



Long Range Transportation Plan for Fish and Wildlife Service Lands in Region 1

Final Draft

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Abbreviations and Acronyms

AADT	Annual Average Daily Traffic
ATS	Alternative Transportation System
API	Asset Priority Index
BLM	Bureau of Land Management
BMP	Best Management Practices
CCA	Comprehensive Conditions Assessment
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CHMP	Comprehensive Hatchery Management Plan
DOT	Department of Transportation
ERFO	Emergency Relief for Federally Owned (Roads)
FCI	Facility Condition Index
FHWA	Federal Highway Administration
FLH	Federal Lands Highway Division
FLMA	Federal Land Management Agency
HPP	High Priority Projects
IPaC	Information, Planning, and Consultation
ITS	Intelligent Transportation System
LRTP	Long Range Transportation Plan
MPO	Metropolitan Planning Organization
RIP	Road Inventory Program
RRP	Refuge Roads Program
RSA	Road Safety Audit
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
STIP	Statewide Transportation Improvement Program
TIP	Transportation Improvement Program
USC	United States Code
U.S.	United States
USGS	United States Geological Survey

Executive Summary

Transportation infrastructure provides critical links and resources in connecting people with nature on all U.S. Fish and Wildlife Service (Service) lands, specifically, at national wildlife refuges and national fish hatcheries. To this end the Service seeks to optimize transportation funding decisions and leverage its transportation dollars wisely, for the next 20 years and beyond.

Why was the Long Range Transportation Plan for U.S. Fish and Wildlife Service Lands initiated?

This long range transportation plan (LRTP) was initiated within the

Service to achieve the following:

- Establish a defensible structure for sound transportation planning and decision-making.
- Establish a mission, goals, and objectives for transportation planning in Region 1.
- 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) that requires all Federal land management agencies (FLMA) to conduct long range transportation planning in a manner that is consistent with metropolitan planning organization (MPO) and State department of transportation (DOT) planning.
- Integrate transportation planning and funding for wildlife refuges and fish hatcheries into existing and future Service management plans and strategies (e.g., comprehensive conservation plans [CCPs] and comprehensive hatchery management plans [CHMPs]).
- Increase awareness of Alternative Transportation Systems (ATS) and associated benefits
- Develop best management practices (BMP) for transportation improvements on Service lands.
- Serve as a pilot project for the implementation of a region-level transportation planning process within the Service.



Alex Schwartz USFWS

What are the Goals for this Long Range Transportation Plan?

As defined by the Region 1 core planning team, the primary goals of this LRTP are to:

- Ensure that the transportation program helps to conserve and enhance fish, wildlife, and plant resources and their habitats.
- Provide a safe and reliable transportation network to and within Service lands.
- Develop and maintain a transportation network that welcomes and orients visitors.
- Integrate transportation planning into Service plans and processes.
- Develop partnerships to leverage resources and develop integrated transportation solutions.
- Adopt and promote sustainable transportation practices.

Region 1 at a Glance

Within Region 1 there are:

270 million acres managed or co-managed by the Service (throughout five states and outlying Pacific Islands)

421 road miles

342 parking lots

160 trail miles

63 National Wildlife Refuges

15 National Fish Hatcheries

23 other fish facilities

Who is Leading This Effort?

Region 1 of the Service is leading the development of this LRTP. The region's refuge and fisheries programs have been the principle leads in this effort, supported by the Division of Planning and Visitor Services.

Federal Lands Highway Division (FLH) of the Federal Highway Administration (FHWA) has also played an important role in this LRTP. In addition to helping establish the framework for the

Service's transportation planning process, FLH has assisted in identifying potential partner agencies at the Federal, State, and local levels that may provide leveraging opportunities to advance future transportation projects.

Why is Transportation Planning Important to the Service?

Although often overlooked, transportation infrastructure supports U.S. Department of Interior initiatives by connecting people with nature, improving the condition of parking areas, public and service roads, and trails assets all while meeting the mission of the Service. Understanding the connection between transportation and conservation, the Service has established a transportation-related mission statement, goals, and objectives to serve as benchmarks for evaluating improvements to the transportation system within Region 1 as part of this LRTP. Together with an understanding of existing transportation infrastructure

deficiencies in the region, this plan enables the region to make better decisions regarding its most critical transportation needs.

At a time when resource and infrastructure funding is scarce, this LRTP provides leaders with a toolkit to use in working with gateway communities, counties, MPOs, other FMLAs, and stakeholder agencies outside Service boundaries, many of whom could potentially contribute funding or in kind services to advance priority projects.



FHWA



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What Value Does This Plan Provide for the Service?

The LRTP brings multiple benefits to the Service, such as:

- Provides a platform for individual units to communicate needs and opportunities to regional and national decision makers.
- Enables leaders to make informed decisions based on long-term transportation mission, goals, and objectives.
- Provides the Service with a better picture of future transportation needs and information for discussion regarding transportation reauthorization.
- Provides a long-term view of transportation in relation to core operations and Service priorities.
- Enables leaders to direct funding to the most beneficial and highest priority transportation projects.
- Enables leaders to find alternative funding from Federal sources that are administered by States (DOTs) or MPOs.
- Enables leaders to synchronize transportation planning with other refuge and hatchery planning efforts such as refuge CCPs, CHMPs, and other regional planning efforts outside Service boundaries.
- Provides current data on multimodal transportation issues and needs across the region.
- Provides an opportunity for Region 1 and individual refuges and hatcheries to partner and discuss areas of mutual interest with the public and regional entities such as minimizing carbon footprint, the potential for alternative transportation systems, and improved transportation systems linkages.

How Will This Plan Be Implemented?

This plan outlines how to quantify and communicate needs and opportunities in the areas that best align with Service goals and objectives, and thereby is more likely to receive funds. The plan provides a project selection framework that improves the defensibility of transportation funding decisions. The framework improves confidence in funding decisions by allowing decision makers to view transportation system needs throughout the

region, and compare how these needs rank against predefined evaluation criteria and benchmarks that represent the long-term interests of the Service, as established in the mission, goals, and objectives. This decision-making framework allows projects to be compared and ranked according to their merits.

What are the Key Findings of This Plan?

Since the inception of the Refuge Roads Program in 1998, Region 1 has completed over 100 projects improving public roads, trails, and parking lots. These improvements have improved the experience for millions of visitors to National Wildlife Refuges in Region 1.

The fisheries program has also demonstrated mission critical need for transportation improvements that currently can only be met through deferred maintenance. Because deferred maintenance funds are used to address deficiencies in all real property assets, transportation projects must compete with other mission critical projects such as water delivery systems and fish rearing infrastructure. This LRTP demonstrates the fisheries program mission critical need to allocate transportation funding specifically for fisheries.

Funding for the Service's transportation program (including refuges and fisheries) does not meet current or anticipated future needs. A well-defined funding and investment strategy is critical to maintain Service transportation assets. The Service must also seek opportunities outside the traditional funding sources in order to keep up with its aging infrastructure. Forming partnerships with local and State agencies will become increasingly critical to address these needs.

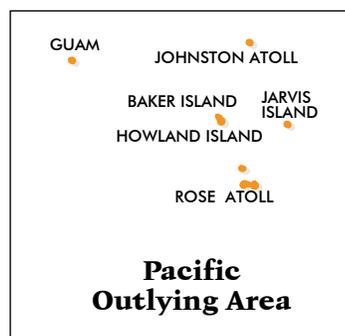
Chapter 1: Introduction

Region 1 of the U.S. Fish and Wildlife Service (Service), with the assistance of the Federal Highway Administration (FHWA), Federal Lands Highway Division (FLH), has developed this long range transportation plan (LRTP). This plan is the first of its kind for the Service, and serves as a pilot for future LRTP planning endeavors. The LRTP outlines a strategy for improving and maintaining transportation assets that provide access to Service-managed lands over the next 20 years. The plan ensures that the Service’s fundamental mission of “working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people” is furthered by providing access to a sound transportation system on lands managed by the Service. Region 1 boundaries are shown in Figure 1.

This LRTP is intended to help the Service make investment decisions for planning, preservation, and construction on its roads, parking lots, and trails. Because funds are limited, it is essential to assess needs, set priorities, and efficiently manage the expenditure of transportation funds to meet documented transportation needs.

FLH has played an important role in the development of this LRTP by providing technical and planning assistance for the Service. In addition to helping establish the framework for the Service’s transportation planning process, FLH has assisted in identifying potential federal, state, and local partner agencies that may provide leveraging opportunities to advance future transportation projects.

*Figure 1
U.S. Fish and Wildlife Region 1 Boundaries*



1.1 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 a mission, goals, and objectives for transportation planning in Region 1.
- Implement coordinated and cooperative transportation partnerships in an effort to improve the Service’s transportation infrastructure.
- Bring the Service into compliance with Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) that requires all federal land management agencies (FLMA) to conduct long-range transportation planning in a manner that is consistent with metropolitan planning organizations (MPOs) and State departments of transportation (DOTs) planning.
- Integrate transportation planning and funding for wildlife refuges and fish hatcheries into existing and future Service management plans and strategies.
- Increase awareness of Alternative Transportation Systems (ATS) and associated benefits.
- Develop best management practices (BMP) for transportation improvements on Service lands.
- Serve as a pilot project for the implementation of a region-level transportation planning process within the Service.

Transportation infrastructure provides critical links and resources in connecting people with nature on all Service lands, which include national wildlife refuges and national fish hatcheries. To this end, the Service seeks to systematically approach transportation funding decisions and leverage its transportation dollars wisely.

Long-range transportation planning is necessary for the Service to define the vision and goals for the transportation system that will serve the public for years to come. It also provides a mechanism to objectively set priorities for implementing projects while working toward achieving the Service’s vision for its transportation system. To accomplish these tasks, planners and decision makers must collaborate effectively to consider the complex balance between transportation efficiency, human safety, and environmental stewardship.

In an effort to reinforce sustainable transportation practices, the Service is actively pursuing ATS strategies, specifically in Region 1, in areas where such systems can provide better linkages between the local communities and the individual units. ATS strategies promote the Service’s effort to reduce its carbon footprint, reduce impacts to natural resources, and act as a critical visitor management tool for units facing increasing visitor demands with limited resources and capacity.

The Service desires a planning process that involves partner agencies (Federal, State, and local), that is consistent with state and local transportation planning processes, and that clearly defines and offers opportunities for public input. The key objective of such a planning process is to develop and maintain a coordinated, “seamless” transportation system for public use, ranging from auto tour routes to parking lots, transit access, and trails. Coordinated planning will also help ensure that the most critical projects receive funding.

Another critical aspect of this LRTP is facilitating partnerships with the Service and fostering opportunities to leverage funds to accomplish transportation improvements of common interest and mutual benefit. The intention is to increase the utility of transportation investments by pooling resources into efforts that satisfy the goals of multiple agencies and organizations. The LRTP serves as a tool in working with gateway communities, counties, MPOs, other FLMAs, and stakeholder agencies.

1.2 Mission, Goals, and Objectives

Through a collaborative effort, the Refuge and Fisheries Programs, in cooperation with the planning and visitor services programs within Region 1, have contributed to the definition of the mission, goals, and objectives presented in this document. The resulting mission, goals, and objectives are intended to provide a systematic approach to guide the process for evaluating and selecting transportation improvement for the Service lands in Region 1. These guiding principles have shaped the development, conclusions, and recommendations of this LRTP.

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 transportation plan in Region 1 represent six categories. Each goal includes distinct objectives that explain how the Service will accomplish each goal. The LRTP goals and objectives are:

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

Objective 1: Identify, research, and adopt BMPs for planning, design, construction, and maintenance that mitigate or avoid negative impacts of transportation activities and facilities.

Objective 2: Reduce transportation related conflicts within fish and wildlife corridors and habitat on or adjacent to Service lands.

Conditions and Safety: Provide a safe and reliable transportation network to and within Service lands.

Objective 1: Identify and reduce safety problems and modal conflicts to and within Services lands.

Objective 2: Ensure that mission critical transportation assets are maintained at "good" or better condition.

Welcome and Orient Visitors: Develop and maintain a transportation network that welcomes and orients visitors.

Objective 1: Provide public information to enable visitors to easily get to refuges and hatcheries and to use its sites.

Objective 2: Engage the visitor with compelling information so they better understand the National Wildlife Refuge System and Fisheries Program purpose of wildlife conservation and to enjoy natural resources.

Objective 3: Create a consistent and recognizable identity throughout all Service units through the use of standard materials for readily observed physical elements associated with the transportation system.

Planning: Integrate transportation planning into Service plans and processes.

Objective 1: Ensure consistency and coordination between the project, unit, regional, and national levels of planning.

Objective 2: Define need for transportation improvements and prioritize projects using a scientific and objective process.

Partnerships: Develop partnerships to leverage resources and develop integrated transportation solutions.

Objective 1: To the extent authorized by law, pursue opportunities for both transportation funding and resources.

Objective 2: Cooperate with public and private sector partners to address shared transportation issues that impact Service goals.

Sustainability: Adopt and promote sustainable transportation practices.

Objective 1: Address climate change and other environmental factors at all levels of transportation planning, design, project delivery, operations, and maintenance.

Objective 2: To reduce the Service's carbon footprint, improve access to and within Service lands by transit and non-motorized transportation modes, and provide improved visitor information systems.

Objective 3: Reduce fossil fuel energy consumption by refuge staff and visiting public.

1.3 Region 1 Background

The lands managed by the Service in Region 1 are widely diverse in geography and character. They receive different levels of funding and vary in terms of existing transportation infrastructure.

1.3.1 National Wildlife Refuges and National Fish Hatcheries

Region 1 manages or co-manages nearly 270 million acres of land, water, coral reefs and ocean floor in the States of Idaho, Oregon, Washington, a portion of northern Nevada, Hawaii, and the Pacific Islands, as shown in Figure 2. The region is home to diverse ecologies ranging from tropical forests to coral reefs, old-growth rainforests, glacial lakes and streams, and arid shrub-steppe. These habitats support over 390 endangered and threatened species; unique and endemic plant and animal communities; and some of the most productive anadromous fish runs in the world.

Region-wide the Service manages 63 national wildlife refuges composed of wetlands, estuaries, grasslands, nesting seabird colonies, forests, remote atolls, and high mountain deserts. The Region 1 Fisheries Program provides a network of 46 field stations. These facilities include 15 fish hatcheries, 23 associated fish facilities, 3 fish health centers, 1 fish technology center, and 4 fish and wildlife conservation offices. All Service units in Region 1 are listed by state in Appendix B.

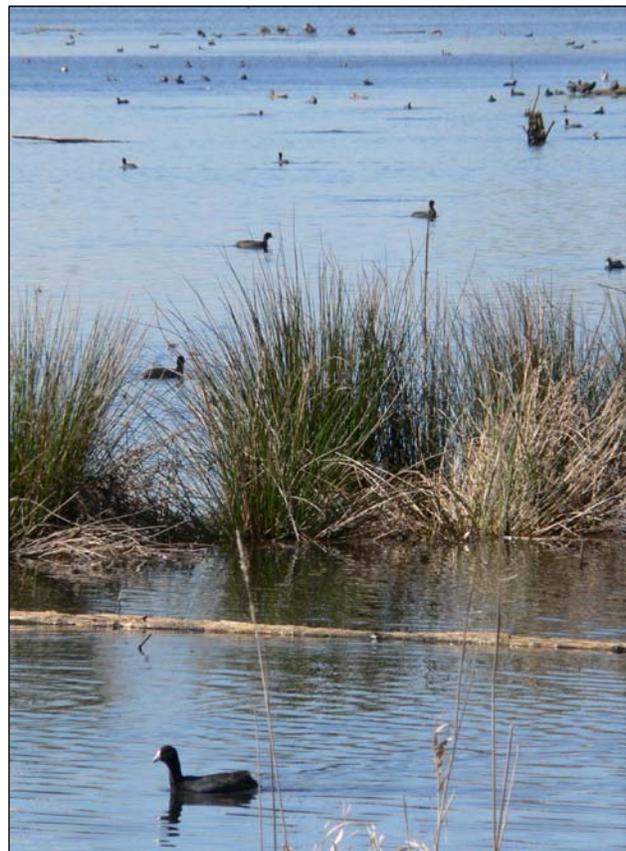
1.3.2 Region 1 Transportation System

The Service-maintained transportation facilities in Region 1 consist of paved, gravel, and native surface roads, trails, bridges, boardwalks, boat docks, airstrips, and parking lots. While a large portion of roads are open for public use, due to the conservation-based orientation of the Service, many roads, especially within the fish hatcheries, are for administrative use only.

Within Region 1 there are 421 miles of roads, 342 parking lots, and 547 miles of paved and unpaved trails for bicycle, pedestrian, and off-highway vehicle use. Nationally, the Service is responsible for approximately 7,224 miles of roads, 4,578 parking lots,

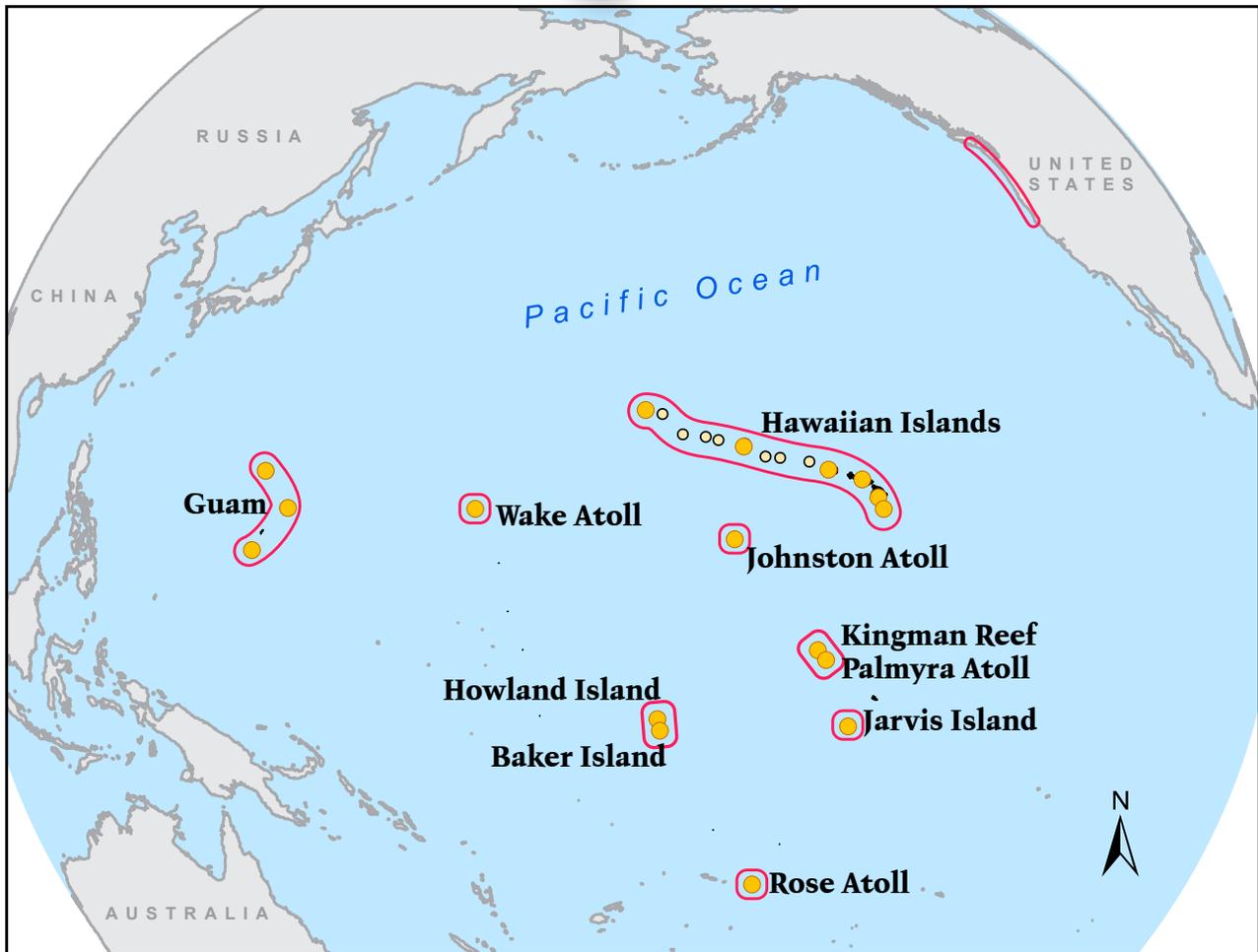
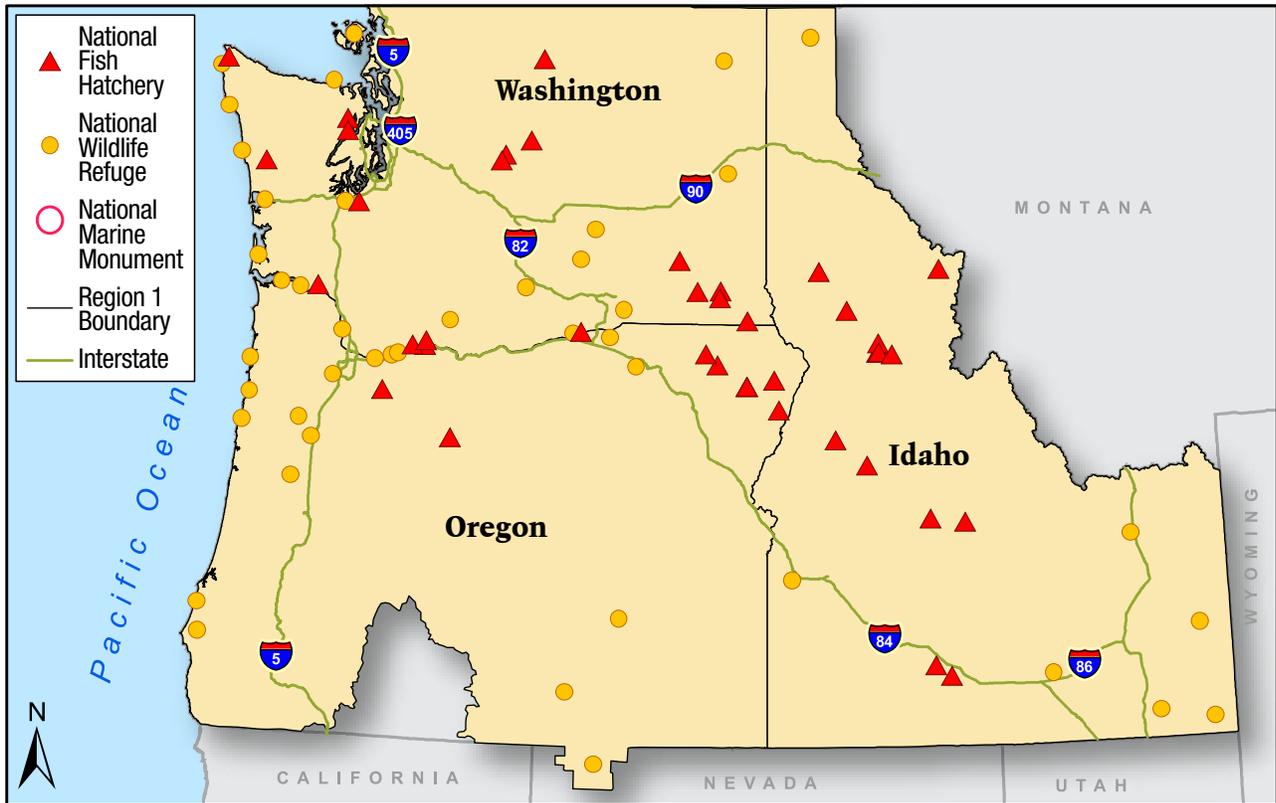
and 1,409 miles of trails. Based on 2007 conditions assessments, 17 percent of the Region 1 roads and 32 percent of parking lots were listed in poor or failing condition. This compares to 22 percent of roads nationally listed in poor or failing condition.

Transportation projects are funded primarily through the Refuge Roads Program (RRP), refuge deferred maintenance funds, fisheries deferred maintenance funds, and visitor facility enhancement funds. Each of these funding sources has specific project requirements. The RRP is the most widely used for transportation projects and can be used for planning, programming, construction, reconstruction, and improvement of public roads in the National Wildlife Refuge System (refuge roads), including bridges and appurtenances in connection with the administration of the National Wildlife Refuge System. In addition, up to five percent of these funds can be used for public use trails within refuges. Through the RRP, the Service is working to improve public access to refuges and provide a better overall visitor experience. Additional information about project funding and leveraging opportunities is in Chapter 3, Funding and Project Selection.



Walter Siegmund

Figure 2
National Wildlife Refuges and Fish Hatcheries within Region 1



1.4 Primary Audience

This LRTP is written for project leaders from wildlife refuges and fish hatcheries; regional internal and external leaders from the Service; national level decision makers; and potential local and regional partners from governmental agencies or non-governmental organizations, particularly refuge and hatchery friends groups. Information provided in the LRTP is intended to support these groups in several ways.

1.4.1 Project Leaders

Project leaders will use the LRTP as a guide for the best tools to use in identifying projects. Guidance found in this plan can assist project leaders in using readily available data and resources to justify a project’s need, which will ultimately lead to better positioning for funding, which affects project prioritization at the regional level. Project leaders can also use this plan as a process-based tool to partner with outside agencies and discuss project needs of mutual interest, such as safety concerns, alternative transportation systems, and addressing climate change with public and regional entities.

1.4.2 Regional Level

At the regional level, this LRTP will provide the information necessary for leaders to make transportation decisions based on long-term Service vision, mission, and goals. The plan also enables regional transportation coordinators to direct funding to the most beneficial and highest priority transportation projects. Furthermore, the LRTP enables regional leaders to find where alternative funding from Federal sources that are administered by the States or MPOs might be available. At the regional level, the LRTP is used to synchronize transportation planning with refuge and hatchery efforts such as refuge comprehensive conservation plans (CCP), comprehensive hatchery management plans (CHMP), and other regional and statewide plans outside Service boundaries, such as MPO regional transportation plans and state transportation plans.

1.4.3 National Level

This LRTP will align with the *National U.S. Fish and Wildlife LRTP* and other regional LRTPs to provide additional information to congressional leaders as to the unmet mission critical transportation need. It will also help illustrate the Service’s foresight, need, and commitment to certain mission critical goals—especially when projects are being pursued jointly with other agencies or organizations, and additional Federal dollars are requested. This regional plan will be adjusted in the future as necessary to be in alignment with the ultimately adopted national LRTP for the Service.

1.4.4 Potential Partners

Potential partners may use this LRTP to understand the Service transportation program, its needs, goals, and objectives for the future. It will also serve as a tool to identify projects of mutual interest between the Service and external groups or agencies. The Service recognizes the value of cooperative transportation partnerships, and seeks to leverage funds with other agencies, organizations, and Congress. Potential partner agencies could include other FLMAs, State DOTs, MPOs, county governments, and Friends groups.



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1.5 Public Involvement

The Service recognizes the public involvement requirements associated with LRTPs developed by State DOTs and MPOs. At the outset of this pilot effort for the Service, a structured communication plan was developed with a list of potential stakeholders and actions identified at key milestones in the plan's development to inform the decision-making processes. The approach for stakeholder outreach, including agency and public involvement, proposed the following strategies:

- Solicit input from Service staff that will inform the transportation planning effort
- Inform and educate external stakeholders about decision-making in Region 1 relative to transportation planning
- Provide opportunities for stakeholders to identify their concerns, values, ideas, and interests of the Region 1 transportation system
- Provide Service staff and external stakeholders the opportunity to review and comment on the LRTP at key decision points
- Build support from internal and external stakeholders for the processes and projects adopted under the LRTP
- Strengthen existing partnerships while forging new ones
- Identify opportunities for coordination with priority MPOs and states for short- and medium-term project development

Given the experimental effort of developing this LRTP, and the sensitivity of Service leadership to external distribution of draft-level information, it was decided that the external outreach component (input from agencies and public external to the Service) of this plan would not be fully executed. In addition, given the geographic and demographic diversity of the Service lands within Region 1, it is not expected that all or even most of the potential stakeholders would be able to participate, or have interest in directly influencing the outcomes of this plan. One initial newsletter was developed and distributed within the Service and to other FMLAs interested in this pilot project to provide contextual information about the plan. A second newsletter was distributed to mark the completion of the LRTP and to announce its public availability. A Federal Register notice was filed to advertise

the release of this final draft document and invite comments to be considered in the final LRTP. The original communication plan and stakeholder list is provided in Appendix F to serve as a guide for future public involvement activities when this plan is updated.

1.6 Plan Overview

This LRTP is structured in four chapters, including this introduction, such that each chapter builds upon the information and conclusions derived in the previous chapter(s). The document examines baseline conditions, funding and project selection, and recommendations for future action.

Chapter 2, Baseline Conditions. This chapter presents baseline conditions as they relate to the six goals of this plan. Using existing asset management systems and road inventory data maintained by the Service and FLH, Chapter 2 presents a data-informed view of the transportation system. It also provides a "road map" for identifying unit level transportation improvement needs. Data such as road service life, visitation statistics and trends, population growth, alternative transportation systems opportunities, and other spatially significant issues are used to establish a baseline from which LRTP decisions can be made.

Chapter 3, Funding and Project Selection.

This chapter illustrates the funding gap for the Service transportation system. It also describes a variety of funding categories that may be used for transportation projects in Region 1. Using the available funding, this chapter also describes how projects are selected for implementation in the context of the LRTP goals and objectives. This chapter highlights funding available from traditional Federal sources and identifies opportunities for partnering with outside agencies, State DOTs, and local governments to leverage funding.

Chapter 4, Recommendations for Future Plan Activities.

This chapter includes recommended actions for future development. Recommendations include improving data informed analysis through better data management from internal and external sources, specifically related to accident data and fish and wildlife resources and developing a long-range list of project needs from the call for projects.

Chapter 2: Goals and Baseline Conditions

Understanding the current state of the transportation system in Region 1 is a prerequisite for planning future transportation projects. As such, this Region 1 LRTP documents existing condition, safety, and visitor use with regard to the transportation system. This LRTP also considers changes that are likely to occur in the future, such as increased traffic and visitation due to population increases. The intent is to identify future transportation needs and plan for them proactively in alignment with goals and objectives identified during the planning process. The baseline data (i.e., existing conditions and trends) in this chapter are intended to inform the project identification and selection process described in *Chapter 3, Funding and Project Selection*, allowing projects to be selected based on an objective process, not existing conditions alone.

This chapter offers a summary of the current state of Region 1 transportation infrastructure as it relates to the goals and objectives described in *Chapter 1, Introduction*. The six goal areas are natural resource protection, conditions and safety, welcome and orient visitors, planning, partnerships, and sustainability. The following sections in this chapter define the intent of each goal and provide supportive data and an analysis summary supporting each goal. The chapter provides a road-map for identifying improvement needs (i.e., potential projects) at the unit level using readily available data to analyze deficiencies or hot spots that may be occurring at individual units. By applying the approach demonstrated in the following sections for each goal area, Service leadership can identify potential project opportunities that are most likely to receive funds. This chapter outlines the data sources, data relationships, and extra steps that are necessary to identify needs and opportunities that correspond to the LRTP goals and objectives, as outlined in Chapter 1. Figure 3 illustrates the structure of this chapter and how improvement needs can be identified.

2.1 Natural Resource Protection

The LRTP natural resource protection goal is to **“ensure that the transportation program helps to conserve and enhance fish, wildlife, and plant resources and their habitats.”** The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

Identify, research, and adopt BMPs for planning, design, construction, and maintenance that mitigate or avoid the impacts of transportation activities and facilities.

Objective 2

Reduce transportation related conflicts within fish and wildlife corridors and habitat on or adjacent to Service lands. Strategies to achieve this objective are:

- Conduct needs assessments for wildlife crossings on and adjacent to Service lands.
- Consider aquatic organism passage during the planning and design phases of transportation project development on Service units.

2.1.1 Resource Protection Data

Resource protection data are needed to evaluate both the BMP and wildlife conflict objectives. Information used to establish a baseline for the BMP-focused objective includes existing Service BMP guidance and systems. The wildlife conflict objective is informed by data that helps identify places where animal and vehicle conflicts have occurred in the past and are likely to occur in the future.



Caroline Peterschmidt/USFWS

Figure 3
How to use Chapter Two

2.# Goal Topic
Presents the long range transportation goals for the region, and how circumstances at the unit level can demonstrate needs and opportunities to further these goals. The chapter should be read as a unit level roadmap illustrating how to identify projects that stand the best chance of receiving funds and how to use existing data to demonstrate the need for your project.

2.#.1 Data
These sections identify the datasets used to identify need and opportunity for a particular goal area.

2.#.2 Identifying Improvement Areas
These sections explain how the data identified in 2.#.1 should be used to demonstrate need and opportunity.

2.#.3 Recommendations for Future Analysis
These sections identify information that would improve future efforts to identify need and opportunity.

Sidebars
Case studies show the practice of identifying need and opportunity.

Long Range Transportation Plan for Fish and Wildlife Service Lands in Region 1

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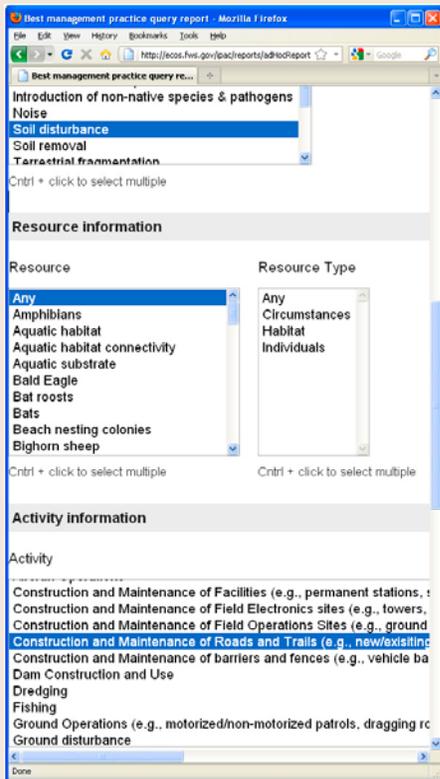
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U.S. Fish & Wildlife Service - Region 1

BMP Searches

Among many other functionalities, the IPaC system allows users to conduct a “BMP search,” where stressors, resources, project activities can be selected from a list. The system then generates a report of relevant BMPs, as illustrated below.



Best Management Practices

The Service has a library of BMPs that promotes guidelines for planning, design, construction and maintenance pertaining to transportation projects. Transportation related BMPs are included in the Service’s *Roadway Design Guidelines* provided in Appendix D. A BMP library is also available as a searchable database on the Service’s website along with the Information, Planning, and Consultation system (IPaC), which allows users to preview how proposed activities may impact sensitive natural resources and which BMPs are appropriate to help mitigate negative impacts. The IPaC tool is available online at <http://ecos.fws.gov/ipac>.

Resource Conflicts

Wildlife conflict data helps to identify places where animal and vehicle conflicts have occurred in the past and are likely to occur in the future. Ideally, this data would consist of sensitive wildlife habitat locations, wildlife corridors, and historic locations of

vehicle-animal collisions. At this time, not all of this information is available; however, data on wildlife conflicts that resulted in fatalities is available from the National Highway Traffic Safety Administration. While this data is informative and provides some indication of historic conflict locations, by itself, the data is insufficient as a basis for decision making. There are too many other factors that are yet to be quantified that must be considered in resource conflict decisions.

2.1.2 Identifying Resource Protection Improvement Areas

Resource protection improvement areas are identified in both the BMP objective and the wildlife conflict objective. The BMP objective can be addressed through the use of appropriate BMPs for a proposed action. Appropriate BMPs can be found several ways, such as using the Service Region 1 *Roadway Design Guidelines* (available in Appendix D) and using IPaC. IPaC allows users to preview how proposed activities may impact sensitive natural resources and which BMPs are appropriate to help mitigate negative impacts.

To identify areas of resource protection relevant to wildlife conflicts, one must consider multiple factors including wildlife corridors, wildlife habitat, and records of historic animal-vehicle collisions. At this time, only a measure of historic fatal animal-vehicle collisions is available. The data indicate that over a period of 8 years, one fatal accident involving an animal-vehicle collision occurred in the region on Service lands. The accident occurred in 2008 at the Saddle Mountain National Wildlife Refuge at the intersection of SR-240 and SR-225 (Reservation Road). The accident is a single indicator of wildlife conflict and suggests that further study is needed to determine if this or other refuges are a resource protection improvement area. Additional documentation regarding the presence of wildlife corridors, wildlife habitat, and other non-fatal collisions would determine the appropriate need for resource protection improvements at refuges and hatcheries.

2.1.3 Recommendations for Future Analysis

Additional information is necessary to better evaluate resource protection needs. The following datasets are required to better understand where transportation related resource protection improvements should occur:

- Use a systematic method to quantify the significance of the conflict between fish and wildlife and transportation facilities to better demonstrate a need for improvements.
- Obtain wildlife habitat locations and fish passage corridors to help identify potential animal-

transportation conflict areas as well as the type of potentially impacted wildlife.

- Identify the locations of access conflicts between resources (fish and wildlife habitat) and transportation facilities to help decision makers develop appropriate solutions.
- Obtain fish passage data to help identify potential fish-transportation conflict areas and potentially impacted species.
- Obtain non-fatal vehicle-animal collision data to provide a more complete understanding of historic vehicle-animal conflict hot-spots.

2.2 Conditions and Safety

The LRTP condition and safety goal is to **“provide a safe and reliable transportation network to and within Service lands.”** The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

Identify and reduce safety problems and modal conflicts to and within Services lands. Strategies to achieve this objective are:

- Conduct road safety audits (RSAs) and/or safety need assessments.
- Increase the number of projects that address access/egress safety problems or conflicts between private motor vehicles, transit, and bicyclists and/or pedestrians.
- Identify and implement operational improvements through intelligent transportation systems applications.

Objective 2

Ensure that mission critical transportation assets are maintained to “good” or better condition. Strategies to achieve this objective are:

- Use comprehensive condition assessment and Road Inventory Program (RIP) to establish a baseline condition.
- Determine what is needed to extend service life of mission critical assets.

2.2.1 Condition and Safety Data

Data used to identify appropriate opportunities for improving transportation system conditions include physical characteristics like surface condition and asset type as well as external factors such as an asset’s importance and relationship to safety. Data used to make these determinations are obtained from regularly updated data sources like the Service’s service asset maintenance management system (SAMMS) and RIP. SAMMS provides information on facility and equipment deficiencies, justifies budget requests for maintenance needs, and provides a sound basis for management decision making. RIP data is collected by the FLH, on behalf of the Service, to provide ongoing condition monitoring of all public use roads, trails, and parking lots. The inventory is updated continuously and resulting datasets are compiled and released every 5 years.

Supplemental information from outside sources is used to help identify problem areas and opportunities for improvements. Sources of supplemental information include the U.S. Census, FHWA, and State DOTs. These data help inform decision makers about issues that extend beyond condition and typically relates to transportation system issues regarding access to and through units.

Overview of Condition Data

The majority of the Service’s transportation system consists of asphalt, gravel, and native surface roads. In Region 1, the Service owns and maintains 421 miles of public use roads, 22 miles of which are asphalt, 289 miles are gravel, and 110 miles are native surface. These numbers exclude roads that are used for Service administrative purposes as well as public use roads that are double-track and unpaved. The States of Nevada (Sheldon National Wildlife Refuge only) and Oregon have the most roads (by length) with 31.7 percent (133.5 miles) and 31.5 percent (132.6 miles) of total Region 1 miles, respectively. The State of Washington is the third highest with 123.5 miles (29.3 percent), followed by Idaho with 31.2 miles (7.4 percent), and Hawaii with 0.7 miles (0.2 percent). Based on RIP inventory data, 26.4 percent of asphalt roads have at least 7 years of use remaining and 88.6 percent of gravel roads and 63.0 percent of native roads have at least 3 years of use remaining, as expressed by remaining service life and as summarized in Table 1. The need for road improvements are also determined by a road’s asset priority, facility condition index, and condition, as summarized in Appendix C, Table 2.

Conversely, 15.4 percent of asphalt roads, 11.4 percent of gravel roads, and 37.0 percent of native roads have 3 years or fewer of use remaining and are in need of immediate rehabilitation or reconstruction.

Supporting the Service’s road network are 342 parking lots spanning a total of 70 acres. Table 2 summarizes parking lot conditions for the region. RIP data indicate that 35 percent of parking lots are asphalt, 57 percent are gravel, 8 percent are native surface, and less than 1 percent are concrete. A rating of “good” or better is attributed to

77 percent of asphalt parking lots, 52 percent of gravel, 100 percent of concrete, and 32 percent of native surface parking lots. The need for parking lot improvements can be determined by asset condition, as summarized in Appendix C, Table 3.

Table 1
Service Road Conditions

Road Surface	Remaining Service Life (years)	Miles	Percentage of Total	Percentage of Surface Type	Cumulative Percentage
Asphalt	15 to 16	0.25	0.1	1.1	1.1
	11 to 14	3.4	0.8	15.6	16.7
	7 to 10	2.1	0.5	9.7	26.4
	4 to 6	12.65	3.0	58.2	84.6
	0 to 3	3.34	0.8	15.4	100.0
Gravel	8 to 10	2.05	0.5	0.7	0.7
	5 to 7	209.93	49.8	72.5	73.2
	3 to 4	44.48	10.6	15.4	88.6
	1 to 2	11.87	2.8	4.1	92.7
	0	21.14	5.0	7.3	100.0
Native	8 to 10	0	0.0	0.0	0.0
	5 to 7	32.22	7.6	29.2	29.2
	3 to 4	37.22	8.8	33.8	63.0
	1 to 2	7.52	1.8	6.8	69.8
	0	33.28	7.9	30.2	100.00

Source: FHWA, Road Inventory Program; Cycle 4 (2007)

Table 2
Service Parking Lot Conditions

Surface	Condition	Acres	Percentage of Surface Type	Percentage of Total
Asphalt	Excellent	3.7	15.0	5.0
	Good	14.7	61.0	21.0
	Fair	2.4	10.0	4.0
	Poor	3.1	13.0	5.0
	Failed	0.0	0.0	0.0
Concrete	Excellent	0.1	31.0	0.0
	Good	0.1	73.0	0.0
	Fair	0.0	0.0	0.0
	Poor	0.0	0.0	0.0
	Failed	0.0	0.0	0.0
Gravel	Excellent	2.3	6.0	3.0
	Good	17.9	46.0	26.0
	Fair	14.3	36.0	21.0
	Poor	4.4	11.0	6.0
	Failed	0.2	1.0	0.0
Native	Excellent	0.0	0.0	0.0
	Good	1.8	32.0	3.0
	Fair	1.4	25.0	2.0
	Poor	0.7	12.0	1.0
	Failed	1.7	31.0	2.0

Source: FHWA, Road Inventory Program, Cycle 4 (2007)

The Service also owns and maintains 547 miles of trails in Region 1. The majority of trails are located in Washington with 99 miles (62 percent), followed by Oregon with 44 miles (28 percent), Idaho with 13 miles (8 percent), the Sheldon National Wildlife Refuge portion of Nevada with nearly 2 miles (1 percent) and Hawaii with less than 1 mile (less than one percent). The reported conditions of these trails are generally in good condition or better, as summarized in Table 3. Sixty-four percent of trails have a rating of “good” or better. Only 2 percent of trails receive a rating of “very

poor;” however, 33 percent of trails are unrated. Need for trail improvement is also determined by a trail’s asset priority, facility condition index, and condition, as summarized in Appendix C, Table 4. Some trails contain specific areas that are deemed deficient due to drainage, erosion, structure, or location. Region 1 has 48 such locations, with the majority being drainage-related issues in Willapa National Wildlife Refuge with 23 locations and William L. Finley National Wildlife Refuge with nine locations. These locations are summarized in Appendix C, Table 5.

Table 3
Trail Conditions by Type

Condition	Surface Type	Miles	Percentage of Condition	Percentage of Surface Type	Percentage of Total
Excellent	Trail on Admin Road	30.1	58	32.6	18.9
	Asphalt	2.6		2.8	1.6
	Boardwalk	3.5		3.8	2.2
	Concrete	0.4		0.4	0.2
	Gravel	8.7		9.4	5.5
	Mowed	7.2		7.8	4.5
	Native	38.4		41.5	24.1
	Wood Chip	1.5		1.6	0.9
Total		92.4			57.9
Good	Trail on Admin Road	2.3	6	22.9	1.4
	Asphalt	0.2		1.9	0.1
	Concrete	0.1		1.1	0.1
	Gravel	0.2		2.0	0.1
	Native	7.2		72.2	4.5
Total		10.0			6.3
Fair	Concrete	0.1	1	4.9	0.0
	Native	1.4		95.1	0.8
Total		1.5			0.9
Very Poor	Trail on Admin Road	0.6	2	23.8	0.4
	Mowed	0.7		29.0	0.5
	Native	1.2		47.2	0.7
Total		2.5			1.6
Not Rated	Trail on Admin Road	53.3	33	100.0	33.4
Grand Total		159.6			

Source: FHWA, Road Inventory Program, Cycle 3 (2004)

Safety Hot Spots

Baseline data analysis is intended to help decision makers identify condition and safety hot spots to and within refuges and hatcheries. The following example shows that there is a possible deficiency in the transportation system condition and safety within, and possibly to, Kealia Pond National Wildlife Refuge in Maui. Deficiencies are shown in Table 4, illustrating that the non-Service routes accessing the refuge are generally in “poor” or “very poor” condition and have comparatively high AADT (above 20,000 vehicles). System deficiencies are present within the refuge; the Service route called Entrance Road is rated as “fair,” yet has very high API of 100, as summarized in Appendix C, Table 2.



the mission critical priority of an asset as determined by the Service for roads and trails. Ideally, assets with a value of 80 or greater are mission critical and should have a condition rating of “good” or better. FCI is the ratio of the deferred maintenance costs to replacement value and is used as an indicator of infrastructure condition.

