitting in with existing topography is key to minimizing impacts.

Principles

- Consider roadway alignments that will minimize and balance cut and fill volumes
- Consider alternative structures to reduce fill volumes (e.g. bridge vs. culvert, etc.)
- Use roadways to highlight Refuge habitats as they follow existing terrain
- Look for continued opportunities to minimize and improve "aesthetic wounds"

Metrics

- Earthwork volumes per mile (compare to similar projects)
- Balanced cut and fill volumes
- Visual resources assessment

Resources

See cut and fill guideline on page 83.

USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Case study on context sensitive solutions (CSS) for scenic highway.

Kentucky Transportation Center. Undated. Context-Sensitive Design Case Study No. 1: Paris Pike - Kentucky. College of Engineering, University of Kentucky. Lexington, KY.

Guidelines on appropriate lower-impact road alignment.

Jones, Grant R., et al. 2007. Applying Visual Resource Assessment for Highway Planning (pp.130-139) and Road Alignment (pp.330-341). In Landscape Architecture Graphic Standards. Hoboken, New Jersey: John Wiley & Sons. Available at: http://www.jonesandjones.com/news/publications.html.

Road design guidelines.

FHWA. Undated. Flexibility in Highway Design. FHWA Pub. No. FHWA-PD-97-062. Found at: http://www.fhwa.dot.gov/environment/flex/index.htm.

Common standard on roadway design.

AASHTO. 2004. AASHTO A Policy on Geometric Design of Highways and Streets, 5th Edition (aka 'Green Book). Washington, D.C.

Guidelines for design of very low volume roadways.

AASHTO. 2001. Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400), 1st Edition. Washington, D.C.

Gravel roads maintenance and design.

Skorseth and Selim. 2000. Gravel Roads Maintenance and Design Manual. South Dakota Local Transportation Assistance Program (USDOT - FHWA).

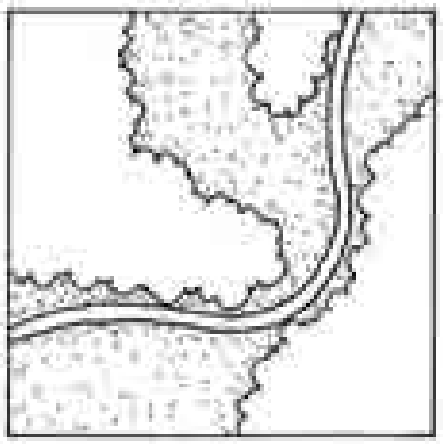
Roadway terraced along hillside at Hart Mountain NWR responds to opportunities and constraints of the topography

Fort Photo/Flickr.com

DE-4 Consider Road Geometries for Lower Speeds, Safety and Alertness

Intent

Low speeds can help protect wildlife, increase the value of roadside habitat and provide a greater degree of safety for all roadway users. In addition to improved safety for wildlife and roadway users, low travel speeds are compatible with the Big Six public uses. Low road speeds help to encourage alternative modes of transportation, including walking and bicycling. Lower actual speeds are achieved through deliberate roadway geometry and design, not simply signage.



Curving roads with varying views can promote alertness and lower speeds.

Principles

- Road alignments may include continuous curves, spiral curves, curving alignment, etc. in order to support safety and alertness
- Consider how curvilinear road geometries achieve multiple objectives and can specifically support habitat and wildlife management goals
- Consider the effect of road surface on travel speeds
- Determine and design around a roadway 'design speed' so that people will *want* to drive slower
- Consider safety and engineering standards that are applicable to the roadway's context

Metrics

- Road speed and volume study
- Accident reports
- Visual resources assessment
- Balanced cut and fill volumes
- Protection of vegetation and habitat
- FHWA Road Safety Audit

Resources

Design guidance based on human behavior patterns.

Transportation Research Board of The National Academies. 2008. Human Factors Guidelines for Road Systems.

Guidelines on appropriate lower-impact road alignment.

Jones, Grant R., et al. 2007. Applying Visual Resource Assessment for Highway Planning (pp.130-139) and Road Alignment (pp.330-341). In Landscape Architecture Graphic Standards. Hoboken, New Jersey: John Wiley & Sons. Available at: http://www.jonesandjones.com/news/publications.html.

Road design guidelines.

FHWA. Undated. Flexibility in Highway Design. Access at: http://www.fhwa.dot.gov/environment/flex/index.htm.

Standards for roadway design.

AASHTO. 2004. AASHTO A Policy on Geometric Design of Highways and Streets, 5th Edition (aka 'Green Book).

Handbook with design guidance on appropriate construction techniques for low traffic volume roads.

Weaver, William and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

Curving roadway at Nestucca Bay NWR highlights scenery and discourages high speeds (top); emergency personnel respond to an accident at Ridgefield NWR (bottom).

Alex Schwartz/USFWS

USFWS

DE-5 Consider Construction Impacts and Best Practices

Intent

Roadway construction can have major impacts to terrestrial and aquatic organisms, as well as to environmental quality. Appropriate project planning, project management and construction management should be applied to ensure that impacts from construction activities are minimized and acceptable. The overall project footprint should be minimized as much as possible, especially with regard to construction activities such as staging materials and equipment.

Principles

- Consider appropriate season for construction
- Minimize construction impacts to terrestrial and aquatic organisms
- Implement construction best practices, such as dust and erosion control
- Look for staging opportunities that use existing developed sites and minimize impact to adjacent habitat areas
- Consider impacts of construction needs, such as water, on the surrounding environment
- Consider how construction elements, such as water wells, could be used for staff and visitor services in the future

Metrics

- Changes in population counts or behavior (e.g. breeding) of local organisms
- Visible signs of disturbance beyond limits of work
- Compliance with erosion control plan elements

Resources

Handbook with design guidance on appropriate construction techniques for low traffic volume roads.

Weaver, William and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

Good checklist for items to address or consider.

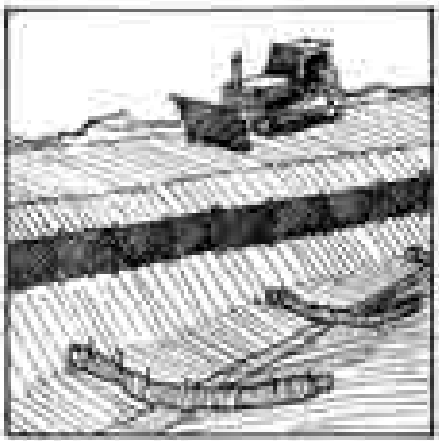
ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Guidelines with resources on environmentally-friendly construction practices.

University of Washington and CH2MHill. 2009. Greenroads Rating System, v1.0. http://www.greenroads.us/.

New technology to minimize pile-driving construction impacts to aquatic organisms.

Reyff, James. 2009. Reducing Underwater Sounds with Air Bubble Curtains.



Standard practices such as using silt fencing help reduce construction impacts to adjacent habitat.

Construction on an entry road, parking lot, and trailhead project at Steigerwald NWR, in partnership with FHWA's Federal Lands Highways program. Project required extensive multidisciplinary planning, design, and construction expertise to ensure implementation of best construction practices and minimization of habitat and scenic area disturbance.

FHWA

BMPs: Best Management Practices

Best management practices are methods that have been determined to be the most effective and practical means of preventing or reducing a project's short- and long-term environmental impacts. BMPs focus on prescriptive measures, typically in the construction and maintenance phases of a project. Design Guidelines are more general and require interpretation and adaptation.

BMPs available for roadway construction projects include:

- Erosion control
- Equipment and operation
- Noise and emissions
- Spill and Pollution Prevention
- Safety

DE-6 Consider Range and Sources of Materials for Sustainable Construction

Intent

There are numerous options available for materials that have sustainable characteristics. Consider selecting materials with lower embodied energy and carbon footprints, recycled content, high durability, and which have a high level of environmental performance. Using sustainable materials can achieve compliance with the Service's environmental and performance goals, as well as save money in the long term. Even existing roadway materials can be effectively recycled into a new project, including asphalt, aggregates and fill material.

Principles

- Identify range of materials that would be suitable or possible to use in a given project
- Consider various qualities of material options, including environmental performance, longevity, maintenance needs and aesthetic fit
- Study past performance and success of materials in other sites (case studies)
- Consider using materials that are certified for sustainability
- Consider paying more for a more durable material that may save money (through performance and maintenance) in the long run
- Source materials locally where possible

Metrics

- Embodied energy calculations
- Runoff discharge rates

Resources

See materials listed in Greenroads Guidelines.

University of Washington and CH2MHill. 2009. Greenroads Rating System, v1.0. http://www.greenroads.us/.

Check on embodied energy of proposed materials at University of Bath's Inventory of Carbon & Energy (ICE) Wiki.

See: http://wiki.bath.ac.uk/display/ICE/Home+Page.

The Sustainable Sites Initiative (SSI) provides resources and guidelines for materials and site development.

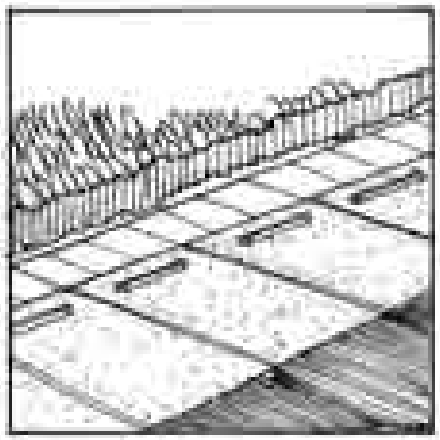
See: http://www.sustainablesites.org/.