The need for safety improvements can be illustrated by RSAs and/or crash data. Reducing conflicts between cars and bicyclists and/or pedestrians travelling to and within Service lands transportation asset can be achieved by investing in improvements where crash history or RSAs have demonstrated safety problems with the current transportation system.

In addition to improving Service transportation assets that are of high value and show deficiencies, the condition and safety goal may be advanced by joint projects with partners to address transportation safety needs of mutual interest with other government agencies. To identify such opportunities, non-Service condition and safety information is also examined when there is a shared geography with Service assets. Opportunities may exist if both Service and non-Service entities have system condition deficiencies in shared locations.

The Service supports safe and reliable access to its lands, regardless of facility ownership. As such, safety indicators including condition, AADT, and crash history were collected and analyzed to help identify potential safety problem areas on non-Service owned roads near refuges and hatcheries. Places where these factors are pronounced and within one mile of a Service unit are areas of potential opportunity to partner with non-Service agencies to resolve safety issues of mutual interest. These hot spot locations are identified in Table 4 and illustrated in Figure 4 through Figure 7. Hot spots are identified as non-Service routes that satisfy at least one of the following criteria:

- An AADT of 20,000 or more
- Five or more crashes have occurred within the most recent 3-year period on a route within 1 mile of a unit
- Current road conditions are considered “poor” or “very poor”

Overview of Safety Data

The Service supports safe and reliable access to and through its lands. As such, safety indicators including road pavement condition, annual average daily traffic (AADT), and crash history were collected when available and analyzed to help identify potential safety problem areas on non-Service owned roads near refuges and hatcheries.

2.2.2 Identifying Conditions and Safety Improvement Areas

Baseline condition data helps identify areas that are in need of transportation improvements for safety, modal connections, and/or condition. Service-owned assets that could potentially benefit from condition improvements are identified by several variables including asset priority index (API), facility condition index (FCI), and observed condition. API describes

Table 4
Non-Service Road Condition, Use, and Safety Hotspots

State	Name	Route	Condition	AADT	Crashes
Hawaii	Hanalei NWR	Weke Rd	Very Poor	2,032	Not Available (N/A)
	Huleia NWR	Puhi Rd	Very Poor	5,337	N/A
	Kealia Pond NWR	Honoapiilani Hwy	Fair	28,610	N/A
		Piilani Hwy	Fair	28,113	N/A
		Mokulele Hwy	Poor	28,413	N/A
		Ohukai Rd	Very Poor	7,702	N/A
		South Kihei Rd	Very Poor	21,342	N/A
	Pearl Harbor NWR	Fort Weaver Rd	Fair	65,698	N/A
		H-2	Fair	100,371	N/A
		Kamehameha Hwy	Poor	54,814	N/A
		Acacia Rd	Very Poor	29,425	N/A
		Farrington Hwy	Very Poor	65,394	N/A
		H-1	Very Poor	217,006	N/A
		Hoolaulea St	Very Poor	5,252	N/A
		Kuala St	Very Poor	16,955	N/A
		Lehua St	Very Poor	12,688	N/A
		Paiwa St	Very Poor	26,502	N/A
	Idaho	Renton Rd	Very Poor	11,079	N/A
		Waimano Home Rd	Very Poor	19,593	N/A
		Waipahu St	Very Poor	9,589	N/A
Waipio Point Access Rd		Very Poor	2,011	N/A	
Camas NWR		I-15	N/A	4,100	17
Clearwater FH		US 12	N/A	6,200	19
		SH 55	N/A	12,000	130
Deer Flat NWR		12th Ave	N/A	11,000	11
		I-84	N/A	16,500	20
		Idaho Ave	N/A	5,600	18
	Karcher Rd	N/A	12,000	23	
	SH-19	N/A	2,500	5	
	SH-45	N/A	11,000	45	
	US-95	N/A	5,600	14	
	SH-78	N/A	1,500	41	
Dworshak NFH	US 12	N/A	6,200	19	
Grays Lake NWR	SH 34	N/A	500	6	
Hagerman NFH	US 30	N/A	1,600	5	
Kooskia NFH	US 12	N/A	1,000	6	
McCall FH	Lake St	N/A	7,300	14	
Minidoka NWR	I-86	N/A	6,600	41	
Sawtooth FH	SH 75	N/A	860	5	

Table 4
Non-Service Road Condition, Use, and Safety Hotspots

State	Name	Route	Condition	AADT	Crashes
Oregon	Ankeny NWR	I-5	N/A	59,300	10
	Baskett Slough NWR	SR-22	Poor	N/A	6
		SR-99W	Poor	N/A	N/A
	Deer Flat NWR	SR-453	Very Poor	N/A	N/A
		SR-454	Very Poor	N/A	N/A
		I-84	Poor	N/A	N/A
		SR-201	Poor	N/A	N/A
	Deer Flat NWR	SR-201	Very Poor	N/A	N/A
		Lewis And Clark NWR	US 30	Poor	N/A
	McKay Creek NWR	US 395	N/A	N/A	5
	Oregon Islands NWR	US 101	Poor	N/A	7
	Siletz Bay NWR	US 101	N/A	N/A	8
	Tualatin River NWR	SR-99W	N/A	42,200	6
	Umatilla NWR	US 730	N/A		5
Washington	Columbia NWR	SR-26	N/A	2,566	9
	Dungeness NWR	US 101	N/A	12,091	10
	Franz Lake NWR	SR-14	N/A	4,032	8
	Grays Harbor NWR	SR-109	N/A	N/A	32
	Julia Butler Hansen Refuge	SR-4	N/A	4,369	24
	Little Pend Oreille NWR	SR-20	N/A	N/A	10
		US 12	N/A	10,147	34
	McNary NWR	SR-124	N/A	N/A	5
		US 730	N/A	N/A	9
		Nisqually NWR	I-5	N/A	110,850
	Quilcene NFH	US 101	N/A	2,858	9
	Saddle Mountain NWR	SR-24	N/A	N/A	18
		SR-240	N/A	N/A	16
	Steigerwald Lake NWR	SR-14	N/A	6,758	12
	Toppenish NWR	US 97	N/A	4,034	9
	Turnbull NWR	SR-904	N/A	N/A	7
	Umatilla NWR	SR-14	N/A	N/A	13
Willapa NWR	US 101	N/A	N/A	13	
Winthrop NFH	SR-20	N/A	N/A	6	

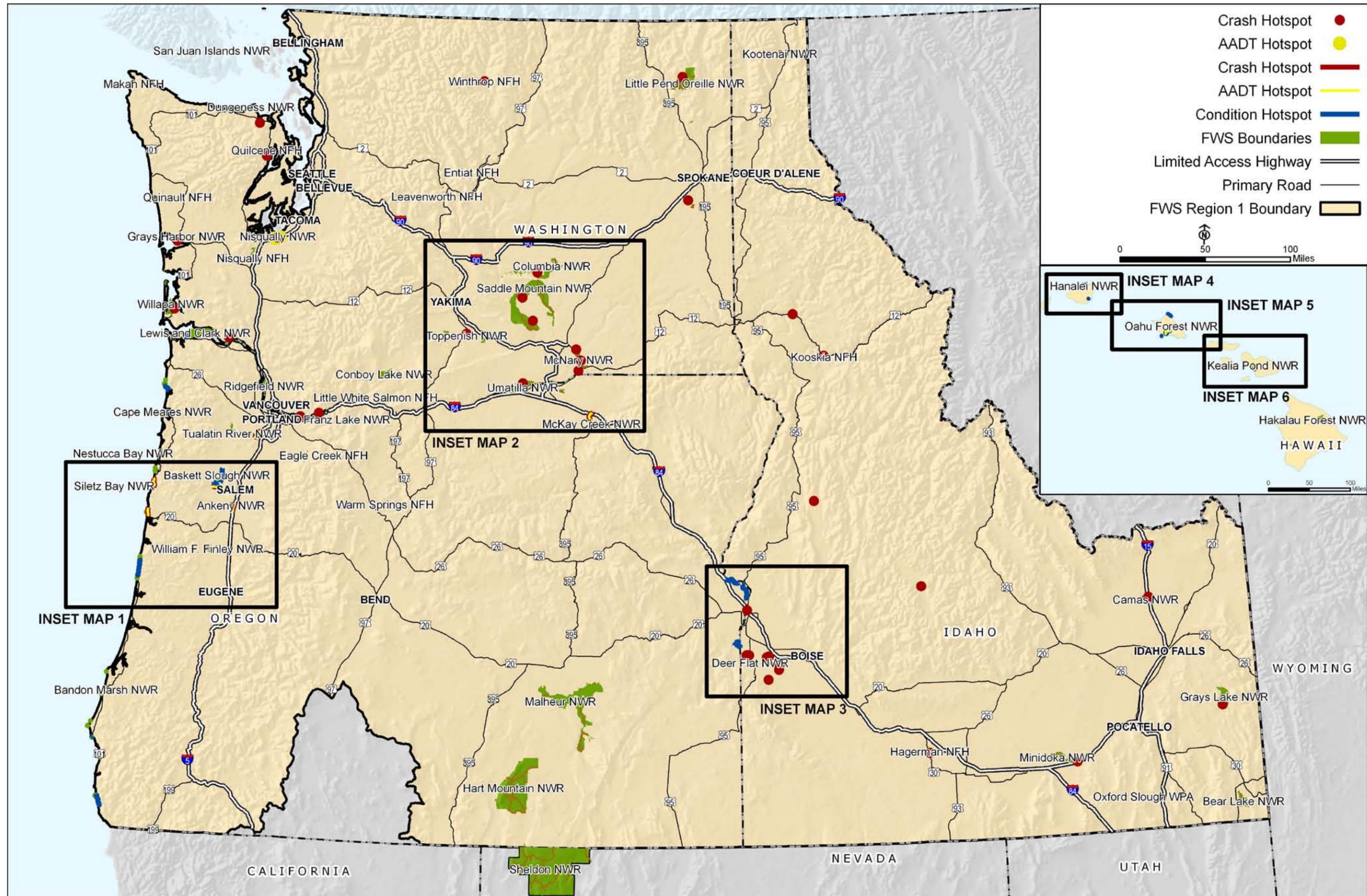
Cited in sidebar on page 25

Note: Green highlight means meets hotspot criteria of AADT 20,000 or higher, five or more crashes in the past three years, or road conditions of poor or worse

Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; Condition: Hawaii DOT (2003/2004), Oregon DOT (2008); Idaho DOT (N/A); Washington DOT (N/A) AADT: Hawaii DOT (2008), Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Crashes: Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii (N/A)

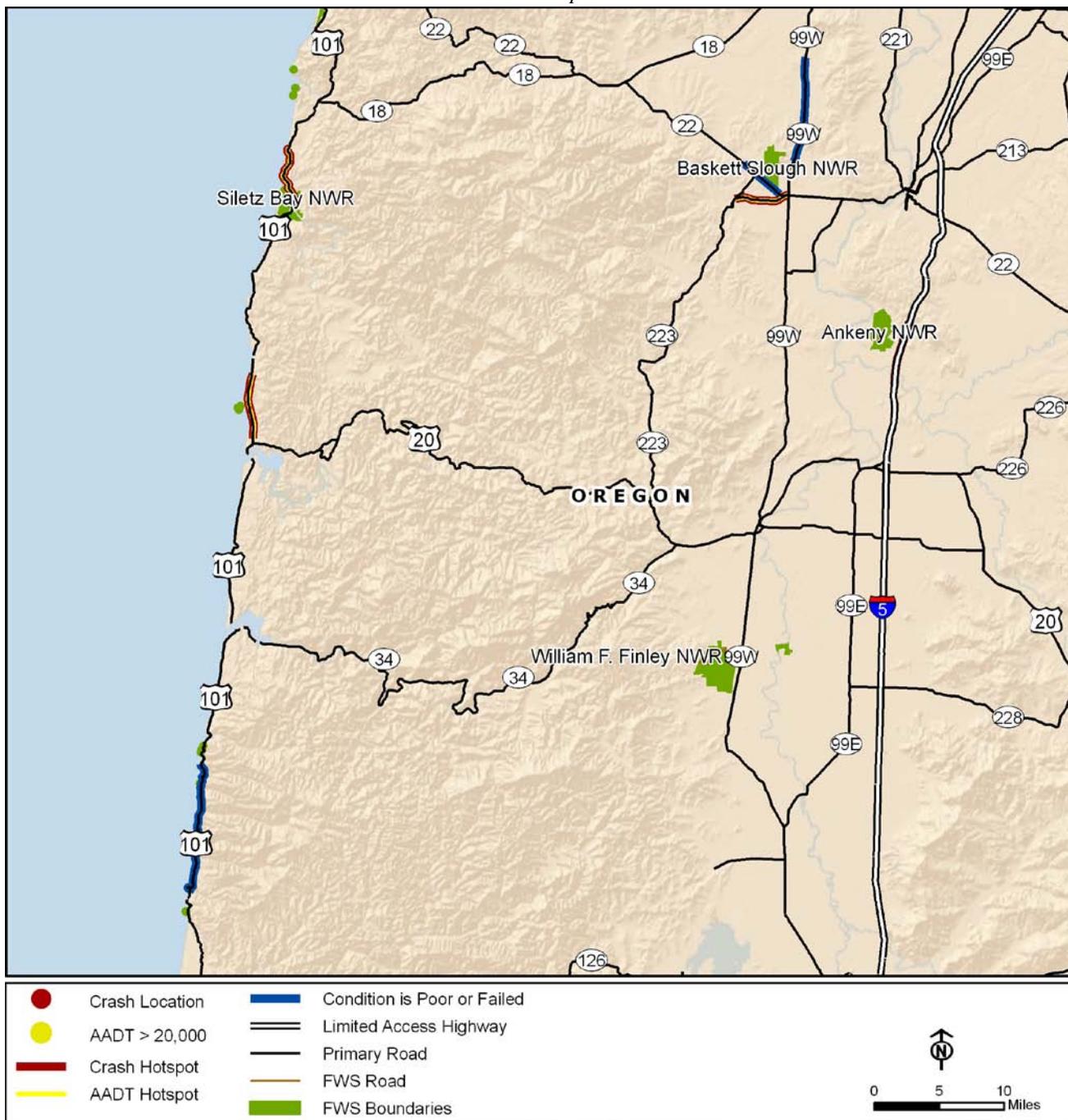
NWR = National Wildlife Refuge; NFH = National Fish Hatchery; FH = Fish Hatchery

Figure 4
Service Units and Non-Service Road Hotspots



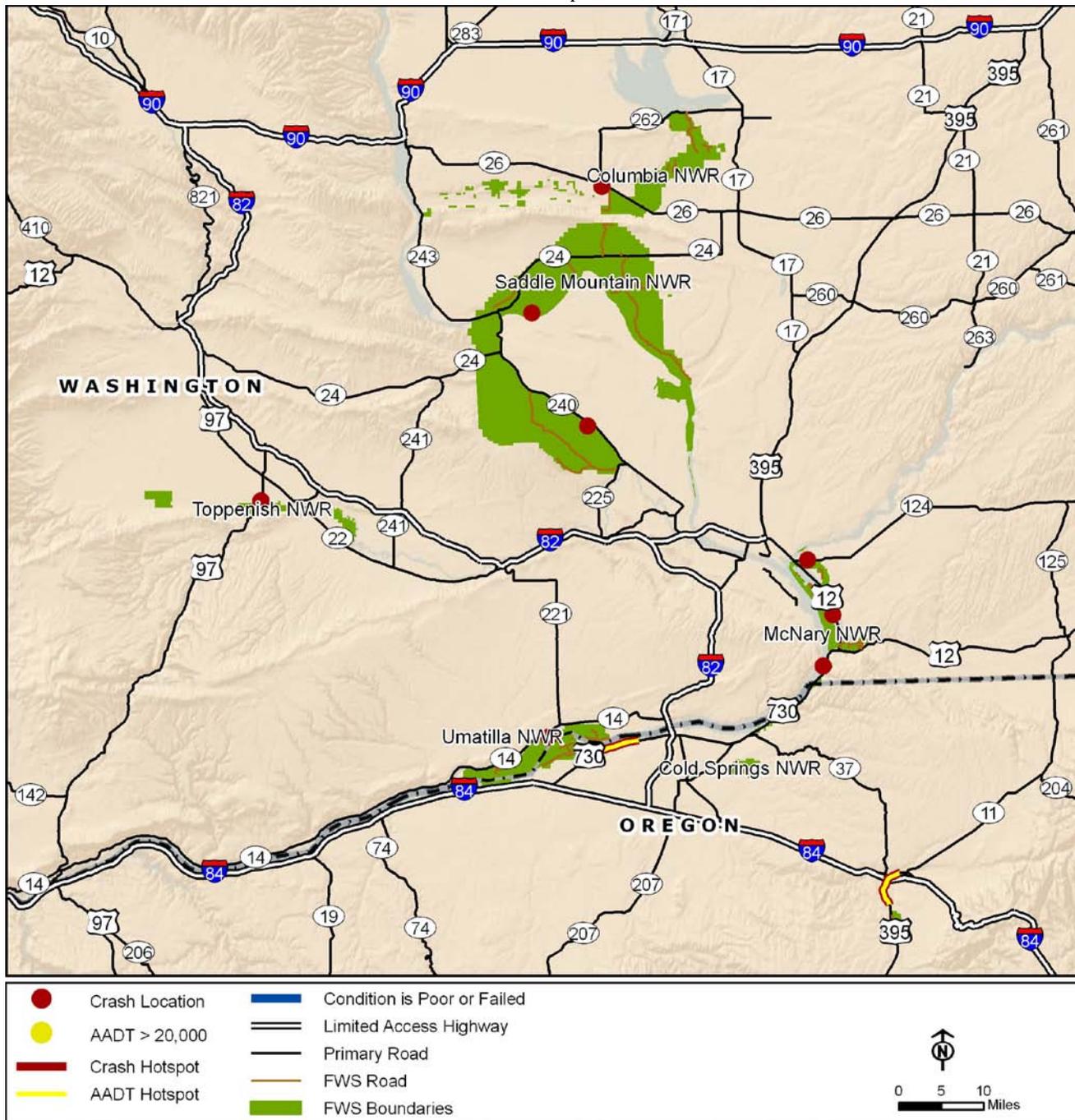
Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008) AADT: Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008)

Figure 5
Inset Map 1



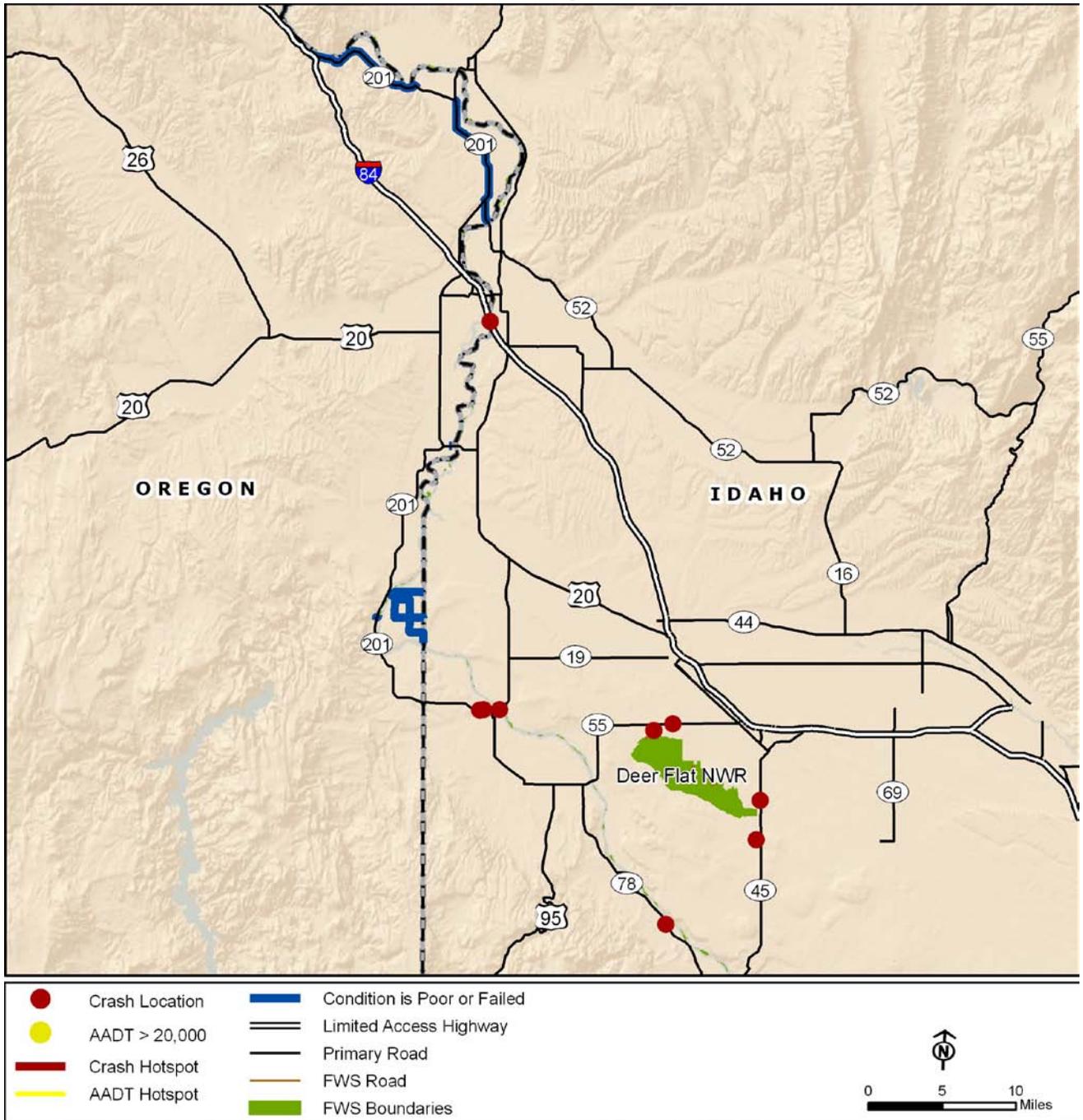
Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Idaho DOT (N/A); Hawaii DOT (N/A)

Figure 6
Inset Map 2



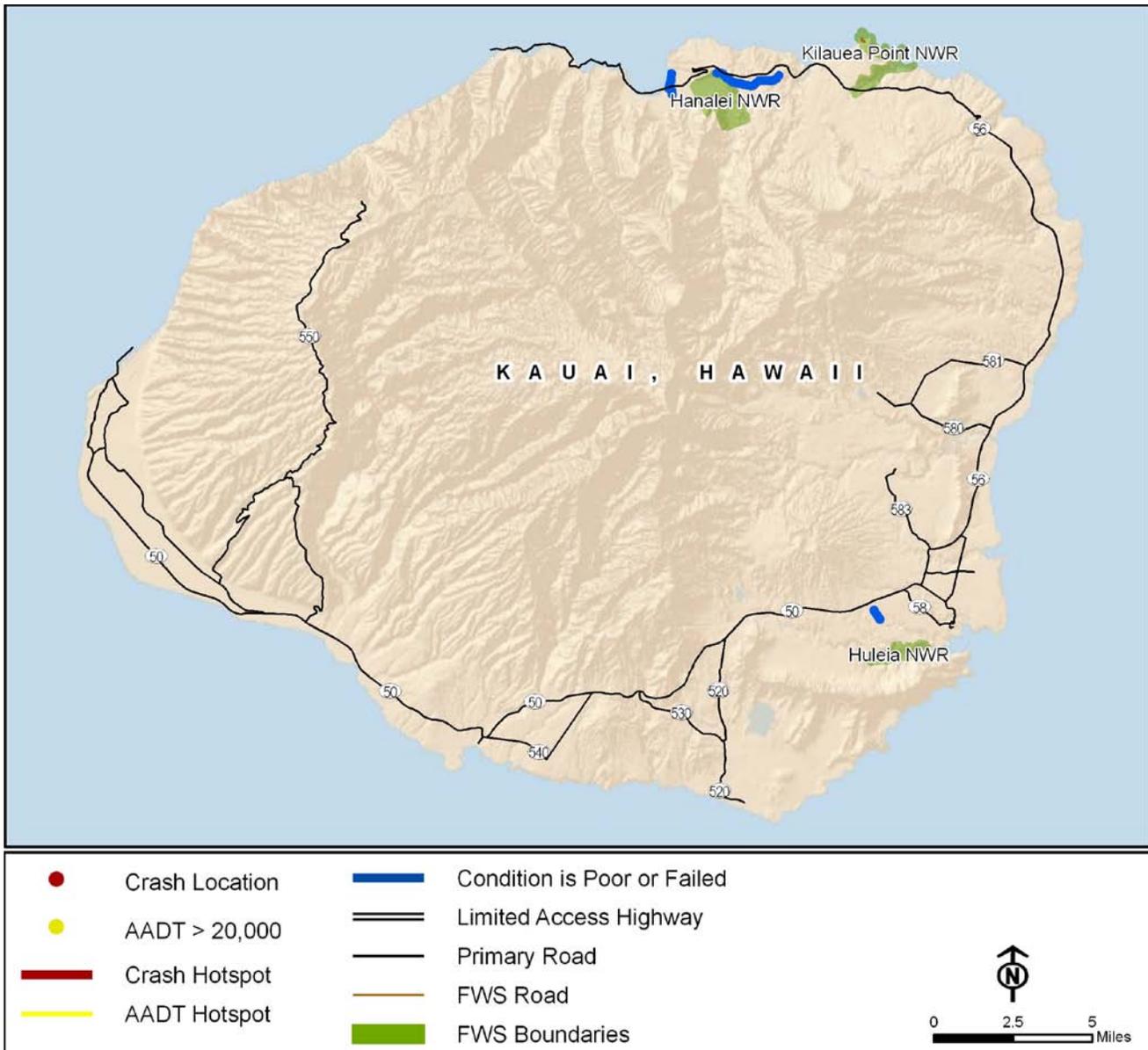
Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii DOT (N/A)

Figure 7
Inset Map 3



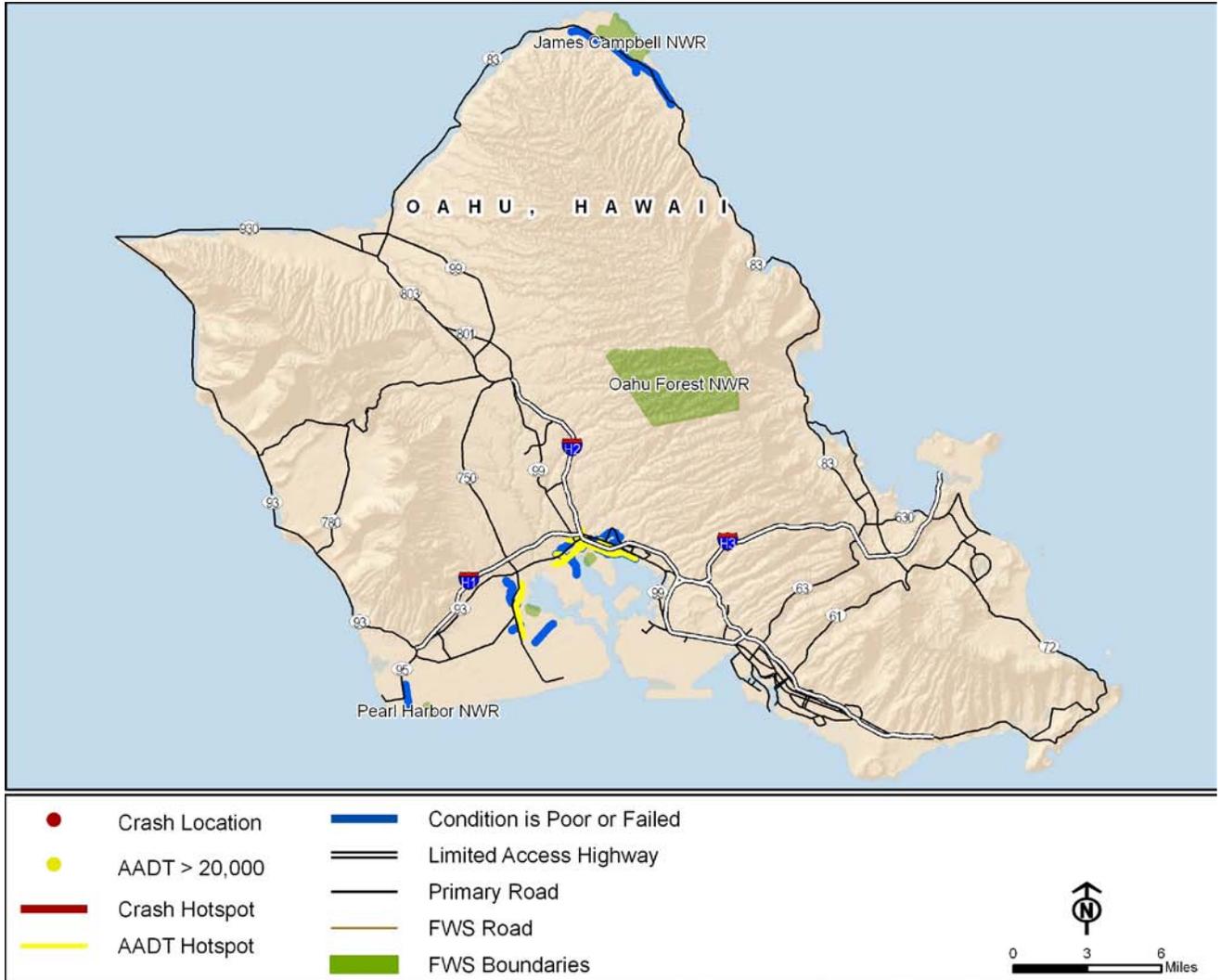
Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii DOT (N/A)

Figure 8
Inset Map 4



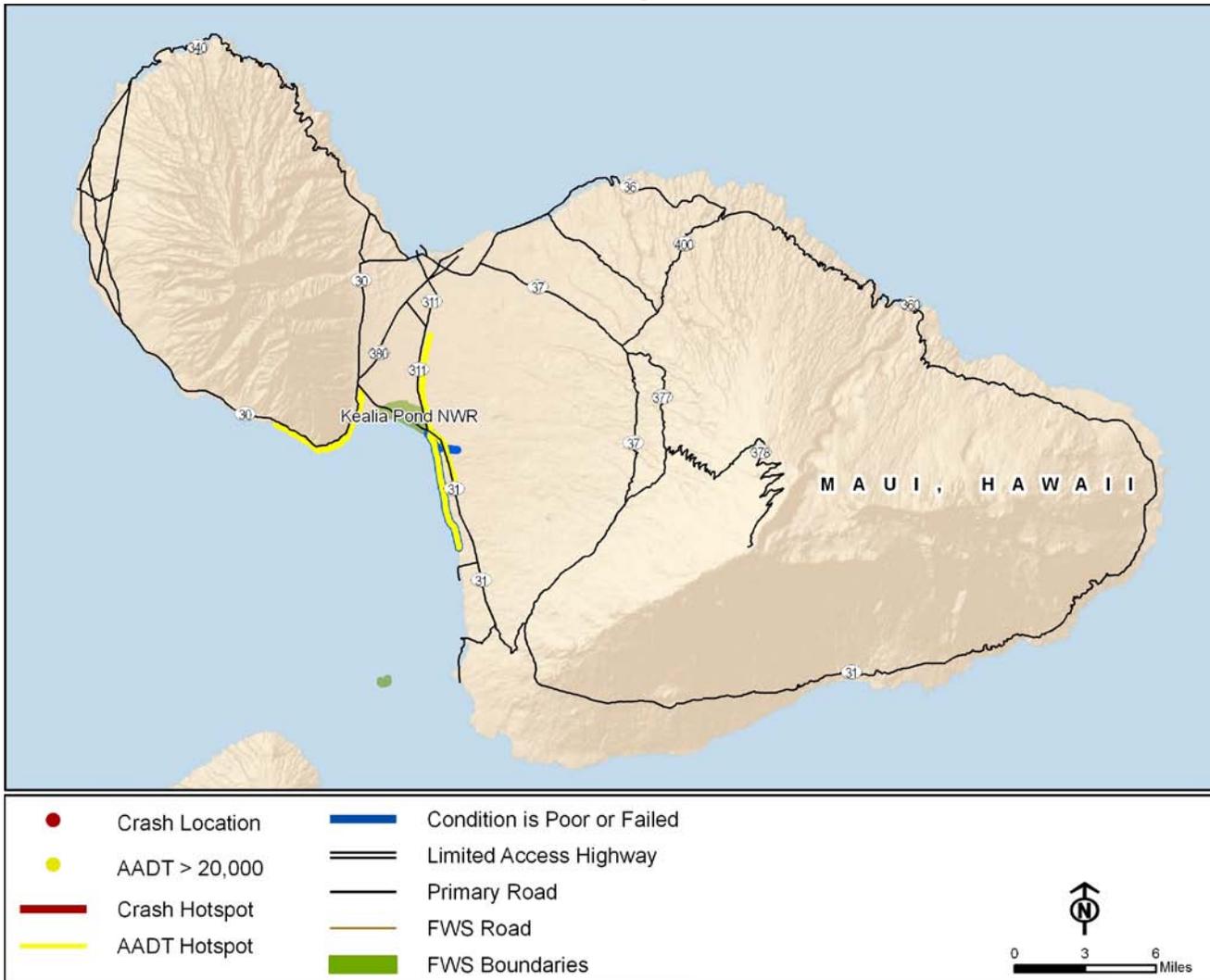
Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii DOT (N/A)

Figure 9
Inset Map 5



Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii DOT (N/A)

Figure 10
Inset Map 6



Routes: Hawaii DOT, Idaho DOT, Oregon DOT, Washington DOT; **Condition:** Oregon DOT (2008); Washington DOT (N/A); Idaho DOT (N/A); Hawaii DOT (N/A) **AADT:** Idaho DOT (2007), Oregon DOT (2007), NHPN (2008); Hawaii DOT (N/A) **Crashes:** Idaho DOT (2006 to 2008), Oregon DOT (2005 to 2007, \$1,500 or more in damage), Washington DOT (2006 to 2008); Hawaii DOT (N/A)

Baseline data suggest that McNary National Wildlife Refuge, in the state of Washington, is a reasonable candidate for road improvements. The first table below indicates that 84 percent of the refuge’s roads are rated “fair” or worse. The second table below indicates that there are 12 routes with an API of 80 or greater, the threshold for being considered mission critical. Eleven of these twelve mission critical routes have a condition of “fair” or “failed.” Table 4 shows that the segment of US 12 that intersects the refuge had 34 crashes within a 2-year timeframe.

Excerpt from Appendix C, Table 6

Service Unit	Surface	Condition	Miles	% in Unit
McNary NWR	Asphalt	Fair	0.60	4%
		Poor	1.05	7%
		Failed	1.31	9%
	Gravel	Fair	7.15	50%
		Good	2.11	15%
		Failed	0.56	4%
Native	Failed	0.56	4%	
	Fair	1.38	10%	

FHWA, Road Inventory Program, Cycle 4

Excerpt from Appendix C, Table 2

Route Name	Route ID	Surface	Asset Priority Index	Condition
East Millet Pond Road	FWS-MCNA-118	Gravel	80	Failed
Game Dept. Road	FWS-MCNA-014	Gravel	100	Good
Johnson Pond Road	FWS-MCNA-120	Asphalt	80	Fair
Old Bridge Road	FWS-MCNA-123	Gravel	80	Fair
Peninsula Unit Entrance Road	FWS-MCNA-010	Gravel	100	Fair
Quarry Pond Road	FWS-MCNA-109	Gravel	80	Fair
Twin River Access Main Road	FWS-MCNA-015	Asphalt	100	Fair
Two Rivers Entrance Road	FWS-MCNA-012	Gravel	100	Fair
Two Rivers Entrance Road	FWS-MCNA-012	Gravel	100	Failed
Wallula Unit Road	FWS-MCNA-013	Gravel	100	Fair
Winery Road	FWS-MCNA-100	Gravel	80	Fair
Winery Road	FWS-MCNA-100	Native	80	Fair

FHWA, Road Inventory Program, Cycle 4

1.1.3 Recommendations for Future Analysis

Several actions are necessary to better evaluate the need for conditions and safety improvements. The following actions are recommended:

- Obtain AADT for all Service roads to help quantify use and add to the meaningfulness of need determinations.
- Collect crash data for all Service roads to help identify areas in need of safety improvements.
- Obtain complete current replacement value, API, FCI, and deferred maintenance for all refuge and hatchery roads, parking lots, and trails to eliminate data gaps and improve the reliability of need determinations.
- Develop a better cross-compatibility between SAMMS and RIP for roads, parking lots, and trails to eliminate data gaps and increase the reliability and usefulness of need and hotspot analyses.
- Use a complete dataset of non-Service road use, condition, and crashes to eliminate data gaps in the determinations of improvement need and partnership opportunity.

1.2 Welcome and Orient Visitors

The LRTP welcome and orient visitors goal is, **“Develop and maintain a transportation network that welcomes and orients visitors.”** The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

Provide public information to enable visitors to easily get to refuges and hatcheries and to use its sites. Strategies for this objective are:

- Identify appropriate locations in the transportation system to place entrance, directional, and boundary signs to improve visitor way-finding to and within refuges and hatcheries.
- Increase use of traveler information systems, such as 511 and variable message signs, to transmit safety, interpretive and special events management information.

Objective 2

Engage the visitor with compelling information so they better understand the National Wildlife Refuge System and Fisheries Program purpose of wildlife conservation and to enjoy natural resources. The strategy for this objective is:

- Develop signage with positively worded regulations and information to create a relaxed and welcoming atmosphere.

Objective 3

Create a consistent and recognizable identity throughout all Service units through the use of standard materials for readily observed physical elements associated with the transportation system. Strategies for this objective are:

- Replace substandard entrance, regulatory, and interpretive signs to adhere to Service-wide standards when located adjacent to a transportation improvement project
- Develop and apply standards for landscape treatments to create a recognizable appearance to Service-owned parking lots and pull-offs to trailheads.

1.2.1 Welcome and Orient Visitors Data

Welcome and orient visitors data is analyzed with the assumption that opportunities for enhancing this goal are greatest in places that receive the highest number of visitors. Visitation and population data is used to identify appropriate opportunities. Population estimates and forecasts are derived from the U.S. Census, while visitation data is reported by the Service.

Visitation to refuges and hatcheries in Region 1 varies greatly, from less than 100 average annual visits at several small remote refuges and fish hatcheries, to 1.9 million average annual visits at Oregon Islands National Wildlife Refuge. Units that experience higher levels of visitation are generally located near populous locations, as shown in Figure 11 through 13. The figures also show visitation data by unit and U.S. Census county-level population estimates for 2008. Table 5 summarizes visitation trends to Region 1 Service lands. Change in visitation is generally positive throughout the region. Data indicate that the number of visits to Service lands had an average annual increase in visitation of 16 percent, from 2005 to 2009¹.

¹ Based on units that have data for all five years. Sixty-four percent of units have visitation data for all years.

Table 5
2009 Visitation by Unit

State/ Territory	Units	Visitation 2009	Relative Change (2005 – 2009)	State/ Territory	Units	Visitation 2009	Relative Change (2005 – 2009)	
Guam	Guam NWR	85,000	+	Washington	Leavenworth NFH	155,000	NA	
Hawaii	Kilauea Point NWR	500,000	+		Nisqually NWR	150,756	-	
	Hanalei NWR	402,000	-		Ridgefield NWR	117,345	+	
	Kealia Pond NWR	5,727	+		Umatilla NWR	76,000	+	
	Pearl Harbor NWR	3,230	-		Columbia NWR	73,000	+	
	Hakalau Forest NWR	1,502	-		Dungeness NWR	66,642	-	
	James Campbell NWR	1,376	-		McNary NWR	65,000	-	
	Midway Atoll NWR	291	+		Little Pend Oreille NWR	60,000	+	
	Kakahaia NWR	53	+		Turnbull NWR	43,930	+	
	Pacific Outlying Islands	Palmyra Atoll NWR			+	Saddle Mountain NWR	43,000	-
						Julia Butler Hansen Refuge	25,000	-
Idaho	Deer Flat NWR	167,884	+		Willapa NWR	25,000	+	
	Dworshak NFH	20,800	NA		San Juan Islands NWR	17,405	-	
	Bear Lake NWR	11,674	+		Spring Creek NFH	10,000	NA	
	Hagerman NFH	8,139	NA		Lewis and Clark NWR	16,000	-	
	Kooskia NFH	7886	NA		Grays Harbor NWR	13,000	-	
	Kootenai NWR	42,000	-		Toppenish NWR	9,750	+	
	Minidoka NWR	65,000	+		Little White Salmon NFH	7,600	NA	
	Camas NWR	7,512	+		Quinault NFH	7,456	NA	
	Idaho	Idaho Fish Health Center	60		NA	Steigerwald Lake NWR	7,267	+
Nevada	Sheldon NWR	17,000	-		Conboy Lake NWR	6,500	+	
Oregon	Oregon Islands NWR	2,556,440	+		Winthrop NFH	3,300	NA	
	Cape Meares NWR	489,564	+		Entiat NFH	3,170	NA	
	Three Arch Rocks NWR	347,728	+		Carson NFH	2,179	NA	
	Baskett Slough NWR	168,336	+		Franz Lake NWR*	2,000	-	
	William L. Finley NWR	119,602	-		Quilcene NFH	1,400	NA	
	Tualatin River NWR	86,896	+		Mid-Columbia River Fisheries Resource Office	1,048	NA	
	Malheur NWR	65,000	-		Makah NFH	800	NA	
	Ankeny NWR	61,185	+		Columbia River Fisheries Program Office	654	NA	
	Cold Springs NWR	30,000	-		Willard NFH	265	NA	
	McKay Creek NWR	30,000	-		Pierce NWR*	197	+	
	Hart Mountain National Antelope Refuge	20,786	-		Abernathy Fish Tech Center	190	NA	
	Nestucca Bay NWR	9,888	+	Lower Columbia River Fish Health Center	46	NA		
	Bandon Marsh NWR	4,718	+	Protection Island NWR	25	+		
	Grays Lake NWR	2,560	-					
	Warm Springs NFH	930	NA					
	Eagle Creek NFH	350	NA					
	Siletz Bay NWR*	180	+					
	Oxford Slough WPA	150	-					

Source: U.S. Fish and Wildlife Service, 2009

* This refuge is closed to the public

NWR = National Wildlife Refuge; NFH = National Fish Hatchery; WPA = Waterfowl Production Area

Population has also increased in the areas near Service units. Counties overlapping Service units experienced an average population increase of 11 percent from 2000 to 2008. According to U.S. Census forecasts, population is expected to increase an average of 24 percent by 2030 in counties overlapping Service lands in Region 1. By this measure, visitation is also expected to continue its upward trend and increase into 2030. Table 7 in Appendix C summarizes population increase from 2000 to 2008 as well as U.S. Census 2030 population forecasts in counties overlapping Service units. Besides serving as a contextual tool, population projections serve as a cross check when considering visitor facility enhancement projects. The assumptions discussed below for identifying visitor facility improvement areas assume that relative differences in visitation levels between Region 1 units will remain the same for future years. Population forecasts are used to confirm that population change is similar for Region 1 units. That is, no dramatic declines are expected in places that could potentially receive transportation improvements. According to Appendix C, Table 7, only two counties with Service units are anticipated to experience negative growth population into the future.

Transportation hubs are defined as populous areas serving as the nearest major metropolitan area to refuges and hatcheries. These hubs likely generate the majority of visitor traffic to a refuge or hatchery. Gateway communities are identified as the small towns or communities near a refuge or hatchery that channel most traffic into a refuge or hatchery. When visitation to a unit is high, these gateway communities experience higher traffic volumes and may reap the economic benefits of increased visitation. High visitation units (more than 100,000 average annual visits) are highlighted in red in Table 5. These units are most likely to benefit the greatest number of visitors through improvements. Transportation hubs and gateway communities are summarized in Table 6. Distance and population variables are weighed against each other so that communities identified are not always the closest or the most populated, but are rather a combination of the two. Gateway communities of the greatest interest are those associated with units receiving high levels of visitation.



USFWS

Table 6
Transportation Hubs and Gateway Communities

State/ Territory	Service Unit	2009 Visitation	Transportation Hub		Gateway Community		
			Location	Distance From Unit (miles)	Location	Distance From Unit (miles)	Population
Guam	Guam NWR	85,000	Dededo, GU	15	Dededo, GU	15	154,805
	Hakalau Forest NWR	1,500	Honolulu, HI	120	Hilo, HI	23	48,104
Hawaii	Hanalei NWR	402,000	Lihue, HI	130	Princeville, HI	4	1,698
	Kilauea Point NWR	500,000	Lihue, HI	130	Kilauea, HI	2	2,092
	Maui NWR Complex	5,727	Honolulu, HI	60	Kihei, HI	2	19,703
	Bear Lake, NWR	11,674	Boise, ID	336	Montpelier, ID	12	2,785
Idaho	Camas NWR	7,512	Boise, ID	317	Hamer, ID	5	12
	Deer Flat NWR	167,884	Boise, ID	20	Nampa, ID	6	81,349
	Kootenai NWR	42,000*	Spokane, WA	114	Bonnars Ferry, ID	6	2,515
	Minidoka, NWR	65,000	Boise, ID	183	Rupert, ID	11	5,645
	Ankeny NWR	61,185	Portland, OR	60	Salem, OR	15	152,634
	Baskett Slough NWR	168,336	Portland, OR	50	Salem, OR	20	152,634
	Cape Meares NWR	489,564	Portland, OR	83	Tillamook, OR	9	24,949
Oregon	Cold Springs NWR	73,000	Portland, OR	194	Hermiston, OR	8	13,154
	Malheur NWR	65,000	Boise, ID	120	Burns, OR	32	3,064
	Oregon Islands NWR	2,556,440	Portland, OR	250	Newport, OR	34	9,532
	Sheldon-Hart NWR Complex	37,786	Portland, OR	336	Lakeview, OR	0	2,474
	Three Arch Rocks NWR	347,728	Portland, OR	60	Oceanside, OR	1	326
	Tualatin River NWR	86,896	Portland, OR	10	Sherwood, OR	3	11,791
	William L. Finley NWR	119,602	Portland, OR	80	Corvallis, OR	15	52,102

Table 6
Transportation Hubs and Gateway Communities

State/ Territory	Service Unit	2009 Visitation	Transportation Hub		Gateway Community		
			Location	Distance From Unit (miles)	Location	Distance From Unit (miles)	Population
	Columbia NWR	73,000	Spokane, WA	126	Othello, WA	15	5,847
	Conboy Lake NWR	6,500	Portland, OR	90	Glenwood, WA	5	650
	Dungeness NWR	66,642	Seattle, WA	15	Sequim, WA	7	4,334
	Grays Harbor NWR	13,000	Seattle, WA	116	Hoquiam, WA	3	9,097
	Hanford Reach NM	43,000	Pasco, WA	42	Richland, WA	30	45,460
	Julia Butler Hansen Refuge	25,000	Portland, OR	74	Cathlamet, WA	1	565
	Leavenworth NFH	155,000	Seattle, WA	70	Leavenworth, WA	3	2,074
	Little Pend Oreille NWR	60,000	Spokane, WA	75	Colville, WA	14	4,988
	McNary NWR	65,000	Pasco, WA	10	Burbank, WA	3	3,303
	Nisqually NWR	150,756	Seattle, WA	40	Olympia, WA	14	46,529
	Ridgefield NWR	120,000	Portland, OR	15	Ridgefield, WA	2	2,147
	Steigerwald Lake NWR	7,267	Portland, OR	15	Washougal, WA	3	8,595
	Turnbull NWR	43,930	Spokane, WA	17	Cheney, WA	2	8,832
	Umatilla NWR	76,000	Pasco, WA	63	Umatilla, OR	34	73,252
	Willapa NWR	25,000	Portland, OR	86	Long Beach, WA	43	1,263

Washington

Source: U.S. Fish and Wildlife Service; U.S. Census (2008 estimate)

* For year 2008

NWR = National Wildlife Refuge; NFH = National Fish Hatchery

Figure 11
Population and Visitation - Washington and Oregon

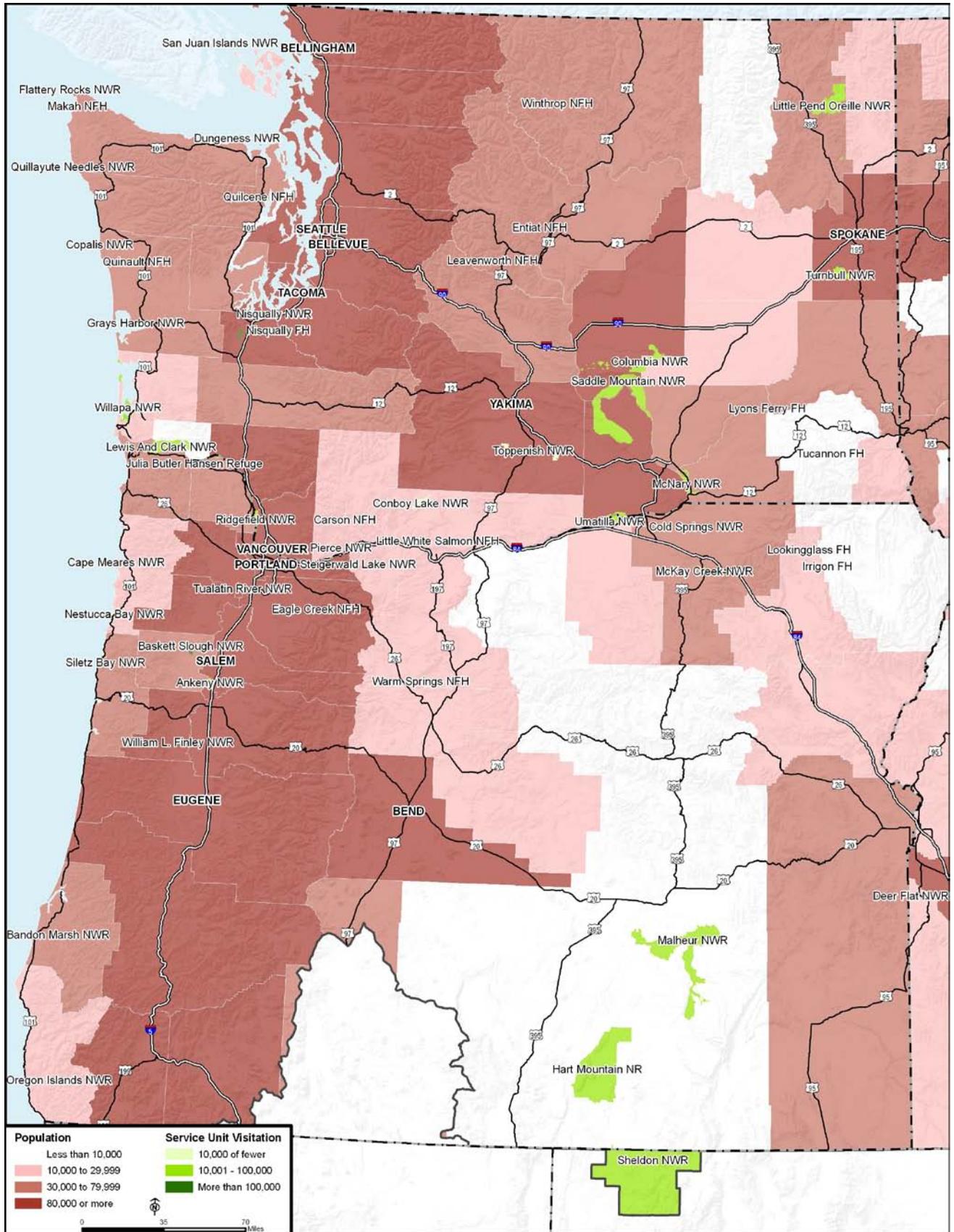


Figure 12
Population and Visitation - Idaho

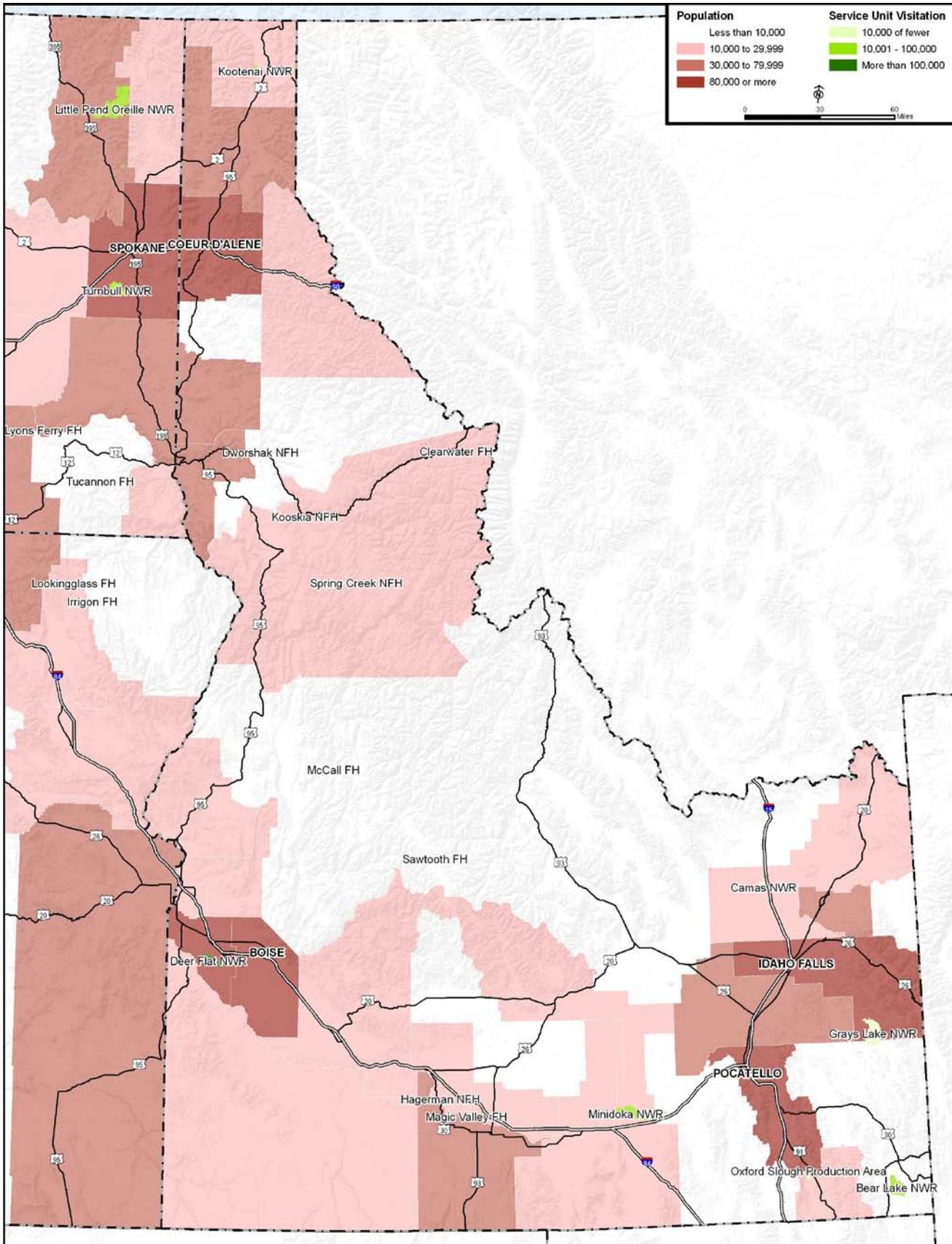
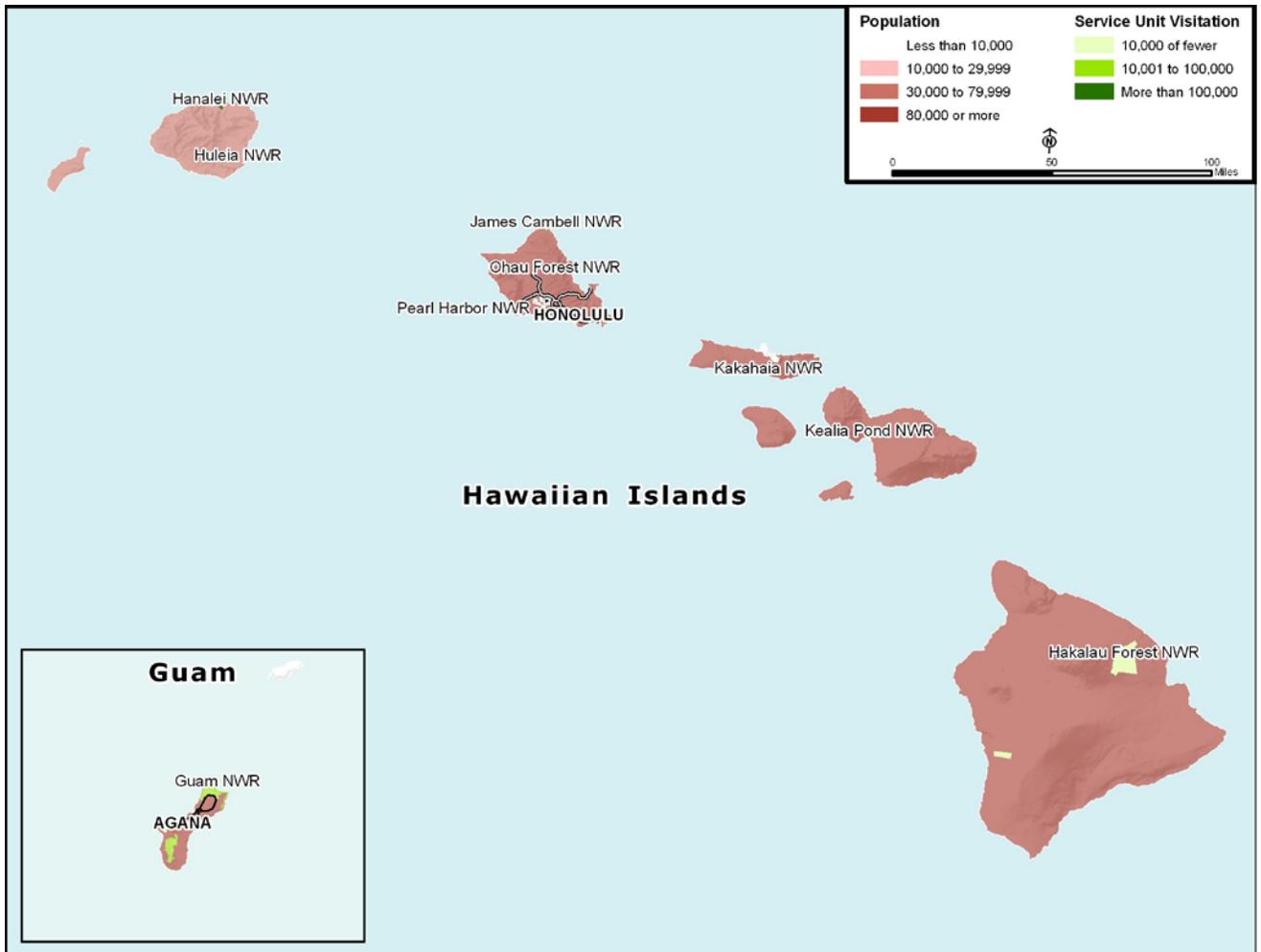


Figure 13
Population and Visitation - Hawaii and Guam



1.2.2 Identifying Visitor Enhancement Improvement Areas

Generally, visitor enhancement related improvements such as signage, way-finding, and interpretation are most appropriate for units that have, and will continue to have, consistently high levels of visitation—where the greatest number of visitors possible can benefit from the improvements. Gateway communities are also potential locations for visitor enhancements, particularly as they relate to way-finding, thereby directing people to the refuge or hatchery. These enhancements can improve ease of travel to and through units, thus improving visitor experience. To ensure the greatest enhancement value for Region 1, potential improvements decisions should be focused on high visitation units (identified as units having over 100,000 average annual visits). Within this subset, larger gateway communities have the added benefit of potentially tying into existing non-Service traveler information systems (such as 511 services and variable message signs). Gateway communities that serve multiple Service lands may also offer added value and opportunities to address multiple needs through one improvement.

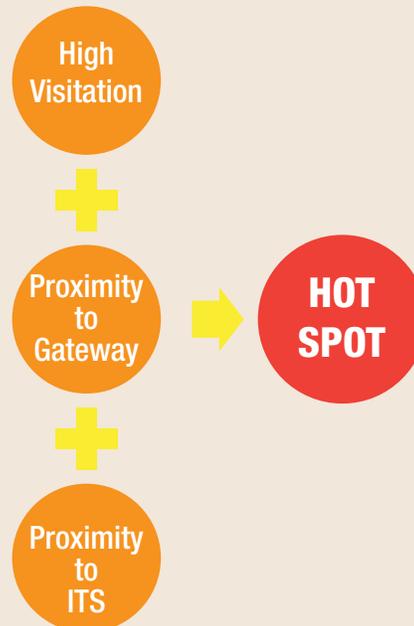
1.2.3 Recommendations for Future Analysis

Several datasets are necessary to better evaluate opportunities for visitor experience related transportation improvements, such as:

- Identify where state way-finding and variable message signs are located to assist in identifying areas of possible partnership.
- Develop and implement a regional or national sign inventory that includes sign location, condition, and adherence to Service sign standards and FHWA the Manual on Uniform Traffic Control Devices to help identify where additional or improved signage is needed.

Hot Spot for Visitor Enhancement Improvements

Baseline condition analysis helps identify areas, or hot-spots, that could potentially benefit the most from visitor enhancement improvements. As discussed in the previous section, these improvement hot-spots are tied primarily to visitation, as well as proximity of populated places. Hot-spots are places that have high values for all of these variables. In the baseline condition summary, these are assumed to be places with over 100,000 annual visits in Table 5 and the communities identified in Table 6. An example of a hot spot for visitor enhancement improvements is William L. Finley National Wildlife Refuge. The Refuge receives a high level of visitation (119,314 average annual visits) and is located in an area expecting future population growth (19 percent). The Refuge is also located in close proximity to the gateway community of Corvallis, Oregon (15 miles away, with a population of 52,102). These indicators suggests that visitor enhancement improvements would reach a large number of people, and that improvements at gateway communities may potentially tie into existing traveler information systems.



1.3 Planning

The LRTP planning goal is **“integrate transportation planning into Service plans and processes.”** The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

Ensure consistency and coordination between the project, unit, regional, and national levels of planning. The strategy for this objective is:

- Develop and apply transportation planning templates for CCPs and CHMPs or station development plans.

Objective 2

Define need for infrastructure improvements and prioritize projects using a scientific and objective process. Strategies for this objective are:

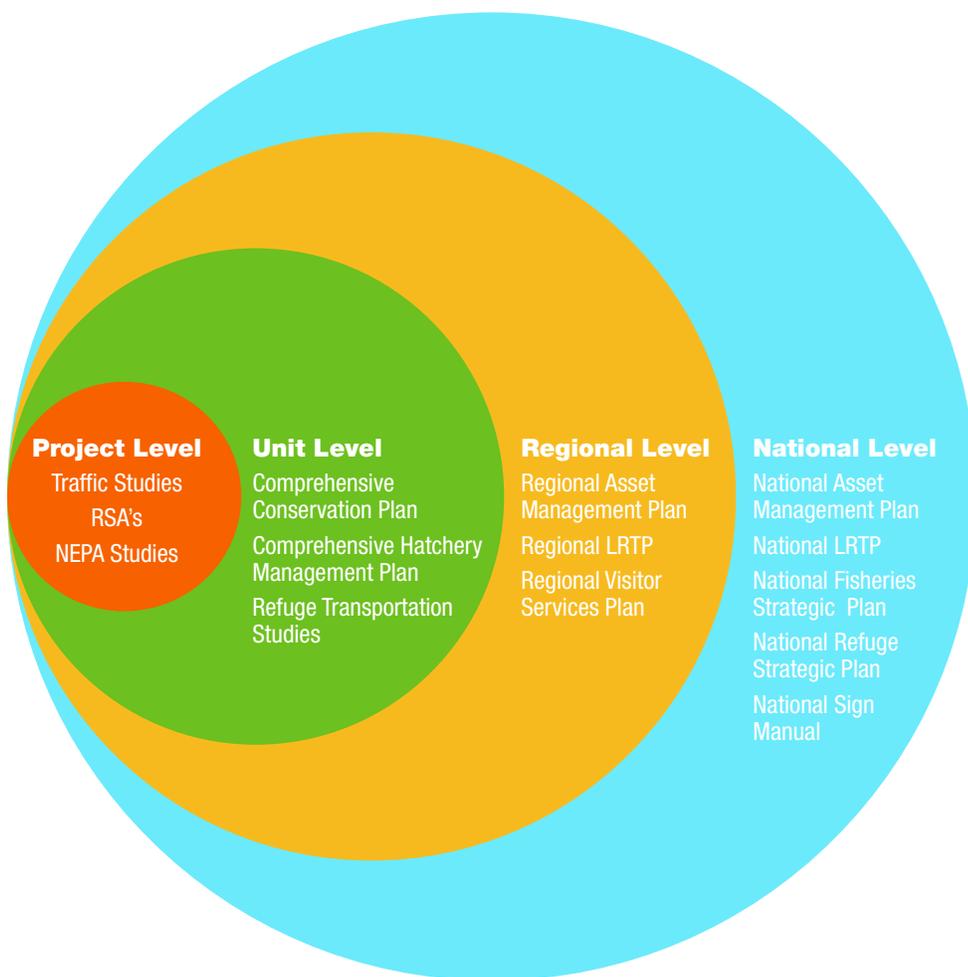
- Use condition assessments and/or road safety audits to identify road system deficiencies.
- Use established goals and objectives in the project selection process.

1.3.1 Planning Data

The Service uses plans at all levels within the organization, from the project and unit levels to national level. Plans are used to express guiding principles and/or specific deficiencies or needs from the project to the policy level. A wide range of planning tools is therefore available for all Service levels. Figure 14 illustrates examples of the types of plans that are used at different levels within the Service. For example, project level operations use RSAs to document safety issues. The outcome of the studies is used to help resolve documented safety issues by identifying need, possible solutions, and serving as leverage for future project funding.

Data used to establish a baseline for the planning goal includes the current state of the Service’s resource management planning and the planning activities of potential partners.

*Figure 14
Service Plans*



Service resource management plans include CCPs and CHMPs. CCPs are planning documents developed for individual refuges to provide a description of the desired future conditions and long-range guidance with regard to resource management at the refuge unit level. CCPs establish management direction to achieve refuge goals. CHMPs are operational management plans specific to fish hatcheries. The plans outline policies and objectives relevant to the overall management of a specific fish hatchery. CHMPs are used as planning reference tools, to help integrate Service objectives and priorities with those of other agencies; fulfill obligations under the Endangered Species Act and other management programs; identify and define specific hatchery reforms to implement; and provide a foundation for future program and budget development.

Currently, 29 CCPs have been completed, 23 are in progress, and 9 are scheduled to begin in 2011 within Region 1. Fifteen CHMPs have been adopted for National Fish Hatcheries. In addition, two RSAs,

four traffic studies, and eight transportation studies have been completed or are in-progress as of January 2011. Several units are also located within non-Service transportation planning districts. Nine units are within the boundary of a state MPO, and 34 units are located in a State regional planning organization. Table 8 summarizes the completeness of Service planning and identifies non-Service transportation planning occurring in the same area.

Additionally, project leaders have identified units that demonstrate need for additional transportation planning studies based on their knowledge of issues facing individual refuges and hatcheries. Additional plans fall into three categories: large scale and comprehensive plans, issue driven plans, and small scale plans and studies. These categories are used to describe the different types of plans and studies, as shown in Table 7. Table 8 summarizes progress of transportation planning efforts and anticipated needs for Region 1 stations.

Table 7
Planning Need and Plan Types

Planning Need	Corresponding Plan Types
Comprehensive/Large Scale	CCP step-down plan Complex issue analysis (e.g., Sheldon National Wildlife Refuge) Regional transportation analysis (e.g., big picture look at connectivity, visitor use analysis)
Issue Driven	Engineering/traffic safety analysis Access analysis
Small Scale	Traffic safety audit

“C” = Complete; “I” = In-progress; “S” = Scheduled; “P” = Planned

** MPO = Metropolitan Planning Office, RTPO = Regional Transportation Organization, RTC = Regional Transportation Council, RC = Regional Council, ACT = Area Commissions on Transportation

Table 8
Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
Guam	Guam National Wildlife Refuge		C									Department of Administration
HI	Hakalau Forest National Wildlife Refuge	I						X				Hawaii
	Hanalei National Wildlife Refuge	I					X					Kauai
	Hawaiian Islands NWR	C										Hawaii
	Huleia National Wildlife Refuge	I						X				Kauai
	James Campbell National Wildlife Refuge	I					X		Oahu MPO			Oahu
	Kakahaia National Wildlife Refuge	I						X				Maui
	Kealia Pond National Wildlife Refuge	I						X				Maui
	Kilauea Point National Wildlife Refuge	I			I	X						Kauai
	Kona Forest NWR	P										Hawaii
	Midway Atoll National Wildlife Refuge	C										
	Oahu Forest National Wildlife Refuge	S							X	Oahu MPO		Oahu
	Pearl Harbor National Wildlife Refuge	I								Oahu MPO		Oahu
ID	Bear Lake National Wildlife Refuge	S						X				ITD 5
	Camas National Wildlife Refuge	S						X				ITD 6
	Clearwater Forest Highway		P									ITD 2
	Crooked River NFH		P									ITD 3
	Deer Flat National Wildlife Refuge	S			I	X			COMPASS			ITD 3 and Eastern Oregon
	Dworshak National Fish Hatchery		C									ITD 2
	Eagle Fish Health Laboratory		P						COMPASS			IDT 2
	East Fork Salmon NFH		P						COMPASS			IDT 2

Table 8
Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
ID	Grays Lake National Wildlife Refuge	S										ITD 5 and 6
	Hagerman National Fish Hatchery		C	C	I							ITD 4
	Idaho Fish Health Center		P									ITD 2
	Kooskia NFH		C									ITD 2
	Kootenai National Wildlife Refuge	S						X				ITD 1
	Magic Valley Fish Hatchery		P									ITD 4
	McCall Fish Hatchery		P									ITD 3
	Minidoka National Wildlife Refuge	S							X			ITD 4 and 5
	Oxford Slough Waterfowl Production Area	S	P									ITD 5
	Red River NFH		p									ITD 3
	Sawtooth Fish Hatchery		P									ITD 6
	South Fork National Fish Hatchery	P										ITD 3
NV	Sheldon National Wildlife Refuge	I				I		X				District 3
OR	Ankeny National Wildlife Refuge	I							X		Mid-Willamette Valley ACT	Willamette Valley & Coast
	Bandon Marsh National Wildlife Refuge	S						X			South West ACT	Southwestern Oregon
	Baskett Slough National Wildlife Refuge	S		S	I			X			Mid-Willamette Valley ACT	Willamette Valley & Coast
	Big Canyon NFH										Northwest Oregon ACT	District 13
	Cape Meares National Wildlife Refuge	C							X		Northwest Oregon ACT	Willamette Valley & Coast
	Cold Springs National Wildlife Refuge	S							X		Northwest Oregon ACT	Eastern Oregon
	Eagle Creek National Fish Hatchery		C								Portland Metropolitan ACT	Portland Metro
	Hart Mountain National Antelope Refuge	C						X			South Central ACT	Central Oregon

Table 8
Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
OR	Imnaha NFH		P								Northwest Oregon ACT	
	Irrigon Fish Hatchery		P								Northeast ACT	Eastern Oregon
	Little Sheep Creek										Northwest Oregon ACT	
	Lookingglass Fish Hatchery		P								Northeast ACT	Eastern Oregon
	Malheur National Wildlife Refuge	S				C	X				Southeast ACT	Eastern Oregon
	McKay Creek National Wildlife Refuge	S						X			Northwest Oregon ACT	Eastern Oregon
	Nestucca Bay National Wildlife Refuge	S					X				Northwest Oregon ACT	Willamette Valley & Coast
	Oregon Islands National Wildlife Refuge	C						X			Northwest Oregon ACT	Willamette Valley & Coast
	Siletz Bay National Wildlife Refuge	S					X				Cascades West ACT	Willamette Valley & Coast
	Three Arch Rocks National Wildlife Refuge	P									Northwest Oregon ACT	Willamette Valley and Coast
	Tualatin River National Wildlife Refuge	S					X		Metro MPO		Portland Metropolitan ACT	Portland Metro
	Wallowa NFH		P								Northwest Oregon	Willamette Valley and Coast
	Warm Springs National Fish Hatchery		P								Lower John Day ACT	Central Oregon
	William L. Finley National Wildlife Refuge	S		S		I		X			Cascades West ACT	Willamette Valley & Coast
	Pacific Outlying Islands	Baker Island NWR	C									
Howland Island NWR		C										
Jarvis Island NWR		C										
Johnston Island NWR		P										
Kingman Reef NWR		C										
Pacific Reefs National Wildlife Refuge		P										
Palmyra Atoll NWR		C										
Rose Atoll National Wildlife Refuge		I										
Wake Atoll National Wildlife Refuge		P										

Table 8
Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
WA	Abernathy Fish Technology Center		P								Southwest RTP0	Southwest
	Captain John Rapids NFH										Lewis-Clark Valley MPO	South Central
	Carson National Fish Hatchery		C								Southwest RTP0	Southwest
	Columbia National Wildlife Refuge	S					X				Quad-County RTP0	North Central
	Conboy Lake National Wildlife Refuge	S					X				Southwest RTP0	Southwest
	Copalis National Wildlife Refuge	C						X			Southwest RTP0	Olympic
	Cottonwood Creek NFH		P								Lewis-Clark Valley MPO	South Central
	Curl Lake NFH		P								Palouse RTP0	South Central
	Dungeness National Wildlife Refuge	S					X				Peninsula RTP0	Olympic
	Entiat National Fish Hatchery		P								North Central RTP0	North Central
	Flattery Rocks National Wildlife Refuge	C						X			Peninsula RTP0	Olympic
	Franz Lake National Wildlife Refuge	C						X			SW WA RTC	Southwest
	Grays Harbor National Wildlife Refuge	S									Southwest RTP0	Olympic
	Hanford Reach National Monument										Benton-Franklin-Walla Walla RTP0	South Central
	Julia Butler Hansen Refuge	I						X			Southwest RTP0	Willamette Valley & Coast
	Leavenworth National Fish Hatchery		P								North Central RTP0	North Central
	Lewis and Clark National Wildlife Refuge	S							X		Southwest RTP0	Willamette Valley & Coast
	Little Pend Oreille National Wildlife Refuge	C						X			Northeast WA RTP0	Eastern
Little White Salmon National Fish Hatchery		C								Southwest RTP0	Southwest	

Table 8
Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
WA	Lower Columbia River Fish Health Center		P								SW WA RTPO	Southwest
	Lyons Ferry Fish Hatchery		P								Palouse RTPO	South Central
	Makah National Fish Hatchery		P								Peninsula RTPO	Olympic
	McNary National Wildlife Refuge	C					X		Benton-Franklin COG	Benton-Franklin-Walla Walla RTPO	South Central and Eastern Oregon	
	Nisqually National Wildlife Refuge	C					X		Thurston MPO	Puget Sound RC	Olympic	
	Olympia Fish Health Center		P						Thurston MPO	Puget Sound RC	Olympic	
	Pierce National Wildlife Refuge	C								SW WA RTC	Southwest	
	Protection Island NWR	C								Northwest Oregon	Portland/Metro	
	Quilcene National Fish Hatchery		C							Peninsula RTPO	Olympic	
	Quillayute Needles National Wildlife Refuge	C								Peninsula RTPO	Olympic	
	Quinault National Fish Hatchery		P							Southwest RTPO	Olympic	
	Ridgefield National Wildlife Refuge	I			C	C				SW WA RTC	SW WA RTC	Southwest
	Saddle Mountain National Wildlife Refuge	P								Quad-County RTPO Benton-Franklin-Walla Walla RTPO	South Central and North Central	
	San Juan Islands National Wildlife Refuge	I								San Juan	Northwest	
	Spring Creek National Fish Hatchery		C							SW WA RTC	Southwest	
	Steigerwald Lake National Wildlife Refuge	C						X	SW WA RTC	SW WA RTC	Southwest	
	Toppenish National Wildlife Refuge	S						X	Yakima Valley COG	Yakima Valley	South Central	
Tucannon Fish Hatchery		P							Palouse RTPO	South Central		

Table 8
 Transportation Related Planning Efforts

State /Territory	Service Unit	Planning Studies					Planning Need			Non-Service Planning Jurisdictions		
		CCP	CHMP	RSA	Traffic Studies	Trans. Studies	Comprehensive / Large Scale	Issue Driven	Small Scale or None	MPO**	Regional Planning District	DOT Regions
WA	Turnbull National Wildlife Refuge	C					X				Spokane RTC	Eastern
	Umatilla National Wildlife Refuge	C						X			Benton-Franklin-Walla Walla RTPO	South Central & Eastern Oregon
	Willapa National Wildlife Refuge	I				X					Southwest RTPO	Southwest
	Willard National Fish Hatchery		C								SW WA RTC	Southwest
	Winthrop National Fish Hatchery		P								North Central RTPO	North Central

“C” = Complete; “I” = In-progress; “S” = Scheduled; “P” = Planned

** MPO = Metropolitan Planning Office, RTPO = Regional Transportation Organization, RTC = Regional Transportation Council, RC = Regional Council, ACT = Area Commissions on Transportation

1.3.2 Identifying Planning Areas

Units that have not yet adopted a CCP or CHMP should reach out to non-Service transportation planning agencies when developing a plan. Early identification of partnership opportunities improves the likelihood of successful cooperation. As such, Table 8 identifies non-Service planning organizations at the State and regional levels that should be considered when developing the transportation component of a CCP or CHMP. Contact information for non-Service planning organizations identified in Table 8 is available in Appendix H.

As stated in the planning goal, the Service strives for scientific and objective processes to guide transportation funding decisions. This LRTP is a step towards meeting this goal. Each LRTP goal area establishes a framework in which data can be used to objectively locate opportunities and need for transportation projects.

1.4 Partnerships

The partnership goal of the LRTP is to **“develop partnerships to leverage resources and develop integrated transportation solutions.”** The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

To the extent authorized by law, pursue opportunities for both funding and resources. Strategies for this objective are:

- Participate in transportation partnering meetings in each state.
- Identify and pursue projects of mutual interest to partners.

Objective 2

Cooperate with partners to address shared transportation issues that impact Service goals. Strategies for this objective are:

- Ensure that all Service transportation needs and contributing resources are accounted for in local and State partner transportation plans.
- Inform appropriate Service staff and potential transportation partners about Service transportation plans.
- Work with partners to reduce wildlife-vehicle collisions.
- Improve fish passage at roads adjacent to Service lands.

1.4.1 Partnerships Data

To help identify potential partnerships, it is useful to know if a unit is intersected by non-Service transportation assets and/or the boundaries of a non-Service transportation planning organization. Partnership data therefore includes an inventory of non-Service agencies that routinely participate in transportation planning and intersect unit boundaries, as shown in Table 8. Non-Service transportation assets that intersect service boundaries are also included as partnership data, as summarized in Appendix C, Table 8. Non-Service routes that are Scenic Byways and intersect or are co-located with Service routes are identified for their potential for partnering, as identified in Table 8.

1.4.2 Identifying Partnership Opportunities

There may be opportunities for partnership where Service mission and needs overlap with those of a non-Service organization, as they pertain to a transportation asset or project of common interest. In these situations, potential funding and resources could be leveraged with partners to accomplish mutually beneficial work. Not only does partnering offer practical benefits, but it also advances the integrated regional and planning goals of President Obama’s October 2009 Executive Order 13514, Federal Leadership in Environmental Energy, and Economic Performance. Executive Order 13514 promotes, “participating in regional transportation planning and recognizing existing community transportation infrastructure.”

Identifying opportunities for partnership may be complex and highly unique between units. As such, unit managers are encouraged to gain an understanding of surrounding communities and local resources and develop relationships with these entities when seeking partnerships. In addition, there are several high-level opportunities for transportation related partnerships, including State DOTs, MPOs, and regional planning organizations. Opportunities for partnership with these organizations may exist if a unit is intersected by a DOT asset and/or a transportation planning organization’s boundary. Table 8 and Appendix C, Table 8 identify many of these locations.

Additional partnership opportunities may exist where non-Service assets are of special significance, such as Scenic Byways. These routes are typically high value assets and may be eligible for supplemental funding sources. Table 9 identifies Service routes that intersect or share a route designation with designated Scenic Byways.

Besides a unit having a geographic connection with non-Service transportation assets and/or planning boundaries, other factors may provide leverage for establishing partnerships. Conditions discussed in sections pertaining to other goal areas may help identify areas where joint projects could serve the goals of multiple agencies, and provide a stage or partnership. These conditions and the sections in which they are discussed are:

- Locations where there are deficiencies (such as poor road condition or high occurrence of accidents) in both Service and non-Service transportation systems within a common area. Section 2.2, Conditions and Safety, identifies areas of deficiency of Service and non-Service assets (where possible).
- Regions with documented air quality issues and/or existing transit service. These locations are identified in Section 2.6, Sustainability.
- Units that have not completed CCPs or CHMPs. These locations are identified in this section.
- Visitor enhancement hot-spots as discussed in Section 2.3, Welcome and Orient Visitors.

As partnerships require not only a shared geography, but interests as well, successful partnership hinges on finding topics of common ground. There are several paths to finding this common ground. First, units can learn about an organization’s future transportation projects by reviewing documented plans such as a transportation improvement program (TIP), statewide transportation improvement program (STIP), or LRTP. Second, the transportation interests of a particular unit should be made available to relevant planning organizations through CCP or CHMP. Third, in-person collaboration is necessary. If a project is programmed in a TIP or STIP, the project may be too far along to develop a partnership that fully suits both parties. Early collaboration by both Service and non-Service agencies in their respective planning activities ensures that projects of mutual interest develop with partnership in-mind from inception. It is recommended that units involve non-Service transportation planning agencies in relevant planning activities, and proactively seek opportunities for collaboration in the planning activities of relevant non-Service agencies.

1.4.3 Recommendation for Future Analysis

For future analysis, identify partnership opportunities with non-Service transportation agencies by identifying route jurisdiction for the roads listed in Table 9 and Appendix C, Table 8. Additional data acquisition is needed in order to have a complete inventory of road jurisdictions.



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Table 9
Service Routes and Scenic Byways

Service Unit	Service Route Name	Relationship to Byway	Byway Name	Byway Designation
Hart Mountain NWR	Blue Sky Rd	Intersects	Lakeview to Steens Mountain Back Country Byway	BLM Back Country Byway
	Flook Lake Rd	Intersects		
	Frenchglenn Rd	Shared Route		
	Main Entrance Rd	Shared Route		
	Petroglyph Lake Rd	Intersects		
	Poker Jim Rd	Intersects		
	Warner Pond Rd	Intersects		
Little White Salmon NFH	Hatchery Entrance Rd	Intersects	Lewis and Clark Trail Highway	Washington State Scenic Byway
	Hatchery Entrance Rd	Intersects	Columbia River Gorge Scenic Byway - Washington	
Malheur NWR	Center Patrol Rd North	Intersects	Diamond Loop Back Country Byway	BLM Back Country Byway
		Intersects	Lakeview to Steens Mountain Back Country Byway	
	Hunter Access Narrows	Intersects	Diamond Loop Back Country Byway	BLM Back Country Byway
	Krumbo Reservoir Rd	Intersects	Lakeview to Steens Mountain Back Country Byway	BLM Back Country Byway
	P-Lane Rd	Intersects	Diamond Loop Back Country Byway	BLM Back Country Byway
		Intersects	Steens Loop Tour Route	Oregon State Scenic Backway
	Resort Lane	Intersects	Steens Mountain Back Country Byway	BLM Back Country Byway
		Intersects	Diamond Loop Back Country Byway	BLM Back Country Byway
	Tipton Rd	Intersects	Steens Loop Tour Route	Oregon State Scenic Backway
		Intersects	Steens Mountain Back Country Byway	BLM Back Country Byway
	Johnson Pond Rd	Intersects	Diamond Loop Back Country Byway	BLM Back Country Byway
		Intersects	Lakeview to Steens Mountain Back Country Byway	BLM Back Country Byway
	Johnson Pond Rd	Intersects	Lewis and Clark Trail Highway	Washington State Scenic Byway
	Overlook Loop	Intersects	Lewis and Clark Trail Highway	Washington State Scenic Byway
Spring Creek NFH	Entrance Road	Intersects	Lewis and Clark Trail Highway	Washington State Scenic Byway

Source: FHWA Byways (2010), FHWA, Road Inventory Program, Cycle 4 (2007)

BLM = Bureau of Land Management; NWR = National Wildlife Refuge; NFH = National Fish Hatchery

1.5 Sustainability

The LRTP sustainability goal is to **“adopt and promote sustainable transportation practices.”**

The following objectives and strategies serve to further the sentiment expressed by the goal.

Objective 1

Address climate change and other environmental factors at all levels of transportation planning, design, project delivery, and maintenance. Strategies for this objective are:

- Identify transportation resources that are at-risk of climate change impacts by using a comprehensive risk assessment.
- Develop adaptive management strategies, such as relocating strengthening and downgrading assets, to prepare for both short-term (25 to 40 years) and long-term (40 to 100 years) impacts on the transportation infrastructure.
- Encourage transportation practices and design that responds to climate change impacts.

Objective 2

To reduce the Service’s carbon footprint, improve access to and within Service lands by transit and non-motorized transportation and information systems. Strategies for this objective are:

- Identify the need for alternative transportation projects through the Service planning process.
- Encourage refuges and hatcheries to consider applying for partner funding for alternative transportation projects involving Service lands.
- Increase availability of information in public outreach and education programs to encourage transit, car-pooling, bicycling, and walking to and within Service lands.

Objective 3

Reduce fossil fuel energy consumption by Refuge and Hatchery staff and visiting public. The strategy for this objective is:

- Increase number of alternatively fueled vehicles for refuge staff, on-refuge tours, and transit to and within Service lands.

1.5.1 Data

Sustainable transportation practices and climate change are addressed in two ways. First, the potential risks to transportation assets due to changes in climate are examined. Second, the Service supports programs and projects that would lower greenhouse gas emissions through increased use of ATS, such as transit, cycling, or walking to, within, and through Service lands.

Risks to Transportation Assets

Identifying specific units and related transportation assets that are at risk due to climate change requires comprehensive risk analysis. This type of risk analysis would include factors such as sea level rise (rising water levels, increased coastal and estuarine flooding), changing precipitation levels (more precipitation, higher water tables, greater flooding, higher soil moisture), temperature changes (rising maximum temperatures, lower minimum temperatures), and storm surges (larger and more frequent storm surges). Data on all of these factors are not widely available, and requires additional research, data collection, and analysis. Some factors, however, are examined in this LRTP that could be used as part of a larger scale risk analysis. Factors such as coastal vulnerability to sea level change can be analyzed for their potential to impact Service transportation assets.

Units located near coastal areas may be at risk of environmental change due to rises in sea level. Such areas include 35 units that are located along the coastlines of Hawaii, Pacific outlying islands including Guam, and the Oregon and Washington coasts. Sea level risks are supported by the United States Geological Survey (USGS) *Coastal Change Potential Index Assessment* (2001) report, which factors tides, wave height, relative sea level rise, coastal slope, geomorphology, shoreline erosion, and accretion rate into a ranking of relative potential for coastal change due to future sea level rise. Figure 15 shows the results of the assessment along the Pacific Coast area of Washington and Oregon.

Fossil Fuel and Alternative Transportation Systems

The Service seeks opportunities to reduce greenhouse gas emissions from fossil fuels through programs that focus on transportation to and through Service lands. This desire to reduce the National Wildlife Refuge and National Fish Hatcheries greenhouse gas emissions responds to the Service-wide commitment to responsible and sustainable practices as well as President Obama’s October 5, 2009 Executive Order, Federal Leadership in Environmental, Energy, and Economic Performance, which calls for a reduction of greenhouse gas emissions from direct and indirect Federal agency activities. Furthermore, Goal 4 of the Service Strategic Plan for Responding to Accelerating Climate Change in the 21st Century calls for the Service to achieve carbon neutrality by 2020 by reducing the carbon footprint of the Service’s facilities, vehicles, and work force. Programs that reduce the number of vehicle miles traveled have the potential to substantially reduce green house gas emissions and the Service’s carbon footprint. The Service believes that ATS are an important tool in achieving this end. To identify candidate locations for ATS, the following is considered:

- Adopted unit and national level planning documents that identify Service lands as having potential or need for ATS.
- Areas where non-Service entities may have an interest in creating or expanding ATS programs into or through Service lands. This consideration includes areas of existing mass-transit and/or poor air quality.
- ATS Questionnaire conducted in Region 1.

As expressed by the sustainability goal, the Service wishes to reduce greenhouse gas emissions through transportation systems that reduce the use of motor vehicles. In some cases, unit and national level planning have identified locations that are in need of ATS. Other opportunities may exist where non-Service entities have a vested interest in creating or expanding alternative transportation programs. These opportunities for partnership may exist in places where units are in or near transit districts, especially in locations where air quality fails to meet national standards, where there is added incentive for local municipalities to reduce emissions.

Objective 2 calls for improved access to and within Service lands by alternative transportation as a way to reduce the Service’s carbon footprint. ATS include any travel by means other than personal automobile, such as shuttles and van transit connecting units with other destinations, regional transit connections, bicycle and pedestrian infrastructure, and water-based

Reducing Green House Emissions

The Service is committed to reducing green house emissions. One example of the Service’s commitment to meeting this end is the Climate Change Mitigation Project currently underway. The project entails developing a beta version of a greenhouse gas management tool that would be capable of estimating emissions for energy consumption within, and visitor transportation to and within, National Wildlife Refuges. The beta version tool will be populated by data provided by Service headquarters and used by Refuge and regional staff to plan greenhouse gas mitigation and climate change education and outreach strategies. The tool will be completed in cooperation with the Service, USGS, and FLH.

transportation. ATS can also reduce impacts to wildlife and other natural resources, enhance visitor access and assist with visitor management, improve visitor health and safety, and defer or reduce the need for additional transportation investments.