For sites that include buildings, calculate the project's carbon footprint at BuildCarbonNeutral.

See: http://buildcarbonneutral.org.

Information and data on sustainable materials.

Calkins, Meg. 2009. Materials for Sustainable Sites.



Materials may vary for travel lanes, parking stalls and pedestrian pathways.

A parking lot at Tualatin River NWR used warm mix asphalt for main travel ways, pervious pavers in parking stalls and features a bioswale with amended soils and native plants to cleanse stormwater in order to protect habitat (top); local and sustainable materials were used to construct an Auto Tour pullout / wildlife viewing area at Modoc NWR (bottom).

Brain Baimson

Steve Clay/USFWS

Embodied Energy and Carbon Footprints

Embodied energy is generally defined as the energy (commercial and industrial) that was used to make a product. It generally includes the energy used to deliver the product to its point of use or consumption, and may also include any energy needed for the deconstruction and disposal of the product. It is commonly measured in megajoules of energy per kilogram of product (MJ/kg).

A carbon footprint is a similar metric, which measures the total amount of greenhouse gas emissions caused by a product. It is often expressed in terms of tons of CO_2 produced per kilogram of product (tCO_2/kg).

DE-7 Consider Maintenance

Intent

When planning a new roadway or retrofits to existing facilities, it is important to anticipate both short- and long-term maintenance needs. During the design phase, consider whether anticipated maintenance of potential designs is realistic, given existing or likely future budgets, staff training and skills, and other related factors. To be successful in their purpose, new types of materials (e.g. pervious paving) or facilities (e.g. wildlife underpasses or signals) may have new maintenance needs requiring staff training. Consider also that regular maintenance practices can extend the life of a facility. Weigh the pros and cons of potentially higher first costs with the benefit of lower life cycle maintenance costs for durable projects.

Consider trade-offs between longevity and maintenance needs.

Principles

- Examine current maintenance budgets, responsibilities and staff availability in concert with partners
- Estimate increase or reduction of maintenance needs for new facilities
- Consider current skills of maintenance staff and what types of training may be needed
- Consider whether contractors would be required to complete maintenance activities
- Be aware of concerns about adopting new practices, and be prepared to understand and address the concerns of operations and maintenance staff
- Provide achievable and responsive BMPs
- Discuss early in project who is responsible for repairs and maintenance to wildlife-specific facilities such as fencing
- Consider maintenance partnerships with State and County Transportation Dept's to leverage their transportation resources and expertise
- Consider the impacts of chemicals or other products that are used in roadway maintenance

Metrics

- Historic vs. current maintenance costs
- Road closure data
- BMPs correctly applied in field

Resources

Handbook with design guidance on construction and maintenance techniques for low traffic volume roads.

Weaver, William and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

Good checklist for items to address or consider.

ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Gravel roads maintenance & design.

Skorseth and Selim. 2000. Gravel Roads Maintenance and Design Manual. South Dakota Local Transportation Assistance Program (USDOT - FHWA).

BMPs for rural road maintenance.

Smith, Stacy (Idaho Technology Transfer Center, Univ. of Idaho). 2005. BMP Handbook: Best Management Practices for Idaho Rural Road Maintenance.

Roadside vegetation management.

WSDOT. 1997. Integrated Vegetation Management for Roadsides.

Maintenance guidelines for sensitive areas.

Crane, Bill. 2006. Road Maintenance with Threatened, Endangered, or Sensitive Plants: Finding Solutions.

Maintenance guidelines.

Ruiz, Leo. 2005. Guidelines for Road Maintenance Levels.

Fire being used for maintenance of roadside vegetation

USFWS

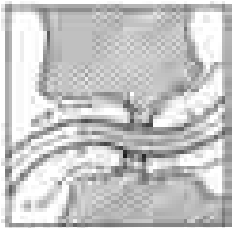
Organism Passage

Organism Passage
Overview

Terrestrial and Aquatic Passage
The conservation of fish, wildlife, plants and their habitats is the primary FWS mission. Roadways have major impacts on terrestrial and aquatic organisms. Roadways create barriers to wildlife movement and fragment habitat. Ensuring that organisms are able to safely move across (either over or under) roadways to meet basic life requisites is imperative to meeting the Service's mission.

This section is intended to help direct you to guidance and resources for improving terrestrial and aquatic organism passage. The guidelines in this section reflect the growing body of science that documents the need for wildlife-sensitive planning, design, engineering, and construction of roadways. Recognizing the highly site- and species-specific nature of aquatic and terrestrial passage issues, you are particularly encouraged to seek out resources on regionally-appropriate techniques to facilitate passage of terrestrial and aquatic organisms. In areas where ESA listed species or critical habitat may benefit from a passage improvement, additional conservation measures may be warranted during both the design and construction phases.

Addressing organism passage issues on FWS managed lands is an emerging priority for the Service which these guidelines are intended to support. At present, addressing organism passage issues on FWS lands is most realistic in conjunction with high priority infrastructure projects such as bridge replacements. A future possibility is that projects intended to specifically address organism passage will be eligible for Refuge Roads funding.



OP-1 Develop Your Corridor Plan for Crossing

Intent

It is important to develop a comprehensive plan to address aquatic and terrestrial connectivity along a roadway. Corridor level plans are necessary to document habitat fragmentation, lack of stream continuity, population level roadway avoidance effects and wildlife-vehicle collisions (WVC). In addition to identifying the ecological impacts a roadway is having on organisms, plans should identify funding opportunities and partnerships in support of recommended mitigation measures. Successful plans identify target species and crossing "hot spots". Prioritize your specific individual crossing projects and include conceptual design documentation for crossing structures and supporting mitigation measures.

Principles

- Develop organizational partnerships
- Solicit expert review and input; wildlife crossing structures require expert design and review
- Monitor to locate roadkill hotspots but consider how roads change animal movements (avoidance)
- Identify target species based on management objectives
- Consider how crossing needs align with other transportation priorities and budgets
- Consider species' home range size and seasonal movements to determine extent of passage needed
- Consider how current or future roadway design speed and traffic volumes may impact wildlife

Metrics

- Safety (animal/vehicle collision reductions)
- Species population health
- Dispersal capability
- Daily/seasonal movement necessary to meet life requisites

Resources

Latest information on road ecology as it relates to mitigating interactions between roads and wildlife.

Beckmann, J. P., A. P. Clevenger, M. P. Huijser, and J. A. Hilty. 2010. Safe Passages.

Coordinating aquatic and terrestrial passage opportunities.

Jacobson et al. 2007. Combining Aquatic and Terrestrial Passage Design into a Continuous Discipline.

Effectiveness of various wildlife crossing facilities.

Transportation Research Board of The National Academies. 2008. Evaluation and the Use and Effectiveness of Wildlife Crossings (NCHRP Report 615).

Best practices for reduction of WVC.

FHWA. 2008. Wildlife-Vehicle Collision Reduction Study, Best Practices Manual. Access at http://www.fhwa.dot.gov/environment/hconnect/wvc/index.htm.

Guidance on reduction of WVC.

FHWA. 2008. Wildlife-Vehicle Collision Reduction Study, Report to Congress. Access at http://www.fhwa.dot.gov/publications/research/safety/08034/index.cfm.

Effects of roadways on wildlife (see entire Conservation Biology issue).

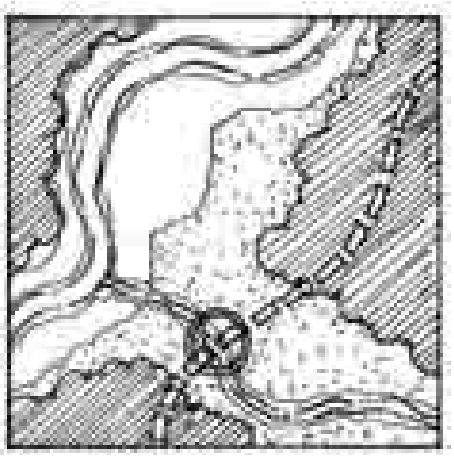
Trombulak, Stephen and C. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities.

Background research on roadway impacts to wildlife.

Mader, Sharon. 2006. Comparing the Ecological Effects of Linear Developments on Terrestrial Mammals.

See list of crossing issues by state, by FWS national Refuge Roads Coordinator (unpublished).

Wildlife Crossing and Aquatic Organism Passage Issues by State.



Examine the roadway corridor for locations where organisms would prefer to cross in the absence of a roadway. Study topography, vegetation patterns and hydrology along the corridor.

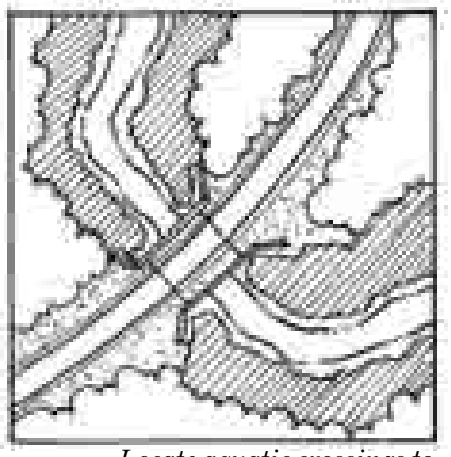
A corridor management and wildlife crossing plan is a critical tool to plan and fund projects; map showing monitoring locations for crossing plan study (below).

Robert Henke et al.

OP-2 Provide and Enhance Aquatic Organism Crossings

Intent

Roads, streams and rivers are similar systems in that they all transport material and organisms across the landscape in a linear fashion. Stream and river functions, such as the movement of woody debris, sediment transport and fish and wildlife passage have historically been impeded by engineering solutions intended to minimize disruptions to roadway infrastructure. Recognizing the importance of aquatic resources on FWS managed lands, an ecosystem-based approach to aquatic organism passage focuses on maintaining the continuity of a stream or river's characteristics where that system intersects a roadway.



Locate aquatic crossings to minimize interruption to normal stream flow and channel migration.

Principles

- Consider and design for long-range traffic volume projections for road
- Consider seasonality of wildlife movement and stream flows
- Develop list of target species for aquatic organism passage and focus planning and design efforts on supporting overall ecosystem health
- Consider range of stream crossing solutions and techniques
- Culverts or bridges that mimic the slope, structure and dimensions of the natural stream bed can allow aquatic species to freely move under roadways
- Plan for appropriate post-construction riparian and streambed restoration work
- Consider maintenance needs for various stream crossing designs
- Plan for appropriate in-water work windows
- Consider how to best complete road maintenance activities at or near stream crossings in order to avoid impacts to water quality

Metrics

- Surveys to show healthy passage of aquatic organisms
- Water quality measurements (upstream vs. downstream)
- Re-colonization of upstream habitat by aquatic organisms (in cases of improving/upgrading existing crossings)

Resources

Analysis & costs of culvert design and aquatic organism passage.

MN Dept. of Transportation. 2009. Cost Analysis of Alternative Culvert Installation Practices in Minnesota.

Design guidelines and best practices for aquatic organism passage.

USDA Forest Service. 2008. Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings.

Bridge construction guidance.

AZ Game and Fish Dept., Habitat Branch. 2008. Guidelines for Bridge Construction or Maintenance to Accommodate Fish & Wildlife Movement and Passage.

Riparian restoration guidance.

USDA Forest Service. 2002. Management Techniques for Riparian Restorations (Roads Field Guide, Volume II).

Design guidelines for stream crossings and proper road drainage.

William Weaver and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

See list of crossing issues by state, by FWS national Refuge Roads Coordinator (unpublished).

Wildlife Crossing and Aquatic Organism Passage Issues by State.

See aquatic organism passage in:

Proceedings of International Conference on Ecology and Transportation (ICOET). Access online at: http://www.icoet.net/.

Site visit to a new aquatic crossing structure during a Refuge Roads coordination meeting at Kenai NWR (top); viability for many aquatic species, such as salmon, depend on their ability to move through river and stream ecosystems (bottom).

John Sauer/USFWS

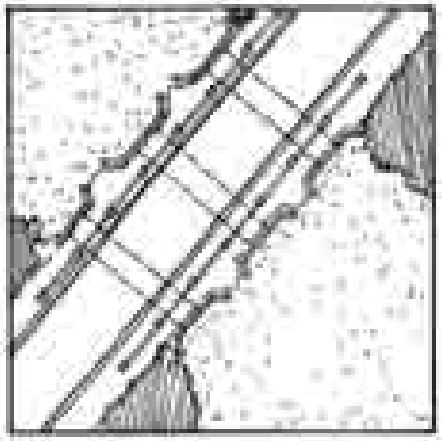
Florian Schulz

OP-3 Provide and Enhance Terrestrial Wildlife Crossings

Intent

Roadways are a significant barrier and danger for terrestrial organisms. When terrestrial organisms attempt to cross roadways in order to meet life requisites, fatalities and injuries can result for both wildlife and humans. If wildlife-vehicle collisions (WVC) regularly take place along a roadway, this is a good indicator of the need for mitigation. Another less visible effect of habitat fragmentation caused by roadways is avoidance behaviors that can have significant effects on populations.

The most effective mitigation measure to reduce WVC and to enhance terrestrial organism passage across roadways is to design and construct suitable crossing structures, in combination with barrier and diversion fencing, where appropriate. It is important to remember that every species is impacted by roadways in different ways. Terrestrial crossing projects can seek to meet multiple ecosystem connectivity objectives simultaneously.



Terrestrial wildlife crossings provide safer crossings for wildlife and connect fragmented habitat patches.

Principles

- Identify design species and their crossing structure needs; design crossings that work for as many species as possible
- Consider and design for long-range traffic volume projections for roadway
- Consider visual quality and aesthetic impact of structures
- Improve nearby habitat for wildlife, especially areas leading to or connecting with crossings
- Maximize opportunity for restoration project links to crossing/connectivity sites
- Consider "right crossing, right place" when locating crossings
- Review the corridor management or crossing plan
- Bridge replacements are the best opportunity in a 50-70 year time frame to create movement opportunities and should be taken advantage of even if no other projects are in the area

Metrics

- Evidence of unmet need to cross
- Improved wildlife counts in adjacent areas after crossing implementation
- Improved wildlife dispersal rates
- Reduction in WVC

Resources

Bridge construction guidance.

AZ Game and Fish Dept., Habitat Branch. 2008. Guidelines for Bridge Construction or Maintenance to Accommodate Fish & Wildlife Movement and Passage.

Wildlife crossing structures and fencing effectiveness evaluation.

Hardy et al, Western Transportation Institute. 2007. Evaluation of Wildlife Crossing Structures and Fencing US Hwy 93 Evaro to Polson.

Effectiveness of various wildlife crossing types.

Transportation Research Board of The National Academies. 2008. Evaluation and the Use and Effectiveness of Wildlife Crossings.

Best practices for WVC reduction.

FHWA. 2008. Wildlife-Vehicle Collision Reduction Study, Best Practices Manual.

Guidance on reduction of WVC.

FHWA. 2008. Wildlife-Vehicle Collision Reduction Study, Report to Congress.

See FWS Refuge Roads Coordinator list of crossing issues by state (unpublished).

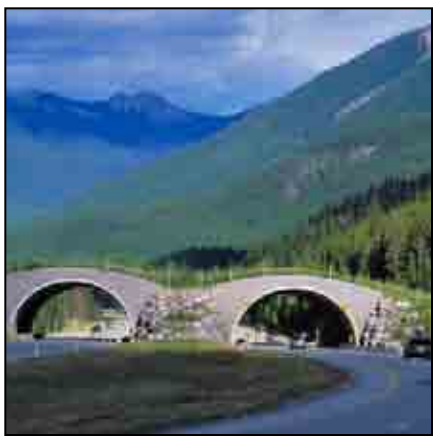
Wildlife Crossing and Aquatic Organism Passage Issues by State.

See crossing structure design in:

Proceedings of International Conference on Ecology and Transportation (ICOET). Access online at: http://www.icoet.net/.

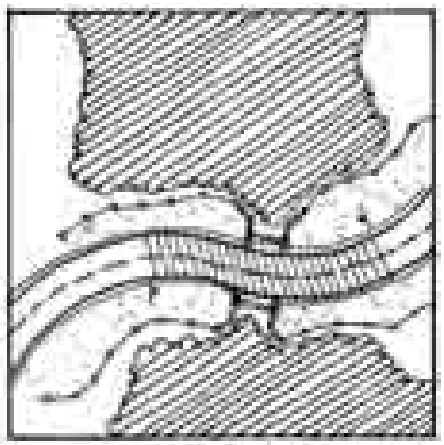
Bridge replacements are excellent opportunities to enhance terrestrial crossing opportunities (top); a wildlife overcrossing in Banff NP, Canada has successfully improved both safety and wildlife movement (bottom).

Brian Baimson



Florian Schulz

OP-4 Evaluate Need for Wildlife Fencing and Other Guiding Features



Fencing can help guide wildlife to safer crossing areas.

Intent

Wildlife-vehicle collisions (WVC) can be reduced through the use of barrier and diversion fencing or other features that help guide wildlife to crossing structures, including overpasses or underpasses. Effective wildlife barrier and diversion fencing forces animals off the road and into a crossing structure. In order for a crossing structure to be effective, it needs to be designed in conjunction with fencing. Project teams should consider aesthetics, where to end fencing and how fencing relates to topographical features in the landscape. Fencing design is highly species-specific and should be designed in consultation with an expert.

Barrier and diversion fencing requires maintenance. Successful projects account for maintenance concerns and budgets during the design phase. Fencing discussions might include a consideration of how to handle fence ends. Where to end a fence has major safety implications. It is a difficult decision, and is best done in consultation with an expert.

Principles

- Study WVC or other interactions along the corridor
- Recognize that fencing is a last resort option, and that the outcomes can be deadly for wildlife inadvertently trapped on a roadway
- Design fencing treatments based on species and environmental conditions
- Include escape structures in the design; jumpouts are more effective than the commonly used one-way gates
- To avoid "end run" WVC, end fencing beyond prime habitat areas *or* at locations with good visibility
- Boulder piles can act as a maintenance-free fence for ungulates
- Consider how best to accommodate multiple species
- Consider the aesthetic impacts of wildlife fencing
- Consider how to handle fencing at access roads

Metrics

- WVC counts
- Reduction in wildlife mortality due to WVC

Resources

BMPs for reduction of WVC.

FHWA. 2008. Best Practices Manual, Wildlife Vehicle Collision Reduction Study (Report to Congress). Found at http://www.fhwa.dot.gov/environment/hconnect/wvc/index.htm.

Wildlife crossing structures and fencing effectiveness evaluation.

Hardy et al, Western Transportation Institute. 2007. Evaluation of Wildlife Crossing Structures and Fencing on US Hwy 93 Evaro to Polson.

Effectiveness of various wildlife crossing types.