The Region 1 ATS Questionnaire, as included in Appendix I, provides initial data on the needs and opportunities of units with regard to transit and non-motorized access. Several refuges and hatcheries in Region 1 are effectively using transit for access to units and for special events. They are also using non-motorized infrastructure² to connect with existing non-motorized trail networks, gateway towns, and local and regional amenities. The ATS Questionnaire also revealed significant future opportunities for transit and trail connections: 30 percent of respondents have a bus stop or train station within 3 miles of their unit and 50 percent of respondents have a regional non-motorized trail for bicycle and pedestrian use within 3 miles of their unit. Additionally, 30 percent of respondents have a trail that directly connects to their unit.

² *Non-motorized infrastructure includes sidewalks, trails, lanes, signage, crosswalks, and bicycle racks to support travel by bicycle and pedestrian modes. Non-motorized infrastructure does not include recreational hiking trails; this infrastructure must lead to a connection with schools, residences, businesses, recreation areas, transit stations, and other community activity centers.*

Based on the results of the ATS Questionnaire and the Regional Alternative Transportation Evaluation (also defined in Appendix I), the following actions at the unit level would be most effective for achieving Objective 2 and increasing ATS within Region 1:

- Increase non-motorized connections to units through the use of non-motorized paths, bicycle lanes, bicycle racks, and signage for non-motorized users to access existing non-motorized trail networks, gateway communities, and local and regional amenities.
- Use public or private transit for festivals and special events.
- Enhance connections to local bus routes for urban and suburban units within transit service areas.
- Partner with local governments, transportation planners, transit providers, Friends groups, and others to craft appropriate strategies for transportation and visitor management.

This LRTP also recognizes units that are identified in planning documents as being suitable locations for ATS. The *Federal Lands Transportation System Study* (2001) studied 207 candidate Service units for transit need. Based on the study, 13 sites were determined to show sufficient indications or need. One of these 13 locations is located in Region 1, Kilauea Point National Wildlife Refuge.

Although no currently adopted CCPs identify ATS initiatives, CCP planning efforts underway increasingly consider ATS. For example, drafts of the Ridgefield National Wildlife Refuge and Kauai National Wildlife Refuge Complex CCPs cite the need to build facilities that tie into existing non-Service transit operations. Planning efforts are discussed further in Section 2.4, Planning and Section 2.6, Partnerships.

Example ATS in Region 1: Tualatin River National Wildlife Refuge

TriMet, the public transportation provider for the Portland metropolitan region, offers bus service from downtown Portland to the Refuge entrance, where visitors can walk along a short paved path to the Wildlife Center. TriMet Route 12 runs from downtown Portland west along Route 99W to Sherwood, with a stop at the Refuge along the way. The route runs 7 days a week, departing approximately every 15 to 20 minutes. Travel time from SW 5th and Morrison Streets in downtown Portland to the Refuge entrance is just under 1 hour.



Greater opportunities to work with partners on programs that reduce greenhouse gas emissions are likely in larger metropolitan areas that have existing mass-transit programs and/or where air quality is an issue. Therefore, units located within air quality non-attainment areas or existing transit districts are considered places where there may be partnership opportunities for alternative transportation programs. Table 10 identifies units within U.S. Environmental Protection Agency designated non-attainment areas. Units located within transit districts are summarized in Table 11.

Table 10
Air Quality Non-Attainment Areas

State	City	Service Unit	Non-Attainment	Classification
Oregon	Portland	Tualatin River NWR	Carbon monoxide	Moderate
	Seattle-Tacoma	Nisqually NWR	Carbon monoxide	Moderate
Washington	Vancouver	Ridgefield NWR	Carbon monoxide	Moderate
		Steigerwald Lake NWR	Carbon monoxide	Moderate

Source: Research and Innovative Technology Administration/Bureau of Transportation Statistics, 2008

Table 11
Service Units Intersected by Transit Districts

State	Transit District (city)	Service Unit	
Hawaii	TheBus (Honolulu)	James Campbell NWR	
		Oahu Forest NWR	
		Pearl Harbor NWR	
Idaho	Valley Ride (Nampa)	Deer Flat NWR	
Oregon	Tri-County Metropolitan Transportation District of Oregon (Portland)	Tualatin NWR	
	Jefferson Transit Authority (Port Townsend)	Quilcene NFH	
		Quillayute Needles NWR	
	Valley Transit & Grapeline (Walla Walla)	McNary NWR	
	Ben Franklin Transit (Richland)		
	Grant Transit District	Saddle Mountain NWR	
		Columbia NWR	
	C-Tran	Ridgefield NWR	
	Pacific Transit	Willapa NWR	
		Copalis NWR	
	Washington	Grays Harbor Transportation Authority	Quinault NFH
			Grays Harbor NWR
		Clallam Transit District	Quillayute Needles NWR
			Flattery Rocks NWR
			Dungeness NWR
	Intercity Transit (Thurston)	Nisqually NWR	
	Pierce Transit	Nisqually NWR	
Link Transit	Leavenworth NFH		
Columbia County Public Transportation	Tucannon FH		
	Lyons Ferry FH		
Asotin	Lyons Ferry FH		
Spokane Transit Authority	Tumbull NWR		

Sources: the Service, Federal Railroad Administration, Washington DOT, Google

1.5.2 Identifying Sustainability Improvement Areas

Baseline condition data helps identify areas that should receive special consideration for topics of sustainability. As discussed previously, sustainability considerations occur on two fronts: (1) consideration of assets that could be at risk due to climate change and (2) consideration of transportation projects that could potentially reduce greenhouse gas emissions.

Service lands that may have assets at risk due to climate change if they:

- Are located in a coastal area,
- Are likely to experience more frequent flooding events,
- Will experience greater temperature fluctuations, or
- Are likely to experience more frequent storm surges.

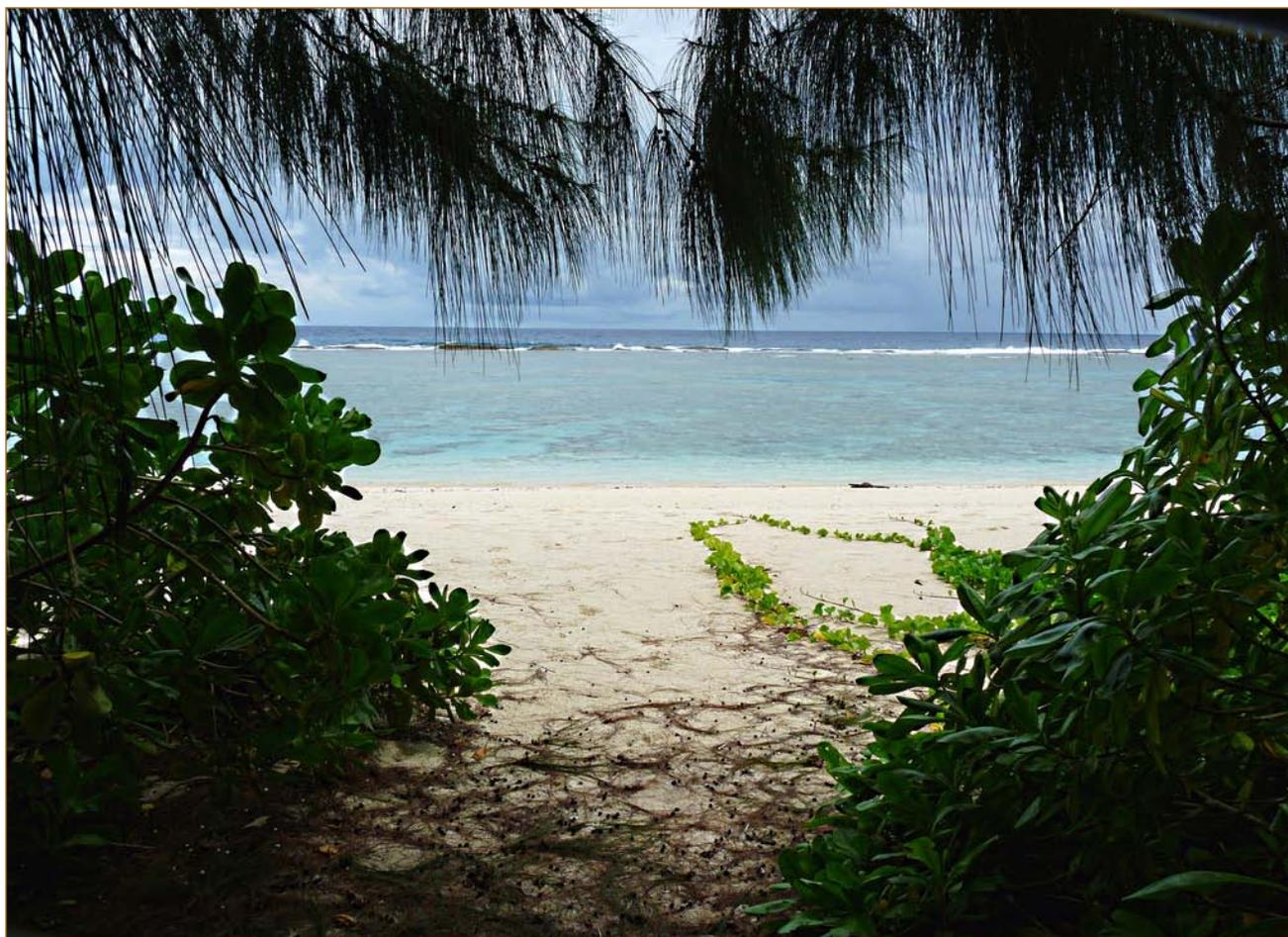
Service lands that are best suited to reduce greenhouse gas emissions through ATS are those that fall in one or more of the following categories:

- A unit is identified in a national-level, state, or regional planning document as having the potential or need for ATS
- A unit’s CCP documents a need for alternative transportation system
- A unit is located in or adjacent to an existing mass-transit district’s service area
- A unit is located in a U.S. Environmental Protection Agency air quality non-attainment area

1.5.3 Recommendations for Future Analysis

Several actions are necessary to better evaluate the sustainability goal, including:

- Perform a comprehensive risk analysis of climate change. Factors that should be included in a comprehensive risk analysis are:
 - Precipitation levels, including associated impacts on water tables, flooding, and soil moisture
 - Temperature changes
 - Storm surges
 - Estuarine flooding
- Coastal vulnerability due to climate change could be better quantified if data were available for Hawaii and the outlying Pacific area.
- Identify places with ATS needs or opportunities by addressing these issues at the CCP and CHMP level.
- Provide boilerplate transportation language for CCPs and CHMPs to improve the quality of transportation material in these plans.



Laura Beauregard/USFWS

Chapter 2: Funding and Project Selection

Funding for the Service's transportation program (including refuge and fisheries programs) does not meet current needs. For purposes of establishing an overall need for the public use road system eligible to receive funding through the RRP, estimates show that approximately \$130 million per year is needed to ensure that most of the public roads and bridges are in good to excellent condition. This estimate assumes an aggressive schedule for road reconstruction and bridge rehabilitation over an extended period of time. Further documenting needs, an August 2010 report, *Life Cycle Investment Needs for Assets in the Refuge System* found that the deferred maintenance cost for public roads alone is over \$1 billion (41 percent of all Service assets), with a replacement value of \$6.7 billion (30 percent of all Service assets). Today, approximately 45 percent of the public roads and 40 percent of the public bridges are in fair to poor/failing condition throughout the entire system. Further growth of the program's funding is needed to improve the overall condition of transportation assets.

Based on the nationwide need of \$130 million per year, \$12 to \$15 million per year is needed in Region 1 just to maintain the road system and bridges in good to excellent condition. SAFETEA-LU, the current transportation legislation and authorization for the public transportation system, expired in September 2009. A series of extensions have been in place since. In 2011, dialogue on new transportation legislation will continue. While it is not known what if any increase in funding will be provided to the program, further documenting the needs is essential to provide the best information to decision-makers.

A well-defined funding and investment strategy and a defensible project selection process are critical to maintain Service transportation assets. The Region 1 LRTP is an important step in documenting that information. This chapter identifies reasonably expected funding through the planning horizon, illustrates the funding gap between projected funding levels and anticipated need for Service transportation improvements, identifies existing funding opportunities through partnership with State and local entities, and defines the current project selection process for transportation projects in Region 1.

2.1 Transportation Funding in Region 1

For fiscal year 2009, Region 1 received approximately \$2.4 million through the RRP, \$5.7 million in deferred maintenance funds, while the Fisheries Program received \$2 million in deferred maintenance funding. Visitor facility enhancement funds were allocated through resource appropriations averaging \$77,500 annually over the last 3 years, and construction appropriations averaging \$210,000 per year over the same period. The latter of these is highly variable. The two primary sources used for transportation projects are the RRP and deferred maintenance funds for fisheries.

It is important to note that only a small portion of the total budgets for both deferred maintenance and visitor facility enhancement funds are used for transportation projects. This section provides an overview of the two primary sources currently used to fund transportation improvements on National Wildlife Refuges and National Fish Hatcheries in Region 1.

2.1.1 Refuge Roads Program

The Service's RRP began in 1998 with the passage of the Transportation Equity Act for the 21st Century, which authorized \$20 million annually. Initially, work focused on completing initial inventories and addressing the most pressing needs for transportation improvements. Transit and trail improvements were also evaluated across the Refuge System to prepare for future needs. Now included in SAFETEA-LU, the program is authorized at \$29 million per year. This represented a 45 percent increase over the previous Transportation Equity Act for the 21st Century funding levels. Nationwide, the program provides a funding source to improve public-use transportation assets at wildlife refuges that are located in urban, suburban, and rural settings within the Service's eight regions.

A majority of past funds provided to the program have gone to improve the eligible roads and bridges in the system. With a growing emphasis and need for other transportation improvements such as bicycle and pedestrian access, and alternative vehicle use where appropriate, the program needs to view all transportation modes as viable uses of program funds. With pending transportation reauthorization and looking to the future, the Service intends to continue to provide a multitude of quality transportation

options for its visitors, and to its Refuge staff and volunteers.

The current RRP allocation to Region 1 is \$2.4 million per year. Up to 5 percent of the funds can be used each year for public use trails within refuges. The National Transportation Coordinator located in the headquarters/Washington office manages the allocation process to the Service regions through coordination with FHWA and the Regional Refuge chiefs. With legislative changes likely in the new transportation legislation, this allocation process may change.

Funds are allocated to the RRP from the FHWA according to Title 23 United States Code (U.S.C.), Chapter 2 Section 202(e). In keeping with its decentralized decision making structure, the Service has chosen to allocate the majority of its funds to its eight regional offices using an internally developed formula based on the National Park Service’s Park Roads and Parkways Program fund allocation formula. A small percentage, which varies with the RRP actual allocation from the Highway Trust fund, is used to fund the ongoing Inventory and Assessment Program and national level research, technical assistance training, partnership development, and coordination of legislative affairs with the Service’s Congressional and Legislative Affairs Division. The Service’s allocation formula has three components:

1. Size of a region’s combined adjusted road/bridge/parking inventory
2. Amount of a region’s road/bridge/parking assets assessed as being in fair/good/excellent conditions
3. Public use of a region’s refuges, wetland management districts, and hatcheries

Fifty-five percent of a region’s allocation is based on the miles of roads and their type (paved, improved gravel, improved native and native surfaces); square footage of bridges; square footage of parking lots and

their type (paved, improved gravel, improved native, native surfaces and mowed). This data is gathered by the ongoing Public Use Roads inventory conducted by FLH of FHWA. Thirty percent of the allocation is based on asset condition determined to be in fair/good or excellent condition. Fifteen percent of the formula is based on the amount of public visitation per region as reported in the Refuge Annual Performance Plan each year.

Through the RRP, the Service is working to improve public access to refuges and provide a better overall visitor experience. Eligible project types under this program include improvements to existing public use roads, bridges, parking lots, and trails, including those needed to correct identified safety problems at high accident locations and to protect and improve natural and cultural resources within National Wildlife Refuges. Additional information on project eligibility can be found in *Guidance on the Federal Lands Highway Refuge Roads Program* (September 2005) available in Appendix I.

The following work is not presently eligible to be funded under the RRP:

- Constructing new roads, parking areas or pullouts, or widening off existing road bench
- Realigning or relocating roads
- Constructing new pedestrian or bicycle paths
- Recurring, routine maintenance (e.g., grading roads and mowing roadsides)

Based on current and forecasted funding allocation for the RRP, the Service will continue to experience a funding gap that significantly falls short of program needs. Table 12 illustrates current and anticipated funding through 2030, with a \$376 million funding gap through the horizon of this plan.

Table 12
Anticipated Funding Gap through Planning Horizon Year (2030)

Existing funding for Region 1 (annually, in millions)	Anticipated need through 2030 (in millions)	Anticipated funding available through 2030 (in millions)	Funding gap through 2030 (in millions)
\$2.4	\$446.7	\$70.3	\$376.4

Note: Anticipated need is based on a current need of \$15 million, with 4% annual inflation. Anticipated funding is based on 20% program increase every 6 years, starting in 2012.

The total need through year 2030 represents raising the condition of all roads to good or excellent condition, and maintaining that condition over time. It also includes funds to address trails and other alternative transportation needs. While this type of funding level to meet this amount of need is not achievable, the Service is beginning to examine pavement management system approaches to improve efficiencies and stretch the value of available funds across the transportation network.

In Region 1, the RRP already has an informal project selection process in place. This LRTP will improve project selection by integrating defensibility and justification for why certain projects are selected for advancement and implementation. Beyond project selection, this LRTP will also make better use of refuge road funding by promoting partnerships with other agencies. Partnering will support reaching the Service's goal of facilitating cooperation and identifying opportunities to work together to conserve wildlife habitats.

2.1.2 Fish Hatchery Deferred Maintenance

The Region 1 Fisheries Program is largely funded by resource management and reimbursable funds to co-manage inter-jurisdictional fisheries, promote recreational fisheries, mitigate Federal agencies' actions related to hydropower projects, and meet treaty trust responsibilities. The Fisheries Program includes a network of 48 field offices including fish hatcheries to meet this challenge. Rivers in the Pacific Northwest support some of the largest populations of iconic fish such as steelhead and salmon that are declining in numbers. To counter the decline, the regional Fisheries Program works to improve aquatic habitat and to supplement existing wild populations with hatchery fish production to satisfy a variety of fishery needs.

Transportation plays a key role in mission critical activities for the Fisheries Program. Activities include transportation for fish release, fish transfer to acclimation ponds, transfer for specific research purposes, public access for recreational fishing, and providing right of way to inholders under a memorandum of understanding. Transportation activities assist in effort to promote sustainable populations in waterways in the Pacific Northwest.

Throughout the history of the program, deferred maintenance and resource management funds have been used to fund transportation activities and projects in the region. Transportation specific funding as part of the current Surface Transportation Act is not yet available for the Fisheries Program; however, this may change. Currently, the Service has proposed

that the RRP be broadened to become the Fish and Wildlife Service Transportation Program, which will include fish production facilities in the region. If approved under new transportation legislation, funds will become available to improve public use transportation assets at fishery facilities including National Fish Hatcheries.

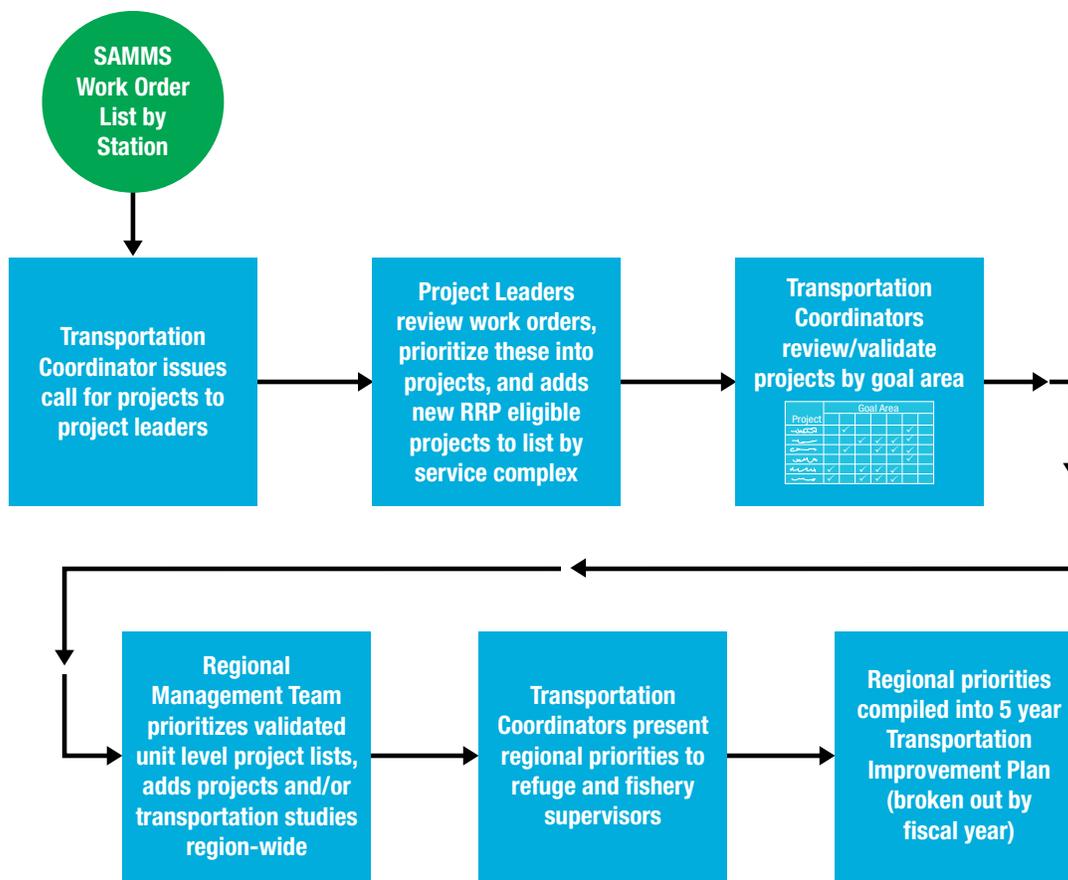
The fisheries program continues to demonstrate a strategic need for transportation infrastructure improvements by participating in the regional transportation planning process. Currently, the Region 1 fisheries program requires an estimated \$1.7 million to fund outstanding mission critical transportation projects. This LRTP will help project prioritization for the program by influencing policy and planning level decisions.

2.2 Project Selection Process for Transportation Projects

Currently, transportation projects in Region 1 are generated through work orders developed in the SAMMS; therefore, before a project can be developed, a work order must be generated in SAMMS. The Service uses SAMMS to identify, plan, prioritize and implement capital improvements and maintenance projects under the RRP and fisheries deferred maintenance funding at both the regional and field station level. Because of differences in the funding sources between the Refuge and Fisheries Programs, the RRP relies on a 5-year TIP, while the fisheries program relies on a 5-year maintenance plan for prioritized project, both under the direction of the respective transportation coordinator. However, SAMMS work orders do not account for projects within the Fisheries Reimbursable Program; therefore, when considering regional transportation priorities as a whole, it is important to consider multiple funding sources across all Service programs.

This LRTP creates a defensible project selection process based on established goals and available funding that clearly identify the Service's priorities for transportation for both refuges and hatcheries. This process will be used as a guide to programming future projects. The region may alter the process as needed to be responsive to emergency needs, changes in the funding allocation, and other urgent programming needs. The process described below outlines the Region's decision-making process to address critical transportation needs. The process consists of six basic steps, conducted on an annual basis, as shown in Figure 16.

Figure 16
Project Selection Process



Step 1: Call for projects. The first step in project selection is initiated when the transportation coordinators for refuges and hatcheries issue a call for projects. This call will come in the form of a memorandum that describes the project selection process, describes the integral relationship between project selection and transportation goals and objectives, and includes a list of existing projects generated through work orders in SAMMS.

Step 2: Project leaders review work orders and prioritize needs. This call is an opportunity for refuge and hatchery supervisors and project leaders to review the needs of each unit and submit eligible projects to the regional transportation coordinator. Project submittals should include sufficient information to support eligibility and need for the transportation improvements based on the information provided in this regional LRTP.

Step 3: Review and validate projects. Upon receiving project submittals from the call process, the transportation coordinators review each potential project and validate it against the goals and objectives of this LRTP. The validation process may include site visits to confirm condition of a specific facility and/or discussions with project leaders and refuge managers to confirm or clarify a project’s purpose and need and how it relates to the Region’s priorities. Consistent with the goals described in *Chapter 2, Goals and Baseline Conditions*, rankings are assigned to each goal category as a function of the relative importance the Service places on achieving a particular goal relative to the mission of the agency, shown in Table 13. The rankings represent the relative priority of each of the goal areas in which a project can be scored. Projects with the highest total ranking points indicate the Region’s highest priority projects, while projects with lower scores may be funded if additional funds were to become available. Regional leadership reserves the discretion to alter the priority of individual projects as needed.

Table 13

Transportation Program Goals and Selection Criteria Used for Project Ranking

Goals/Objectives	Ranking Priority
Resource Protection	High
Visitor Services	Low
Condition and Safety	High
Partnering	Medium
Planning	Low
Sustainability	Medium

Step 4: Regional-level prioritization. Following validation, the regional management team will meet to discuss and prioritize the validated project listing. Using the information obtained during the call for projects and validation process, the transportation coordinator presents each project to the management team. Regional priorities are aligned with project level decisions, resulting in an approved, prioritized ranking of projects.

Step 5: Presentation of regional priorities. The transportation coordinator then presents this prioritized list to refuge and hatchery supervisors.

Step 6: Develop 5-year TIP. In order to program projects, the transportation coordinator aligns the prioritized project list with available funding to identify when each project will be implemented. Once this alignment has been completed, the list serves as the Region’s 5-year TIP. Because this process is conducted on an annual basis, changes in funding availability, local conditions, and unforeseen circumstances may influence how and when specific projects are programmed for implementation during the 5-year timeframe.



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2.3 Additional Funding Opportunities

Other funding sources are available for transportation improvements in addition to the funding provided through the RRP and the Fish Hatchery Deferred Maintenance funds. The following programs and funding sources are examples of those have been used on past Service transportation projects:

- Transportation Enhancements
- Recreational Trails Program
- Scenic Byways
- Rivers, Trails, and Conservation Assistance Program
- Public Lands Highway Discretionary Program
- High Priority Projects (Congressionally designated)
- Emergency Relief for Federally Owned Roads (ERFO)
- Paul S. Sarbanes Transit in Parks (formerly Alternative Transportation for Parks and Public Lands)

These programs and funds are available at the State and local level, which is why partnering is critical to addressing the recognized funding gap.

2.3.1 Transportation Enhancements

Transportation enhancement activities offer funding to help expand transportation choices and enhance the built and natural environment. To be eligible for funding, a transportation enhancement project must fit into one or more of the 12 eligible transportation enhancement activities related to surface transportation, including pedestrian and bicycle infrastructure and safety programs, scenic and historic highway programs, landscaping and scenic beautification, historic preservation, and environmental mitigation (23 U.S.C. 104). SAFETEA-LU authorized approximately \$800 million annually for this program over the period of 2005 to 2009. Funds are distributed through State DOTs and each has its own process to solicit and select projects. This program is an 80 percent federal share. The Service could provide the 20 percent match with other federal funds or a combination of other federal, state, or local agency funds. Profiles for each State’s transportation enhancement program can be found online at <http://www.enhancements.org/Stateprofile.asp>

2.3.2 Recreational Trails Program

The Recreational Trails Program (RTP) provides funds to the states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail use (23 USC 206). SAFETEA-LU authorized \$370 million in funding nationwide, of which \$85 was dispersed in 2009. Examples of trail uses include hiking, bicycling, equestrian use, all-terrain vehicle riding, and four-wheel driving. Eligible activities include trail maintenance and restoration and new trail construction. National Scenic and Historic Trails and National Recreational Trails are eligible under this funding program and should be considered in locations where these designated trails converge with refuges and hatcheries. Funds are distributed through the states, and each has its own process to solicit and select projects. This program is an 80 percent federal share. The Service could provide the 20 percent match with other federal, state, and local funds including up to five percent of the region's allocated Refuge Roads Program funds. Links to Region 1 States' RTPs are included below. Check FHWA's state administrator's website for current contact information (<http://www.fhwa.dot.gov/environment/rectrails/rtpstate.htm>).

The State agency contacts for each State within Region 1 with knowledge of their program are:

Hawaii: Trail & Access Program, Department of Land and Natural Resources, Division of Forestry and Wildlife (<http://hawaiitrails.ehawaii.gov/>)

Idaho: State of Idaho, Parks and Recreation, Recreational Trails Program (<http://parksandrecreation.idaho.gov/aboutus/grants/trails.aspx>)

Nevada: Parks and Recreation Program Manager, Nevada State Parks

Oregon: State of Oregon, Parks and Recreation Grants Program (http://egov.oregon.gov/OPRD/GRANTS/trails_more.shtml#awards)

Washington: Washington State, Recreation and Conservation Office, Recreational Trails Program (<http://www.rco.wa.gov/grants/rtp.shtml>)

2.3.3 Scenic Byways

The National Scenic Byways Program is funded through FHWA to help recognize, preserve, and enhance designated roads throughout the United States. Designation is awarded to certain roads based on one or more archeological, cultural, historic, natural, recreational, and scenic qualities (23 U.S.C. 162). SAFETEA-LU allocated \$175 million in funding over 6 years for byways-related projects, with \$43.5 million allocated in 2009. FHWA awards funds competitively each year covering 80 percent of project cost, with the requirement that the remaining 20 percent be matched by local, State, other Federal or in-kind means. Grant applications are submitted annually. The Service would submit an application for National Scenic Byways funding through the State DOTs, in cooperation with or through a Byway Organization. Because many of the National Wildlife Refuge and National Fish Hatcheries units in Region 1 are located along or near National Scenic Byways, partnering with the local Scenic Byway organizations is important to gain access to this funding for potential projects. Table 9 identifies refuges and hatcheries that either share a route or intersect a Scenic Byway route.

2.3.4 Rivers, Trails, and Conservation Assistance Program

The Rivers, Trails, and Conservation Assistance (RTCA) Program provides assistance with planning, project development, and construction related to natural resource conservation and outdoor recreation. While not a funding program, this community assistance branch of the National Park Service offers valuable staff assistance for local project planning for communities, state and Federal agencies. The RTCA Program in the Pacific West Region is managed from National Park Service offices in Oakland and Seattle. The Pend d'Oreille Bay Trail is an example of a project that received program assistance in Region 1, lead by the Friends of Pend d'Oreille Bay Trail.

2.3.5 Public Lands Highway – Discretionary Program

Public Lands Highway – Discretionary Program funds are available for transportation planning, research, engineering, and construction of highways, roads, parkways, and transit facilities within Federal public lands. These funds are also available for operation and maintenance of transit facilities located on Federal public lands. Funding is provided for projects designated by Congress. Certain projects not designated by Congress may also be eligible. Because only State DOTs can submit candidate projects for this program, it is critical that the Service coordinate with their respective DOTs to align common project priorities to become eligible for these funds. Eligible projects may include:

- Transportation planning for tourism and recreational travel, including National Forest Scenic Byways, Bureau of Land Management Back Country Byways, National Trail System, and similar federal programs
- Adjacent vehicle parking areas
- Interpretive signs
- Acquisition of scenic easements and scenic or historic sites
- Provision for pedestrians and bicycles

Region 1 received ERFO funds for the following projects:

- Repair/reconfigure parking lots and pedestrian trail – Kilauea Point NWR (2010)
- Entrance road improvements – Kakahaia NWR (2009)
- Parking area construction – Kealia Pond NWR (2008)
- Road improvements – Hakalau Forest NWR (2008)
- Entrance road improvements, including turn lanes, bus stop, and visitor enhancements – Tualatin River NWR (2003)

2.3.6 High Priority Projects Program

The High Priority Project Program provides designated funding for specific projects identified in SAFETEA-LU. This program is an 80 percent Federal share. The 20 percent match may come from FLH Program or Service appropriated funds. All eligible projects must be listed in section 1702 of SAFETEA-LU.

2.3.7 Emergency Relief for Federally Owned Roads

The ERFO program provides assistance for the repair and reconstruction of Federal roads that have been damaged by a natural disaster over a wide area or by a catastrophic failure from any external cause. This program is meant to supplement the commitment of resources from other federal sources to help pay unusually high expenses resulting from extreme conditions. Funds are provided from the Highway Trust Fund. No match is required; the federal share of the project cost is 100 percent.

2.3.8 Paul S. Sarbanes Transit in Parks Program

The Paul S. Sarbanes Transit in Parks program is administered by the Federal Transit Administration in conjunction with the U.S. Department of the Interior and U.S. Forest Service. It is a competitive grant program open to the Service, the National Park Service, Bureau of Land Management, Bureau of Reclamation, and the U.S. Forest Service. The program funds capital and planning expenses for alternative transportation systems such as shuttle buses and bicycle trails. The goals of the program are to conserve natural, historical, and cultural resources; reduce congestion and pollution; improve visitor mobility and accessibility; enhance visitor experience; and ensure access to all, including persons with disabilities. In addition, 10 percent of the annual allocation is available for the provision of technical assistance in alternative transportation planning where project proposals are not already well-developed. The total allocation for this program has been \$22 to \$27 million each year, nationally since 2006.

2.4 Getting Station Projects into the Transportation Improvement Program

Because the Region's project selection process is designed to be a defensible mechanism to select projects, the key to advancing projects is ensuring consistency with the Region's transportation priorities (i.e., the six goals and corresponding objectives and strategies).

In addition to creating a work order in SAMMS (this applies to both RRP projects for refuges and deferred maintenance projects for hatcheries), the project proponent must strategize how the project supports a specific goal area or objective, as described in Chapter 2, Goals and Baseline Conditions. It is also critical to communicate the validity of the project and how it supports regional transportation goals/objectives with the respective project leader, as these individuals play an important role early in the selection process during the initial review of work orders and identification of eligible projects.

One of the most important ways to inform regional decision makers about the validity of a project is to submit appropriate documentation supporting the projects' need. Examples of supporting documentation include road or bridge condition data, safety assessment, traffic volumes, visitation statistics, site photos, and potential funding partnerships. Recognizing the limited funding for transportation projects within the region, the Service is placing greater importance on the need to coordinate outside refuge and hatchery units, and seek partnerships for projects that receive RRP funds.



Chapter 3: Recommendations for Future Plan Activities

Several action items have been identified during the development of the Service Region 1 LRTP. These items are summarized in Table 14.

*Table 14
Long Range Transportation Plan Action Items*

Number	Action Item	Description
1	Revise LRTP within 5 years of this document	Based on the need for additional analysis described in the following action items, this plan should be revised to provide the Service with the necessary analysis to reflect the current transportation needs of the region.
2	Improve resource protection analysis	<p>Use a systematic method to quantify the significance of the conflict between fish and wildlife and transportation facilities to better demonstrate a need for improvements.</p> <p>Obtain wildlife habitat locations and fish passage corridors to help identify potential animal-transportation conflict areas as well as the type of potentially impacted wildlife.</p> <p>Identify the locations of access conflicts between resources (fish and wildlife habitat) and transportation facilities to help decision makers develop appropriate solutions.</p> <p>Obtain fish passage data to help identify potential fish-transportation conflict areas and potentially impacted species.</p> <p>Obtain non-fatal vehicle-animal collision data to provide a more complete understanding of historic vehicle-animal conflict hot-spots.</p>
3	Improve safety and condition analysis	<p>Obtain AADT for all Service roads to help quantify use and add to the meaningfulness of need determinations.</p> <p>Collect crash data for all Service roads to help identify areas in need of safety improvements.</p> <p>Obtain complete current replacement value, asset priority index, facility condition index, and deferred maintenance for all refuge and hatchery roads, parking lots, and trails to eliminate data gaps and improve the reliability of need determinations.</p> <p>Develop a better cross-compatibility between SAMMS and RIP for roads, parking lots, and trails to eliminate data gaps and increase the reliability and usefulness of need and hotspot analyses.</p> <p>Use a complete dataset of non-Service road use, condition, and crashes to eliminate data gaps in the determinations of improvement need and partnership opportunity.</p>

Table 14
 Long Range Transportation Plan Action Items

Number	Action Item	Description
4	Improve welcome and orient visitors analysis	<p>Identify where State way-finding and variable message sign are located to assist in identifying areas of possible partnership.</p> <p>Use a Service sign inventory that includes sign location, condition, and adherence to Service sign standards (those specifically related to way-finding and interpretation) to help identify locations of need.</p>
5	Improve partnership analysis	<p>Identify partnership opportunities with non-Service transportation agencies by identifying route jurisdiction for the roads listed in Table 8 and Appendix C, Table 8. Additional data acquisition is needed in order to have a complete inventory of road jurisdictions.</p>
6	Improve sustainability analysis	<p>Perform comprehensive risk analysis to determine risks to transportation resources from climate change. Factors that should be included in a comprehensive risk analysis are:</p> <ul style="list-style-type: none"> Precipitation levels, including associated impacts on water tables, flooding, and soil moisture Temperature changes Storm surges Estuarine flooding <p>Analyze the coastal vulnerability due to climate change could be better quantified if data were available for Hawaii and the outlying Pacific area.</p> <p>Identify places with ATS needs or opportunities by addressing these issues at the CCP and CHMP level.</p> <p>Provide boilerplate transportation language for CCPs and CHMPs to improve the quality of transportation material in these plans.</p>

Appendix A

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Plan Contributors

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Appendix B

Region 1 Refuges and Hatcheries

Region 1 Refuges and Hatcheries

Station	Headquarters/Complex	State/Territory
Abernathy Fish Technology Center	Abernathy Fish Technology Center	WA
Ankeny NWR	Willamette Valley NWR Complex	OR
Baker Island NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Bandon Marsh NWR	Oregon Coast NWR Complex	OR
Baskett Slough NWR	Willamette Valley NWR Complex	OR
Bear Lake NWR	Southeast Idaho NWR Complex	ID
Big Canyon NFH	Lower Snake River Compensation Plan	OR
Camas NWR	Southeast Idaho NWR Complex	ID
Cape Meares NWR	Oregon Coast NWR Complex	OR
Captain John Rapids NFH	Lower Snake River Compensation Plan	WA
Carson NFH	Carson NFH Complex	WA
Clearwater NFH	Lower Snake River Compensation Plan	ID
Cold Springs NWR	Mid-Columbia River NWR Complex	OR
Columbia NWR	Mid-Columbia River NWR Complex	WA
Conboy Lake NWR	Mid-Columbia River NWR Complex	WA
Copalis NWR	Washington Maritime Complex	WA
Cottonwood Creek NFH	Lower Snake River Compensation Plan	WA
Crooked River NFH	Lower Snake River Compensation Plan	ID
Curl Lake NFH	Lower Snake River Compensation Plan	WA
Deer Flat NWR	Deer Flat NWR	ID
Dungeness NWR	Washington Maritime Complex	WA
Dworshak NFH	Dworshak National Fish Hatchery Complex	ID
Eagle Creek NFH	Eagle Creek NFH Complex	OR
Eagle Fish Health Laboratory	Lower Snake River Compensation Plan	ID
East Fork Salmon NFH	Lower Snake River Compensation Plan	ID
Entiat NFH	Leavenworth National Fish Hatchery Complex	WA
Flattery Rocks NWR	Washington Maritime Complex	WA
Franz Lake NWR	Ridgefield National Wildlife Refuge Complex	WA
Grays Harbor NWR	Nisqually NWR Complex	WA
Grays Lake NWR	Southeast Idaho NWR Complex	ID
Guam NWR	Hawaiian and Pacific Islands NWR Complex	Guam
Hagerman NFH	Hagerman National Fish Hatchery Complex	ID
Hakalau Forest NWR	Big Island NWR Complex	HI
Hanalei NWR	Kauai NWR Complex	HI
Hanford Reach National Monument	Mid-Columbia River NWR Complex	WA
Hart Mountain National Antelope Refuge	Sheldon-Hart Mountain NWR Complex	OR
Hawaiian Islands NWR	Hawaiian and Pacific Islands NWR Complex	HI

Station	Headquarters/Complex	State/Territory
Howland Island NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Huleia NWR	Kauai NWR Complex	HI
Idaho Fish Health Center	Dworshak National Fish Hatchery Complex	ID
Imnaha NFH	Lower Snake River Compensation Plan	OR
Inland Northwest NWR Complex	Inland Northwest NWR Complex	WA
Irrigon NFH	Lower Snake River Compensation Plan	OR
James Campbell NWR	Oahu NWR Complex	HI
Jarvis Island NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Johnston Island NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Julia Butler Hansen Refuge	Willapa National Wildlife Refuge Complex	WA
Kakahaia NWR	Maui NWR Complex	HI
Kauai NWR Complex	Hawaiian and Pacific Islands NWR Complex	HI
Kealia Pond NWR	Maui NWR Complex	HI
Kilauea Point NWR	Kauai NWR Complex	HI
Kingman Reef NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Kona Forest NWR	Big Island NWR Complex	HI
Kooskia NFH	Dworshak National Fish Hatchery Complex	ID
Kootenai NWR	Inland Northwest NWR Complex	ID
Leavenworth NFH	Leavenworth National Fish Hatchery Complex	WA
Lewis and Clark NWR	Willapa National Wildlife Refuge Complex	WA
Little Pend Oreille NWR	Inland Northwest NWR Complex	WA
Little Sheep Creek	Lower Snake River Compensation Plan	OR
Little White Salmon NFH	Little White Salmon National Fish Hatchery Complex	WA
Lookingglass NFH	Lower Snake River Compensation Plan	OR
Lower Columbia River Fish Health Center	Little White Salmon National Fish Hatchery Complex	WA
Lower Snake River Compensation Plan	Lower Snake River Compensation Plan	ID
Lyons Ferry NFH	Lower Snake River Compensation Plan	WA
Magic Valley NFH	Lower Snake River Compensation Plan	ID
Makah NFH	Makah NFH	WA
Malheur NWR	Malheur NWR	OR
McCall NFH	Lower Snake River Compensation Plan	ID
McKay Creek NWR	Mid-Columbia River NWR Complex	OR
McNary NWR	Mid-Columbia River NWR Complex	WA
Midway Atoll NWR	Papahānaumokuākea Marine National Monument	Pacific Outlying Islands

Station	Headquarters/Complex	State/Territory
Minidoka NWR	Southeast Idaho NWR Complex	ID
Nestucca Bay NWR	Oregon Coast NWR Complex	OR
Nisqually NWR	Nisqually NWR Complex	WA
Nisqually NWR Complex	Nisqually NWR Complex	WA
Oahu Forest NWR	Oahu NWR Complex	HI
Olympia Fish Health Center	Olympia Fish Health Center	WA
Oregon Coast NWR Complex	Oregon Coast NWR Complex	OR
Oregon Islands NWR	Oregon Coast NWR Complex	OR
Oxford Slough WPA	Southeast Idaho NWR Complex	ID
Pacific Reefs NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Palmyra Atoll NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Pearl Harbor NWR	Oahu NWR Complex	HI
Pierce NWR	Ridgefield National Wildlife Refuge Complex	WA
Protection Island NWR	Washington Maritime Complex	WA
Quilcene NFH	Quilcene NFH	WA
Quillayute Needles NWR	Washington Maritime Complex	WA
Quinault NFH	Quinault NFH	WA
Red River NFH	Lower Snake River Compensation Plan	ID
Ridgefield NWR	Ridgefield National Wildlife Refuge Complex	WA
Rose Atoll NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands
Saddle Mountain NWR	Mid-Columbia River NWR Complex	WA
San Juan Islands NWR	Washington Maritime Complex	WA
Sawtooth NFH	Lower Snake River Compensation Plan	ID
Sheldon NWR	Sheldon-Hart Mountain NWR Complex	NV
Siletz Bay NWR	Oregon Coast NWR Complex	OR
South Fork NFH	Lower Snake River Compensation Plan	ID
Southeast Idaho NWR Complex	Southeast Idaho NWR Complex	ID
Spring Creek NFH	Spring Creek NFH	WA
Steigerwald Lake NWR	Ridgefield National Wildlife Refuge Complex	WA
Three Arch Rocks NWR	Oregon Coast NWR Complex	OR
Toppenish NWR	Mid-Columbia River NWR Complex	WA
Tualatin River NWR	Tualatin River NWR	OR
Tucannon NFH	Lower Snake River Compensation Plan	WA
Turnbull NWR	Inland Northwest NWR Complex	WA
Umatilla NWR	Mid-Columbia River NWR Complex	WA
Wake Atoll NWR	Pacific Remote Islands NWR Complex	Pacific Outlying Islands

Station	Headquarters/Complex	State/Territory
Wallowa NFH	Lower Snake River Compensation Plan	OR
Warm Springs NFH	Warm Springs NFH Complex	OR
Washington Maritime NWR Complex	Washington Maritime NWR Complex	WA
Willamette Valley NWR Complex	Willamette Valley NWR Complex	OR
Willapa NWR	Willapa National Wildlife Refuge Complex	WA
Willard NFH	Little White Salmon National Fish Hatchery Complex	WA
William L. Finley NWR	Willamette Valley NWR Complex	OR
Winthrop NFH	Leavenworth National Fish Hatchery Complex	WA

Appendix C

Data Sources

Data Sources and Analysis

Baseline conditions are established for a number of factors including physical characteristics like condition and asset type as well as external factors such as value, visitation, population, sensitivity to/from climate change, safety, and non-service partnership opportunities. Understanding of these factors is achieved by synthesizing various datasets and establishing a baseline condition. The Data Sources and Analysis appendix documents the data and processes used to synthesize information used in the baseline condition analysis.