Transportation Research Board of The National Academies. 2008. Evaluation and the Use and Effectiveness of Wildlife Crossings (NCHRP Report 615).

Website with additional guidelines and case studies of construction and maintenance practices to benefit wildlife along roadways.

FHWA - Keeping It Simple: Easy Ways to Help Wildlife Along Roads. See: http://www.fhwa.dot.gov/environment/wildlifeprotection/index.cfm.

Continuous page wire fencing is commonly used to keep wildlife off roads and to direct them to crossing structures (top); jumpouts are essential features to allow trapped animals to leave the road whenever continuous fencing is used (bottom).

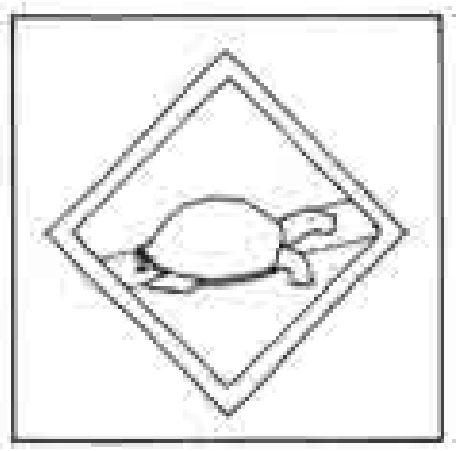
lisahends/Flickr.com

USFWS

OP-5 Consider Warning and Safety Systems for Drivers

Intent

An important component of facilitating terrestrial organism passage is promoting adequate awareness and caution on the part of drivers. Various systems exist to warn drivers of the presence of wildlife on a roadway. These systems include static signs to alert drivers to zones where wildlife typically cross roadways as well as flashing lights or other signals that respond to the presence of wildlife near the roadway. The most effective signage systems are active warning systems. Static warning signs, if strategically placed and well designed, can improve public awareness and may be a good fit for low volume roads.



Warning signs can help remind drivers to look out for wildlife on the road.

Principles

- Select the appropriate type of signage for the species, roadway LOS and site conditions
- Provide public information on the crossing design and intent
- Consider active warning systems for "end runs" of fencing, crossing hot spots and as temporary mitigation measures in the absence of crossing structures
- Consider the related benefits of communicating crossing and habitat areas, such as public education and communicating stewardship

Metrics

- Wildlife-vehicle collision (WVC) statistics (note that these are a better measure of safety than ecological conditions; even then, they are suspect unless expertly interpreted)

Resources

BMPs for reduction of WVC.

FHWA. 2008. Best Practices Manual, Wildlife Vehicle Collision Reduction Study (Report to Congress). Found at http://www.fhwa.dot.gov/environment/hconnect/wvc/index.htm.

Wildlife crossing structures and fencing effectiveness evaluation.

Hardy et al, Western Transportation Institute. 2007. Evaluation of Wildlife Crossing Structures and Fencing on US Hwy 93 Evaro to Polson.

Research on effectiveness of methods for collision reduction.

Huijser et al, and Salsman and Wilson. 2006. Animal Vehicle Crash Mitigation Using Advanced Technology, Phase I: Review, Design And Implementation, SPR-3(076).

In areas where wildlife is known to cross roadways, active warning systems can be effective to alert drivers to the presence of wildlife on or near a roadway.

Florian Schulz

Stormwater Management

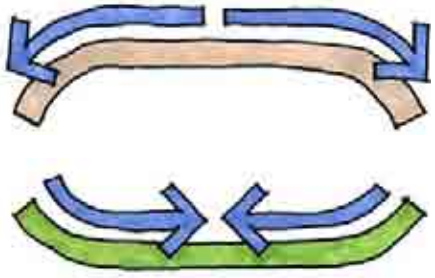
Stormwater Management
Overview

Cleaning Water, Improving Habitat
It is important to consider what happens to stormwater runoff along the entire roadway. Runoff from roadways on FWS managed lands may deliver chemical pollutants and sediment to surface and ground water. Roadways have a profound effect on the hydrology of a given site and watershed. Impervious surfaces increase runoff rates, volumes, temperature and duration. Roadway surfaces can concentrate flows, creating unnatural flow regimes that impact adjacent lands and lead to cumulative impacts downstream at the watershed scale, such as erosion and flooding.

This section discusses sustainable stormwater management techniques and points you to educational resources and guidelines on their design, construction and maintenance. Such techniques can help to clean stormwater runoff from roadways, filtering out particulates and other pollutants. They can also slow flows and detain water during peak storm events, restoring more natural flows to adjacent water bodies. A common term used to describe this approach to stormwater management is low impact development (LID). LID emphasizes conservation and the use of existing natural site features, integrated with distributed, small-scale stormwater controls to more closely mimic natural hydrologic patterns.

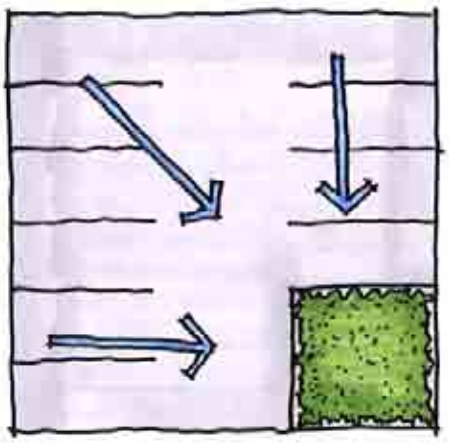
LID techniques include various features known collectively as natural drainage systems (NDS). These rely mainly on plantings, amended soils and other natural materials to treat, detain and retain stormwater runoff; these are often referred to as bioretention. Bioretention features include bioswales and rain gardens. Areas dedicated to NDS serve to buffer high value habitat from ecological disturbances caused by roadway infrastructure. Natural drainage features may also provide screening or visual buffering—functions that are often desirable when separating uses on a site or landscape.

NDS should be designed and implemented with care, so as to be compatible with habitat management goals. Concerns about their use include drawing wildlife closer to roadways through habitat creation (potentially causing increased negative animal-vehicle interactions), and the possibility of concentrating roadway pollutants into specific areas at levels that may be harmful to wildlife. These are important concerns to address, and care should be taken that each facility is designed to meet site-specific concerns.

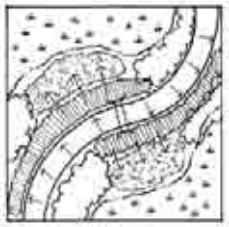


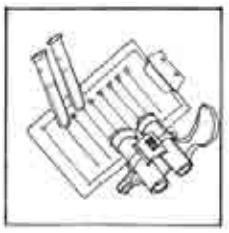
Typical facilities disperse runoff without treatment (top), while an LID approach detains and cleans water on site (bottom)

LID Philosophy
LID asks us to nurture stormwater rather than dispose of it. NDS features van help to achieve this.



Typical NDS Sizing
An NDS feature such as a bioretention area typically requires an area of only 10% of the impervious area it is designed to treat.





SM-1 Buffer Habitat from Polluted Runoff

Intent

Runoff from roadways can carry unwanted pollutants into adjacent streams and water bodies. It can also adversely affect (increase) the temperature of receiving water bodies. Methods for reducing pollution (chemical, particulate and temperature) should be considered and used to minimize or eliminate water quality issues roadway runoff. Treatment facilities in the right-of-way can also serve to intercept and improve the quality of runoff water from other nearby sources.

Principles

- Adhere to a low impact development (LID) strategy in planning and designing repairs and improvements
- Consider natural drainage system (NDS) treatment facilities, including filter strips and bioswales
- Stormwater treatment facilities and approach need to be site-specific
- Consider appropriate NDS features for the type of roadway—parking, auto tour route, entry/access road, highway, etc.
- Look at hydrology planning in the area and be aware of roadway impacts on it

Metrics

- Water quality testing
- Temperature monitoring

Resources

Design guidelines for LID features.

US Dept. of Defense. 2004. Unified Facilities Criteria (UFC) - Design: Low Impact Development.

LID guidelines for Pacific NW.

Hinman, Curtis. 2005. Low Impact Development: Technical Guidance Manual for Puget Sound. Puget Sound Action Team. Access at: http://www.psparchives.com/publications/our_work/stormwater/lid/lid_tech_manual05/LID_manual2005.pdf.

Buffer design guidelines for that include stormwater treatment.

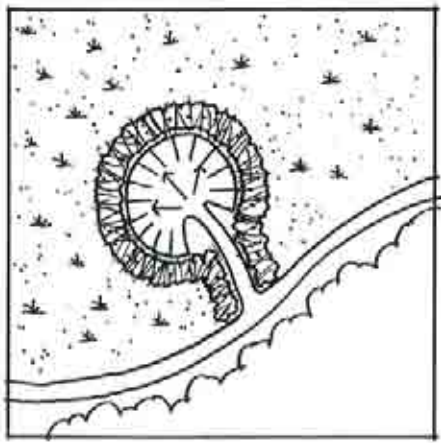
Bentrup, G. 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Access at: http://www.unl.edu/nac/bufferguidelines/.

Roadway design guidance for lower impact to hydrology.

Dashiell and Lancaster. Undated. Road Design Guidelines for Low Impact to Hydrology. Five Counties Salmonid Conservation Program.

White paper on integrated LID and ecological analysis.

Mensing and Chapman. Undated. Conservation Development and Ecological Stormwater Management: An Ecological Systems Approach.



NDS features receive, clean and detain or retain runoff from roadways and other impervious surfaces; they can buffer habitat areas from negative ecological impacts.

Parking lot runoff at McNary NWR drains to a central bioswale that treats polluted runoff and buffers habitat from roadway impacts.

Brian Bainsson

Water Quality 101 **Issue: Stormwater runoff from roads and parking lots is laden with pollutants**

Alex Schwartz/USFWS

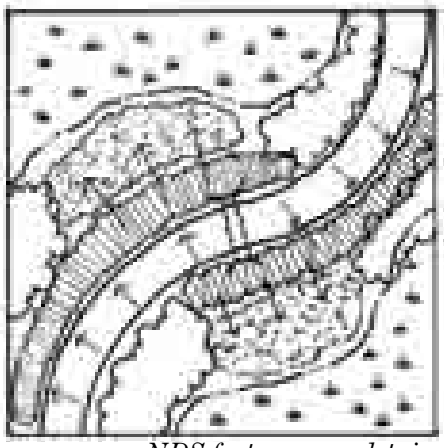
- Conventional facilities collect and drain polluted runoff using a variety of methods, such as sheet draining, "grassy swales," curbs and drainage inlets. These can quickly convey pollutants directly to sensitive habitats before the pollutants can be filtered out (*left*).
- Improved facilities are designed to intercept and filter polluted runoff before discharge to sensitive habitats (*right*).

SvR Design

SM-2 Protect Habitat from Erosive Flows and Flooding

Intent

The rate of flow of runoff from roadways is major issue of concern. Flow rates are typically much higher and shorter in duration than those which would come from the same areas in unpaved conditions. Such spikes in flow rates create erosion and flooding issues and prevent groundwater recharge. These effects can have major detrimental impacts on fish, wildlife and their habitats. Natural drainage system (NDS) facilities should be designed to not only clean water, but to detain peak flows and, where appropriate retain, runoff locally. Target flow control should be based on undeveloped conditions for local ecosystems, as well as current soil conditions and downstream concerns.



NDS features can detain runoff, slowing its flow to adjacent water bodies.

Principles

- Minimize quantity of stormwater runoff
- Minimize use of impervious materials
- Technologies to address water quantity issues include wet ponds, porous pavements, bioswales and rain gardens
- Improvements (stormwater facilities) must be sized appropriately to handle flow

Metrics

- Measurements of stormwater runoff rates and volumes
- Hydrographs for receiving water bodies

Resources

Design guidelines for low-use roads, focusing largely on hydrology.

Weaver, William and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

Low impact development (LID) guidelines for Pacific Northwest.

Hinman, Curtis. 2005. Low Impact Development: Technical Guidance Manual for Puget Sound. Puget Sound Action Team. Olympia, WA.

Design guidelines for LID features.

US Dept. of Defense. 2004. Unified Facilities Criteria (UFC) - Design: Low Impact Development.

Info on vegetative filter strips (page 44) and other practices.

Smith, Stacy (Idaho Technology Transfer Center, Univ. of Idaho). 2005. BMP Handbook: Best Management Practices for Idaho Rural Road Maintenance.

Roadway design guidance for lower impact to hydrology.

Dashiell and Lancaster. Undated. Road Design Guidelines for Low Impact to Hydrology. Five Counties Salmonid Conservation Program.

BMPs for ESA compliance.

WSDOT. Best Management Practices Field Guide for ESA Sec 4(d) Habitat Protection.

A gravel parking lot with central vegetative swale at Ash Meadows NWR minimizes impervious materials and allows for large storm events to be infiltrated on site, away from more sensitive habitats.

Jeff Holm/USFWS

Water Quantity 101 **Issue: Impervious surfaces increase runoff rates, temperature, and volume**

SvR Design

- Runoff from impervious areas often concentrates flows, which impacts adjacent lands and also leads to cumulative downstream and watershed-scale impacts
- Where space is limited or linear alignment is tight, choose materials such as pervious paving (*left*) to reduce runoff rates
- Use NDS features to detain runoff before discharge (*right*)

SvR Design

SM-3 Monitor and Maintain Stormwater Facilities

Intent

Monitoring and maintaining stormwater facilities after project construction is key to learning from your work and improving the effectiveness of future projects. Particular attention should be given to monitoring the effects of the project on the landscape's environmental quality. Budgeting for and following standard monitoring and maintenance protocols are a critical component for stormwater management on FWS managed lands.

Principles

- Employ stormwater facility monitoring protocols (per ASCE or other standards)
- Maintain facilities in a manner that optimizes facility performance
- Collect relevant baseline data before project construction
- Check for and use appropriate control measures on any invasive species
- Check for levels of contaminants coming from roadway, and track their fate in areas adjacent to roadway
- Monitor level of compatibility with local wildlife and surrounding habitats
- Document maintenance needs and costs
- Document effectiveness of soil mixes and plants used
- Share or publish monitoring results to help improve design and results in other projects
- Use monitoring results in adaptive management

Metrics

- Measurements of stormwater runoff rates, volumes, temperature and contaminants
- Hydrographs for receiving water bodies
- Analysis documenting water quality improvements due to NDS features

Resources

Technical guidelines for monitoring of stormwater in various conditions.

US EPA. 2002. Urban Stormwater BMP Performance Monitoring. Access at: http://water.epa.gov/scitech/wastetech/guide/stormwater/monitor.cfm.

NDS maintenance guidelines that include guidance on monitoring.

City of Bellevue, WA. 2009. Natural Drainage Practices Maintenance Guidelines. Access at: http://www.bellevuewa.gov/pdf/Utilities/Natural_Drainage_Practices.pdf.

Study from UC Davis & USFS finding that bioswale significantly reduced runoff and removed pollutants; includes monitoring protocols used.

Xiao, Qingfu and E. G. McPherson. 2009. Testing a Bioswale to Treat and Reduce Parking Lot Runoff. Access at: http://www.fs.fed.us/psw/programs/cufr/products/psw_cufr761_P47ReportLRes_AC.pdf.

Standard operating procedures for stormwater monitoring.

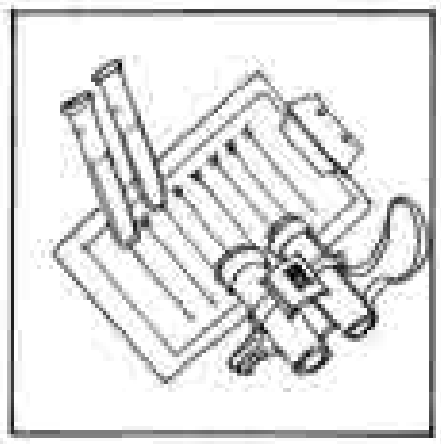
Washington Department of Ecology. 2010. Stormwater monitoring resources. Access at: http://www.ecy.wa.gov/programs/wq/stormwater/municipal/strmH2Omonitoring.html.

Guidance on stormwater monitoring for construction sites.

Washington Department of Ecology. 2006. How to do Stormwater Monitoring: A guide for construction sites. Access at: http://www.ecy.wa.gov/biblio/0610020.html.

Monitoring for larger debris.

ASCE. 2010. Guideline for Monitoring Stormwater Gross Solids. Order at: http://www.asce.org/Product.aspx?id=2147485997.



Monitoring projects will help advance the development of a focused approach to stormwater management on FWS managed lands that is responsive to the Service's mission.

Similar to managed wetlands, stormwater facilities should be periodically monitored for performance and to inform adaptive management and maintenance regimes.

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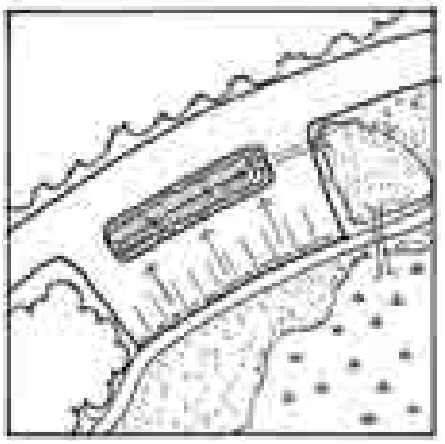
SM-4 Promote Stewardship of Aquatic Resources

Intent

Low impact development (LID) facilities for stormwater management serve the functional purposes of cleaning and slowing or retaining stormwater runoff and protecting our aquatic resources. Additionally they can help to raise public awareness and understanding of the relationship of roadways to aquatic resources, wildlife and habitat conservation. Stormwater facilities can be designed to reveal to and educate visitors about the impacts of development on aquatic resources. Facilities can communicate how they protect aquatic resources, and can influence behavior and management practices beyond FWS managed lands in support of the Service's mission.



Stormwater treatment facilities integrated into roadways provide places where FWS stewardship of aquatic resources can be demonstrated.

Principles

- Prioritize aesthetic and educational components of highly visible stormwater management facilities
- Use stormwater facilities to communicate stewardship commitment of FWS
- Design stormwater facilities with native plants in arrangements that respond to multiple objectives, including management, educational/ interpretive, aesthetic and maintenance goals
- Make stormwater part of the site's interpretive story and reveal the process of stormwater quantity and quality controls to the extent possible
- Consider educational and volunteer opportunities presented by stormwater management facilities
- Consider potential benefits or drawbacks of additional wetland habitat areas created by natural drainage facilities

Metrics

- "Friends" groups involvement & awareness
- Production/use of interpretive materials or content
- Use of stormwater facilities as positive examples or success stories (e.g. in public media, professional circles, within FWS)

Resources

Social benefits of road and highway systems.

AASHTO. 2008. Above and Beyond: The Environmental and Social Contributions of America's Highway Programs.

Promotional information for visitors to FWS sites.