Data Sources Overview

Information used to establish baseline conditions is mined from regularly updated Service data sources like the Service Asset Maintenance Management System (SAMMS) and the Road Inventory Program (RIP). SAMMS provides information on

facility and equipment deficiencies, justifies budget requests for maintenance needs, and provides a sound basis for management decision-making. RIP data contains a condition assessment of all Service roads, parking lots, and trails. The dataset is updated in regular five year periods.

Supplemental information from non-Service sources is also used to establish baseline conditions. These sources include the US Census, Federal Highway Administration (FHWA), Federal Transit Administration (FTA), US Geological Survey (USGS), Federal Emergency Management Agency (FEMA), Environmental Systems Research Institute (ESRI), Bureau of Transportation Statistics (BTS), and state departments of transportation (DOT). Table 1 indicates commonly used datasets for determining baseline conditions in each goal area.

Table 1. Data Sources

1. Resource Protection	Fatal accidents	NHTSA
2. Conditions and Safety	Asset Conditions (RIP)	FWS/FLH
	API rankings (SAMMS)	FWS
	Facility condition index (SAMMS)	FWS
	Crashes	ID, OR, WA DOTs
	Road pavement condition	OR DOT
	AADT	ID/OR DOTs and NHPN
3. Welcome and Orient	Visitation	FWS
	Population	US Census
	Populated places	US Census
4. Planning	Service planning status	FWS
	State planning boundaries	HI, WA, OR, ID state departments
5. Partnerships	N/A	N/A
6. Sustainability	FWS plans	FWS
	Vulnerability of coastal areas to sea level change	USGS
	Seismic risk	USGS
	Air quality non-attainment areas	BTS
	Transit districts	FTA, BTS, State DOTs, Google

C.4 Resource Protection

At this time, resource protection data consists of fatal accident locations caused by animal-vehicle collisions. This data was derived from NHTSA vehicle fatality tables, for 2001 through 2008. Filtering for animal collision deaths (using “HARM_EV” = 11), latitude and longitude values were used to plot, and select based on proximity to FWS boundaries. A spatial join was used to identify the accidents that were located in or near a particular unit.

C.5 Safety and Conditions

The Service is committed to providing safe and reliable access to and within its lands and facilities. As such, baseline condition analyses have been established for issues related to access and safety.

Priority, Condition Index, Value, and Condition

Transportation asset conditions, value, priority, and deferred maintenance summaries combine SAMMS, RIP, and GIS data provided by FHWA FLH and FWS. This information is summarized in Table 2 and Table 4. Current replacement value (CRV), asset priority index (API), and facility condition index (FCI) data is aggregated to the unit level. These RIP and SAMMS tables were joined by “asset id” to generate tabular summaries. Because of gaps in “asset ids” in both the RIP and SAMMS datasets, results are incomplete.

For trails, “asset-id” fields were not used, rather records were filtered by trail related keywords (This was done instead of using the SAMMS asset number as a common join field because 30% of trails (by length) in the GIS dataset contain “N/A” values as their asset ID). The remaining information was summed and normalized (by length) for each unit. To verify the completeness or coverage of the SAMMS information, the recorded trail lengths were compared against measured trail lengths generated through the GIS dataset. The outcome of this exercise is represented in the “% Coverage” columns in the final outcome table. A value greater than 100% in this column indicates that the SAMMS table shows a total trail distance that is longer than what was derived from the GIS dataset.

Deferred maintenance could not be summarized using the process described above because the table containing DM values does not list trail lengths. As a result, information could not be weight/averaged or verified for completeness. Instead, and despite the gap in asset IDs, the SAMMS asset number was used to perform a table relate with the GIS dataset. The measured lengths generated through the GIS dataset were then used to weight/average DM information.

Road, Parking, and Trail Conditions

To better understand the composition of roads, parking, and trail condition rankings, it was necessary to aggregate surface type from condition ranking. This information is summarized in Table 5 and Table 6 in addition to the condition summary tables in the Goals and Conditions chapter, *Safety and Condition* section. The result is a table that breaks out the lengths of surface type contained within a condition ranking. For context, this information is supplemented with percentages of: surface type within a particular condition category, percent of a particular condition and surface type that make up the total of Service trails, and total percent condition category of all trail miles – regardless of surface type. The summaries were produced using Access queries of RIP data.

FWS Trail Deficiencies

Trail deficiencies are identified in baseline conditions in tabular form by state, unit, and deficiency classification. Access queries of RIP trail deficiencies data show number and type of deficiencies found in each unit, by state. This data is shown in Table 5.

Non-Service Road Condition, Use, and Safety

The LRTP uses non-service road condition, use, and safety improvement information to help identify areas of need of improvement and possible partnership. To accomplish this, data is required from each Region 1 state’s department of transportation.

For Oregon, a GIS was used to identify crash data, use, and AADT for Oregon State Department of Transportation (ODOT) non-Service roads that intersect FWS units. A spatial intersect was performed between the NHPN dataset and FWS units to find where these roads entered/exited Service boundaries. Spatial joins allowed for the linking of these locations to ODOT crash, condition, and AADT data. Data resulting from these operations were synthesized using Access.

For Washington, crash data was provided as a series of tables which described crash events. Once these tables were compiled into a single table, route name and milepost information was used to create a unique identifier (“Seg-code” + “milepost[rounded]”). Using GIS milepost data available from WDOT’s website, the same route name-milepost unique identifier was created. The tabular crash dataset was then able to be joined to the milepost spatial data. AADT data was not available from the state, so this information was derived from the NHPN dataset instead. AADT data was spatially joined to the crash data to facilitate the creation of tabular summaries. The state was not able to provide pavement condition data.

The process of joining crash data with milepost data was repeated for Idaho data. Like Washington, no pavement surface condition data was available; however a 2007 AADT dataset was readably available.

No road condition, use, or safety data was available from Hawaii D

Table 2. Combined SAMMS and RIP Road Data

State	FWS Unit	Route Name	Route ID	Surface	API	FCI	Condition
Hawaii	Hanalei NWR	Cemetery Road	FWS-HANA-100	Asphalt	45	0.1	Failed
		Cemetery Road	FWS-HANA-100	Gravel	65	0.1	Failed
	Kealia Pond NWR	Entrance Road	FWS-KEPO-010	Asphalt	100	0	Fair
	Kilauea Point NWR	Kilauea Lighthouse Road	FWS-KIPO-010	Asphalt	100	0	Fair
Idaho	Bear Lake NWR	Paris Dike Boat Ramp Access	FWS-BELA-102	Gravel	70	0.9	Fair
	Camas NWR	Main Entrance Road	FWS-CAMA-013	Asphalt	70	0	Fair
		Wildlife Viewing Route - Big Pond	FWS-CAMA-010	Gravel	55	0	Good
		Wildlife Viewing Route - Toomey Pond	FWS-CAMA-011	Gravel	65	0	Good
	Deer Flat NWR	Gott's Point Road	FWS-DEFL-100	Gravel	45	0	Fair
		Lower Dam Boat Ramp Access	FWS-DEFL-101	Asphalt	45	0.1	Fair
		Lower Dam Youth Camp Access	FWS-DEFL-102	Gravel	45	0	Fair
		Visitor Center Access	FWS-DEFL-010	Asphalt	70	0.1	Poor
	Grays Lake NWR	Headquarters Auto Tour Road	FWS-GRLA-010	Gravel	55	0	Good
	Kootenai NWR	Auto Tour Route	FWS-KOOT-010	Asphalt	100	0	Fair
		Auto Tour Route	FWS-KOOT-010	Gravel	100	0	Good
	Minidoka NWR	17-mile Hole Road	FWS-MINI-103	Gravel	65	0.3	Failed
		Bird Island Road	FWS-MINI-100	Gravel	80	0.2	Fair
		Gifford Springs Road	FWS-MINI-105	Gravel	65	0	Good
		North Refuge Road 1	FWS-MINI-106	Gravel	65	0	Failed
		North Refuge Road 1	FWS-MINI-106	Gravel	65	0	Poor
		North Refuge Road 2	FWS-MINI-107	Gravel	65	0	Fair
		North Refuge Road 2	FWS-MINI-107	Gravel	65	0	Poor
		North Refuge Road 2	FWS-MINI-107	Gravel	65	0	Failed
	North Refuge Road 3	FWS-MINI-108	Gravel	65	0	Failed	
Oxford Slough WPA	Entrance Road	FWS-OXSL-010	Gravel	80	0	Good	
Nevada	Sheldon NWR	34A Road	FWS-SHEL-100	Gravel	80	0	Fair
		34A Road	FWS-SHEL-100	Gravel	80	0	Good
		Badger Road	FWS-SHEL-107	Native	80	0.1	Good
		Big Spring Road	FWS-SHEL-102	Gravel	80	0	Fair
		Big Spring Road	FWS-SHEL-102	Gravel	80	0	Good
		IXL Road	FWS-SHEL-101	Native	65	0.1	Poor
		IXL Road	FWS-SHEL-101	Native	65	0.1	Good
		IXL Road	FWS-SHEL-101	Native	65	0.1	Fair
		Sagebrush Creek Road	FWS-SHEL-104	Gravel	80	0.1	Good
		Virgin Valley Road	FWS-SHEL-103	Gravel	100	0.1	Good
		Virgin Valley Road	FWS-SHEL-103	Native	100	0.1	Good

Table 2. Combined SAMMS and RIP Road Data

State	FWS Unit	Route Name	Route ID	Surface	API	FCI	Condition
Nevada	Sheldon NWR	Virgin Valley Road	FWS-SHEL-103	Native	100	0.1	Failed
		Virgin Valley Road	FWS-SHEL-103	Native	100	0.1	Fair
		Virgin Valley Road	FWS-SHEL-103	Native	100	0.1	Poor
Oregon	Ankeny NWR	Office Road	FWS-ANKE-101	Gravel	100	0.1	Good
		Visitor Kiosk Access	FWS-ANKE-100	Gravel	100	0.4	Excellent
	Bandon Marsh NWR	HQ Access Road	FWS-BAMA-010	Asphalt	80	0	Good
	Baskett Slough NWR	Office Access Road	FWS-BASL-100	Gravel	100	0.8	Excellent
	Cape Meares NWR	Cape Meares Lighthouse Drive	FWS-CAME-100	Asphalt	100	0.1	Poor
	Cold Springs NWR	South Auto Tour Loop	FWS-COSP-100	Gravel	65	0	Good
		South Entrance Road	FWS-COSP-010	Gravel	80	0	Good
		Southeast Boat Launch Access	FWS-COSP-102	Gravel	65	0	Good
	Hart Mountain NWR	Bath House Road	FWS-HAMO-200	Gravel	65	0	Good
		Blue Sky Road	FWS-HAMO-100	Native	80	0	Good
		Blue Sky Road	FWS-HAMO-100	Native	80	0	Fair
		Blue Sky Road	FWS-HAMO-100	Gravel	80	0	Good
		Blue Sky Road	FWS-HAMO-100	Native	80	0	Poor
		Flook Lake Road	FWS-HAMO-012	Native	80	0	Failed
		Frenchglenn Road	FWS-HAMO-011	Native	80	0.1	Good
		Frenchglenn Road	FWS-HAMO-011	Native	80	0.1	Fair
		Hot Springs Campground Road	FWS-HAMO-101	Gravel	65	0	Good
		Main Entrance Road	FWS-HAMO-010	Gravel	80	0	Good
		Petroglyph Lake Road	FWS-HAMO-014	Native	65	0.2	Failed
		Poker Jim Road	FWS-HAMO-015	Native	65	0.2	Failed
		Post Meadows Road	FWS-HAMO-019	Native	65	0.3	Failed
		Warner Pond Road	FWS-HAMO-013	Gravel	65	0.2	Failed
	Malheur NWR	Buena Vista Road	FWS-MALH-108	Gravel	100	0	Failed
		Buena Vista Road	FWS-MALH-108	Gravel	100	0	Fair
		Center Patrol Road North	FWS-MALH-106	Gravel	100	0	Good
		Center Patrol Road North	FWS-MALH-106	Gravel	100	0	Poor
		Center Patrol Road North	FWS-MALH-106	Gravel	100	0	Fair
		Center Patrol Road South	FWS-MALH-102	Gravel	100	0	Fair
		Center Patrol Road South	FWS-MALH-102	Gravel	100	0	Good
		Double O Road	FWS-MALH-110	Gravel	65	0	Poor
		Double O Road	FWS-MALH-110	Gravel	65	0	Good
		Double O Road	FWS-MALH-110	Gravel	65	0	Fair
		Headquarters Entrance Road	FWS-MALH-010	Gravel	100	0	Good
Krumbo Reservoir Road		FWS-MALH-104	Gravel	100	0	Good	
Tipton Road	FWS-MALH-116	Native	100	0	Failed		
McKay Creek NWR	Entrance Road/Boat Launch Access	FWS-MCCR-010	Asphalt	100	0	Fair	
	McKay Reservoir Road	FWS-MCCR-100	Asphalt	80	0	Fair	

Table 2. Combined SAMMS and RIP Road Data

State	FWS Unit	Route Name	Route ID	Surface	API	FCI	Condition
Oregon	McKay Creek NWR	McKay Resevior Road	FWS-MCCR-100	Gravel	80	0	Fair
		McKay Resevior Road	FWS-MCCR-100	Gravel	80	0	Good
	Nestucca Bay NWR	Christensen Road	FWS-NEBA-100	Gravel	100	0	Good
	Tualatin River NWR	Refuge Entrance Road	FWS-TURI-010	Gravel	65	0.6	Good
		Wayside Road	FWS-TURI-100	Gravel	65	0	Excellent
	Umatilla NWR	Auto Tour Route	FWS-UMAT-010	Asphalt	80	0.1	Poor
		Auto Tour Route	FWS-UMAT-010	Gravel	80	0.1	Good
		Heritage Trail Road	FWS-UMAT-101	Gravel	65	0.2	Good
		McCormick North Road	FWS-UMAT-103	Gravel	65	0	Fair
		Paterson Slough South Road	FWS-UMAT-105	Gravel	65	0.1	Good
		Paterson Slough South Road	FWS-UMAT-105	Asphalt	65	0.1	Poor
		Paterson Unit Access Road	FWS-UMAT-104	Gravel	80	0.1	Good
		Paterson Unit Access Road	FWS-UMAT-104	Asphalt	80	0.1	Poor
		Ridge Unit Access Road	FWS-UMAT-106	Gravel	65	0	Good
		Visitor Info Access	FWS-UMAT-100	Gravel	65	0	Fair
		Whitcomb East Spur	FWS-UMAT-109	Gravel	65	0	Good
		Whitcomb Island Road	FWS-UMAT-011	Gravel	65	0.1	Good
		Whitcomb Middle Road	FWS-UMAT-108	Gravel	65	0	Good
		Whitcomb West Spur	FWS-UMAT-107	Gravel	65	0	Fair
	William F. Finley NWR	Bruce Road Overlook Access Road	FWS-WIFI-102	Gravel	55	0	Excellent
Finley Refuge Road		FWS-WIFI-010	Gravel	100	0.2	Excellent	
Finley Refuge Road		FWS-WIFI-010	Gravel	100	0.2	Good	
Refuge Office Access		FWS-WIFI-100	Gravel	100	1	Good	
Woodpecker Loop Road		FWS-WIFI-101	Gravel	55	0	Good	
Washington	Columbia NWR	Black Lake Road	FWS-COIA-106	Gravel	80	0.9	Fair
		Blythe Lake Road	FWS-COIA-103	Gravel	100	0.5	Failed
		Hampton Lake Road	FWS-COIA-107	Gravel	80	0.2	Good
		Hutchinson Lake Road	FWS-COIA-105	Gravel	80	0.3	Poor
		Marsh Unit 1 Access	FWS-COIA-100	Gravel	100	0.3	Good
		Marsh Unit 1 Access	FWS-COIA-100	Gravel	100	0.3	Failed
		Morgan Lake Road	FWS-COIA-010	Gravel	80	0.2	Fair
		Morgan Lake Road	FWS-COIA-010	Gravel	80	0.2	Good
		Pillar/Wigeon Road	FWS-COIA-101	Gravel	100	0.8	Failed
		Pillar/Wigeon Road	FWS-COIA-101	Gravel	100	0.8	Good
		Soda Lake Campground Road	FWS-COIA-102	Gravel	100	0.6	Fair
		Solbeck Road	FWS-COIA-104	Gravel	100	0.4	Good
		Teal Lakes Road	FWS-COIA-011	Gravel	80	0	Fair
	Teal Lakes Road	FWS-COIA-011	Gravel	80	0	Good	
	Conboy Lake NWR	Wildlife Refuge Road	FWS-COLA-010	Gravel	70	0	Good
Julia Butler Hanson NWR	Refuge Entrance Road	FWS-JUHA-010	Asphalt	100	0	Fair	

Table 2. Combined SAMMS and RIP Road Data

State	FWS Unit	Route Name	Route ID	Surface	API	FCI	Condition
Washington	Little Pend Oreille NWR	Bear Creek Road	FWS-LIOR-010	Gravel	100	0.2	Good
		Bear Creek Road	FWS-LIOR-010	Gravel	100	0.2	Fair
		Bear Creek Road	FWS-LIOR-010	Gravel	100	0.2	Failed
		Blacktail Mountain Cutoff Road	FWS-LIOR-105	Gravel	100	0	Good
		Blacktail Mountain Road	FWS-LIOR-014	Gravel	100	0.1	Poor
		Blacktail Mountain Road	FWS-LIOR-014	Gravel	100	0.1	Failed
		Blacktail Mountain Road	FWS-LIOR-014	Gravel	100	0.1	Fair
		Blacktail Mountain Road	FWS-LIOR-014	Gravel	100	0.1	Good
		Cedar Creek Road	FWS-LIOR-107	Gravel	100	0.4	Failed
		Cliff Ridge Road	FWS-LIOR-013	Native	100	0.2	Failed
		Headquarters Access	FWS-LIOR-100	Gravel	100	0	Good
		Olson Creek Road	FWS-LIOR-015	Gravel	100	0	Poor
		Olson Creek Road	FWS-LIOR-015	Gravel	100	0	Good
		Olson Creek Road	FWS-LIOR-015	Gravel	100	0	Fair
		Rookery Road	FWS-LIOR-012	Gravel	100	1	Poor
		Rookery Road	FWS-LIOR-012	Gravel	100	1	Failed
		Rookery Road	FWS-LIOR-012	Gravel	100	1	Fair
		Squaw Creek Road	FWS-LIOR-106	Gravel	100	0.2	Good
		Squaw Creek Road	FWS-LIOR-106	Native	100	0.2	Good
		Starvation Flat Road	FWS-LIOR-011	Gravel	100	0	Fair
		Starvation Flat Road	FWS-LIOR-011	Gravel	100	0	Good
		Webb-King Road	FWS-LIOR-104	Gravel	100	0.1	Fair
		Webb-King Road	FWS-LIOR-104	Native	100	0.1	Failed
	Webb-King Road	FWS-LIOR-104	Gravel	100	0.1	Failed	
	McNary NWR	Alfalfa Field Road	FWS-MCNA-122	Gravel	65	0	Good
		Cliff Unit Road	FWS-MCNA-117	Native	55	0.3	Failed
		East Millet Pond Road	FWS-MCNA-118	Gravel	80	0.1	Failed
		Game Dept. Road	FWS-MCNA-014	Gravel	100	0	Good
		Gasline Crossing Spur	FWS-MCNA-116	Native	55	0	Failed
		Hunters Road	FWS-MCNA-101	Gravel	65	0.2	Fair
		Johnson Pond Road	FWS-MCNA-120	Asphalt	80	0.1	Fair
		Lower BR Road	FWS-MCNA-105	Native	65	0	Fair
		Old Bridge Road	FWS-MCNA-123	Gravel	80	0	Fair
		Old Peninsula Highway	FWS-MCNA-112	Asphalt	70	0	Poor
Peninsula Unit Entrance Road		FWS-MCNA-010	Gravel	100	0	Fair	
PSH #3 Road		FWS-MCNA-111	Gravel	70	0.2	Fair	
Pump #2 Road		FWS-MCNA-103	Gravel	55	0	Good	
Quarry East Side Access		FWS-MCNA-110	Gravel	65	0.2	Fair	
Quarry Pond Road		FWS-MCNA-109	Gravel	80	0.2	Fair	
Ranger Road		FWS-MCNA-119	Gravel	65	0.2	Failed	
Twin River Access Main Road		FWS-MCNA-015	Asphalt	100	0	Fair	
Two Rivers Entrance Road	FWS-MCNA-012	Gravel	100	0.1	Fair		
Wallula Unit Road	FWS-MCNA-013	Gravel	100	0	Fair		

Table 2. Combined SAMMS and RIP Road Data

State	FWS Unit	Route Name	Route ID	Surface	API	FCI	Condition
Washington	McNary NWR	Winery Road	FWS-MCNA-100	Gravel	80	0.2	Fair
		Winery Road	FWS-MCNA-100	Native	80	0.2	Fair
	Nisqually NFH	Brown Farm Road	FWS-NISQ-010	Asphalt	100	0	Fair
	Ridgefield NWR	Auto Tour Route	FWS-RIDG-010	Gravel	100	0	Fair
		Auto Tour Route	FWS-RIDG-010	Gravel	100	0	Good
		Carty Unit Access Road	FWS-RIDG-100	Gravel	100	0	Good
	Saddle Mountain NWR	Wahluke South Road - South Access	FWS-SAMO-010	Gravel	100	0.1	Good
		WB-10 Road	FWS-SAMO-105	Native	100	0	Poor
		WB-10 Road	FWS-SAMO-105	Asphalt	100	0	Poor
		WB-10 Road	FWS-SAMO-105	Gravel	100	0	Failed
		White Bluffs Ferry Road	FWS-SAMO-104	Gravel	100	0.1	Good
		White Bluffs Ferry Road	FWS-SAMO-104	Asphalt	100	0.1	Poor
	Toppenish NWR	Headquarters Road	FWS-TOPP-010	Gravel	100	0	Good
	Turnbull NWR	Pine Creek Auto Tour Route	FWS-TURN-011	Asphalt	55	0	Fair
		Pine Creek Auto Tour Route	FWS-TURN-011	Gravel	55	0	Good
		Refuge Entrance Road	FWS-TURN-010	Gravel	90	0	Good
		Refuge Entrance Road	FWS-TURN-010	Asphalt	90	0	Fair

Source: RIP, Cycle 4 (2009); SAMMS (2008)

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Ankeny NWR	Buena Vista Road South Parking	Gravel	70	n/a	Fair
	Restroom Parking	Gravel	100	n/a	Good
	Pintail Boardwalk Parking	Gravel	100	n/a	Good
	Field Five Parking	Gravel	55	0.07	Good
	Wintel Trailhead Parking	Gravel	100	n/a	Good
	Buena Vista Road North Parking	Gravel	70	n/a	Fair
	Sidney Road South Parking	Gravel	70	n/a	Good
	Wintel Road Middle Parking	Gravel	70	n/a	Good
	Eagle Marsh HC Parking	Concrete	n/a	n/a	Good
	Eagle Marsh Parking	Gravel	100	n/a	Fair
	Pintail Marsh Parking	Gravel	100	n/a	Excellent
	Buena Vista Road Middle Parking	Gravel	70	0.07	Fair
	Mohoff Parking	Gravel	80	0.07	Fair
	Wintel Road East Parking	Gravel	70	0.07	Good
	Wood Duck Pond Parking	Gravel	70	n/a	Excellent
Sidney Road North Parking	Gravel	70	0.07	Fair	
Bandon Marsh NWR	Bandon Marsh Overlook Parking	Asphalt	65	n/a	Good
	Ni Lestum Parking	Asphalt	65	n/a	Excellent
	HQ/Residence Parking	Asphalt	70	n/a	Excellent
	Office/Service Parking	Gravel	100	n/a	Excellent
	Taverner’s Marsh Parking	Gravel	80	0.01	Good
	Coville Road West Parking	Gravel	80	0.02	Good
	Coville Road East Parking	Gravel	30	0.12	Poor
	Smithfield Wildlife Viewing Pull-out	Gravel	100	n/a	Excellent
	Visitor Kiosk and Restroom Parking	Gravel	100	n/a	Good
	Visitor Kiosk/Restroom HC Parking	Gravel	100	n/a	Excellent
	Morgan Lake Trailhead Parking	Gravel	100	n/a	Excellent
	Baskett Butte Trailhead Parking	Gravel	100	n/a	Excellent
Bear Lake NWR	West Rainbow Pullout North	Gravel	30	0.24	Failed
	Restroom Parking	Native	55	n/a	Fair
	Paris Dike Parking	Gravel	55	n/a	Fair
	West Rainbow Pullout South	Gravel	30	n/a	Failed
	Rainbow Boat Launch East	Gravel	n/a	n/a	Poor
	Rainbow Boat Launch West	Gravel	n/a	n/a	Fair
	Rainbow Hunting Blind Paking	Gravel	n/a	n/a	Fair
	Rainbow Canoe Trail Launch	Gravel	n/a	n/a	Fair
	Paris Dike Boat Trailer Parking	Gravel	n/a	n/a	Fair
	West Rainbow Parking	Gravel	80	n/a	Fair
	Rainbow Trailhead Parking	Gravel	n/a	n/a	Fair
Camas NWR	North Headquarters Hunter Access	Gravel	n/a	n/a	Fair
	Visitor Parking	Asphalt	55	n/a	Good
Cold Springs NWR	Auto Tour Parking #1	Gravel	55	0.07	Fair

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Cold Springs NWR	Auto Tour Parking #2	Gravel	55	0.07	Fair
	South End Dam Parking	Gravel	55	0.07	Fair
	South End Parking	Gravel	55	0.07	Fair
	Southeast Boat Launch	Gravel	n/a	n/a	Good
Columbia NWR	North Teal Lake Parking	Gravel	55	0.12	Fair
	Potholes Canal Parking	Gravel	55	n/a	Fair
	Pillar/Wigeon Parking	Gravel	55	0.12	Fair
	O'Sullivan Dam Parking	Gravel	55	0.07	Poor
	Soda Lake Campground Parking	Gravel	55	0.07	Good
	Soda Lake Campground Restroom/Overflow Parking	Gravel	55	0.07	Fair
	McManamon Lake Parking	Gravel	55	0.07	Fair
	Maintenance Area Parking	Gravel	55	0.07	Fair
	Frog Lake Trail Parking	Gravel	55	0.07	Fair
	Drunheller Interpretive Site	Gravel	55	n/a	Fair
	Hampton Lake Parking	Gravel	55	n/a	Fair
	March Unit 1 Parking	Gravel	55	n/a	Fair
	South Teal Lake Parking	Gravel	55	n/a	Fair
	Bobcat/Coyote Lake Parking	Gravel	55	n/a	Good
	Halfmoon Lake Parking	Gravel	55	n/a	Good
	Crab Creek Parking	Gravel	55	n/a	Poor
	Lower Crab Creek Trail Parking	Gravel	55	n/a	Fair
	Soda Lake Campground Boat Launch	Gravel	65	0.85	Good
	Black Lake Parking	Gravel	65	0.98	Good
	Blythe Lake Parking	Gravel	65	0.93	Fair
	Corfu Parking	Native	55	0.25	Fair
	Soda Lake Boat Ramp	Gravel	65	0.85	Fair
	Hutchinson Lake Parking	Gravel	55	1.00	Poor
Hampton Lake Trailer Parking	Gravel	55	0.79	Fair	
Deer Flat NWR	Lake Shore Drive Parking #2	Asphalt	30	0.48	Excellent
	Lake Shore Drive Parking #1	Asphalt	30	0.48	Good
	Upper Dam West Parking	Asphalt	55	n/a	Good
	Lake Shore Drive Parking #6	Asphalt	30	0.48	Good
	Gott's Point Parking #1	Gravel	30	n/a	Poor
	Lower Dam Beach Parking	Asphalt	30	0.02	Good
	Lower Dam Boat Ramp Parking	Asphalt	30	0.02	Good
	Iowa Ave Parking #1	Asphalt	30	0.07	Good
	Iowa Ave Parking #2	Asphalt	30	0.07	Good
	Gott's Point Parking #2	Gravel	30	0.07	Poor
	Lake Shore Drive Parking #8	Native	n/a	n/a	Fair
	Tio Lane Parking	Asphalt	45	0.12	Good
	Visitor Center Parking	Asphalt	100	0.11	Fair
	Upper Dam East Parking	Asphalt	55	0.02	Good

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Deer Flat NWR	Lake Shore Drive Parking #5	Asphalt	30	0.48	Excellent
	Lake Shore Drive Parking #4	Asphalt	30	0.48	Excellent
	Lake Shore Drive Parking #7	Asphalt	30	0.48	Good
	Lake Shore Drive Parking #3	Asphalt	30	0.48	Excellent
	Lower Dam Picnic Area Parking	Gravel	30	0.07	Good
Grays Harbor NWR	Refuge Parking	Asphalt	65	0.80	Fair
Grays Lake NWR	Headquarters Parking	Gravel	70	0.07	Good
	Bear Island Parking	Native	45	0.12	Poor
Hanalei NWR	Hanalei River Bridge Pull off	Asphalt	45	0.10	Poor
	Temple Parking	Gravel	45	0.13	Poor
	Hanalei Overlook Parking	Asphalt	30	n/a	Good
Hart Mountain NAR	Warner Pond Parking Area	Gravel	55	n/a	Fair
	Campbell Lake Overlook Parking Area	Gravel	55	n/a	Poor
	CCC Campground Parking	Gravel	n/a	n/a	Good
	Lookout Point Overlook Parking Area	Native	50	0.18	Fair
	Visitor Parking Area	Gravel	50	0.07	Good
	Warner Valley Overlook Parking Area	Gravel	50	0.07	Fair
Julia Butler Hansen Refuge	Wildlife Viewing Site Parking	Asphalt	70	n/a	Good
	Center Rd Parking	Gravel	n/a	n/a	Poor
	Headquarters Parking	Asphalt	100	n/a	Good
Kealia Pond NWR	Staff Parking	Asphalt	50	n/a	Excellent
	Office Parking	Asphalt	100	n/a	Excellent
	Bus Turnaround	Asphalt	100	n/a	Excellent
Kilauea Point NWR	Kilauea Lighthouse Lower Parking	Asphalt	90	n/a	Good
	Kilauea Lighthouse Overflow Parking	Gravel	90	n/a	Good
	Kilauea Lighthouse Upper Parking	Asphalt	90	n/a	Good
	Overlook Parking	Asphalt	90	n/a	Good
Kootenai NWR	Island Trail Handicapped Parking	Asphalt	100	0.06	Fair
	Office Parking	Asphalt	100	n/a	Good
	Environmental Education Parking Lot	Asphalt	100	n/a	Good
	Forest Trail Parking	Gravel	100	n/a	Good
	CR 13 North Pullout	Gravel	n/a	n/a	Fair
	Friends Parking Lot	Gravel	n/a	n/a	Good
	CR 13 View Parking Lot	Gravel	n/a	n/a	Fair
	South Pond Parking	Gravel	100	0.07	Good
	East Day Use Parking	Gravel	100	0.07	Good
	Cascade Pond Overlook	Gravel	70	n/a	Fair
	Island Trail Parking	Gravel	100	0.06	Fair
	Island Pond Overlook	Gravel	70	n/a	Fair

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Kootenai NWR	Headquarter Overflow Parking	Asphalt	100	n/a	Excellent
	ADA Myrtle Falls Parking Lot	Asphalt	100	n/a	Good
Little Pend Oreille NWR	Headquarters Visitor Information Parking	Gravel	100	n/a	Good
	Headquarters Parking	Gravel	100	n/a	Fair
	Potter's Pond Parking	Native	n/a	n/a	Poor
	McDowell Lake Overlook	Native	80	n/a	Poor
	Bayley Lake Parking	Gravel	n/a	n/a	Good
	Bear Creek Campground Parking	Native	80	0.12	Fair
Malheur NWR	Swan Pond Parking Area	Gravel	n/a	n/a	Good
	Visitor Headquarters Overflow Parking Area	Gravel	n/a	n/a	Fair
	Crane Pond Overlook Trail Parking	Gravel	n/a	n/a	Good
	Brenton Cabin Parking Lot	Gravel	n/a	n/a	Good
	East Canal Entrance Parking	Gravel	n/a	n/a	Fair
	Buena Vista Parking Area	Gravel	65	n/a	Fair
	Visitor Parking Area	Gravel	65	0.07	Good
	Krumbo Reservoir Parking Area	Gravel	65	0.07	Good
	P-Ranch Parking Area	Gravel	100	n/a	Good
	Krumbo Reservoir Boat Ramp Parking Area	Asphalt	65	n/a	Good
	Sodhouse Ranch Parking Area	Gravel	100	0.18	Good
	North Saddle Butte Parking Area	Native	100	0.10	Failed
	Narrows Parking Area	Native	100	0.18	Failed
	Opie Public Access Parking	Native	100	0.18	Failed
	Benson Pond Parking Area	Gravel	100	n/a	Good
Visitor Handicap Parking Area	Asphalt	65	n/a	Good	
McKay Creek NWR	McKay Reservoir Parking #1	Gravel	55	0.05	Fair
	McKay Reservoir Parking #4	Gravel	55	0.07	Good
	McKay Reservoir Parking #3	Gravel	55	0.07	Good
	McKay Reservoir Parking #2	Gravel	55	0.07	Good
	Shaw Road Parking #2	Gravel	55	0.07	Fair
	McKay Reservoir Parking #5	Gravel	55	0.07	Fair
	Shaw Road Parking #1	Gravel	55	0.06	Fair
	McKay Reservoir Boat Launch	Gravel	n/a	n/a	Good
	McKay Reservoir Parking #7	Gravel	55	0.05	Fair
	McKay Reservoir Parking #6	Gravel	55	1.00	Fair
	McKay Reservoir Parking #8	Gravel	55	n/a	Fair
	McKay Reservoir Dam Boat Launch	Gravel	55	n/a	Good
McNary NWR	Ranger Road Parking	Native	55	0.25	Failed
	Wallula Road Parking #1	Gravel	55	0.07	Fair
	Madame Dorian Parking	Gravel	n/a	n/a	Good
	Madame Dorian Restroom Parking	Gravel	n/a	n/a	Good
	Walla Walla River Fishing Access	Gravel	n/a	n/a	Good

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
McNary NWR	Quarry Pond Parking #2	Gravel	65	0.06	Fair
	Burbank Slough Parking	Gravel	n/a	0.97	Fair
	White-Tail Bay Parking	Gravel	55	n/a	Fair
	Dog Trial Parking	Native	40	0.44	Failed
	Two Rivers Primitive Parking	Gravel	40	0.25	Fair
	Wallula Road Parking #3	Gravel	55	n/a	Good
	Juniper Canyon Parking Lot	Gravel	n/a	n/a	Fair
	Casey Pond Parking	Gravel	65	0.10	Good
	Hunters Road Parking #2	Gravel	55	0.07	Fair
	Johnson's Pond Parking	Native	55	n/a	Poor
	Madame Dorian Boat Launch	Gravel	n/a	n/a	Good
	Casey Pond Boat Launching and Parking	Gravel	65	0.10	Good
	Quarry Pond Handicapped Parking	Concrete	n/a	n/a	Good
	Quarry Pond Parking #1	Gravel	55	n/a	Fair
	Ivarson Road Parking	Gravel	55	n/a	Fair
	Humorist Road Parking #1	Gravel	55	n/a	Fair
	Game Dept. Parking #2	Gravel	55	n/a	Fair
	East Millet Pond Parking	Gravel	55	n/a	Good
	Game Dept. Parking #1	Gravel	55	n/a	Good
	Headquarters Parking	Gravel	55	n/a	Good
	Madame Dorian Monument Parking	Gravel	n/a	n/a	Good
	Wallula Road Parking #2	Gravel	55	n/a	Good
	Game Dept. Parking #3	Gravel	n/a	n/a	Good
	Hunters Road Parking #1	Gravel	55	0.07	Fair
	Game Dept. Parking #5	Gravel	n/a	n/a	Good
	Wallula Road Handicapped Parking	Concrete	55	0.07	Excellent
	Old Peninsula Parking	Gravel	n/a	n/a	Fair
	Game Dept. Parking #4	Gravel	n/a	n/a	Good
Humorist Road Parking #2	Gravel	55	0.02	Fair	
Humorist Road Parking #3	Asphalt	55	0.02	Good	
Minidoka NWR	Office Parking	Gravel	65	0.07	Good
	Gifford Springs Parking	Native	65	0.12	Good
Nisqually NWR	Visitor Parking East	Asphalt	55	n/a	Good
	Visitor Parking West	Asphalt	55	n/a	Good
Oregon Islands NWR	HQ Parking	Asphalt	70	n/a	Excellent
	Coquille Point Parking	Asphalt	65	1.00	Good
Ridgefield NWR	Carty Unit Parking	Gravel	65	1.00	Fair
	River S Observation Parking	Concrete	65	n/a	Good
	River S Unit Main Parking	Gravel	65	0.07	Fair
	Headquarters Handicapped Parking	Concrete	65	n/a	Good
	Kiwa Trailhead Parking	Gravel	65	n/a	Fair
	Ridgeport Dairy Unit Parking #1	Asphalt	45	0.07	Good
	Headquarters Parking	Gravel	65	n/a	Good

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Saddle Mountain NWR	Wahluke North Parking	Gravel	n/a	n/a	Poor
	Parking Lot #2	Gravel	45	0.43	Good
	Parking Lot #3	Gravel	30	0.07	Fair
	Dog Trial Parking	Asphalt	n/a	n/a	Poor
	Parking Lot #7 and Boat Launch	Gravel	45	0.21	Fair
	Parking Lot #5	Gravel	n/a	1.00	Fair
	White Bluffs Landing Parking #2	Gravel	55	0.05	Good
	White Bluffs Landing Parking #1	Gravel	55	0.05	Good
	Parking Lot #8	Native	n/a	0.99	Fair
	Wahluke South Road - North Access	Native	n/a	n/a	Good
	Parking Lot #4	Gravel	45	0.12	Poor
	Parking Lot #1	Gravel	45	0.06	Fair
	Old Turret Site Parking	Asphalt	n/a	n/a	Fair
Sheldon NWR	Virgin Valley Parking	Gravel	n/a	n/a	Good
	Headquarters Parking	Gravel	n/a	n/a	Good
	8A Information Kiosk Parking	Gravel	n/a	n/a	Good
	34A Kiosk Parking	Gravel	n/a	n/a	Good
	Hwy 140 Kiosk Parking	Gravel	n/a	n/a	Good
	South 8A Kiosk Parking	Native	n/a	n/a	Fair
	Big Spring Boat Ramp Parking Area	Gravel	80	0.06	Good
Toppenish NWR	Headquarters Parking	Gravel	55	n/a	Good
	Visitor Contact Parking	Gravel	65	0.07	Good
	Visitor Contact Handicapped Parking	Concrete	65	0.07	Good
	Pumphouse Road Parking	Gravel	55	0.07	Fair
Tualatin River NWR	Headquarters Parking	Gravel	n/a	n/a	Excellent
	Disabled Parking	Concrete	n/a	n/a	Excellent
	Wayside Parking	Gravel	65	n/a	Excellent
Turnbull NWR	Kepple Peninsula Parking	Asphalt	n/a	n/a	Excellent
	Main Entrance Parking Lot	Asphalt	n/a	n/a	Good
	Kepple Lake Parking	Gravel	45	0.04	Good
	Restroom Parking	Asphalt	45	n/a	Excellent
	30 Acre Lake Trailhead Parking	Gravel	45	0.07	Good
	Blackhorse Lake Boardwalk Parking	Asphalt	45	n/a	Excellent
	Beaver Pond Trailhead Parking	Gravel	55	0.07	Fair
	Fee Station Parking	Gravel	65	0.07	Fair
	Headquarters Bus Parking	Asphalt	65	n/a	Good
	Headquarters Parking	Asphalt	65	n/a	Good
	Black Horse Restroom Parking Lot	Asphalt	n/a	n/a	Excellent
Umatilla NWR	Dike Parking	Gravel	55	n/a	Fair
	Whitcomb Parking #2	Gravel	55	n/a	Good
	Whitcomb Parking #3	Gravel	55	n/a	Fair
	Whitcomb Parking #7	Gravel	55	n/a	Fair

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
Umatilla NWR	Paterson Slough Parking #6	Native	55	n/a	Fair
	Parking Lot C	Gravel	55	n/a	Good
	Parking Lot E	Gravel	55	n/a	Good
	Ridge Unit Info East Parking	Gravel	55	n/a	Good
	Ridge Unit Info West Parking	Gravel	55	n/a	Good
	Paterson Slough Parking #5	Gravel	55	n/a	Fair
	Paterson Slough Boat Launch	Gravel	n/a	n/a	Fair
	Whitcomb Parking #1	Gravel	55	n/a	Good
	Whitcomb Parking #5	Gravel	55	n/a	Excellent
	Whitcomb Unit Information Parking	Gravel	55	n/a	Good
	Restroom Parking	Gravel	55	0.07	Good
	Parking Lot G	Gravel	55	0.08	Fair
	Visitor Information Parking	Gravel	55	0.08	Fair
	Whitcomb Parking #4	Gravel	55	0.24	Good
	Observation Deck Parking	Concrete	65	n/a	Good
	Visitor Information Handicapped Parking	Concrete	65	0.06	Good
	Ridge Unit Parking #2	Gravel	55	n/a	Good
	Paterson Slough Parking #3	Gravel	55	n/a	Fair
	Paterson Slough Parking #2	Gravel	55	n/a	Fair
	Paterson Slough Parking #1	Gravel	55	n/a	Fair
	Parking Lot D	Gravel	55	n/a	Fair
	Parking Lot B	Gravel	55	n/a	Fair
	Overlook Parking	Gravel	55	n/a	Fair
	Whitcomb Parking #6	Gravel	55	n/a	Excellent
Whitcomb Parking #8	Gravel	55	n/a	Good	
Paterson Slough Parking #4	Gravel	55	n/a	Fair	
Willapa NWR	Headquarters Parking	Asphalt	70	n/a	Good
	Leadbetter Unit Parking	Asphalt	n/a	n/a	Good
	Bear River Interpretive Site Parking	Gravel	55	1.00	Good
	Teal Slough Parking 1	Gravel	n/a	n/a	Fair
	Boat Launch	Asphalt	70	n/a	Good
	Riekkola Parking	Native	80	0.76	Poor
	Lewis Unit Parking	Gravel	80	0.83	Poor
	Photo Blind Parking	Gravel	n/a	n/a	Fair
William L Finley NWR	Vehicle Turnout at Turtle Flats (West)	Gravel	55	n/a	Good
	Bruce Road Overlook Parking	Gravel	55	n/a	Good
	Refuge Office Parking	Gravel	70	0.81	Excellent
	Hunter Parking		n/a	n/a	
	Restroom Parking		n/a	n/a	
	Feichter House Parking	Gravel	55	0.07	Good
	Mill Hill Trail HC Parking	Concrete	n/a	n/a	Excellent
	McFadden Marsh Observation Blind Parking	Gravel	55	n/a	Excellent
	Vehicle Turnout at Bellfountain Entrance	Gravel	n/a	n/a	Good

Table 3. RIP and SAMMS Parking Lot Data by Unit

FWS Unit	Name	Surface	API	FCI	Condition
William L Finley NWR	Parking Lot #1	Gravel	n/a	n/a	Good
	Snag Boat Bend HC Parking South	Concrete	n/a	n/a	Excellent
	Snag Boat Bend HC Parking North	Concrete	n/a	n/a	Excellent
	Refuge Office Parking - Handicap	Concrete	n/a	n/a	Excellent
	McFadden Marsh East Parking Lot	Gravel	55	n/a	Good
	Field #4 Turnout	Gravel	55	n/a	Excellent
	Turtle Flats East	Gravel	55	n/a	Good
	McFadden Marsh West Parking Lot	Gravel	55	n/a	Excellent
	Pigeon Butte Trail Parking	Gravel	55	n/a	Excellent
	Woodpecker Loop Parking	Gravel	55	n/a	Excellent
	Cheadle Marsh Parking	Gravel	55	n/a	Good
	Mill Hill Trail Parking	Gravel	55	n/a	Good
	Snag Boat bend Parking	Gravel	55	n/a	Good
	Field #22 Vehicle Turnout	Gravel	55	n/a	Excellent

Source: RIP, Cycle 4 (2009). SAMMS (2008)