USFWS. 2005. Byways to America's Wildest Places: Discover Your National Wildlife Refuges.

Scenic byways guidelines with details on benefits of good road design.

USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Green Values calculator can help to quantify benefits from LID (aka green infrastructure) facilities.

Center for Neighborhood Technology. 2010. Green Values Stormwater Management Calculator. Access at: http://greenvalues.cnt.org/

Additional resources on green infrastructure (another term that includes natural stormwater management facilities).

US EPA. 2010. Green Infrastructure: Managing Wet Weather With Green Infrastructure (website). Access at: http://cfpub.epa.gov/npdes/home.cfm?program_id=298.

Report examining social, economic, and environmental benefits of green infrastructure.

Stratus Consulting. 2009. A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds.

Stormwater facilities can be an important part of visitor experience, providing interpretive opportunities (top) and allowing visitors hands-on experience planting or maintaining native vegetation (bottom).

Justin Martin

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Visitor Experience

Visitor Experience
Overview

Engaging the Public

Conservation of fish, wildlife, plants and their habitats is at the core of the Service's mission. Providing public access compatible with conservation goals is paramount to achieving this mandate. Roadways are the primary infrastructure elements that facilitate public access to FWS managed lands. Conversely, landscapes without roads or limited or restricted public access on roads can support protection of sensitive habitats when necessary. This section is intended to help you consider how best to provide access to FWS managed lands. Well-designed roadways on FWS lands can help demonstrate to visitors how the Service's mission is carried out at the landscape scale.

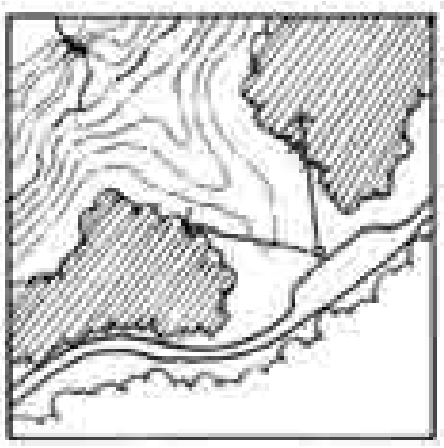
Scenic roadways offer visitors a glimpse into the habitat areas that the Service manages, helping to inspire an ethic of stewardship and conservation among the public. Roadways should be designed to afford such experiences and to convey a sense of place that is unique to each site and destination. They should take into account both the natural and cultural histories of the land they traverse, revealing but not destroying special places and artifacts along the way. This section of the guidelines will point you to resources to help with design solutions focused on the visitor's experience. Design of roadway elements such as safety and guiding features, interpretive signs and visitor facilities should be relevant and specific to the region, if not to the individual site or refuge.

National Wildlife Refuges, Fish Hatcheries and other FWS managed lands are national treasures. Facilities there should help visitors connect with the natural heritage that the Service works to conserve.

VE-1 Preserve and Highlight Scenic Value

Intent

The scenic value of wildlife refuges plays an important role in the visitor experience. Road alignments should be chosen or revised carefully so as to preserve the scenic value of the journey. Roadway alignments and locations on FWS managed lands should afford views and simultaneously prevent roadways from becoming dominant features of the visual landscape.



Plan roadways to afford views to areas of high scenic value.

Principles

- Consider designs that respond to the character of the landscape and management practices. For example, an entrance road may offer a change in design speed, scale and geometry in order to help visitors decompress from previous highway travel
- Provide appropriate orientation and directional signage in a style that fits with the local character and landscape
- Consider and plan the viewsheds and impacts of roadways on the visual and auditory landscape
- Consider and plan coherent and consistent design elements with the facility (color, texture, form)
- Consider the entry experience (does it welcome and orient visitors?) and sequence of visitor experiences when arriving at FWS managed lands or high use areas such as visitor centers
- Consider opportunities for interpreting culture and the landscape along the corridor
- Provide safe places, such as overlooks and viewpoints, to enjoy scenery

Metrics

- Visual resource analysis/ management - USFS or BLM methodologies (see Resources below)

Resources

Scenic byways guidelines with details on benefits of good road design.

USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Study on context sensitive roadway design from New Mexico.

New Mexico Department of Transportation. 2006. Architectural and Visual Quality Design Guidelines for Context Sensitive Design and Context Sensitive Solutions.

Roadside treatment design guidelines.

FHWA. 2008. Safe and Aesthetic Design of Urban Roadside Treatments.

Regional guidelines for roadside development.

ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

Design guidance based on human behavior patterns.

Transportation Research Board of The National Academies. 2008. Human Factors Guidelines for Road Systems (NCHRP Report 600B).

USFS visual assessment technique.

USDA Forest Service. 1995 (rev. 2000). Landscape Aesthetics: A Handbook for Scenery Management. AH-701.

BLM visual assessment technique.

BLM. 2007. Visual Resource Management (website). Access at http://www.blm.gov/nstc/VRM/.

Roadways provide or give access to scenic vistas (top) and visitor facilities such as a viewing blind at Finley NWR (bottom).

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Brian Baimson

VE-2 Promote and Facilitate Multiple Modes of Transportation

Intent

Access to FWS managed lands, where compatible with Station purpose, should be available to visitors via multiple forms of transportation, including public transit, bicycle, and walking. Alternative forms of transportation can help reduce visitors' carbon footprints, which in turn may have long term positive affects for the natural resources we manage. Planning and building to accommodate sustainable transportation options can help to achieve the FWS mission.

Principles

- Design alternative transportation facilities that are compatible with wildlife and habitat conservation
- Provide parking for bicycles and other alternative types of transportation
- Consider adding charging stations for electric vehicles
- Coordinate with other agencies or organizations that could provide public transportation to FWS managed lands
- Promote and partner to develop bicycle routes to FWS managed lands
- Consider bicycle routes through FWS managed lands where compatible with wildlife, safety, and user experience
- Consider signage or pavement markings to alert drivers to other types of road users
- Use outreach to encourage use of alternative transportation modes to and within the FWS managed lands

Metrics

- Counts of users arriving by public transportation, using bicycles, etc.
- Use rates of stationary facilities, such as special parking or bike racks

Resources

Potential funding source for transit and other alternative transportation options.

Paul S. Sarbanes Transit in Parks Program (5320). Access at: http://www.fta.dot.gov/funding/grants/grants_financing_6106.html.

Case studies for alternative transportation projects in National Parks.

See: http://www.volpe.dot.gov/nps/projects.html.

Design guidelines (see pp. 70-76).

USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

Potential funding for developing alternative transportation systems for visitors through the Transit in Parks Program (5230)

See: http://www.fta.dot.gov/funding/grants/grants_financing_6106.html.

Bicycling on federal lands - case studies include two National Wildlife Refuges.

FHWA. 2008. Guide to Promoting Bicycling on Federal Lands. FHWA Pub. No. FHWA-CFL/TD-08-007.

Case studies that include alternative transportation programs in parks, such as shuttle bus systems.

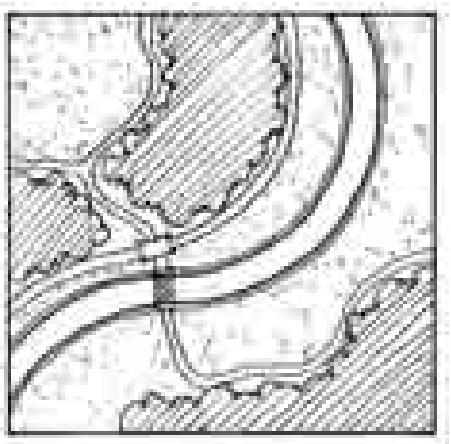
NPS Partnerships Case Studies (Transportation). See: http://www.nps.gov/partnerships/cs_type.htm#anchor19.

Lessons from Europe on traffic calming, enhancing mobility options.

Brewer, Jim, et al. 2001. Geometric Design Practices for European Roads. FHWA, Office of International Programs.

Case Study.

Tualatin River NWR. Two parking spaces designated for hybrid vehicles; bicycle racks provided at parking area; bus stop for a public transit line adjacent to the Refuge.



Providing separate facilities can encourage users who don't want to bike or walk along a roadway.

Roadway projects should facilitate multiple modes of transportation; a roadway at Ding Darling NWR (top) accommodates both autos and bikers for wildlife observation; parking lot at Great Swamp NWR visitor center (bottom) provides a safe, convenient place for bicycle parking.

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Brian Bainnson

VE-3 Comply With Accessibility Standards and Guidelines

Intent
FWS managed lands should be accessible to all. FWS is subject to accessibility standards as dictated by the Architectural Barriers Act (ABA). Project teams should use the relevant suite of resources and guidance to ensure all FWS facilities are designed and constructed to comply with or exceed the mandates of the ABA.

Principles
- Define and consider visitor expectations for accessibility
- Balance safety and accessibility concerns
- Apply all relevant design criteria in order to meet or exceed the requirements of ABA
- Consider the relationship of accessible improvements to related infrastructure. Is there a completely accessible visitor experience?

Metrics
- Compliance with requirements, guidelines and standards
- Visitor use counts
- Outcomes of DCR facility audits

Resources
See ABA accessibility standards.

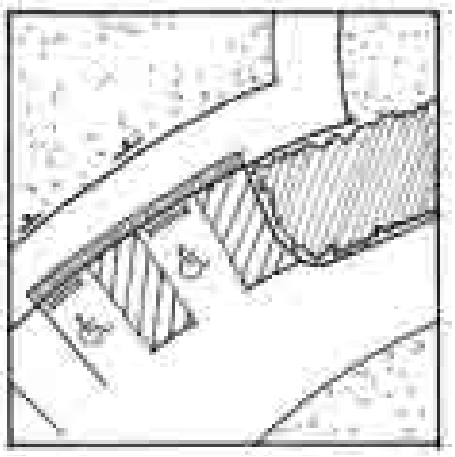
http://www.access-board.gov/gs.htm.