Table 4. Combined SAMMS and RIP FWS Trail Data

	Asset ID	Service Unit	Name	Surface	Condition	API	FCI
Hawaii	10044595	Kilauea Point NWR	Kilauea Lighthouse Trail	Paved	Good	70	0
	10053554	Kilauea Point NWR	Kilauea Lighthouse Trail	Paved	Good	100	0.97
	10053555	Kilauea Point NWR	Kilauea Lighthouse Trail	Paved	Good	100	0
	10053556	Kilauea Point NWR	Kilauea Lighthouse Trail	Paved	Good	45	0.81
	10002234	Hanalei NWR	Okolehao Trail	Unpaved	Excellent	45	0.71
Idaho	10051579	Camas NWR	Birding Trail	Unpaved	Excellent	55	0
	10005470	Kootenai NWR	Chickadee Trail	Paved	Excellent	100	0
	10036379	Kootenai NWR	Deep Creek Trail	Unpaved	Not Rated	100	0.11
	N/A	Deer Flat NRW	East Shoreline Trail	Unpaved	Not Rated	0	0
	10036378	Kootenai NWR	Forest Trail	Unpaved	Excellent	0	0
	10036380	Kootenai NWR	Island Pond Trail	Unpaved	Excellent	100	0
	N/A	Minidoka NWR	Lakeview Trail	Unpaved	Excellent	0	0
	10050209	Kooskia NFH	Mill Pond Trail	Unpaved	Excellent	0	0
	10005460	Kootenai NWR	Murtle Falls Trail	Paved	Excellent	100	0
	1005383	Deer Flat NRW	Nature Trail	Unpaved	Excellent	0	0
	N/A	Bear Lake NWR	Rainbow Hunting Blind Trail	Unpaved	Excellent	0	0
	10053268	Bear Lake NWR	Rainbow Trail	Unpaved	Excellent	80	0
	10047348	Camas NWR	Wildlife Viewing Trail	Paved	Excellent	55	0
Nevada	10036941	Pahranagat NWR	North Marsh Dike Trail	Unpaved	Excellent	0	0
	10036941	Pahranagat NWR	Upper Lake Trail	Unpaved	Not Rated	0	0
Oregon	10039507	Ankeny NWR	Ankeny Hill Overlook Trail	Unpaved	Excellent	100	0
	10040550	Malheur NWR	Barns Springs Footpath	Paved	Not Rated	0	0
	10040550	Malheur NWR	Barns Springs Footpath	Unpaved	Not Rated	0	0
	10004448	William L. Finley NWR	Beaver Pond Trail	Unpaved	Very Poor	55	0.57
	10004085	Malheur NWR	Benson Pond Trail	Unpaved	Excellent		
	N/A	Bandon Marsh NWR	Boardwalk Trail	Unpaved	Excellent		
	N/A	Malheur NWR	Buena Vista Overlook Trail	Unpaved	Excellent		
	10048207	William L. Finley NWR	Cabell Marsh Overlook Trail	Unpaved	Excellent	55	
	10004445	William L. Finley NWR	Cabell Marsh Trail	Unpaved	Not Rated	55	0.27
	N/A	Umatilla NWR	Callows Overlook Trail	Paved	Excellent		
	10004516	Cape Meares NWR	Cape Meares Scenic Trail	Unpaved	Good	65	
	10004451	William L. Finley NWR	Cattail Pond Trail	Unpaved	Very Poor	55	
	10054803	Tualatin River NWR	Centennial Trail	Unpaved	Excellent	65	
	10004568	Oregon Islands NWR	Coquille Point Trail	Unpaved	Excellent	55	
	10004569	Oregon Islands NWR	Coquille Point Trail	Unpaved	Excellent	55	0.83
10004573	Oregon Islands NWR	Coquille Point Trail	Unpaved	Excellent	55		

Table 4. Combined SAMMS and RIP FWS Trail Data

	Asset ID	Service Unit	Name	Surface	Condition	API	FCI
Oregon	N/A	Malheur NWR	Crane Pond Overlook trail	Unpaved	Excellent		
	10048577	William L. Finley NWR	Dike Trail	Unpaved	Excellent		
	10041329	Malheur NWR	East Canal Trail	Unpaved	Not Rated		
	N/A	William L. Finley NWR	Finley Prairie Boardwalk Trail	Unpaved	Excellent		
	N/A	Warm Springs NFH	Fish Tanks Trail	Unpaved	Not Rated		
	10037672	Malheur NWR	Headquarters Overlook Trail	Unpaved	Excellent	65	
	N/A	Warm Springs NFH	Holding Ponds Observation Trail	Unpaved	Excellent		
	N/A	Baskett Slough NWR	Inter-tie Trail	Unpaved	Excellent		
	10048902	William L. Finley NWR	Inter-Tie Trail	Unpaved	Excellent	55	0.83
	10003359	McNary NWR	Juniper Canyon Trail	Unpaved	Excellent		
	N/A	McNary NWR	Juniper Canyon Trail	Unpaved	Excellent		
	N/A	Umatilla NWR	Kathy's Pond Trail	Paved	Fair		
	N/A	Malheur NWR	Long Barn Trail	Unpaved	Not Rated		
	10054803	Tualatin River NWR	Main Trail	Unpaved	Excellent	65	
	10048201	William L. Finley NWR	McFadden Marsh Observation Blind Trail	Unpaved	Excellent	55	
	N/A	Cold Springs NWR	Memorial Marsh Trail	Unpaved	Excellent		
	N/A	William L. Finley NWR	Mid Refuge Connection Trail	Unpaved	Not Rated		
	10004446	William L. Finley NWR	Mill Hill Trail	Unpaved	Excellent	55	0.39
	10004363	Baskett Slough NWR	Moffiti Marsh Trail	Unpaved	Not Rated		
	10004373	Baskett Slough NWR	Morgan Lake Trail	Unpaved	Excellent	100	0.14
	N/A	Umatilla NWR	Morrow County Heritage Trail	Paved	Not Rated		
	10004454	William L. Finley NWR	Pigeon Butte Trail	Unpaved	Not Rated	55	0.66
	10039128	Ankeny NWR	Pintail/Egret Marsh Trail	Unpaved	Excellent		
	10004399	Ankeny NWR	Rail Trail Loop	Unpaved	Excellent		
	10039518	Ankeny NWR	Rail Trail Loop	Unpaved	Excellent	100	
	10004373	Baskett Slough NWR	Rich Guadagno Memorial Trail	Unpaved	Excellent	100	0.14
	N/A	Malheur NWR	River Trail	Unpaved	Not Rated		
	10004608	Tualatin River NWR	Seasonal Trail	Unpaved	Not Rated		
	10048577	William L. Finley NWR	Snag Boat Bend Lake Creek Trail	Unpaved	Very Poor		
	10048577	William L. Finley NWR	Snag Boat Boardwalk Trail	Unpaved	Excellent		
	N/A	Malheur NWR	Sod House Ranch Trail	Unpaved	Good		
	10003759	Julia Butler Hansen Refuge for the Columbian White-tailed Deer	Tenasillahe Island Trail	Unpaved	Not Rated		
	10041830	Nestucca Bay NWR	Tsunami Escape Route	Paved	Excellent	50	0.45
10041830	Nestucca Bay NWR	Tsunami Escape Route	Unpaved	Excellent	50	0.45	

Table 4. Combined SAMMS and RIP FWS Trail Data

	Asset ID	Service Unit	Name	Surface	Condition	API	FCI
Oregon	10048906	William L. Finley NWR	Turtle Flats Walkway Trail	Unpaved	Excellent	55	
	10048577	William L. Finley NWR	Turtle loop Trail	Unpaved	Excellent		
	N/A	Umatilla NWR	Umatilla Heritage Spur Trail	Unpaved	Not Rated		
	10057111	Hart Mountain National Antelope Refuge	Warner Valley Overlook	Unpaved	Excellent	55	0.19
	10057111	Hart Mountain National Antelope Refuge	Warner Valley Overlook 2	Unpaved	Excellent	55	0.19
	10054803	Tualatin River NWR	Wayside Trail	Unpaved	Excellent	65	
	10004491	William L. Finley NWR	Woodpecker Trail	Unpaved	Excellent	70	0.93
Washington	10036009	Turnbull NWR	30-Acre Lake Hiking Trail	Unpaved	Not Rated	55	0.04
	10003492	Nisqually NWR	Bank Fishing Trail	Unpaved	Excellent	55	
	10003747	Willapa NWR	Bearberry Trail	Unpaved	Fair	65	0.07
	N/A	Turnbull NWR	Blackhorse Lake Boardwalk	Unpaved	Excellent		
	10036009	Turnbull NWR	Blackhorse Lake Hiking Trail	Unpaved	Excellent	55	0.04
	10036009	Turnbull NWR	Blackhorse Lake Woodchip Trail	Unpaved	Excellent	55	0.04
	10036009	Turnbull NWR	Bluebird Trail	Unpaved	Not Rated	55	0.04
	N/A	Little White Salmon NFH	Bluff Fishing Area	Unpaved	Excellent		
	N/A	Little White Salmon NFH	Boat Storage Area	Unpaved	Excellent		
	10003484	Nisqually NWR	Brown Farm Dike Trail	Unpaved	Excellent		
	10051070	McNary NWR	Burbank Slough Wildlife Trail	Unpaved	Excellent		
	10051071	McNary NWR	Burbank Slough Wildlife Trail	Unpaved	Excellent		
	10051076	McNary NWR	Burbank Slough Wildlife Trail	Unpaved	Excellent		
	N/A	McNary NWR	Burbank Slough Wildlife Trail	Unpaved	Excellent		
	10003687	Willapa NWR	Center Road Trail	Unpaved	Excellent		
	10003245	Columbia NWR	Coyote Lake Trail	Unpaved	Excellent		
	N/A	Columbia NWR	Coyote Lake Trail	Unpaved	Excellent		
	10003122	Columbia NWR	Crab Creek Trail	Unpaved	Excellent	55	0.1
	10002862	Winthrop NFH	Dike Trail	Unpaved	Not Rated		
	10042349	Willapa NWR	Don Bonker Trail	Unpaved	Excellent	80	0.85
	N/A	Toppenish NWR	East Wildlife Foot Trail	Unpaved	Excellent		
	10003122	Columbia NWR	Frog Lake Trail	Unpaved	Excellent	55	0.1
	N/A	Columbia NWR	Half Moon Lake Trail	Unpaved	Excellent		
	N/A	Toppenish NWR	Handicapped Access Road	Unpaved	Excellent		
	N/A	Little Pend Oreille NWR	Headquarters Pond Trail	Unpaved	Excellent		
	10036009	Turnbull NWR	Headquarters Trail	Unpaved	Not Rated	55	0.04
	10003688	Willapa NWR	High Point Trail	Unpaved	Excellent	100	

Table 4. Combined SAMMS and RIP FWS Trail Data

	Asset ID	Service Unit	Name	Surface	Condition	API	FCI
Washington	N/A	Little White Salmon NFH	Highway Bridge Area	Unpaved	Excellent		
	10003565	Dungeness NWR	Horse Trail	Unpaved	Excellent	50	0.86
	10048256	Leavenworth NFH	Icicle Creek Nature Trail	Paved	Excellent		
	10048256	Leavenworth NFH	Icicle Creek Nature Trail	Unpaved	Excellent		
	10036009	Turnbull NWR	Kepple Lake Lookout Trail	Unpaved	Excellent	55	0.04
	10054711	Turnbull NWR	Kepple Peninsula Trail	Unpaved	Excellent	45	
	10003659	Ridgefield NWR	Kiwa Trail	Unpaved	Excellent	65	
	10054989	Columbia NWR	Lake Marie Trail	Unpaved	Not Rated		
	10003746	Willapa NWR	Leadbetter Bay Loop Trail	Unpaved	Excellent	65	
	10003671	Willapa NWR	Lewis Cross Dike Trail	Unpaved	Not Rated		
	10003670	Willapa NWR	Lewis Dike Trail	Unpaved	Not Rated		
	10003432	Toppenish NWR	Lookout Trail	Paved	Excellent	65	
	10003761	Julia Butler Hansen Refuge for the Columbian White-tailed Deer	Mainland Center Road	Unpaved	Not Rated		
	10003122	Columbia NWR	Marsh Loop Trail	Unpaved	Excellent	55	0.1
	N/A	Columbia NWR	Marsh Unit 1 Trail	Unpaved	Excellent		
	10003523	San Juan Islands NWR	Matia Island Trail	Paved	Excellent	80	
	10003523	San Juan Islands NWR	Matia Island Trail	Unpaved	Excellent	80	
	10048901	Nisqually NWR	McAllister Cross Dike Trail	Unpaved	Excellent	0	
	10055852	Little Pend Oreille NWR	Mcmeet Trail	Unpaved	Excellent	55	
	N/A	Little Pend Oreille NWR	Mill Butte Trail	Unpaved	Excellent		
	10051063	McNary NWR	Millet Pond Trail	Unpaved	Excellent		
	N/A	McNary NWR	Millet Pond Trail	Unpaved	Excellent		
	10003687	Willapa NWR	No Name Trail	Unpaved	Excellent		
	10003599	Ridgefield NWR	Oaks to Wetland Trail	Unpaved	Excellent		
	10003625	Ridgefield NWR	Observation Blind Trail	Paved	Good	65	
	N/A	Little Pend Oreille NWR	Old Timer's Horse Trail	Unpaved	Excellent		
	10003692	Willapa NWR	Paradise Point Spur Trail	Unpaved	Excellent	80	
	10003691	Willapa NWR	Paradise Point Trail	Unpaved	Good	80	0.01
	10003695	Willapa NWR	Paradise Point Trail	Unpaved	Good	100	
	N/A	Umatilla NWR	Paterson Old Road	Paved	Excellent		
	N/A	Umatilla NWR	Paterson Old Road	Unpaved	Excellent		
	10003361	McNary NWR	Peninsula Hiking Trail	Unpaved	Not Rated		
	10003364	McNary NWR	Peninsula Hiking Trail	Paved	Not Rated		
N/A	McNary NWR	Peninsula Hiking Trail	Unpaved	Not Rated			

Table 4. Combined SAMMS and RIP FWS Trail Data

	Asset ID	Service Unit	Name	Surface	Condition	API	FCI
Washington	N/A	McNary NWR	Peninsula Horse Trail	Unpaved	Excellent		
	10003564	Dungeness NWR	People Trail	Unpaved	Excellent	80	0.98
	N/A	Columbia NWR	Pillar-Wigeon-Hampton Lake Trail	Unpaved	Good		
	10054378	Turnbull NWR	Pine Lake Loop Trail	Paved	Excellent	65	
	10054378	Turnbull NWR	Pine Lake Loop Trail	Unpaved	Excellent	65	
	N/A	Columbia NWR	Quail Lake Trail	Unpaved	Excellent		
	N/A	McNary NWR	Quarry Lake Trail	Unpaved	Excellent		
	10054423	Entiat NFH	Red Willow River Walk Trail	Unpaved	Excellent		
	10003493	Nisqually NWR	Ring Dike Trail	Unpaved	Excellent	55	
	10003505	Nisqually NWR	Road to Twin Barns	Unpaved	Not Rated		
	10045080	Little White Salmon NFH	Rocky Point	Unpaved	Excellent		
	10052501	Willapa NWR	Salmon Art Trail	Unpaved	Excellent		
	10052502	Willapa NWR	Salmon Art Trail	Unpaved	Excellent		
	10053967	Willapa NWR	Salmon Art Trail	Unpaved	Excellent	80	
	10003689	Willapa NWR	Sand Spit Trail	Unpaved	Excellent	100	
	10048685	Grays Harbor NWR	Sandpiper Trail	Paved	Excellent	65	
	10003690	Willapa NWR	Sawlog Trail	Unpaved	Excellent	70	0.2
	10048912	Nisqually NWR	Shannon Slough Boardwalk Trail	Unpaved	Excellent		
	N/A	Saddle Mountain NWR	Shoreline Trail	Unpaved	Excellent		
	10003689	Willapa NWR	Smoky Hallow Trail	Unpaved	Excellent	100	
	10045080	Little White Salmon NFH	Social Security Trail	Unpaved	Excellent		
	10036822	Willapa NWR	Teal Slough Trail	Unpaved	Not Rated		
	10003516	Nisqually NWR	Twin Barnes Loop Trail	Paved	Excellent		
	10003516	Nisqually NWR	Twin Barnes Loop Trail	Unpaved	Excellent		
	N/A	McNary NWR	Wallula Bird Trail	Unpaved	Excellent		
	N/A	McNary NWR	Wallula Horse Trail	Unpaved	Excellent		
	10004777	Saddle Mountain NWR	Waluke Pond Trail	Unpaved	Not Rated		
	10004743	Saddle Mountain NWR	Waluke Walking Trail	Unpaved	Not Rated		
10003433	Toppenish NWR	Wildlife Foot Trail	Unpaved	Excellent	55		
10055693	Conboy Lake NWR	Willard Springs Foot Trail	Unpaved	Excellent	80		

Source: RIP, Cycle 3 (2007), Cycle 4 not available for trails at the time of publication; SAMMS (2008)

Table 5. FWS Trail Deficiencies

State	Service Unit	Type of Deficiency	Number of Deficient Locations
Hawaii	Kilauea Point	Erosion	1
Oregon	Cape Meares NWR	Trail Structure	4
	Malheur NWR	Drainage	1
	Umatilla NWR	Trail Structure	1
	William L. Finley NWR	Erosion	3
		Drainage	6
Washington	Columbia NWR	Drainage	3
	Leavenworth NFH	Trail Structure	3
	Ridgefield NWR	Trail Location	1
		Erosion	1
	Turnbull NWR	Trail Structure	1
	Willapa NWR	Trail Structure	2
		Trail Location	2
		Erosion	3
		Drainage	16

Source: U.S. Fish and Wildlife Service, *RIP Cycle 3 (2007)*, *Cycle 4 not available for Deficiencies*

Table 6. Road Conditions by Surface Type

State	Service Unit	Surface	Condition	Miles	% in Unit
Hawaii	Hanalei NWR	Asphalt	Failed	0.07	58%
		Gravel	Failed	0.05	42%
	Kealia Pond NWR	Asphalt	Fair	0.39	100%
	Kilauea Point NWR	Asphalt	Fair	0.21	100%
Idaho	Bear Lake NWR	Gravel	Fair	1.24	22%
		Gravel	Good	4.47	78%
	Camas NWR	Asphalt	Fair	0.15	2%
		Gravel	Good	6.55	98%
	Deer Flat NWR	Asphalt	Fair	0.18	15%
		Asphalt	Poor	0.25	21%
		Gravel	Fair	0.77	64%
	Grays Lake NWR	Gravel	Good	0.51	100%
	Hagerman NFH	Asphalt	Fair	0.11	13%
		Asphalt	Poor	0.38	45%
		Gravel	Fair	0.35	42%
	Kooskia NFH	Asphalt	Fair	0.14	100%
	Kootenai NWR	Asphalt	Fair	0.06	1%
		Gravel	Good	4.70	99%
	Minidoka NWR	Gravel	Failed	5.08	46%
		Gravel	Fair	2.58	23%
		Gravel	Good	0.17	2%
	Gravel	Poor	3.25	29%	
	Oxford Slough WPA	Gravel	Good	0.24	100%
Nevada	Sheldon NWR	Gravel	Fair	3.77	3%
		Gravel	Good	76.07	57%
		Gravel	Poor	2.11	2%
		Native	Failed	8.14	6%
		Native	Fair	24.08	18%
		Native	Good	13.71	10%
		Native	Poor	5.59	4%
Oregon	Ankeny NWR	Gravel	Excellent	0.14	26%
		Gravel	Good	0.39	74%
	Bandon Marsh NWR	Asphalt	Good	0.05	100%
	Baskett Slough NWR	Gravel	Excellent	0.55	100%
	Cape Meares NWR	Asphalt	Poor	0.51	100%
	Cold Springs NWR	Gravel	Good	2.25	100%
	Eagle Creek NFH	Asphalt	Fair	0.04	8%
		Asphalt	Good	0.15	31%
		Gravel	Good	0.30	61%
	Hart Mountain NWR	Gravel	Failed	1.15	2%
		Gravel	Good	10.66	18%
		Native	Failed	15.53	27%

Table 6. Road Conditions by Surface Type

State	Service Unit	Surface	Condition	Miles	% in Unit
Oregon		Native	Fair	11.11	19%
		Native	Good	18.35	32%
		Native	Poor	0.85	1%
	Malheur NWR	Asphalt	Failed	0.31	1%
		Gravel	Failed	1.02	2%
		Gravel	Fair	5.83	12%
		Gravel	Good	37.80	78%
		Gravel	Poor	2.06	4%
		Native	Failed	1.46	3%
	McKay Creek NWR	Asphalt	Fair	0.51	17%
		Gravel	Fair	1.61	53%
		Gravel	Good	0.91	30%
	Nestucca Bay NWR	Gravel	Good	1.13	100%
	Tualatin River NWR	Gravel	Excellent	0.09	24%
		Gravel	Good	0.29	76%
	Umatilla NWR	Asphalt	Poor	2.88	21%
		Gravel	Fair	0.70	5%
		Gravel	Good	10.30	74%
	Warm Springs NFH	Gravel	Good	0.10	100%
	William F. Finley NWR	Asphalt	Good	0.05	1%
	Gravel	Excellent	1.27	35%	
	Gravel	Good	2.27	63%	
Washington	Little Sandy NWR	Asphalt	Fair	1.33	87%
		Asphalt	Poor	0.20	13%
	Abernathy FTC	Asphalt	Poor	0.05	100%
	Columbia NWR	Gravel	Failed	0.56	3%
		Gravel	Fair	5.28	33%
		Gravel	Good	9.33	58%
		Gravel	Poor	0.99	6%
	Conboy Lake NWR	Gravel	Good	0.72	100%
	Entiat NFH	Asphalt	Fair	0.07	100%
	Julia Butler Hanson NWR	Asphalt	Fair	0.14	100%
	Leavenworth NFH	Asphalt	Fair	0.27	36%
		Asphalt	Poor	0.48	64%
	Little Pend Oreille NWR	Gravel	Failed	11.29	24%
		Gravel	Fair	12.48	26%
		Gravel	Good	11.49	24%
		Gravel	Poor	3.46	7%
		Native	Failed	7.59	16%
		Native	Fair	0.65	1%
		Native	Good	0.16	0%
		Native	Poor	0.03	0%

Table 6. Road Conditions by Surface Type

State	Service Unit	Surface	Condition	Miles	% in Unit
Washington	Makah NFH	Asphalt	Poor	0.12	100%
	McNary NWR	Asphalt	Fair	0.60	4%
		Asphalt	Poor	1.05	7%
		Gravel	Failed	1.31	9%
		Gravel	Fair	7.15	50%
		Gravel	Good	2.11	15%
		Native	Failed	0.56	4%
		Native	Fair	1.38	10%
	Nisqually NFH	Asphalt	Fair	0.62	100%
	Ridgefield NWR	Gravel	Fair	2.01	44%
		Gravel	Good	2.58	56%
	Saddle Mountain NWR	Asphalt	Failed	0.26	1%
		Asphalt	Poor	8.18	29%
		Gravel	Failed	0.68	2%
		Gravel	Fair	0.71	2%
		Gravel	Good	17.65	62%
		Native	Poor	1.05	4%
	Spring Creek NFH	Asphalt	Failed	0.14	14%
		Asphalt	Poor	0.88	86%
	Toppenish NWR	Gravel	Good	0.46	100%
Turnbull NWR	Asphalt	Fair	0.68	9%	
	Gravel	Good	6.48	91%	
Willard NFH	Asphalt	Poor	0.11	100%	
Winthrop NFH	Asphalt	Poor	0.12	100%	

Source: RIP, Cycle 4 (2009)

C.6 Welcome and Orient

Population trends are used in the baseline conditions analysis as a general indicator for future visitation. Population trends were derived from U.S. Census datasets. Census data from 2000 and 2008 were used to illustrate recent trends, while U.S. Census 2030 projections were used to indicate possible future trends. The summaries were created by using GIS to union county level population data with Service units and are shown in Table 7.

Gateway communities were identified using U.S. Census data, supplemented with expert knowledge from FWS on which communities serve as gateways.

Table 7. Population Change

Facility Name	Intersecting Counties and States	Population (2000 - 2008)					Projections (2008 - 2030)		
		2000	2008	% Change	Difference	Average Change by FWS Facility	2030	% Change	Median Change by FWS Facility
Ankeny National Wildlife Refuge	Marion, Oregon	284,834	319,114	12%	34,280	12%	368,065	15%	15%
Kooskia National Fish Hatchery	Idaho, Idaho	15,511	15,727	1%	216	1%	20,832	32%	32%
Warm Springs National Fish Hatchery	Wasco, Oregon	23,791	24,296	2%	505	2%	30,743	27%	27%
Quilcene National Fish Hatchery	Jefferson, Washington	25,953	30,075	16%	4,122	16%	34,170	14%	14%
Entiat National Fish Hatchery	Chelan, Washington	66,616	73,445	10%	6,829	10%	87,707	19%	19%
Hagerman National Fish Hatchery	Gooding, Idaho	14,155	15,200	7%	1,045	7%	19,011	25%	25%
Winthrop National Fish Hatchery	Okanogan, Washington	39,564	40,905	3%	1,341	3%	52,090	27%	27%
Leavenworth National Fish Hatchery	Chelan, Washington	66,616	73,445	10%	6,829	10%	87,707	19%	19%
Abernathy Fish Technology Center	Cowlitz, Washington	92,948	100,917	9%	7,969	9%	122,376	21%	21%
Makah National Fish Hatchery	Clallam, Washington	64,525	71,585	11%	7,060	11%	84,954	19%	19%
Little White Salmon National Fish Hatchery	Skamania, Washington	9,872	11,074	12%	1,202	12%	12,998	17%	17%
Spring Creek National Fish Hatchery	Skamania, Washington	9,872	11,074	12%	1,202	12%	12,998	17%	17%
Bandon Marsh National Wildlife Refuge	Coos, Oregon	62,779	64,582	3%	1,803	3%	81,124	26%	26%
Baskett Slough National Wildlife Refuge	Polk, Oregon	62,380	73,363	18%	10,983	18%	80,608	10%	10%
Bear Lake National Wildlife Refuge	Bear Lake, Idaho	6,411	6,378	-1%	-33	-1%	8,610	35%	35%
Bear Valley National Wildlife Refuge	Klamath, Oregon	63,775	67,542	6%	3,767	6%	82,411	22%	22%
Camas National Wildlife Refuge	Jefferson, Idaho	19,155	23,831	24%	4,676	24%	25,726	8%	8%
Cape Meares National Wildlife Refuge	Tillamook, Oregon	24,262	26,232	8%	1,970	8%	31,352	20%	20%
Cold Springs National Wildlife Refuge	Umatilla, Oregon	70,548	73,475	4%	2,927	4%	91,163	24%	24%
Columbia National Wildlife Refuge	Adams, Washington	16,428	17,743	8%	1,315	10%	21,629	22%	19%
	Grant, Washington	74,698	84,241	13%	9,543		98,348	17%	
Conboy Lake National Wildlife Refuge	Klickitat, Washington	19,161	20,532	7%	1,371	7%	25,228	23%	23%
Copalis National Wildlife Refuge	Grays Harbor, Washington	67,194	72,241	8%	5,047	8%	88,468	22%	22%
Clearwater Fish Hatchery	Clearwater, Idaho	8,930	9,020	1%	90	1%	11,993	33%	33%
Deer Flat National Wildlife Refuge	Canyon, Idaho	131,441	186,223	42%	54,782	10%	176,531	-5%	22%
	Payette, Idaho	20,578	23,510	14%	2,932		27,637	18%	
	Washington, Idaho	9,977	10,423	4%	446		13,400	29%	
	Owyhee, Idaho	10,644	11,683	10%	1,039		14,295	22%	
	Malheur, Oregon	31,615	31,772	0%	157		40,853	29%	
Dungeness National Wildlife Refuge	Clallam, Washington	64,525	71,585	11%	7,060	11%	84,954	19%	19%
Eagle Creek National Fish Hatchery	Clackamas, Oregon	338,391	382,316	13%	43,925	13%	437,272	14%	14%
Flattery Rocks National Wildlife Refuge	Clallam, Washington	64,525	71,585	11%	7,060	11%	84,954	19%	19%
Franz Lake National Wildlife Refuge	Skamania, Washington	9,872	11,074	12%	1,202	12%	12,998	17%	17%
Grays Harbor National Wildlife Refuge	Grays Harbor, Washington	67,194	72,241	8%	5,047	8%	88,468	22%	22%
Grays Lake National Wildlife Refuge	Bonneville, Idaho	82,522	99,474	21%	16,952	8%	110,831	11%	25%
	Caribou, Idaho	7,304	7,031	-4%	-273		9,810	40%	
Irrigon Fish Hatchery	Morrow, Oregon	10,995	12,325	12%	1,330	5%	14,208	15%	23%
	Wallowa, Oregon	7,226	7,143	-1%	-83		9,338	31%	
Hakalau Forest National Wildlife Refuge	Hawaii, Hawaii	148,677	183,508	23%	34,831	23%	174,488	-5%	-5%
Hanalei National Wildlife Refuge	Kauai, Hawaii	58,463	63,106	8%	4,643	8%	68,612	9%	9%

Table 7. Population Change

Facility Name	Intersecting Counties and States	Population (2000 - 2008)				Projections (2008 - 2030)			
		2000	2008	% Change	Difference	Average Change by FWS Facility	2030	% Change	Median Change by FWS Facility
Oregon Islands National Wildlife Refuge	Lincoln, Oregon	44,479	46,822	5%	2,343	7%	57,476	23%	21%
	Clatsop, Oregon	35,630	37,866	6%	2,236		46,041	22%	
	Lane, Oregon	322,959	346,633	7%	23,674		417,331	20%	
	Tillamook, Oregon	24,262	26,232	8%	1,970		31,352	20%	
	Curry, Oregon	21,137	22,627	7%	1,490		27,313	21%	
	Coos, Oregon	62,779	64,582	3%	1,803		81,124	26%	
Oxford Slough Waterfowl Production Area	Bannock, Idaho	75,565	80,464	6%	4,899	10%	101,487	26%	22%
	Franklin, Idaho	11,329	12,871	14%	1,542		15,215	18%	
Pearl Harbor National Wildlife Refuge	Honolulu, Hawaii	876,156	917,673	5%	41,517	5%	1,028,259	12%	12%
Pierce National Wildlife Refuge	Skamania, Washington	9,872	11,074	12%	1,202	12%	12,998	17%	17%
Quinalt National Fish Hatchery	Grays Harbor, Washington	67,194	72,241	8%	5,047	8%	88,468	22%	22%
Quillayute Needles National Wildlife Refuge	Jefferson, Washington	25,953	30,075	16%	4,122	13%	34,170	14%	16%
	Clallam, Washington	64,525	71,585	11%	7,060		84,954	19%	
Ridgefield National Wildlife Refuge	Cowlitz, Washington	92,948	100,917	9%	7,969	14%	122,376	21%	13%
	Clark, Washington	345,238	430,867	25%	85,629		454,543	5%	
	Columbia, Oregon	43,560	49,719	14%	6,159		56,289	13%	
Saddle Mountain National Wildlife Refuge	Grant, Washington	74,698	84,241	13%	9,543	15%	98,348	17%	15%
	Adams, Washington	16,428	17,743	8%	1,315		21,629	22%	
	Franklin, Washington	49,347	73,203	48%	23,856		64,971	-11%	
	Benton, Washington	142,475	165,941	16%	23,466		187,584	13%	
San Juan Islands National Wildlife Refuge	San Juan, Washington	14,077	15,957	13%	1,880	13%	18,534	16%	16%
Sawtooth Fish Hatchery	Custer, Idaho	4,342	4,208	-3%	-134	-3%	5,832	39%	39%
Sheldon National Wildlife Refuge	Humboldt, Nevada	16,106	17,546	9%	1,440	5%	24,696	41%	32%
	Harney, Oregon	7,609	7,266	-5%	-343		9,832	35%	
	Lake, Oregon	7,422	7,489	1%	67		9,591	28%	
	Washoe, Nevada	339,486	430,741	27%	91,255		520,550	21%	
Siletz Bay National Wildlife Refuge	Lincoln, Oregon	44,479	46,822	5%	2,343	5%	57,476	23%	23%
Steigerwald Lake National Wildlife Refuge	Clark, Washington	345,238	430,867	25%	85,629	25%	454,543	5%	5%
Toppenish National Wildlife Refuge	Yakima, Washington	222,581	238,474	7%	15,893	7%	293,052	23%	23%
Tualatin River National Wildlife Refuge	Washington, Oregon	445,342	530,596	19%	85,254	19%	575,475	8%	8%
Tucannon Fish Hatchery	Columbia, Washington	4,064	4,128	2%	64	2%	5,351	30%	30%
Turnbull National Wildlife Refuge	Spokane, Washington	417,939	459,933	10%	41,994	10%	550,262	20%	20%
Umatilla National Wildlife Refuge	Morrow, Oregon	10,995	12,325	12%	1,330	14%	14,208	15%	14%
	Benton, Washington	142,475	165,941	16%	23,466		187,584	13%	
Upper Klamath National Wildlife Refuge	Klamath, Oregon	63,775	67,542	6%	3,767	6%	82,411	22%	22%
Dworshak National Fish Hatchery	Clearwater, Idaho	8,930	9,020	1%	90	1%	11,993	33%	33%
Willapa National Wildlife Refuge	Pacific, Washington	20,984	21,889	4%	905	4%	27,628	26%	26%
William L. Finley National Wildlife Refuge	Linn, Oregon	103,069	113,408	10%	10,339	8%	133,187	17%	19%
	Benton, Oregon	78,153	83,564	7%	5,411		100,990	21%	
Willard National Fish Hatchery	Skamania, Washington	9,872	11,074	12%	1,202	12%	12,998	17%	17%

Source: U.S. Census (2000, 2008 estimate update)

Table 7. Population Change

Facility Name	Intersecting Counties and States	Population (2000 - 2008)				Projections (2008 - 2030)			
		2000	2008	% Change	Difference	Average Change by FWS Facility	2030	% Change	Median Change by FWS Facility
Hart Mountain National Antelope Refuge	Lake, Oregon	7,422	7,489	1%	67	-2%	9,591	28%	32%
	Harney, Oregon	7,609	7,266	-5%	-343		9,832	35%	
Huleia National Wildlife Refuge	Kauai, Hawaii	58,463	63,106	8%	4,643	8%	68,612	9%	9%
Julia Butler Hansen Refuge For The Columbian White-Tailed Deer	Clatsop, Oregon	35,630	37,866	6%	2,236	8%	46,041	22%	21%
	Cowlitz, Washington	92,948	100,917	9%	7,969		122,376	21%	
	Wahkiakum, Washington	3,824	4,143	8%	319		5,035	22%	
	Columbia, Oregon	43,560	49,719	14%	6,159		56,289	13%	
Kakahaia National Wildlife Refuge	Maui, Hawaii	128,094	147,939	15%	19,845	15%	150,331	2%	2%
Kealia Pond National Wildlife Refuge	Maui, Hawaii	128,094	147,939	15%	19,845	15%	150,331	2%	2%
Kilauea Point National Wildlife Refuge	Kauai, Hawaii	58,463	63,106	8%	4,643	8%	68,612	9%	9%
Lookingglass Fish Hatchery	Union, Oregon	24,530	25,078	2%	548	1%	31,698	26%	29%
	Wallowa, Oregon	7,226	7,143	-1%	-83		9,338	31%	
Klamath Marsh National Wildlife Refuge	Klamath, Oregon	63,775	67,542	6%	3,767	6%	82,411	22%	22%
Kootenai National Wildlife Refuge	Boundary, Idaho	9,871	11,086	12%	1,215	12%	13,257	20%	20%
Lewis And Clark National Wildlife Refuge	Clatsop, Oregon	35,630	37,866	6%	2,236	6%	46,041	22%	22%
Little Pend Oreille National Wildlife Refuge	Pend Oreille, Washington	11,732	12,986	11%	1,254	10%	15,446	19%	19%
	Stevens, Washington	40,066	44,080	10%	4,014		52,751	20%	
Lower Klamath National Wildlife Refuge	Siskiyou, California	44,301	46,217	4%	1,916	5%	56,294	22%	22%
	Klamath, Oregon	63,775	67,542	6%	3,767		82,411	22%	
Lyons Ferry Fish Hatchery	Asotin, Washington	20,551	21,474	4%	923	4%	27,058	26%	26%
	Columbia, Washington	4,064	4,128	2%	64		5,351	30%	
	Franklin, Washington	49,347	73,203	48%	23,856		64,971	-11%	
Malheur National Wildlife Refuge	Harney, Oregon	7,609	7,266	-5%	-343	-5%	9,832	35%	35%
McKay Creek National Wildlife Refuge	Umatilla, Oregon	70,548	73,475	4%	2,927	4%	91,163	24%	24%
McNary National Wildlife Refuge	Umatilla, Oregon	70,548	73,475	4%	2,927	12%	91,163	24%	18%
	Benton, Washington	142,475	165,941	16%	23,466		187,584	13%	
	Franklin, Washington	49,347	73,203	48%	23,856		64,971	-11%	
	Walla Walla, Washington	55,180	58,981	7%	3,801		72,650	23%	
Nestucca Bay National Wildlife Refuge	Tillamook, Oregon	24,262	26,232	8%	1,970	8%	31,352	20%	20%
McCall Fish Hatchery	Valley, Idaho	7,651	9,486	24%	1,835	24%	10,276	8%	8%
Magic Valley Fish Hatchery	Gooding, Idaho	14,155	15,200	7%	1,045	12%	19,011	25%	20%
	Twin Falls, Idaho	64,284	74,792	16%	10,508		86,336	15%	
Minidoka National Wildlife Refuge	Power, Idaho	7,538	7,854	4%	316	3%	10,124	29%	31%
	Minidoka, Idaho	20,174	19,439	-4%	-735		27,095	39%	
	Blaine, Idaho	18,991	22,667	19%	3,676		25,506	13%	
	Cassia, Idaho	21,416	21,721	1%	305		28,763	32%	
Nisqually National Wildlife Refuge	Pierce, Washington	700,820	803,614	15%	102,794	17%	922,705	15%	13%
	Thurston, Washington	207,355	246,792	19%	39,437		273,005	11%	
Nisqually Fish Hatchery At Clear Creek	Pierce, Washington	700,820	803,614	15%	102,794	15%	922,705	15%	15%
Oahu Forest National Wildlife Refuge	Honolulu, Hawaii	876,156	917,673	5%	41,517	5%	1,028,259	12%	12%

C.4 Planning

Data on completeness of Service plans is provided by FWS core team members. Data on the locations of non-service planning districts varies by state. In Washington, this information is in a GIS. However, other states require manual reference of published maps. MPO data is provided by BTS, however, many data gaps were found so the data cannot be considered a stand-alone MPO resource.

C.5 Partnerships

Because agencies at all levels are increasingly interested in pooling funds to improve assets that benefit multiple organizations, non-Service owned roads that intersect Region 1 units have been identified and summarized. These roads were located using a GIS's ability select by location for all US Census Tiger roads intersecting FWS boundaries. The results of this process are summarized in Table 8. Other data cited in the *Partnerships* section comes from the information established in *Planning*.

Table 8. Non-Service Roads Intersecting Service Units

State	Service Unit	Road Name
Hawaii	Oahu Forest National Wildlife Refuge	Kamehameha Hwy (State)
Idaho	Camas National Wildlife Refuge	I 15
	Clearwater Fish Hatchery	SR 7
	Clearwater Fish Hatchery	Cavendish Rd
	Grays Lake National Wildlife Refuge	Grays Lake Rd
		SR 34
	McCall Fish Hatchery	Lake St
	Minidoka National Wildlife Refuge	Baseline
		I 86
	Oxford Slough Waterfowl Production Area	Westside Hwy
	Sawtooth Fish Hatchery	SR 75
Dworshak National Fish Hatchery	SR 7	
Oregon	Ankeny National Wildlife Refuge	Ankeny Hill Rd
		Buena Vista Rd
		Wintel Rd
	Bandon Marsh National Wildlife Refuge	Bank Rd
	Cape Meares National Wildlife Refuge	Bayshore Dr
	Julia Butler Hansen Refuge For The Columbian White-Tailed Deer	Puget Island Ferry Xing
	Klamath Marsh National Wildlife Refuge	Silver Lake Rd
	Lower Klamath National Wildlife Refuge	The Dalles California Hwy
	Malheur National Wildlife Refuge	Diamond Ln
		Lava Beds Rd
		SR 205
		Frenchglen Hwy
	McKay Creek National Wildlife Refuge	Pendleton John Day Hwy
	McNary National Wildlife Refuge	Columbia River Hwy
	Nestucca Bay National Wildlife Refuge	Little Nestucca River Rd
Old Woods Rd		
US 101		

Table 8. Non-Service Roads Intersecting Service Units

State	Service Unit	Road Name
Oregon	Siletz Bay National Wildlife Refuge	US 101
		Oregon Coast Hwy
	Tualatin River National Wildlife Refuge	Oregon St
		Scholls Sherwood Rd
		Pacific Hwy
	Umatilla National Wildlife Refuge	Columbia Blvd
		Columbia Ln
		I 84
	William L. Finley National Wildlife Refuge	Bellfountain Rd
		Peoria Rd
		SR 99 w
	Washington	Quilcene National Fish Hatchery
Winthrop National Fish Hatchery		SR 20
Little White Salmon National Fish Hatchery		SR 14
Columbia National Wildlife Refuge		McManamon Rd
		SR 26
Dungeness National Wildlife Refuge		US 101
Franz Lake National Wildlife Refuge		Evergreen Hwy
Grays Harbor National Wildlife Refuge		Airport Way
		SR 109
Julia Butler Hansen Refuge For The Columbian White-Tailed Deer		SR 4
Little Pend Oreille National Wildlife Refuge		SR Colville Tiger
Lyons Ferry Fish Hatchery		SR 261
McNary National Wildlife Refuge		US 730
		US Columbia River
Nisqually National Wildlife Refuge		110th Ave
		I 5
Saddle Mountain National Wildlife Refuge		SR 24
		SR 240
		SR 243
		Us Reservation Rd
Steigerwald Lake National Wildlife Refuge		Evergreen Blvd
		SR Lewis
Toppenish National Wildlife Refuge		SR 22
		US 97
Turnbull National Wildlife Refuge		Cheney Spangle Rd
		Jennings Rd
		Mullinix Rd
Willapa National Wildlife Refuge	SR 103	
	US 101	

Source: U.S. Census Tiger/ESRI (2008)

C.6 Sustainability

Baseline conditions associated with sustainability represent topics of climate change, transit, and non-motorized access to Service lands and reduced fossil fuel consumption. These themes are captured in several baseline condition indicators, including:

- Vulnerability of Coastal Service Units to Sea Level Change
- Seismic Risk
- Air-Quality Non-Attainment
- Service Units Intersected by Transit

Vulnerability of Coastal Service Units to Sea Level Change

The baseline condition analysis asserts that service lands located near coastal areas may be at risk of environmental change due to sea level change. The analysis uses the USGS coastal vulnerability index (which factors tides, wave height, relative sea-level rise, coastal slope, geomorphology, shoreline erosion, and accretion rate) as a ranking of relative potential for coastal change due to future sea-level rise. The baseline conditions Coastal Vulnerability map identifies vulnerability rating for Service units within one mile of a Pacific Ocean shoreline. This information was derived by performing a GIS spatial join of Service unit boundaries with the USGS risk index dataset.

Seismic Risk

Seismic events have the potential for impacting transportation assets. Areas prone to severe seismic activity routinely plan for periodic damage in long range planning exercises. As such, the risk of seismic damage to Service transportation assets is considered in LRTP baseline conditions. USGS seismic risk data is used to identify the probability that seismic event will occur in 50 years is 10 percent or greater. This information was derived by performing a GIS spatial join of Service unit boundaries with the USGS seismic risk dataset.

Air Quality Non-Attainment

Because the Service is interested in helping to reduce emissions that contribute to global warming, locations identified as non-attainment areas by the EPA are identified in the baseline conditions section. A GIS was used to select any EPA non-attainment areas within one mile of a Service unit.

Service Units Intersected by Transit Districts

The Service wants to increase the use of transit by visitors to maximize person trips per vehicle mile traveled and lower emissions. As such, partnership with existing non-Service transit systems is viewed as an emerging opportunity for future transportation investment. Service units intersected by transit districts are summarized in the baseline conditions section. A GIS was used to select transit districts that intersect unit boundaries. A transit districts dataset was created by mining Google.com and cross referencing with state transit organization's websites.

Appendix D

Roadway Design Guidelines



Roadway Design Guidelines

Pacific Region





Primary Contact

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Acknowledgements

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Charles Houghten, Chief, R1 Division of Planning, Visitor Services and Transportation

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Sandra Jacobson - Wildlife Biologist, Pacific Southwest Research Station, U.S. Forest Service
Steve Suder - National Coordinator, Refuge Transportation Program, FWS
Eva Paredes - Refuge Roads Coordinator, FWS Region 6
Florian Schulz and Emil Herrera - Florian Schulz Photography (visionsofthewild.com)

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Justin Martin, ASLA

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Brian Bainnson, ASLA

Cover: Pronghorn antelope herd standing at the edge of a hill on sagebrush prairie. Pronghorn are one of many wildlife species found on FWS managed lands in Region 1 that are impacted by roadways.

Photo: Florian Schulz





United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon, 97232-4181



In Reply Refer To:
NWRSPVST

FEB 24 2011

Memorandum

To: All Region 1 Project Leaders

From: Regional Director, Region 1
Portland, Oregon *Rick Y. Johnson* **Acting**

Subject: Pacific Region Roadway Design Guidelines

The Pacific Region's Roadway Design Guidelines (guidelines) document is attached for your use. The guidelines identify how we will deliver surface transportation and related improvements, consistent with the U.S. Fish and Wildlife Service's (Service) mission, on roads and lands managed by the Service in the Pacific Region. The guidelines are effective immediately.