Draft Final Guidelines for accessibility in Outdoor Developed Areas on Federal lands:

http://www.access-board.gov/outdoor/.

Accessibility guidance for Federal outdoor areas (specific to USDA Forest Service lands/facilities).

USDA Forest Service. 2006. Accessibility Guidebook for Outdoor Recreation and Trails.



Brian Bainnson

Provide accessible parking spaces with appropriate access aisles and access to pathways (top); accessible parking at Great Swamp NWR (right).

What Federal Accessibility criteria should FWS projects follow?

The Architectural Barriers Act (ABA) of 1968
FWS is subject to the ABA. The ABA requires access to facilities designed, built, altered or leased with Federal funds. Passed by Congress in 1968, it marks one of the first efforts to ensure access to the built environment. The Access Board develops and maintains accessibility guidelines under this law. These guidelines serve as the basis for the standards used to enforce the law, the Architectural Barriers Act Accessibility Standard (ABASS).

Americans with Disabilities Act and the Architectural Barriers Act Accessibility Guidelines for Buildings and Facilities (ADAABAAG) as published in the Federal Register on July 23, 2004.
FWS should follow the scoping and technical requirements under the ABA sections. This direction covers accessibility to sites, facilities, buildings and elements by individuals with disabilities. The requirements are to be applied during design, construction, additions to and alterations of facilities.

Draft Final Accessibility Guidelines for Outdoor Developed Areas
Many FWS facilities can be characterized as Outdoor Developed Areas. The Access Board is proposing to issue accessibility guidelines for outdoor developed areas designed, constructed or altered by Federal agencies subject to the ABA of 1968. The guidelines cover trails, outdoor recreation access routes, beach access routes and picnic and camping facilities. Once these guidelines are finalized they will become the technical requirements for accessibility in outdoor developed areas. At this time, FWS may use these guidelines.

Accessibility Guidebook for Outdoor Recreation and Trails, USDA Forest Service, April 2006.
These guidelines only apply within National Forest System boundaries. However, they are a very useful tool for FWS projects recognizing that the Draft Final Accessibility Guidelines for Outdoor Developed Areas are still a work in progress.

And In General…
- Use principles of universal design—programs and facilities should be usable by all people, to the greatest extent possible, without separate or segregated access for people with disabilities.
- Accessibility does not supersede requirements for safety.
- Consider the level of development at a site to help balance safety and accessibility.

VE-4 Facilitate Compatible Wildlife Dependent Recreation and Education

Intent

The FWS mission is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people. The mission of the Service should be integrated and transparent in the design of roadways on FWS managed lands. Roadways are key in fulfilling the Service's priority of connecting people with nature, and can provide opportunities to do so in ways that are compatible with the conservation mission of the Service.

Principles

- Consider whether current or anticipated visitor impacts are compatible with wildlife and their habitats
- Consider safety for visitors, staff and wildlife
- Provide orientation and interpretive information to support visitor experiences
- Consider the enabling legislation of the refuge - what is the purpose of the unit?
- Consider relationships with other recreational or educational sites within the region
- Consider demand, site carrying capacity and quality of visitor experience
- Determine what kind of access to recreation sites is available, appropriate and necessary
- Consider impacts to recreational activities from roads
- Promote appropriate facilities for safely viewing wildlife from roads where necessary
- Plan for appropriate signage, including entrance, orientation, directional and interpretive
- Consider access for and needs of school groups

Metrics

- Visitor counts
- Diversity and quality of activities available for visitors
- Ease of use (proximity, clarity, etc.) of recreational and educational elements

Resources

California State Parks Children in Nature Campaign.

http://www.parks.ca.gov/?page_id=24914.

Information on local, regional and national programs to connect kids with nature.

Children and Nature Network. See: http://www.childrenandnature.org/movement/info.

National Wildlife Federation's kids outside program.

See: http://www.nwf.org/beoutthere/.

Washington State Parks "No Child Left Inside" campaign.

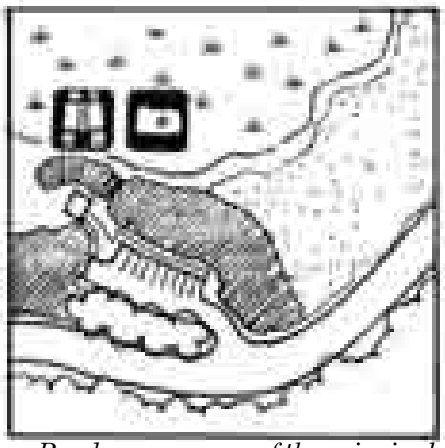
See: http://www.parks.wa.gov/NoChildLeftInside/.

USDA Forest Service Discover the Forest campaign.

http://www.discovertheforest.org/index.php.

Bicycling on federal lands - case studies include two National Wildlife Refuges.

FHWA. 2008. Guide to Promoting Bicycling on Federal Lands. FHWA Pub. No. FHWA-CFL/TD-08-007.



Roadways are one of the principal infrastructure elements that facilitate access to the Big 6 on FWS managed lands.

The Big Six

The 1997 Refuge System Improvement Act outlines "The Big Six" priority public uses for Refuge system improvements:

- Hunting
- Fishing
- Wildlife Photography
- Wildlife Observation
- Environmental Interpretation
- Environmental Education

Auto tour route at Ridgefield NWR provides visitors access to Big 6 activities, such as wildlife observation and photography.

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Appendices

Appendix A: Bibliography

LE - Landscape Ecology

Bentrup, G. 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station. 110 p. Access at http://www.unl.edu/nac/bufferguidelines/.

Climate Impacts Group. 2009. The Washington Climate Change Impacts Assessment. University of Washington. Seattle, WA.

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Appendix B: Glossary

Abbreviations

ABA Architectural Barriers Act

ABAAS Architectural Barriers Act Accessibility Standards

ADA Americans with Disabilities Act

ASCE American Society of Civil Engineers

BGEPA Bald and Golden Eagle Protection Act

BLM Bureau of Land Management

CCP Comprehensive Conservation Plan

CFR Code of Federal Regulations

DCR Division of Diversity and Civil Rights (FWS Region 1)

EE Environmental Education

ES Ecological Services

ESA Endangered Species Act

FHWA Federal Highway Administration

FWCA Fish and Wildlife Coordination Act

FWS U.S. Fish & Wildlife Service (also Service, USFWS)

GIS Geographic Information System

LID low impact development

LOS level of service

LRTP Long Range Transportation Plan

MBTA Migratory Bird Treaty Act

NDS natural drainage system

NEPA National Environmental Policy Act

NWR National Wildlife Refuge (also Refuge).

NWRS National Wildlife Refuge System

ODOT Oregon Department of Transportation

R1 Region 1 of the FWS (HI, ID, OR, WA, Pacific Islands)

ROW Right-of-way

SAMMS Service Asset Maintenance Management System

USDA United States Department of Agriculture

USFS United States Forest Service

VMT Vehicle miles traveled

WDFW Washington State Department of Fish and Wildlife

WSDOT Washington State Department of Transportation

WSPRC Washington State Parks and Recreation Commission

WVC Wildlife-vehicle collisions

Definitions

Adaptive Management. Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results help managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alternative. Alternatives are different means of accomplishing Refuge purposes and goals and contributing to the System mission (draft Service Manual 602 FW 1.5). The no action alternative is the manner in which the refuge is currently managed, while the action alternatives are all other alternatives.

Bald and Golden Eagle Protection Act (Federal). This law makes it illegal for anyone to take (as defined therein) a bald or golden eagle, or their parts, nests, or eggs except as authorized under a permit. Since this law extends protection to eagle nests, it may come into play during the construction and maintenance of transportation infrastructure.

Biological Diversity (also Biodiversity). The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (USFWS Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes.

Biological Integrity. Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities (NWRS Biological integrity policy).

Compatible Use. A wildlife-dependent recreational use or any other use of a Refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Service Manual 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan. A document that describes the desired future conditions of the Refuge, and provides long-range guidance and management direction for the Refuge manager to accomplish the purposes of the refuge, contribute to the mission of the System, and to meet other relevant mandates (Service Manual 602 FW 1.5).

Contaminants (also Environmental Contaminants). Chemicals present at levels greater than those naturally occurring in the environment resulting from anthropogenic or natural processes that potentially result in changes to biota at any ecological level (USGS, assessing EC threats to lands managed by USFWS). Pollutants that degrade other resources upon contact or mixing (Adapted from Webster's II).

Cooperative Agreement. This is a simple habitat protection action, in which no property rights are acquired. An agreement is usually long term but can be modified by either party. They are most effective in establishing multiple use management of land. An example would be a wildlife agreement on a Corps reservoir.

Context Sensitive Solutions (CSS). A theoretical and practical approach to transportation decision-making and design that takes into consideration the communities and lands through which streets, roads, and highways pass ("the context"). CSS seeks to balance the need to move vehicles and other transportation modes efficiently and safely with other desirable outcomes, including historic preservation, environmental goals such as wildlife and habitat conservation and the creation of vital public spaces.

Critical Habitat. Areas that are essential to the conservation of ESA listed species.