A core team including project leaders and technical experts from the Region, and staff from the Federal Highway Administration developed the guidelines as a tool for interdisciplinary teams to use during roadway planning and design, and to support roadway development decisions. The team included state of the art ecological, planning, design, and engineering considerations in the guidelines that reflect both the significant benefits and impacts roadway projects present.

Informational sessions about the guidelines will be announced in the near future. If you have any questions contact Alex Schwartz, Landscape Architect, Division of Planning, Visitor Services, and Transportation, Branch of Transportation, at (503) 736-4723.

Attachment

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 Bainson



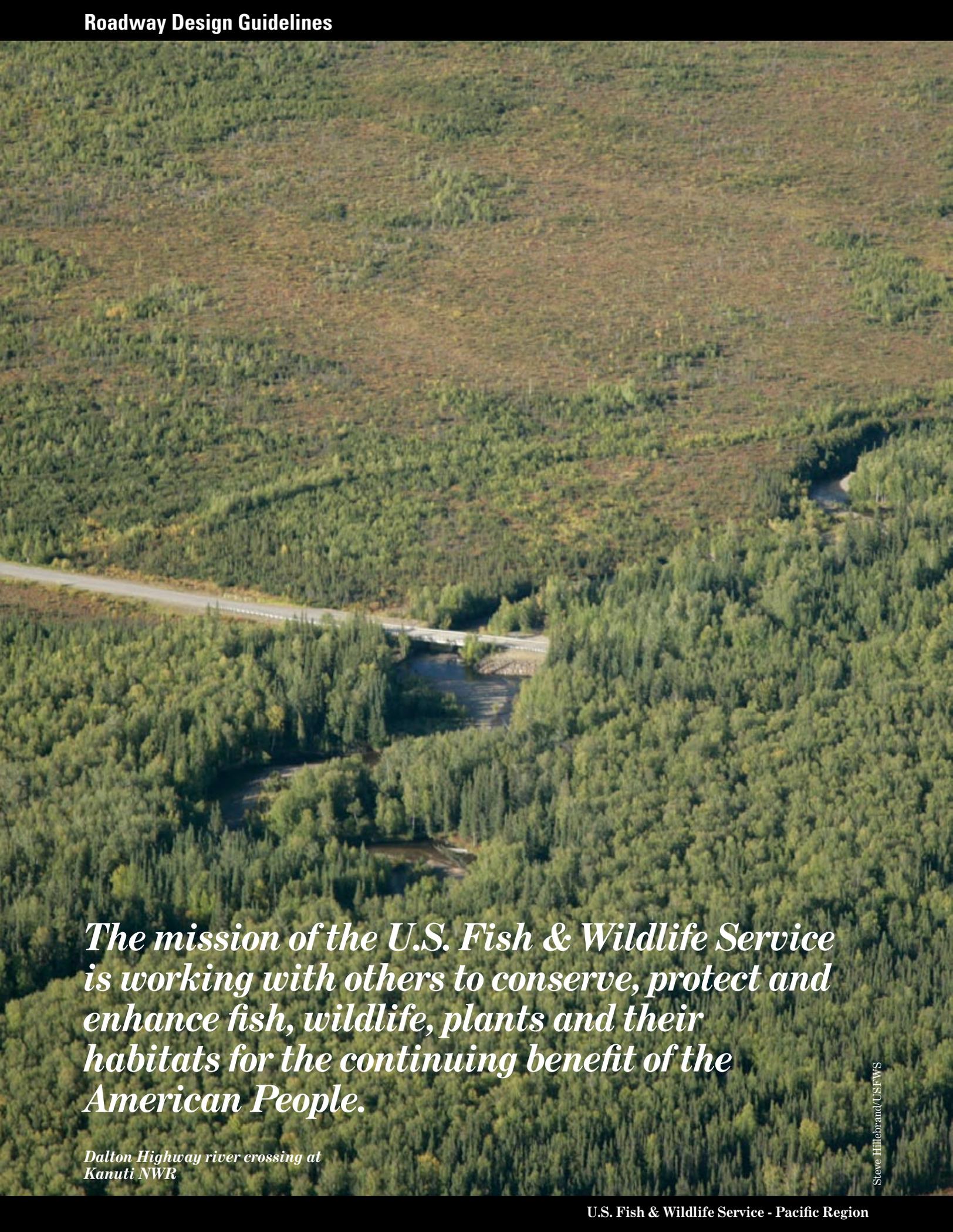
Eva Paredes/USFWS

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.

An aerial photograph showing a highway crossing a river in a dense forest. The highway is a multi-lane road with a bridge over the river. The surrounding area is covered in lush green trees and vegetation. The river flows through the forest, and the highway runs parallel to it.

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

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.

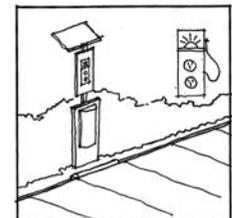
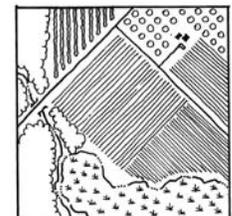
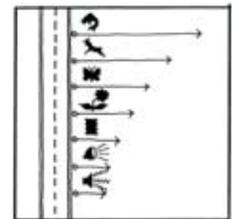
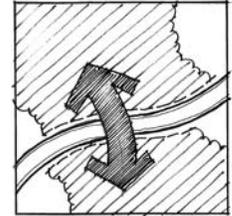
This section, Landscape Ecology, is intended to help you consider the broad-scale environmental impacts of your decisions regarding roadways and transportation infrastructure. It addresses a range of issues, providing you with a set of tools for decision-making.

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.

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.

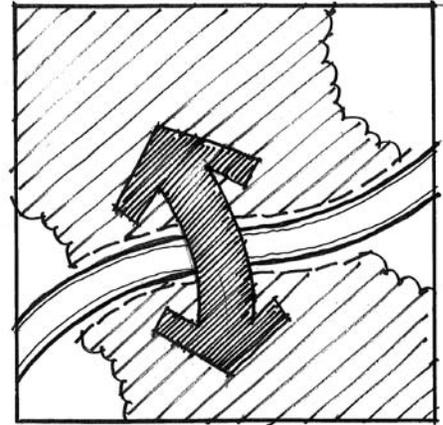
Jones, Grant R., et al. 2007. *Applying Visual Resource Assessment for Highway Planning* (pp.130-139) and *Road Alignment* (pp.330-341). In *Landscape Architecture Graphic Standards.*

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.

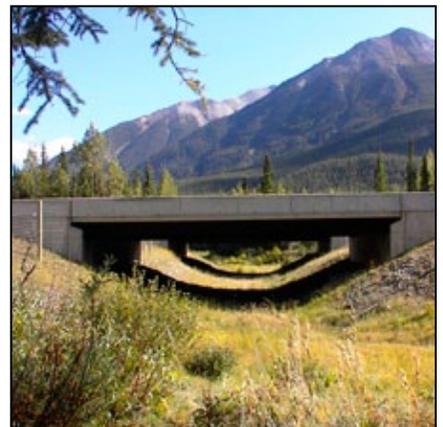


Habitat connectivity is disrupted along any road corridor

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.

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).

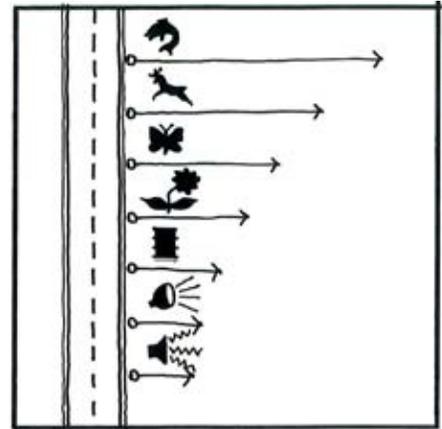
Trombulak, Stephen and Christopher Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities.

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



Impacts to wildlife and habitat extend outward from the roadway in various degrees, creating the 'road-effect zone'.

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.

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.

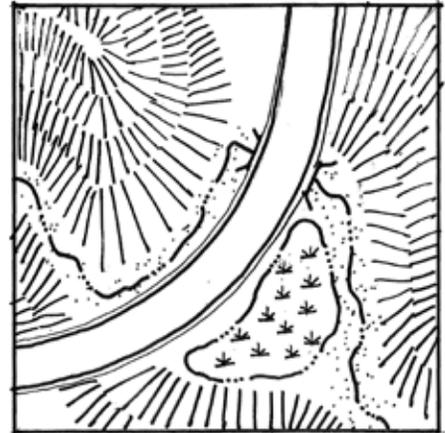
Dashiell and Lancaster. Undated. Road Design Guidelines for Low Impact to Hydrology. Five Counties Salmonid Conservation Program. Weaverville, CA.

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

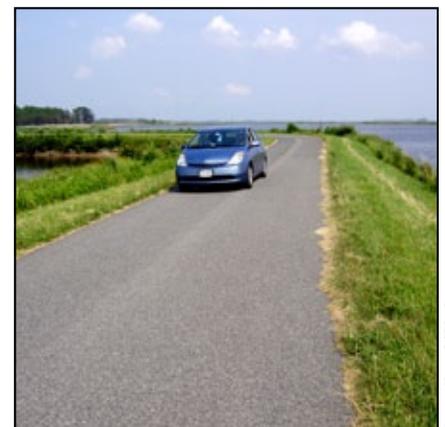


Roadways disrupt natural hydrology.

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.

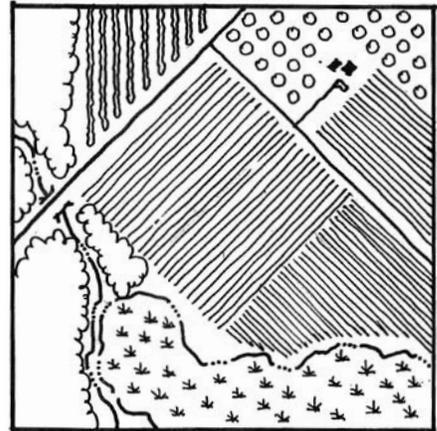
USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

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.

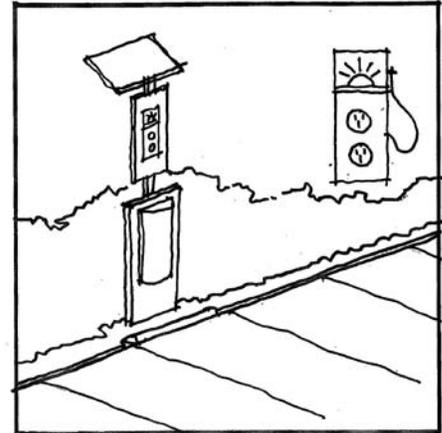
Green Highways Partnership. <http://www.greenhighwayspartnership.org>.

Assistance with emergencies and data on federally owned roads.

Emergency Relief for Federally Owned Roads (ERFO). <http://fh.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



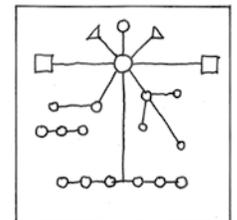
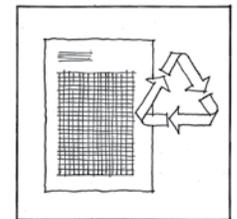
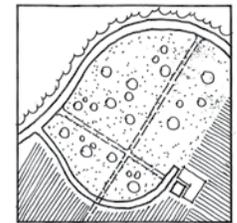
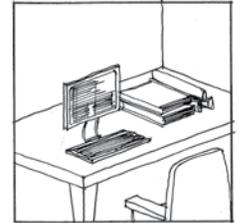
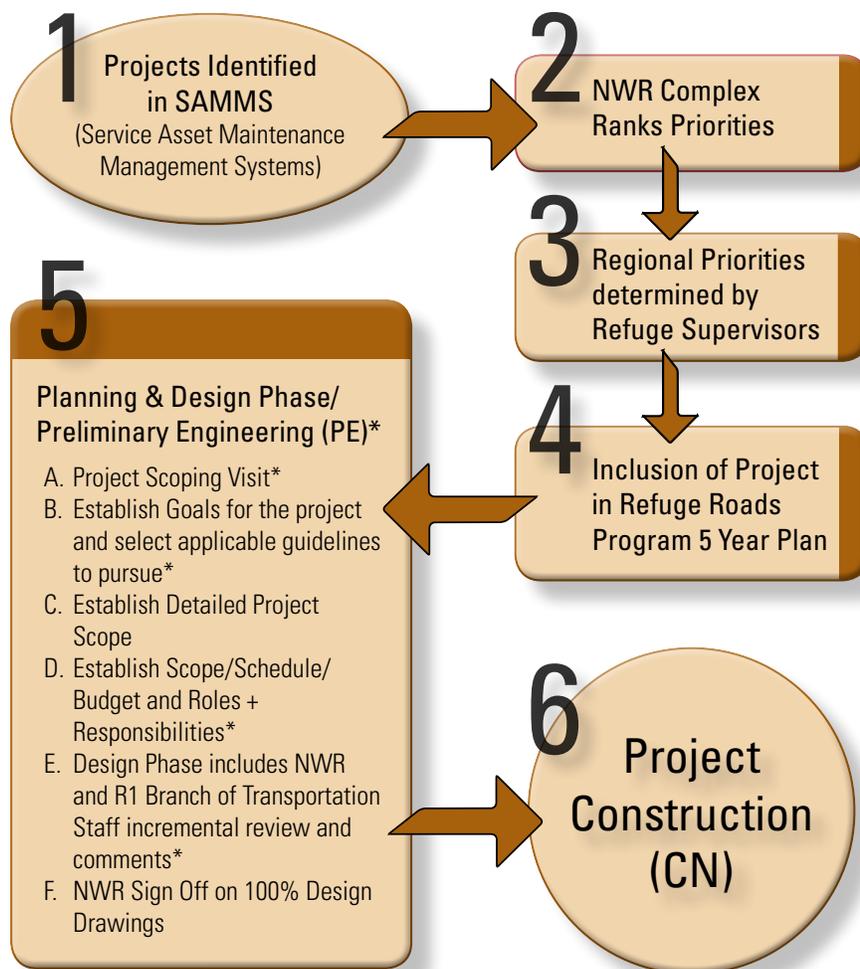
Planning Context Overview

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 Pacific 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.

Typical FWS Region 1 Refuge Roads Project as delivered in partnership with the Federal Highway Administration (FHWA)



* Denotes the phase where the Roadway Design Guidelines are being used by the project team

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 as 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.

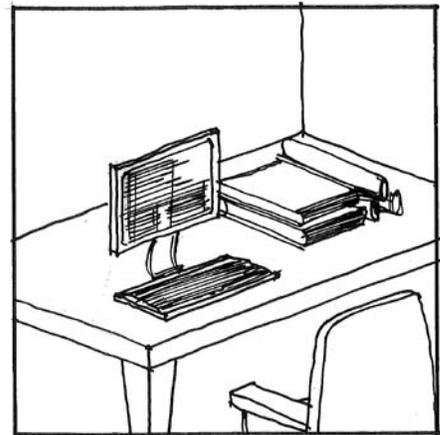
AASHTO. 2008. Guidelines For Environmental Performance Measures. NCHRP 25-25, Task 23. Prepared by Cambridge Systematics, Inc. Cambridge, MA.

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).



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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.

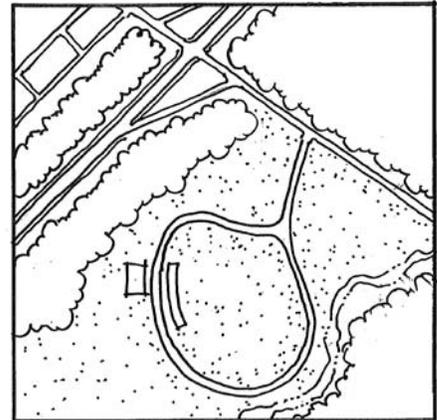
USDA Forest Service. 2002. Scenic Byways: A Design Guide for Roadside Improvements.

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.



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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.

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

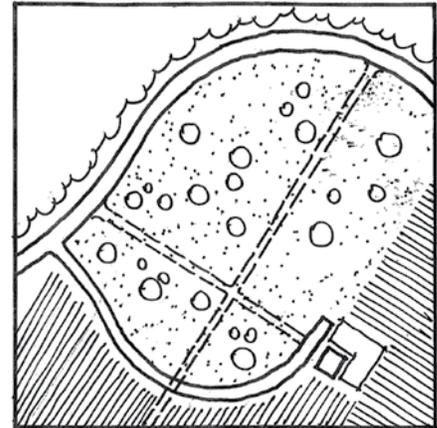
Case Studies.

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).



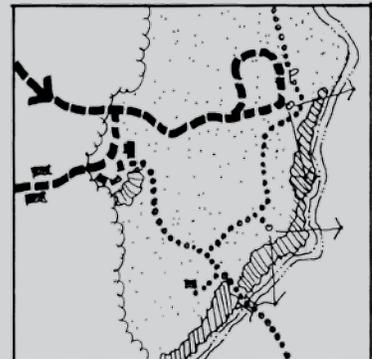
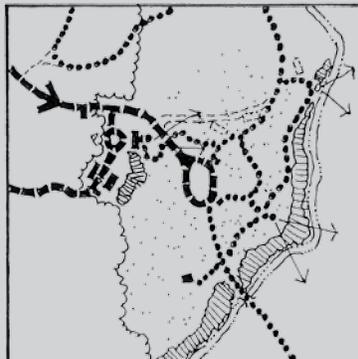
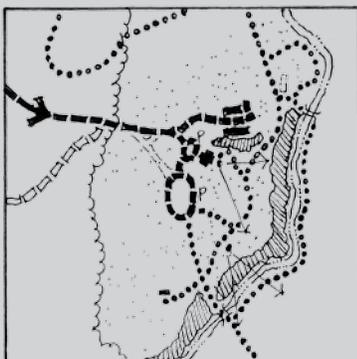
Explore and assess the effects of alternative road alignments.

A decommissioned roadway is restored with native vegetation.



S+R 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.

Principles

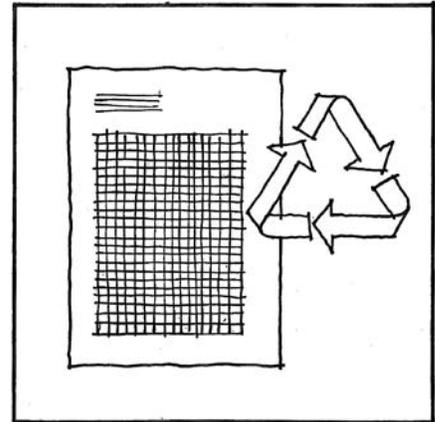
- Environmental impacts should be considered
- Evaluate the embodied energy of materials used
- Minimize externalization of environmental impacts through emissions and materials used
- Include comparison of costs of facilities for alternative modes of transportation in analysis
- Consider projected maintenance 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.



Examine the characteristics of materials used in a project, including embodied energy and recyclability.

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.



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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.

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.

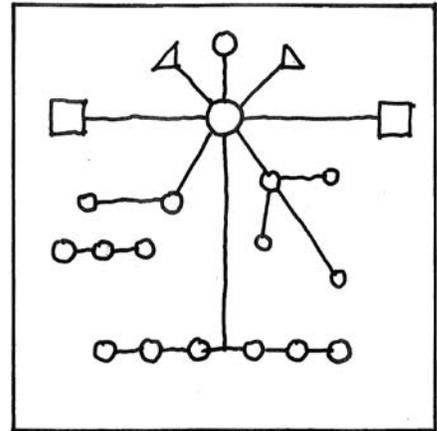
Porter, Douglas, and David Salvesen, eds. 1995. *Collaborative Planning for Wetlands and Wildlife: Issues and Examples*.

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.



Develop a communications strategy and network.

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



Project staff and stakeholders meet in the field at Pelican Island NWR (right).

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Design and Engineering

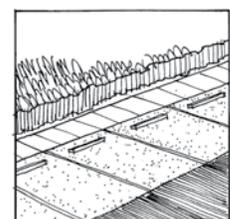
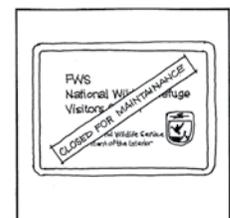
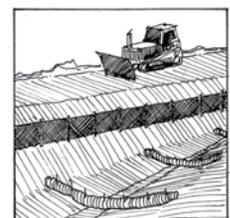
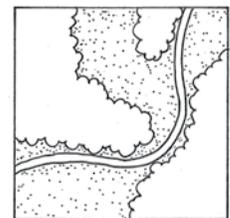
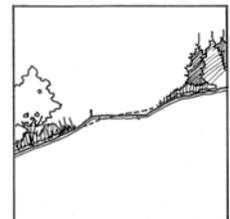
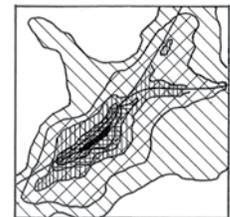
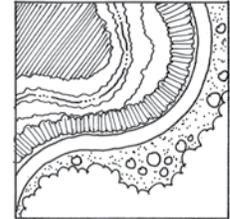
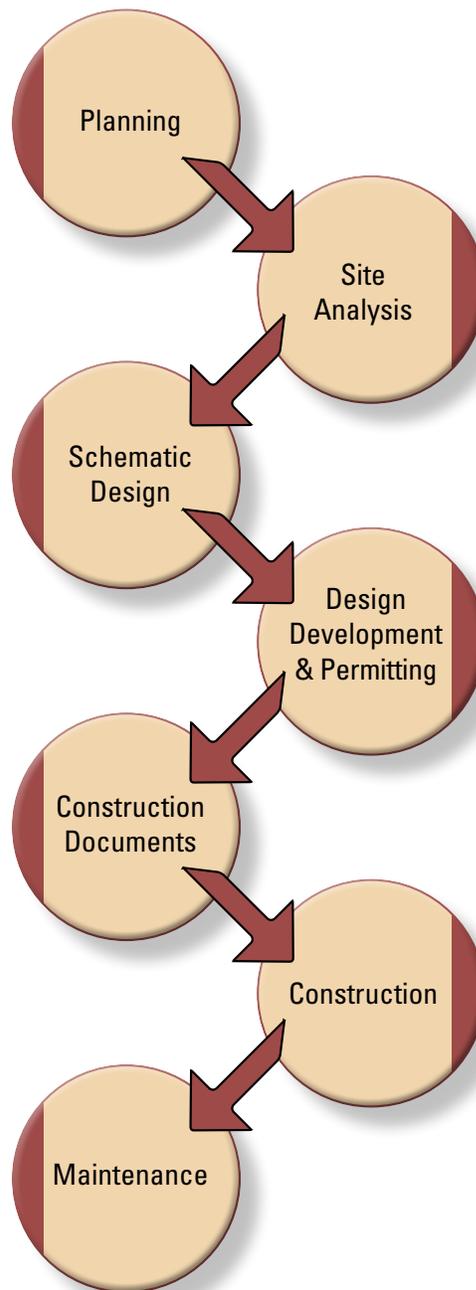
Design and Engineering Overview

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 through 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.

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.

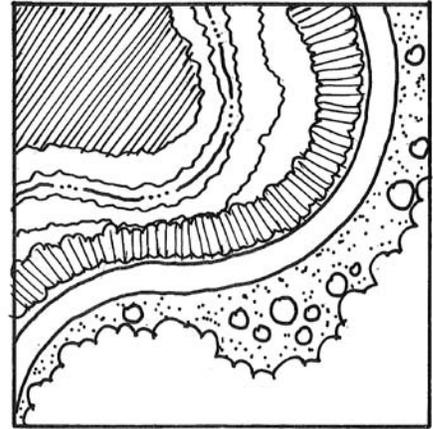
ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

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.



Restored vegetation along road corridor can help support management goals.

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 Baimson

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.

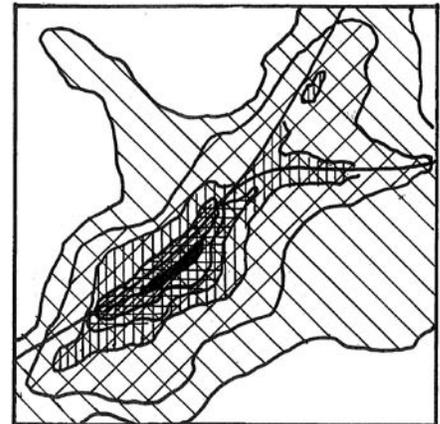
Comprehensive list of roadside vegetation management resources.

Center for Environmental Excellence by AASHTO - Invasive Species/Vegetation Management, Research, 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.

Controlling invasive species after their spread can be labor-intensive; spraying melaluka in FL (right).



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 Hagerly/USFWS

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.

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.

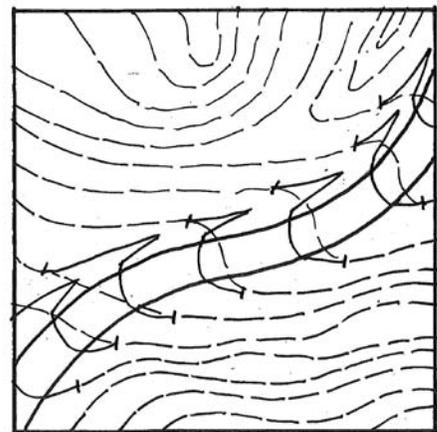
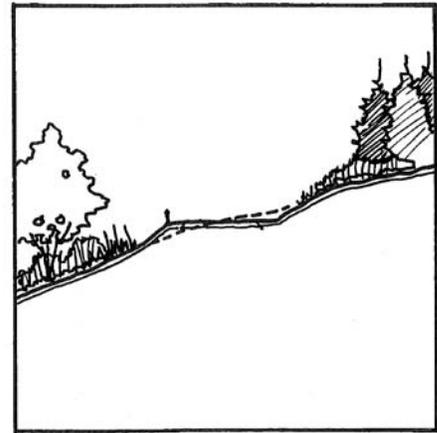
AASHTO. 2004. AASHTO A Policy on Geometric Design of Highways and Streets, 5th Edition (aka ‘Green Book’). Washington, D.C.

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).



Fitting in with existing topography is key to minimizing impacts.

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.

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 roads with varying views can promote alertness and lower speeds.

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.

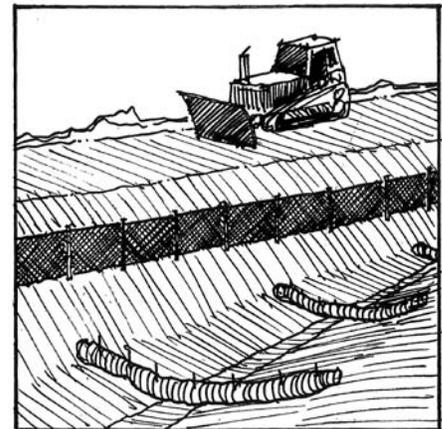
ODOT. 2006. Roadside Development Design Manual - Guidelines for Visual Resource Management, Landscaping, and Hardscaping (DRAFT).

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.

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



FHWA

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.

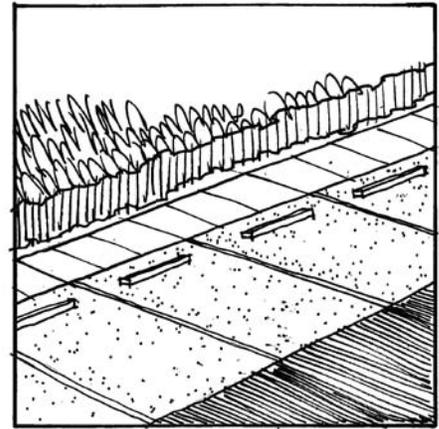
See: <http://www.sustainablesites.org/>.

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 Bainson

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 CO₂ produced per kilogram of product (tCO₂/kg).



Steve Clay/USFWS

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.

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.



Consider trade-offs between longevity and maintenance needs.

Fire being used for maintenance of roadside vegetation



USFWS

Organism Passage



Organism Passage

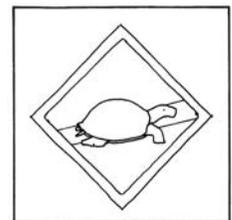
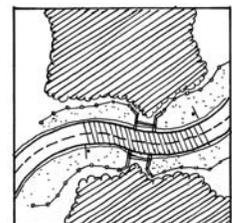
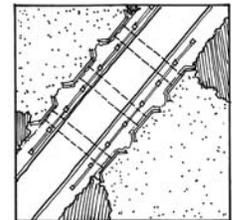
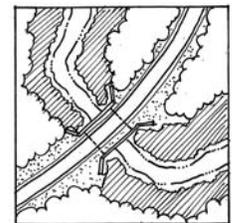
Overview

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.

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.

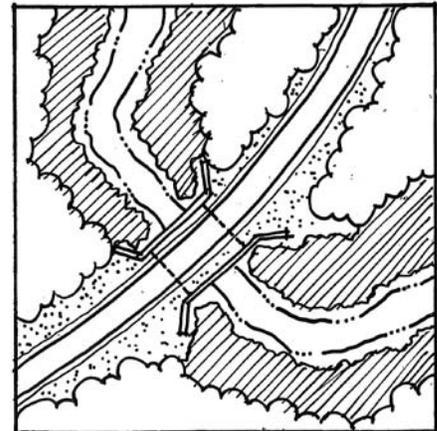
William Weaver and Danny Hagans. 1994. Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Wildland Roads.

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/>.



Locate aquatic crossings to minimize interruption to normal stream flow and channel migration.

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.

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.

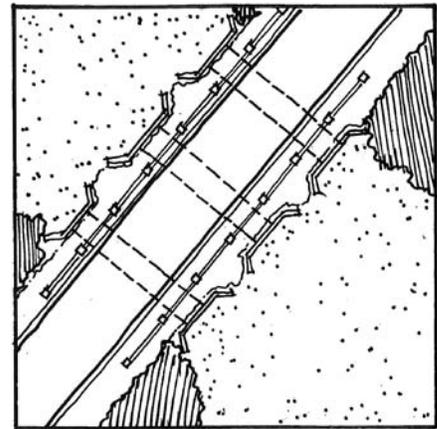
Best practices for WVC reduction.
FHWA. 2008. Wildlife-Vehicle Collision Reduction Study, Best Practices Manual.

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/>.

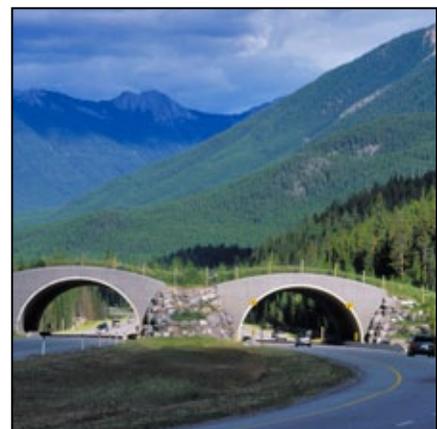


Terrestrial wildlife crossings provide safer crossings for wildlife and connect fragmented habitat patches.

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

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.

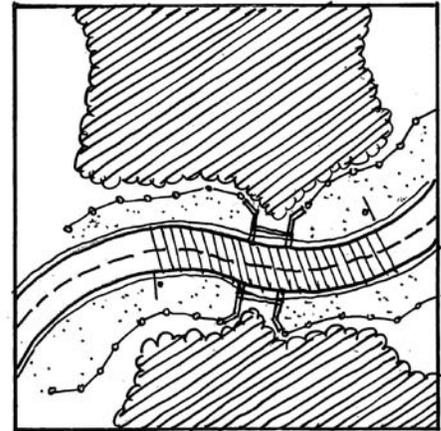
Hardy et al, Western Transportation Institute. 2007. Evaluation of Wildlife Crossing Structures and Fencing on US Hwy 93 Evaro to Polson.

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>.

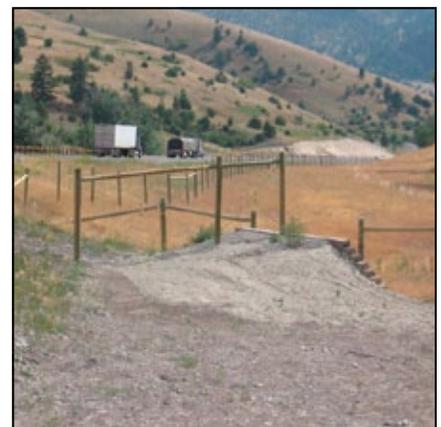


Fencing can help guide wildlife to safer crossing areas.

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).



lisaheads/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.

Principles

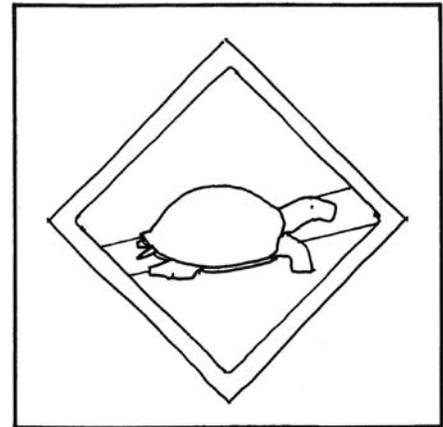
- Select the appropriate type of signage for the species, roadway LOS and site conditions
- Provide public information on the crossing design and intent
- Consider active warning systems for “end runs” of fencing, crossing hot spots and as temporary mitigation measures in the absence of crossing structures
- 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).



Warning signs can help remind drivers to look out for wildlife on the road.

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

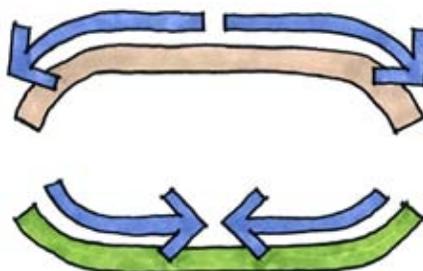
It is important to consider what happens to stormwater runoff along the entire roadway. Runoff from roadways on FWS managed lands may deliver chemical pollutants and sediment to surface and ground water. Roadways have a profound effect on the hydrology of a given site and watershed. Impervious surfaces 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.

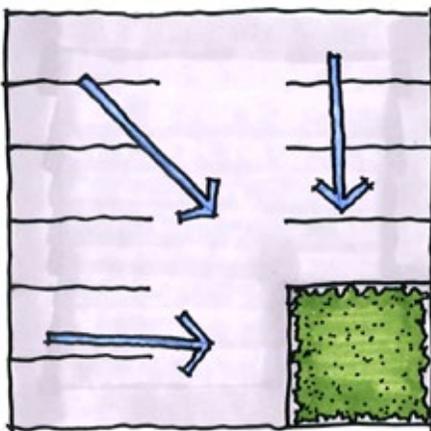
NDS should be designed and implemented with care, so as to be compatible with habitat management goals. Concerns about their use include drawing wildlife closer to roadways through habitat creation (potentially causing increased negative animal-vehicle interactions), and the possibility of concentrating 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)

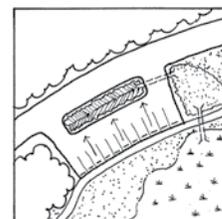
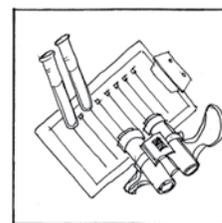
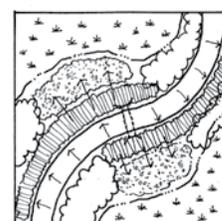
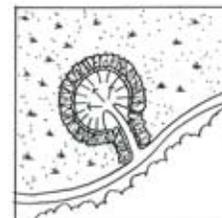
LID Philosophy

LID asks us to nurture stormwater rather than dispose of it. NDS features can 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.

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.

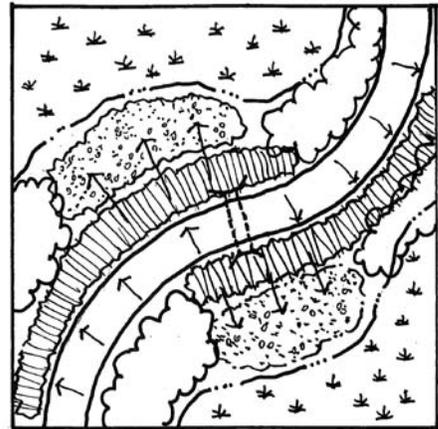
Smith, Stacy (Idaho Technology Transfer Center, Univ. of Idaho). 2005. BMP Handbook: Best Management Practices for Idaho Rural Road Maintenance.

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.



NDS features can detain runoff, slowing its flow to adjacent water bodies.

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 Hohm/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.

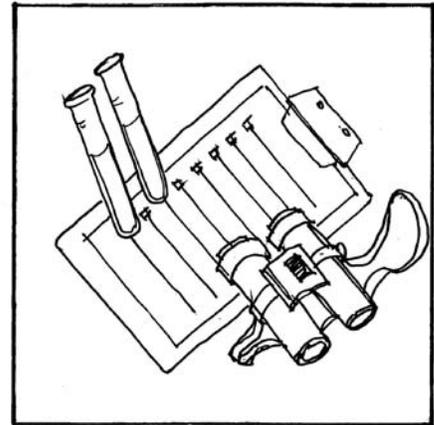
Washington Department of Ecology. 2010. Stormwater monitoring resources. Access at: <http://www.ecy.wa.gov/programs/wq/stormwater/municipal/strmH2Omonitoring.html>.

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.

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.

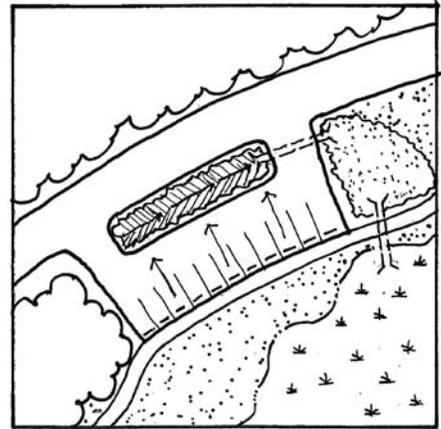
Center for Neighborhood Technology. 2010. Green Values Stormwater Management Calculator. Access at: <http://greenvalues.cnt.org/>

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 treatment facilities integrated into roadways provide places where FWS stewardship of aquatic resources can be demonstrated.

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

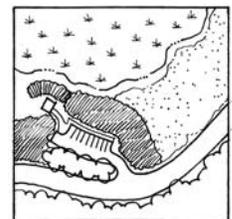
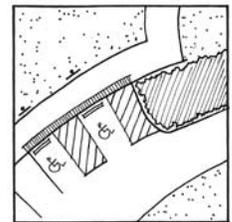
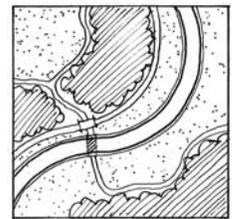
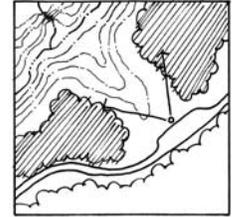
Overview

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.

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/>.

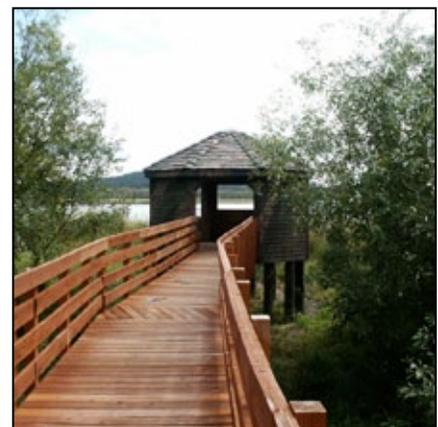


Plan roadways to afford views to areas of high scenic value.

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 Bainson

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.

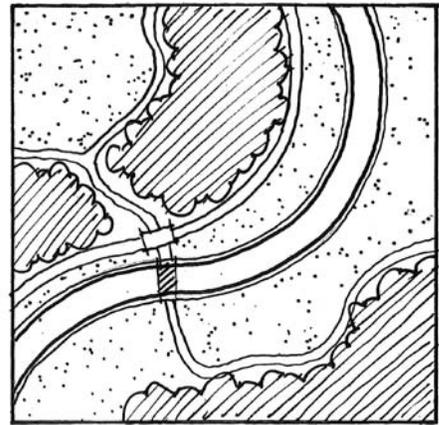
NPS Partnerships Case Studies (Transportation). See: http://www.nps.gov/partnerships/cs_type.htm#anchor19.

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 Baimson

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>

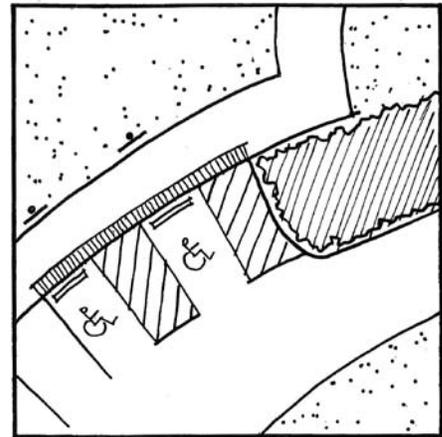
Draft Final Guidelines for accessibility in Outdoor Developed Areas on Federal lands:

<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*.

Provide accessible parking spaces with appropriate access aisles and access to pathways (top); accessible parking at Great Swamp NWR (right).



Brian Baimson

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.

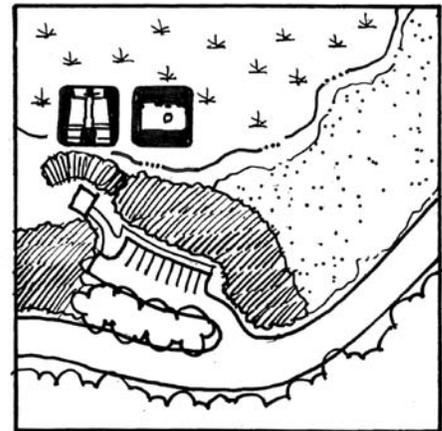
See: <http://www.parks.wa.gov/NoChildLeftInside/>.

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

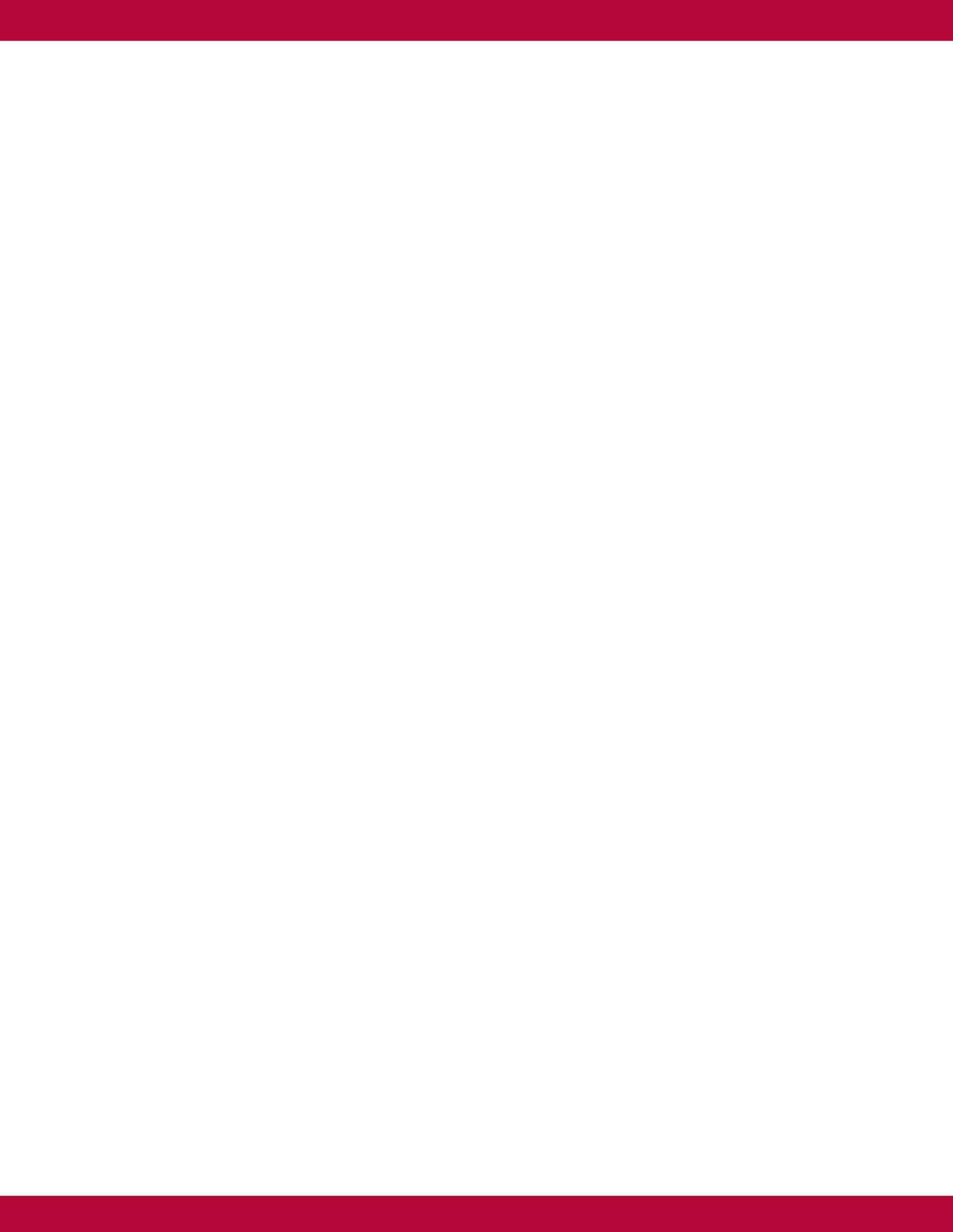
The 1997 Refuge System Improvement Act outlines "The Big Six" priority public uses for Refuge system improvements:

- 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



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Appendix B: Glossary

Abbreviations

ABA Architectural Barriers Act	NWR National Wildlife Refuge (also Refuge).
ABAAS Architectural Barriers Act Accessibility Standards	NWRS National Wildlife Refuge System
ADA Americans with Disabilities Act	ODOT Oregon Department of Transportation
ASCE American Society of Civil Engineers	R1 Region 1 of the FWS (HI, ID, OR, WA, Pacific Islands)
BGEPA Bald and Golden Eagle Protection Act	ROW Right-of-way
BLM Bureau of Land Management	SAMMS Service Asset Maintenance Management System
CCP Comprehensive Conservation Plan	USDA United States Department of Agriculture
CFR Code of Federal Regulations	USFS United States Forest Service
DCR Division of Diversity and Civil Rights (FWS Region 1)	VMT Vehicle miles traveled
EE Environmental Education	WDFW Washington State Department of Fish and Wildlife
ES Ecological Services	WSDOT Washington State Department of Transportation
ESA Endangered Species Act	WSPRC Washington State Parks and Recreation Commission
FHWA Federal Highway Administration	WVC Wildlife-vehicle collisions
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	

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).