Cultural Resources. The physical remains, objects, historic records and traditional lifeways that connect us to our nation's past (USFWS, Considering Cultural Resources).

Disturbance. Significant alteration of habitat structure or composition. May be natural (e.g. fire) or human-caused events (e.g. aircraft overflights).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and that basic ecosystem processes are perpetuated indefinitely.

Environmental Assessment. A concise public document, prepared in compliance with the National Environmental Policy Act (NEPA), that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether an environmental impact statement must be prepared, or a finding of no significant impact can be issued (40 CFR 1508.9).

Endangered Species Act (Federal). The purpose of the ESA is to protect and recover endangered and threatened species and the ecosystems upon which they depend. Under the ESA, species may be listed as either endangered or threatened and critical habitat may be designated.

ESA Listed Species. A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range (endangered) or likely to become so within the foreseeable future (threatened).

Environmental Education Facility. A building or site with one or more classrooms or teaching areas and environmental education resources to accommodate groups of students.

Fish and Wildlife Coordination Act (Federal). This law provides the basic authority for the FWS to evaluate impacts to all fish and wildlife from proposed water resource development projects. This law may come into play for transportation projects that involve effects to a water body(ies).

Gap Analysis. Analysis done to identify and map elements of biodiversity that are not adequately represented in the nation's network of reserves. It provides an overview of the distribution and conservation status of several components of biodiversity, with an emphasis on vegetation and terrestrial vertebrates (Cassidy et al.1997).

Goal. Descriptive, open-ended and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Green infrastructure. A concept and approach in which natural assets are managed and/or designed to provide multiple ecosystem and human services, including services such as stormwater management, flood prevention, carbon sequestration, and habitat. Green infrastructure includes natural drainage systems (NDS) and may be applied as a tool in achieving low impact development (LID).

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Connectivity (Also Landscape Connectivity). The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation/habitat. The opposite of fragmentation (Turnbull NWR Habitat Management Plan).

Habitat Management Plan. A plan that guides Refuge activities related to the maintenance, restoration, and enhancement of habitats for the benefit of wildlife, fish, and plant populations.

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes and/or to healthy ecosystems.

Historic Conditions. Composition, structure and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape (NWRS Biological integrity policy).

Hydrologic influence. Having an effect on water quality and quantity.

Hydrology. A science dealing with the properties, distribution and circulation of water on and below the earth's surface and in the atmosphere (yourdictionary.com).

Indicator. Something that serves as a sign or symptom (Webster's II).

Interpretation. A teaching technique that combines factual information with stimulating explanation (yourdictionary.com). Frequently used to help people understand natural and cultural resources.

Interpretive Trail. A trail with informative signs, numbered posts that refer to information in a brochure, or where guided talks are conducted for the purpose of providing factual information and stimulating explanations of what visitors see, hear, feel, or otherwise experience while on the trail.

Landform. A natural feature of a land surface (yourdictionary.com).

Landscape Linkages. Landscape features linking areas of similar habitat. Plants and smaller animals are able to use landscape linkages to move between larger landscape blocks over a period of generations.

Landscape Ecology. The science and study of the relationship between spatial pattern and ecological processes on a wide variety of landscape scales and organizational levels.

Low Impact Development (LID). A stormwater management strategy that emphasizes conservation and use of existing natural site features integrated with distributed, small-scale stormwater controls to more closely mimic natural hydrologic patterns. (LID Guidance Manual for Puget Sound).

Maintenance. The upkeep of constructed facilities, structures and capitalized equipment necessary to realize the originally anticipated useful life of a fixed asset.

Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment, periodic condition assessment; periodic inspections, adjustment, lubrication and cleaning (non-janitorial) of equipment; painting, resurfacing, rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown.

Mesh Size. The average area or diameter of the polygons enclosed by a road network, as in a fishnet; it is proportional to road density but focuses on the enclosed parcels rather than the roads (Forman 2003).

Migratory Bird Treaty Act (Federal). This law makes it illegal for anyone to take any migratory bird, or the parts, nests, or eggs of migratory birds, except under the terms of a valid permit issued pursuant to federal regulations. This law can come into play during the maintenance and removal of transportation infrastructure as well as during the construction of new structures.

Mission Statement. Succinct statement of a unit's purpose and reason for being.

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA). Requires all Federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (from 40 CFR 1500).

National Register of Historic Places. The Nation's master inventory of known historic properties administered by the National Park Service. Includes buildings, structures, sites, objects and districts that possess historic, architectural, engineering, archeological, or cultural significance at the national, state and local levels.

National Wildlife Refuge (also Refuge). A designated area of land, water, or an interest in land or water within the System.

National Wildlife Refuge System (NWRS; also System). Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; games ranges; wildlife management areas; or waterfowl production areas.

Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem (NWRS Biological integrity policy).

Natural Drainage System (NDS). A set of stormwater management features using plants and specialized soils that slow and infiltrate stormwater and can help remove pollutants through filtration and bioremediation. These features—such as open, vegetated swales, stormwater cascades and small rain gardens or wet ponds—mimic or restore natural functions impeded by development. In contrast to pipes and vaults, these systems increase in functional value over time.

Non-Consumptive Recreation. Recreational activities that do not involve harvest, removal or consumption of fish, wildlife or other natural resources.

Noxious Weed. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Nutrient Loading. The presence of nutrients, such as nitrogen and phosphorus, in waterways insufficient amounts to cause effects such as algal blooms and oxygen depletion, with potentially lethal effects on fish and wildlife species.

Operations. Activities related to the normal performance of the functions for which a facility or item of equipment is intended to be used. Costs such as utilities (electricity, water, sewage) fuel, janitorial services, window cleaning, rodent and pest control, upkeep of grounds, vehicle rentals, waste management and personnel costs for operating staff are generally included within the scope of operations.

Outreach. The process of providing information to the public on a specific issue through the use of the media, printed materials and presentations.

Plant Community. An assemblage of plant species unique in its composition that occurs in particular locations, under particular influences, which reflect or integrate the environmental influences on the site, such as soils, temperature, elevation, solar radiation, slope, aspect and rainfall.

Preferred Alternative. This is the alternative determined (by the decision maker) to best achieve the Refuge purpose, vision and goals; that best contributes to the System mission and addresses the significant issues; and that is consistent with principles of sound fish and wildlife management.

Priority Public Uses. Hunting, fishing, wildlife observation and photography, environmental education and interpretation were identified by the National Wildlife Refuge system Improvement Act of 1997 as the six ("Big Six") priority public uses of the National Wildlife Refuge System.

Public. Individuals, organizations, and groups outside the planning team, including officials of Federal, State, and local government agencies, Indian tribes and foreign nations. It includes those who may or may not have indicated an interest in Service issues and those who may be affected by Service decisions.

Refuge Purpose(s). The purpose(s) specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, a refuge unit, or refuge subunit (Draft Service Manual 602 EW 1.5).

Restoration. The act of bringing back to a former or original condition (Webster's II).

Riparian. An area or habitat that is transitional from terrestrial to aquatic ecosystems, including streams, lakes, wet areas, and adjacent plant communities and their associated soils which have free water at or near the surface; an area whose components are directly or indirectly attributed to the influence of water; and of or relating to a river. Specifically applied to ecology, "riparian" describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes any and all plant life growing on the land adjoining a stream and directly influenced by the stream.

Road Density. The average total road length per unit area of landscape (i.e. kilometers per square km, or miles per square mile) (Forman 2003).

Road-Effect Zone. The zone of influence of a roadway into the surrounding areas. Distance depends upon the type of effect and site conditions (Forman 2003; see graphic, p. 308).

Roadway. The suite of typical improvements associated with a vehicle-focused transportation project. This extends from the centerline of an existing or proposed road outward, to include associated infrastructure components such as paving, utilities, grading and planting. Roadway also refers here to other facilities and infrastructure commonly associated with vehicular transportation, such as parking, visitor contact facilities and pullouts. From an ecological perspective, the roadway conceptually includes impacts such as habitat fragmentation, habitat disturbance, pollution, and aquatic and terrestrial species conflicts.

Strategy. A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.5).

Viewpoint. A designated point that provides an opportunity to see wildlife or habitats of interest. The point may or may not be "supported" with an interpretive sign. Usually the viewpoint is supported by a pullout or a parking area.

Visitor Center. A building with staff that provides visitors with interpretation, education and general information about the natural and cultural resources of the Refuge and the local area.

Visitor Contact Point or Center. A kiosk or other location where visitors may go to learn about Refuge resources, facilities, trails, etc.

Vision Statement. A concise statement of the desired future condition of the planning unit, based primarily upon the System mission, specific Refuge purposes and other relevant mandates (Service Manual 602 FW 1.5).

Watershed. The region or area drained by a river system or other body of water (Webster's II).

Wetlands. Transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time each year (Service Manual 660 FW 2).

- Permanent wetland - a wetland basin or portion of a basin that is covered with water throughout the year in all years except extreme drought. Typically, the basin bottom is vegetated with submerged aquatic plant species, including milfoil, coontail and pondweeds.

- Semi-permanent wetland - a wetland basin or portion of a basin where surface water persists throughout the growing season of most years. Typical vegetation is composed of cattails and bulrushes.

- Seasonal wetland - a wetland basin or portion of a basin where surface water is present in the early part of the growing season but is absent by the end of the season in most years. Typically vegetated with sedges, rushes, spikerushes or burreed.

Wildlife-Dependent Recreation. Hunting, fishing, wildlife observation and photography, environmental education and interpretation. These are also referred to as the priority public uses of the National Wildlife Refuge System or "Big Six".

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