- **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”.
- **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.





**U.S. Department of the Interior
U.S. Fish and Wildlife Service**

<http://www.fws.gov>

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Appendix E

Glossary of Terms

Glossary of Terms

Alternative transportation in parks and public lands program (ATPPL) – Congress established the ATPPL program to enhance the protection of national parks and federal lands and increase the enjoyment of those visiting them. Administered by the Federal Transit Administration in partnership with the Department of the Interior and the Forest Service, the program funds capital and planning expenses for alternative transportation systems such as shuttle buses and bicycle trails in national parks and public lands. The goals of the program are to conserve natural, historical, and cultural resources; reduce congestion and pollution; improve visitor mobility and accessibility; enhance visitor experience; and ensure access to all, including persons with disabilities.

Asset management – Asset management is a systematic process of maintaining, upgrading, and operating physical assets cost effectively. It includes preservation, upgrading and timely replacement of assets, through cost effective management, programming, and resource allocation decisions. Asset management combines engineering principles with sound business practices and economic theory, and provides tools to facilitate a more organized, logical approach to decision making.

Asset priority index (API) – API is a SAMMS metric used by field station managers to assess how critical each property asset is to accomplishing the FWS mission and goals. FWS uses the API to ensure that maintenance activities and projects proposed for funding are focused on highest priority assets. Similarly, the API is used to identify lowest priority assets for disposal.

Best management practices (BMPs) – BMPs are effective, practical, structural or nonstructural methods which prevent or reduce the movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or ground water, or which otherwise protect water quality from potential adverse effects of human activities. These practices are developed to achieve a balance between water quality protection and the production of wood crops within natural and economic limitations.

Congestion management system (CMS) – The CMS is a systematic approach, used by the U.S. Fish and Wildlife Service and other land management agencies that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. The CMS represents the state-of-the-practice in addressing congestion, by providing information on transportation system performance, and alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet Federal, State and local needs.

Context sensitive solutions (CSS) – CSS is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist.

Comprehensive Conservation Plan (CCP) – CCPs are planning documents developed for individual FWS wildlife refuges to provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes.

Comprehensive Hatchery Management Plan (CHMP) – CHMPs are operational management plans specific to fish hatcheries that are developed to outline policies and objectives relevant to the overall management of a specific fish hatchery. These documents are used as planning reference tools, to help integrate FWS objectives and priorities with those of other agencies; fulfill obligations under the Endangered Species Act and other management programs; identify and define specific hatchery reforms to implement; and provide a foundation for future program and budget development.

Core Team – This group serves as the project steering committee for the development of this Long Range Transportation Plan for FWS Lands in Region 1. The groups is composed of representatives from regional and headquarters offices of U.S. Fish and Wildlife Service and planning leadership from the Federal Highway Administration Federal Lands Highway Division.

Cultural landscape – The cultural landscape refers to a geographic area, including both cultural and natural elements, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values.

Cultural resources – Cultural resources include properties such as landscapes or districts, sites, building, structures, objects, or cultural practices that are usually greater than 50 years of age and possess architectural, historic, scientific, or other technical value. By their nature, these resources are non-renewable.

Deferred maintenance (DM) – Maintenance that was not performed when it should have been or when it was scheduled and, therefore, was put off or delayed for a future period.

Extended Team – This group serves as technical resource experts and key stakeholders from the U.S. Fish and Wildlife Service and Federal Land Highways, providing technical assistance and local context knowledge to the Core Team for the Long Range Transportation Plan for FWS lands in Region 1.

Facility condition index (FCI) – FCI is the ratio of the deferred maintenance costs to replacement value. This ratio is generated from data generated from condition assessments. This is an industry accepted indicator of the overall health of facility infrastructure.

Federal Lands Highway Program (FLHP) – The FLHP was created by the 1982 Surface Transportation Assistance Act and is administered through the Office of Federal Lands Highway which provides program stewardship and transportation engineering services for planning, design, construction, and rehabilitation of the highways and bridges that provide access to and through federally owned lands. The primary purpose of the FLHP is to provide financial resources and technical assistance for a coordinated program of public roads that service the transportation needs of Federal and Indian lands.

Fisheries Program – The FWS Fisheries Program partners with states, Native American Tribes, and other interested groups to restore and maintain fish and other important aquatic resources at self-sustaining levels and to support federal mitigation programs for the benefit of the American public. FWS takes a holistic approach to fishery conservation focusing on an array of scientific fishery management and conservations efforts. Region 1 in particular has a large concentration of fishery facilities due to the rich and diverse fish population native to the waters in the region. The region maintains a network of 32 fishery field stations.

Intelligent Transportation Systems (ITS) –ITS is a general term applied to a broad range of diverse technologies known collectively as intelligent transportation systems. They are built on a number of technologies, including information processing, communications, control, and electronics. Effectively integrating these technologies in our transportation system will save lives, time, and money. They provide the intelligent link between travelers, vehicles, and the physical transportation infrastructure. Examples include the use of ITS to: collect and transmit information on traffic conditions and transit schedules for travelers before and during their trips; alert travelers to hazards and delays so they can change their plans to minimize inconvenience and additional strain on the system; decrease congestion by reducing the number of traffic incidents, clearing them more quickly when they occur, and rerouting traffic flow around them; and assist drivers in reaching a desired destination with navigation systems enhanced with pathfinding, or route guidance.

Intergovernmental agreement (IGA) – An IGA is a formal contract between two or more jurisdictions under which governmental agencies agree to provide a service, perform a function or provide funding to another governmental agency under specific terms, as defined in the contract. For example, an agency may contract with another entity for law enforcement services. Intergovernmental agreements may also take the form of a joint service agreement where two or more jurisdictions join forces to plan, finance and deliver a service within the boundaries of all participating jurisdictions. Agencies may also enter into various types of service exchange arrangements under which participating jurisdictions agree to lend services to one another, generally without any payment being required.

Level of service (LOS) – Roadway traffic congestion is expressed in terms of LOS as defined by the Highway Capacity Manual. Operational LOS is a congestion measure used to describe service quality and is related to the density of the traffic stream. Freeflow conditions with no restrictions are described as LOS A. LOS B through D conditions demonstrate progressively worse traffic conditions. LOS F represents a breakdown in traffic flow, characterized by the familiar traffic jam.

Long Range Transportation Plan (LRTP) – The LRTP is a long-term blueprint of a region's transportation system. Usually LRTPs are conducted every five years and are plans for twenty to thirty years into the future. The plan identifies and analyzes transportation needs of the metropolitan region and creates a framework for project priorities. These plans are normally the product of recommendations and studies carried out and put forth by a Metropolitan Planning Organization (MPO).

Metropolitan Planning Organization (MPO) – A MPO is a transportation policy-making organization made up of representatives from local government and transportation authorities. In 1962, the United States Congress passed legislation that required the formation of an MPO for urbanized areas with a population greater than 50,000. Congress created MPOs in order to ensure that existing and future expenditures for transportation projects and programs are based on a continuing, cooperative and comprehensive (“3-C”) planning process. Federal funding for transportation projects and programs are channeled through this planning process.

Mission critical – Mission critical refers to a road or facility that is vitally important to meet mission of the FWS.

Multimodal transportation – The term multimodal refers to all forms of motorized and non motorized transport including cars, trucks, buses, boats, planes, bicycles, and pedestrians, etc.

National Highway Planning Network (NHPN) – The National Highway Planning Network (NHPN) is a 1:100,000 scale network database that contains line features representing just over 450,000 miles of current and planned highways in the U.S. The NHPN consists of interstates, principal arterials, and rural minor arterials.

National Park Service (NPS) – The National Park Service was created by an Act signed by President Woodrow Wilson on August 25, 1916. The National Park Service is a bureau of the Department of the Interior. Directly overseeing its operation is the Department’s Assistant Secretary for Fish and Wildlife and Parks.

Natural resources – Natural resources include features and values found in nature such as plants and animals, water, air, soils, topographic features, geologic features, paleontologic resources, natural quiet, and clear night skies that are worthy of preservation.

Project Leaders – The Project Leader is responsible to the refuge or refuge complex Regional Director for the safe and efficient implementation of activities within their unit, including cooperative activities with other agencies or landowners, in accordance with delegations of authorities.

Real property inventory (RPI) – The RPI contains information on all fixed assets with a replacement cost of \$5,000 or more. These fixed assets include such items as buildings, roads, bridges, levees, water management structures, fish raceways, boardwalks, fences, and other structures and facilities. The FWS collects data annually and report it to the General Services Administration.

Refuge Road Program – The Refuge Roads program was created under the 1998 Transportation Equity Act for the 21st Century (TEA-21). That act and the subsequent passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) provides authorization for National Wildlife Refuge System roads under the Federal Lands Highway program (FLHP). Through the refuge road program, \$29 million annually is authorized for spending on maintenance and improvements on Refuge Roads within the National Wildlife Refuge System. This includes project planning and contract administration as well as construction. Enhancements such as comfort stations, parking lots, bicycle/ pedestrian facilities and interpretive signage related to roads are also allowable.

Regional Transportation Planning Organization (RTPO) – A RTPO is formed through a voluntary association of local governments within a county or contiguous counties. RTPO members include cities, counties, tribes, ports, transportation service providers, private employers and others. MPOs and RTPOs serve the same basic transportation planning functions – to develop a long-range transportation plan, coordinate within a region, and prepare a transportation improvement program. RTPOs are specific to the state of Washington. However, other states have similar regional transportation planning entities that serve this same purpose.

Road Inventory Program (RIP) – The FWS currently manages over 4,900 miles of public roads in the 50 states, Puerto Rico, Virgin Islands and Guam. Approximately 8% of the roads are paved. The remaining 92% are gravel or native material. The value of these assets is estimated at \$1.5 billion. The Federal Lands Highways Division (FLHD) conducts an inventory and condition assessment of all public roads and parking lots on national wildlife refuges and national fish hatcheries over a five year period. This inventory and condition assessment serves as the FWS’s basic public use road management system. It provides a benchmark from which the FWS is able to document the status, condition, funding needs and improvements of the public roads.

Road safety audit (RSA) – A road safety audit is a formal safety performance examination of an existing or future road or intersection by an independent audit team.

Service Asset Maintenance Management System (SAMMS) – SAMMS is an asset management database that documents facility and equipment deficiencies, justifies budget requests for maintenance needs, and provides a sound basis for management decision-making. Property inventory data is maintained as part of the SAMMS to aid in completing inspection and maintenance activities and quantify the complete picture of facilities and equipment owned by FWS. This tool allows field station managers obtain accurate and current information on all real and personal property for which they are responsible. Two types of inventories are conducted and maintained within SAMMS, a Real Property Inventory and a Personal Property Inventory.

Statewide Transportation Improvement Program (STIP) – The STIP is a prioritized, multi-year program for the implementation of transportation improvement projects. As such, it serves as a management tool to ensure the most effective use of funding for transportation improvements. The STIP is a requirement of the transportation planning process, legislated by the SAFETEA-LU. Traditional state sponsored transportation improvements are not eligible for federal funding unless they are listed in the STIP.

Transportation Improvement Program (TIP) – The TIP is a program prepared by a metropolitan or rural planning organization that lists projects to be funded with FHWA/FTA funds for the next one- to three-year period.

Transportation infrastructure – Transportation infrastructure includes roads, bridges, sidewalks, trails (paved and unpaved, front country and back country), waterways, etc.

Transportation planning – Transportation planning for land management incorporates a continuing, comprehensive, and collaborative process to encourage and promote the development of multimodal transportation systems to ensure safe and efficient movement of visitors, employees, and goods while balancing resource protection, visitor experience, and community needs.

Travel demand management (TDM) – TDM is a term given to a broad range of strategies that optimize transportation system performance for commute and non-commute trips. Strategies typically include those that encourage travelers to change their travel mode from driving alone to choosing a carpool, vanpool, public transit vehicle, or other commuter alternative. Managing travel demand focuses on providing all travelers, regardless of whether they drive alone, with choices of location, route, and time, not just mode of travel. Information technology is playing an increasingly more important role in the delivery of TDM strategies.

User capacity – As it applies to wildlife refuges and fish hatcheries, user capacity is the type and level of use that can be accommodated while sustaining the desired resource and social conditions based on the purpose and objectives of a refuge or hatchery unit.

Vehicle miles traveled (VMT) – VMT, or the total number of miles that vehicles are driven represents key data for highway planning and management, and a common measure of roadway use. Along with other data, VMT is often used in estimating congestion, air quality, and potential gas-tax revenues.

Visitor experience – The visitor experience refers to quality and perception of a visitor's visit to a wildlife refuge or fish hatchery in the context of the intended uses at a given facility (wildlife viewing, environmental education, and ease of access).

Visitor facility enhancement (VFE) – The VFE program includes improvements on FWS-owned lands aimed at enhancing wildlife viewing opportunities for the public while providing access in the form of interpretive pullouts, trails, and interpretive kiosks which provide a public benefit. Projects in this program must conserve, protect, and enhance fish, wildlife and plants for the continuing benefit of the American people, consistent with the FWS Mission.

Appendix F

Long Range Transportation Plan for the U.S. Fish and Wildlife Service Lands in Region 1 Public Involvement Plan

Public Involvement Plan

Background

U.S. Fish and Wildlife Service (Service) Region 1 is developing a long range transportation plan (LRTP) that will establish goals, and objectives for how transportation can best help the Service achieve its overarching mission of connecting people to nature at National Wildlife Refuges and National Fish Hatcheries. The purpose of this LRTP is to develop a transportation planning process model for regional level transportation planning within the Service. It will bring the Service into compliance with Federal legislation requiring Federal Land Management Agencies to conduct long-range transportation planning in a manner consistent with U.S. Department of Transportation planning practices for States and Metropolitan Planning Organizations (MPOs). The LRTP will provide Service leaders with a replicable region-level transportation planning process, benchmarks for evaluating transportation projects in an asset-informed environment across the region, and essential facts necessary for informing future planning and operational decisions.

Goals of Public Outreach and Communications

The fundamental purpose of this Public Involvement Plan (PIP) is to provide the structure for an inclusive public process that internal and external stakeholder groups may participate in during the development of the LRTP for Service Lands in Region 1. The goals of this effort include:

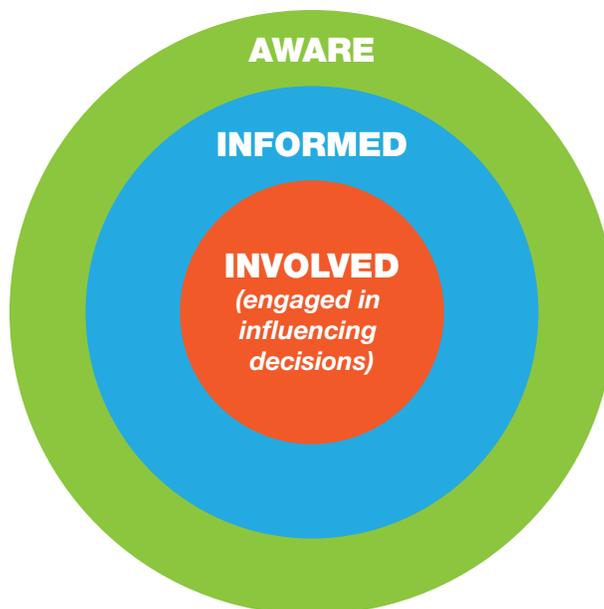
- Solicit input from Service staff that will inform the transportation planning effort

- Inform and educate external stakeholders about decision-making in Region 1 relative to transportation planning
- Provide opportunities for stakeholders to identify their concerns, values, ideas, and interests of the Region 1 transportation system
- Provide Service staff and external stakeholders the opportunity to review and comment on the LRTP at key decision points
- Build support from internal and external stakeholders for the processes and projects adopted under the LRTP
- Strengthen existing partnerships while forging new ones
- Identify opportunities for coordination with priority MPOs and States for short and medium term project development

Public Involvement Approach

The Service recognizes that different transportation planning efforts have varying levels of public participation throughout the decision-making processes. The context of this Region 1 LRTP canvases four western states, including remote Pacific islands. Given this geographic and demographic diversity, there cannot be an expectation that all or even most of the potential stakeholders will be able to participate, or have interest in directly influencing the outcomes of the plan. Figure 1 illustrates the varying levels of public participation for this LRTP.

Figure 1
Levels of Public Participation for Region 1 LRTP



The Service seeks to affect a large number of interested persons and groups by making them aware that the planning activities are taking place, illustrated by the large outer circle. This group will realize that the Service has a process for making transportation decisions and that there is a potential for specific transportation projects to emerge from that process (the LRTP). A somewhat smaller group will be knowledgeable about the LRTP and the transportation problems it seeks to address. For this group, the public involvement processes will be designed to inform them of

rationale for the LRTP, the related decision-making processes, and the anticipated outcomes for Region 1. A much smaller group will be involved, or actively engaged in influencing the decision, represented by the small inner circle in Figure 1.

Table 1 summarizes the internal and external stakeholders the Service hopes to engage at these varying levels throughout the LRTP development. A complete listing of contact information for these stakeholders can be found in the Appendix.

Table 1
Internal and External Stakeholders in Region 1

Involved	Informed	Aware
Internal		
<ul style="list-style-type: none"> - Region 1 LRTP Core Team - Region 1 LRTP Extended Team (subject matter experts) 	<ul style="list-style-type: none"> - Region 1 ARDs - Project leaders - Refuge/Hatchery supervisors - Division Chiefs - Refuge road coordinators 	<ul style="list-style-type: none"> - Budget, contracting, and general services offices - External Affairs - Fire and Law Enforcement - Safety office - Cultural resource office - Fisheries Resource Office - Aquatic Nuisance Species coordinator - National CCP coordinator - Chiefs of Planning and Natural Resources - National Refuge Chiefs - Washington Office
External		
	<ul style="list-style-type: none"> - MPOs - State Departments of Transportation - U.S. Army Corps of Engineers - Bureau of Reclamation - Bureau of Indian Affairs - U.S. Forest Service - National Park Service - Bureau of Land Management - State byways - State Fish and Game agencies - Department of Defense agencies - FHWA Division offices in Region 1 	<ul style="list-style-type: none"> - Congressional/ reauthorization staff and committees - Agencies with an MOU with the Service - State Historic Preservation Office - Collaborative Environmental Transportation Agreement for Streamlining - National Oceanic and Atmospheric Administration - U.S. Coast Guard - Federal Aviation Administration - State Parks - National Wildlife Refuge Association - Refuge and Hatchery Friends groups - Conservation Organizations - Council of University Transportation Centers – 10 total (Oregon Transportation Research and Education Consortium, etc.) - Railroads (those located within Service units) - Gateway communities - Libraries of communities around Service units - Western Governors Association - TRB Transportation Needs of Parks and Public Lands Committee - State Tourism Offices

Strategies

The strategies used to engage the public and agency groups are perhaps the most important element of a public involvement plan. Strategies

are intended to target a specific audience with an intended purpose. Tables 2 and 3 summarize the primary strategies that will be used to engage both internal and external stakeholders as part of the LRTP and when each strategy will be implemented.

Table 2
Stakeholder Outreach Strategies

Task	Who	When
Internal Strategies		
Define roles and assign specific duties to the Core and Extended Teams for this public participation plan	Core team	March 30, 2009
Develop Region 1 Transportation intranet website	Holm	TBD
Internal email distribution to Informed group including link to Planning Update 1	Holm	April 2009
Hold Region-wide briefing or webinar to disseminate key findings and funding opportunities identified in this LRTP	Core team	TBD
Develop data sheets to disseminate to Service units that are currently conducting or preparing for CCPs, including all fisheries to gather additional data	Holm/Hayduk	TBD
Distribution of internal Draft Plan to key internal stakeholders	Core team	At Draft Plan
Host Web-conferences for field staff & management at Draft Plan	Core team	At Draft Plan
Coordinate with Washington Office, Chief of Refuges, Director	Furniss/Caldwell	Ongoing
Brief Region 1 Senior Management	Marxen	Ongoing
External Strategies		
Compile external mailing list	Contractor/Core Team	March 20, 2009
Establish list of external outreach opportunities	Core Team	March 20, 2009
Distribute Planning Update Newsletter 1	Contractor/Core Team	Following internal distribution
Initiate contact with external informed stakeholders to gauge interest in additional information about LRTP	Core Team	TBD
Conduct webinar and/or informal presentations to external informed stakeholders about LRTP	Core Team	As needed
Develop and distribute Planning Update 2 - focused on re-authorization and project accomplishments	Contractor/Core Team	TBD
Monitor exchange of information and comments from the public and stakeholders to the LRTP Core Team (review & summarize comments at key milestones)	Contractor	At key milestones
Federal Register Notice announcing public release of draft LRTP	Division of Planning and Visitor Services	At draft LRTP
Summarize all internal and external comments and responses on draft plan development	Contractor/Core Team	Following draft comment period
Document and evaluate public involvement process; develop model for Service regions	Contractor/Core Team	At Final LRTP

Table 3 identifies the key milestones in the LRTP decision-making process at which specific outreach strategies will be designed to seek input from Service staff and external stakeholders.

Table 3
Stakeholder Involvement Strategy by Task

Key Milestones of the Plan	Outreach Strategy
<ul style="list-style-type: none"> - Vision, Mission, Goals, and Objectives - Purpose and Need - Definition of transportation on Service lands 	<p>Initial Contact – First Planning Update Newsletter, website development, one-page overview, targeted meetings/contact with internal and external stakeholders to solicit input.</p>
<ul style="list-style-type: none"> - Existing conditions and trends - Strategies based on Management - Systems/Needs/Other priorities - Performance Measures - Investigation of funding opportunities 	<p>Midway Update – Update website, targeted meetings with internal and external stakeholders, solicit input.</p>
<ul style="list-style-type: none"> - Preferred strategy and fiscal constraint - Plan and Summary Report - Process Document 	<p>Final input – Final Planning Update Newsletter to solicit comments; website update; Seek consensus among key stakeholders.</p>

Appendix G

National Wildlife Refuge Comprehensive Conservation Plan Transportation Planning Guidance

National Wildlife Refuge Comprehensive Conservation Plan Transportation Planning Guidance

Updated February 20, 2008

Transportation Planning Requirements and Guidance

The Refuge Roads Program (RRP) was established in June 1998, when Congress passed the *Transportation Equity Act for the 21st Century* (TEA-21). The passage of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) in August 2005 reauthorized the RRP and authorized the Alternative Transportation for Parks and Public Lands (ATPPL) program.

Under Title 23 U.S.C. §204(a)(2), the Department of Transportation, in cooperation with the Department of the Interior, is required to develop transportation planning procedures for the Fish and Wildlife Service (Service) that are consistent with the metropolitan and statewide planning processes.

Under Title 49 U.S.C. §5320(e)(1)(A), the Department of Transportation, in cooperation with the Department of the Interior, is required to develop transportation planning procedures for the Service that are consistent with the metropolitan planning provisions, the statewide planning provisions and the public participation requirements.

All transportation projects funded under the RRP must take into consideration the Comprehensive Conservation Plan (CCP), related land use planning (i.e. step-down management plans) and impacts of planning on existing transportation facilities as required by Title 23 U.S.C. §202(e). The whole transportation system should support the mission of the FWS to “conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of present and future generations.”

Failure to address/identify/integrate transportation related planning considerations and needs in a station’s CCP and step-down management plans would result in the individual refuge or waterfowl production area having to develop a separate transportation plan (i.e. a transportation step-down management plan) before any RRP funding or other transportation program funding can be allocated for transportation related improvements.

Transportation planning is an eligible activity for funding under the Refuge Roads Program. There is a nationwide, interagency indefinite delivery indefinite quantity (IDIQ) contract for architect-engineer services for transportation planning, design and implementation that can be used for transportation planning assistance.

When assistance is needed with transportation planning, the Regional Refuge Roads Coordinator should be contacted. For regional contacts and additional information on refuge roads visit the Service’s web site at <http://www.fws.gov/refuges/roads/index.html>.

The Service’s refuge planning policy requires that one of the elements to be considered in the development of a CCP is transportation, including public use roads and trails, pedestrian and cyclist needs, and water and air access as appropriate for each unit of the Refuge System. Transportation issues have always been an inherent part of providing public access and facilitating the Service’s priority public uses. The transportation element in the planning requirements helps focus attention on the public safety and access issues associated with the Service’s public use programs.

It is important to note that this assessment needs to include the transportation systems within the individual refuge as well as the public access to the refuge. Management and public use changes at a refuge may not only impact the refuge transportation systems but also the local transportation systems that provide access to the refuge. Like wildlife connectivity issues, transportation needs tends to be regional in nature, so transportation planning involves ongoing collaboration and coordination with local and regional stakeholders that manage roads, trails, and transit systems.

The Service must coordinate any proposed transportation system changes and improvements with the respective State, Metropolitan and Rural Planning Organizations to assure that, among other considerations, there will be no negative impacts to congestion or air quality.

Every CCP and step-down management plan related to public use should have clearly identifiable transportation related planning documentation. The transportation planning component of these plans is intended to identify, evaluate and integrate in a comprehensive manner the specific needs, considerations and potential impacts of all transportation alternatives identified by the Service and the public during the planning process. This includes public and administrative roads, multiple use trails, air and water based transportation, pedestrian issues, and public transit all which vary by location and use.

Alternative Transportation Planning

A holistic approach to transportation includes a variety of concepts that should be incorporated into the transportation planning process. Considering 'Alternative Transportation' (including transit, bike, pedestrian, air, and water access) on federally managed lands can help achieve the following goals:

Relieve traffic congestion and parking shortages

– Alternative Transportation reduces the number of vehicles needed to transport an equal or greater number of visitors to destinations thereby reducing the need for private vehicle parking spaces.

Enhance visitor mobility and accessibility

– Alternative Transportation enhances visitor experience by permitting visitors to enjoy their site experience rather than concentrating on driving or finding scarce parking spaces. Bike access allows visitors to enjoy their surroundings at a slower pace and connect more readily to the resources. Additionally, transit can provide visitors with disabilities improved access to many sites.

Preserve sensitive natural, cultural and historic resources

– Alternative Transportation can reduce negative impacts to resources made by private vehicles by reducing the parking footprint, minimizing impacts to wildlife due to traffic, and providing more controlled access to sensitive resources.

Provide improved interpretation, education and visitor information services – At cultural and historical sites, Alternative Transportation can enhance the ability of site personnel to provide interpretive services to present past events in a logical, sequential manner.

Reduce pollution – Air quality could be improved by decreasing the total number of vehicles accessing sites as well as replacing older vehicles with lower emission vehicles. Ambient noise levels can also be reduced with alternative transportation, which improves visitor experience and reduces wildlife disturbance.

Improve economic development opportunities for gateway communities

– Alternative Transportation can improve connectivity with surrounding communities, thereby increasing the accessibility of recreational activities. Increasing accessibility through Alternative Transportation can increase the site visitation levels, resulting in additional economic revenues in the local communities through increased use of hotels, restaurants, and other visitor-oriented services.

Alternative Transportation systems can serve both internal trips within and external trips to Federal Lands. In general, at sites where Alternative Transportation is feasible and prudent, needs may be modest and can be served by a small number of vehicles operating on a seasonal basis.

Non-motorized Transportation includes bicycling, walking, hiking, wheelchair use, running, bird-watching, nature interpretation, backpacking, equestrian, non-motorized human-powered snow uses (i.e., skiing, snowshoeing, etc.).

Examples of non-motorized projects include:

- Expand existing bikeways or create new bikeways to increase the opportunity to use a bicycle as a mode of transportation and provide better internal linkages (National Elk Refuge)
- Connect Federal agency trails to the regional trail system and adjacent community trails. (Parker NWR, Neal Smith NWR)
- Build pedestrian paths along tour routes to increase safety and encourage bike/pedestrian use.
- Build hiking trails to encourage non-motorized visitation (Prime Hook NWR)
- Provide bicycle rental program to encourage non-motorized travel

Bus transit systems include a variety of vehicle technologies including tourist trams, vans and van conversions, school buses, small transit buses, historic trolley replicas, standard transit buses, airport apron buses, articulated transit buses, bi-articulated buses, buses with trailers, low floor transit buses, motor coaches, double-decker buses, snow coaches, and electric trolley buses. These vehicles are typically propelled by conventional internal combustion engines (gasoline or diesel) or alternative fuels such as compressed natural gas, bio-diesel, or hybrid electric. Buses can use existing or improved public roads to or within parks/public lands. Most new alternative transportation systems for federally managed public lands will likely be based on buses.

Examples include:

- Develop a guided internal tour route, monitor use to implement changes in tour length, period of operation, seasonality, reservation system. Utilize clean-fuel vehicle, tram, and/or an enclosed, climate-controlled shuttle for the hot summer months. (Rocky Mountain Arsenal NWR, Patuxent NWR, Back Bay NWR)
- In areas of heavy parking congestion, close off access to private vehicles and provide a tour route for visitor access. (Santa Ana NWR)
- Develop an on-demand or regularly scheduled shuttle service from the visitor center or other large parking lots to and from the major activity areas within the Refuge.

Alternative Transportation Systems

- Establish a peak season, weekend shuttle system that operates on a fixed schedule between a potential parking lot/activity center located in the gateway community and the Federal lands.
- Work with surrounding public transit agencies to extend existing public bus routes to the Federal facilities to enhance public access and to increase access by under-served communities. It would be operated frequently enough to afford an attractive alternative to driving for visitors and residents. (Rocky Mountain Arsenal NWR)
- Develop a transit program for transporting visitors from hotels to tourist events.
- Fixed guideway (rail, light rail, streetcars) systems could be considered in very limited applications where infrastructure is already in place. (Merritt Island rail tour)

Waterborne Transportation should be considered wherever there are areas with limited, if any, access by land, such as on an island, peninsula, or lake. This type of transportation may be particularly useful where major communities are located around the waterways. Types of waterborne transit vehicles include: pontoons and skiffs, mono hull vessels, canoes, kayaks, catamarans and hydrofoils.

Examples include:

- Establish a ferry shuttle to transport visitors between the local area and the Federal lands
- Establish an interpretive boat ride to tour wetland areas.
- Encourage canoe or kayak use by establishing water trails. (Prime Hook NWR)

Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems is a term to describe application of the most current technology to improve communication to the traveling public, a powerful tool in enhancing the visitor experience. Examples include electronic signs relaying real-time information on roadways, such as road conditions, construction information, parking availability, and weather information.

Establishing a 511 telephone number is another way to broadcast information. State Departments of Transportation (DOTs) develop ITS plans that develop both the technology needed as well as the content of messaging. For more information on ITS, go to <http://www.fws.gov/refuges/roads/its.html>.

Transportation Planning Resources

Transportation Plans help identify transportation needs within Refuges and lay out potential strategies to improve mobility and safety, while

protecting resources. As described earlier, the CCP transportation step-down management plan is a tool to comprehensively plan transportation.

Step-down transportation plans should consider Alternative Transportation systems concepts, however, they tend to be high-level and policy oriented. Additional transportation planning will be required to determine the feasibility and operations of these systems. NWR transportation studies are either complete or underway at Ding Darling NWR, White River NWR, Bombay Hook NWR, Chincoteague NWR, Kilauea Point NWR, Ash Meadows NWR, Monomoy NWR, and Ridgefield NWR.

Public Involvement

During the transportation planning process, the Service will provide the public an opportunity to comment on the existing and any proposed changes or improvements to the refuge's public transportation systems and infrastructure. This would include public use roads, parking, land and water trails, transit systems (including ferries, trams, shuttles, buses, etc.) and other applicable forms of land, water and air transportation providing access to or within an individual unit. Also included in this would be any related transportation infrastructure such as visitor information, signage, comfort stations, guard rails, water access points, etc.

In order to facilitate public access to the list of transportation improvements being proposed for funding under the RRP for the current year and subsequent four years, the Service will post a list of projects on the Refuge System web site and the three Federal Highway Administration (FHWA) Federal Lands Highway Divisions web sites.

Additionally, the Service and FHWA will post copies of the most current inventory and condition assessments, and geographic information systems data for public use roads and trails on their respective web servers. This will facilitate the public's ability to access information about the current status and location of the respective trail and road infrastructure.

The comprehensive transportation element (plan) will articulate to the public how access is proposed or provided to a specific station; how transportation facilities support and help facilitate the Service's highest priority of comprehensive resource management and protection; ensures safe public access and improves the visitor experience; and, that compatibility requirements relative to the protected resources will be used to evaluate public use.

NWR Transportation Data

The Service's public use roads and trails on refuges and hatcheries have been identified and mapped by FHWA, as part of the Road Inventory Program (RIP) inventory and condition assessment conducted on behalf of the Service. This information has been provided to all refuges and hatcheries. Copies of specific reports are available for public review upon request. The RIP data for improved roads (paved and gravel) is updated on a five-year cycle.

Planning and Funding Resources

Transportation Guidebooks have been developed for both the National Park Service and Forest Service, link to these documents at <http://www.fws.gov/refuges/roads/Transguide.html>

Scenic Byways Program information, go to <http://www.fws.gov/refuges/roads/byways.html>

Refuge Trails information, go to <http://www.fws.gov/refuges/roads/trails.html>

Transportation Enhancement Programs information, go to <http://www.fws.gov/refuges/roads/transEnhancements.html>

National Park Service Shuttle Systems: <http://www.nps.gov/transportation/tmp/shuttles.htm>

Alternative Transportation for Parks and Public Lands Link: http://www.fta.dot.gov/funding/grants/grants_financing_6106.html

Federal transportation programs link: <http://www.fws.gov/refuges/roads/links.html>

Most comprehensive resource is the refuge roads website: <http://www.fws.gov/refuges/roads/index.html>

Region 1 CCP Schedule - NW

Refuge/Complex	Lead Planner	GIS Support	Preplanning			Scoping			Alternatives		Internal & Public Review			CCP Finalization					
			Initiate Pre-planning	Pre-planning Report to RO	Pre-planning Approval	FR NOI Published	Scoping Report to RO	Scoping Status Report to WO	Preliminary Draft Alternatives RO Briefing	Alternatives Status Report to WO	Internal Review Draft to RO	Draft CCP FR NOA Published	Draft CCP Public Review Closes	Final CCP Status Report to WO	FONSI Signed	FEIS NOA Published	ROD Signed	FR NOA Final CCP Published	Final Standalone CCP
PLANS UNDERWAY																			
Protection Island	Bardolf	So	Oct 2006	Feb 2007		July 2007		Apr 2008	Jun 2008	Mar 2009	Dec 2009	Mar 2010	Apr 2010	Jul 2010	Sep 2010				Jan 2011
San Juan Island	Bardolf	So	Oct 2006	Feb 2007		July 2007		Apr 2008	Jun 2008	Mar 2009	Dec 2009	Mar 2010	Apr 2010	Jul 2010	Sep 2010				Jan 2011
Ridgefield	Morris	Maty	Jul 2005	Mar 2006		June 2006		Jan 2007	Nov 2008	June 2009	Feb 2010	Mar 2010	May 2010	Aug 2010	Sep 2010				Jan 2011
Julia Butler Hanson	Young	So	Oct 2005	Mar 2006		Sep 2006		Nov 2006	May 2007	June 2007	Mar 2009	2/10/10	3/29/10	Apr 2010		May 2010	Jun 2010		Sep 2010
Lewis & Clark	Young	So	Oct 2005	Mar 2006		Sep 2006		Nov 2006	May 2007	June 2007	Mar 2009	2/10/10	3/29/10	Apr 2010		May 2010	Jun 2010		Sep 2010
Cape Meares	Bardolf	So	Jan 2006	Aug 2006		Sep 2006		Jan 2007	Nov 2007	May 2008	Oct 2008	6/15/09	June 2009	Aug 2009	Sep 2009				Oct 2009
Oregon Islands	Bardolf	So	Jan 2006	Aug 2006		Sep 2006		Jan 2007	Nov 2007	May 2008	Oct 2008	6/15/09	June 2009	Aug 2009	Sep 2009				Oct 2009
Three Arch Rocks	Bardolf	So	Jan 2006	Aug 2006		Sep 2006		Jan 2007	Nov 2007	May 2008	Oct 2008	6/15/09	June 2009	Aug 2009	Sep 2009				Oct 2009
Sheldon	Collins	Drescher	Feb 2006	Apr 2008		5/12/08		Dec 2008	Mar 2009	Nov 2009	Nov 2009	Jan 2010	Mar 2010	Jul 2010		Aug 2010	Sep 2010		Nov 2010
Ankeny	Selvaggio	Cruz	Oct 2006	Oct 2007		2/29/08		May 2008	Nov 2008	Oct 2009	Mar 2010	Jul 2010	Sep 2010	Nov 2010	Dec 2010				Feb 2011
Baskett Slough	Selvaggio	Cruz	Oct 2006	Oct 2007		2/29/08		May 2008	Nov 2008	Oct 2009	Mar 2010	Jul 2010	Sep 2010	Nov 2010	Dec 2010				Feb 2011
William L. Finley	Selvaggio	Cruz	Oct 2006	Oct 2007		2/29/08		May 2008	Nov 2008	Oct 2009	Mar 2010	Jul 2010	Sep 2010	Nov 2010	Dec 2010				Feb 2011
Columbia	Haas	Hayes	Jan 2007	Nov 2008		May 2009		11/23/09	Dec 2009	Jan 2010	Sep 2010	Oct 2010	Dec 2010	Mar 2011	Apr 2011				Jun 2011
Willapa	Young	So	Sep 2007	Mar 2008		4/9/08		June 2008	Apr 2009	May 2009	12/30/09	May 2010	Jun 2010	Oct 2010		Dec 2010	Jan 2011		Mar 2011
Kootenai	Morris	Cruz	Nov 2007	Oct 2008		2/23/09		June 2009	3/04/10	Dec 2009	Apr 2010	Aug 2010	Oct 2010	Dec 2010	Feb 2011				May 2011
Deer Flat	Wing	Maty	Jan 2008	Mar 2009		Jan 2010*		May 2010	Mar 2011	Aug 2011	Jan 2012	Apr 2012	May 2012	Sep 2012	Dec 2012				Mar 2013
Minidoka	Morris	Maty	Jan 2008	Dec 2008		Jan 2010*		May 2010	Mar 2011	Aug 2011	Jan 2012	Apr 2012	May 2012	Sep 2012	Dec 2012				Mar 2013
*Waiting for SOL feedback on DRF and MND and meetings with BOR, IDFG, and State Lands before proceeding with scoping; after new PL EODs for DRF																			
PRE-PLANNING BEGINNING IN FY09																			
Malheur	Selvaggio	Stockenberg	Jan 2009	Jan 2010		6/29/09	Jan 2010	Mar 2010	Aug 2010	Sep 2010	Feb 2011	May 2011	July 2011	Dec 2011		Apr 2012	Jun 2012		Jul 2012
Cold Springs	Haas	Hayes	Apr 2009	Mar 2010		Apr 2010		Sep 2010	Feb 2011	Apr 2011	July 2011	Oct 2011	Nov 2011	Feb 2012	Apr 2012				June 2012
McKay Creek	Haas	Hayes	Apr 2009	Mar 2010		Apr 2010		Sep 2010	Feb 2011	Apr 2011	July 2011	Oct 2011	Nov 2011	Feb 2012	Apr 2012				June 2012
Bear Lake	Morris	Stockenberg	May 2009	Mar 2010		Apr 2010		June 2010	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Dec 2012				Mar 2013
Oxford Slough	Morris	Stockenberg	May 2009	Mar 2010		Apr 2010		June 2010	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Dec 2012				Mar 2013
Camas	Morris	Stockenberg	May 2009	Mar 2010		Apr 2010		June 2010	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Dec 2012				Mar 2013
Grays Lake	Smith	Stockenberg	Jan 2009	Jun 2009		Apr 2010		June 2010	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Dec 2012				Mar 2013
Conboy Lake	Haas	Hayes	July 2009	Mar 2010		Sep 2010		Jan 2011	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Nov 2012				Dec 2012
Toppenish	Haas	Hayes	July 2009	Mar 2010		Sep 2010		Jan 2011	Apr 2011	May 2011	Sep 2011	Jan 2012	Mar 2012	Sep 2012	Nov 2012				Dec 2012
PRE-PLANNING BEGINNING IN FY10																			
Tualatin River	McCarthy	So	Oct 2009	Mar 2010		Jun 2010		Dec 2010	May 2011	Jun 2011	Aug 2011	Mar 2012	May 2012	Sep 2012	Dec 2012				Mar 2013
Black River (Nisqually)	Young	So	Jan 2010	May 2010		Nov 2010		Apr 2011	Oct 2011	Dec 2011	Feb 2012	May 2012	Jun 2012	Sep 2012	Dec 2012				Mar 2013
Grays Harbor	Young	So	Jan 2010	May 2010		Nov 2010		Apr 2011	Oct 2011	Dec 2011	Feb 2012	May 2012	Jun 2012	Sep 2012	Dec 2012				Mar 2013
Bandon Marsh	Bardolf	So	Nov 2009	Jun 2010		Oct 2010		Feb 2011	Jul 2011	Sep 2011	Jan 2012	Apr 2012	May 2012	Aug 2012	Nov 2012				Feb 2013
Nestucca Bay	Bardolf	So	Nov 2009	Jun 2010		Oct 2010		Feb 2011	Jul 2011	Sep 2011	Jan 2012	Apr 2012	May 2012	Aug 2012	Nov 2012				Feb 2013
Siletz Bay	Bardolf	So	Nov 2009	Jun 2010		Oct 2010		Feb 2011	Jul 2011	Sep 2011	Jan 2012	Apr 2012	May 2012	Aug 2012	Nov 2012				Feb 2013
Dungeness	Bardolf	So	Mar 2010	Sep 2010		Dec 2010		Apr 2011	Jun 2011	Aug 2011	Nov 2011	Mar 2012	Apr 2012	Jul 2012	Oct 2012				Jan 2013

Color key

Complete

Past due(?)

Due in the next 3 months

Dates need review

**Region 1 CCP Milestones
Hawaii/Pacific Islands**

Refuge/Complex	Lead Planner	Preplanning			Scoping			Alternatives			Internal & Public Review			CCP Finalization			
		Initiate Preplanning	Preplanning Report to RO	Preplanning Approval	FR NOI Published	Scoping Report to RO	Scoping Status Report to WO	Preliminary Alternatives RO Briefing	Alternatives Status Report to RO	Alternatives Status Report to WO	Internal Review Draft to RO	Draft CCP FR NOA Published	Draft CCP Public Review Closes	Final CCP Status Report to WO	FONSI Signed	FR NOA Final CCP Published	Final Standalone CCP
Guam	Perry	July 2006	Mar 2007		Jul 2007		Oct 2007	Oct 2008		Dec 2008		7/22/09	Jul 2009	Sep 2009	Sep 2009	Dec 2009	
Kealia Pond	Beauregard	Sept 2006	May 2009		10/20/09		12/16/09	Jan 2010		Feb 2010	Apr 2010	Jun 2010	Jul 2010	Sep 2010	Sep 2010	Oct 2010	
Kakahaia	Beauregard	Sept 2006	May 2009		10/20/09		12/16/09	Jan 2010		Feb 2010	Apr 2010	Jun 2010	Jul 2010	Sep 2010	Sep 2010	Oct 2010	
J. Campbell	Beauregard	Jan 2007	Jun 2008		12/1/08		May 2009	Oct 2009		Nov 2009	Jan 2010	Mar 2010	Apr 2010	Jun 2010	Jun 2010	Aug 2010	
Pearl Harbor	Beauregard	Jan 2007	Jun 2008		12/1/08		May 2009	Oct 2009		Nov 2009	Jan 2010	Mar 2010	Apr 2010	Jun 2010	Jun 2010	Aug 2010	
Hakalau Forest	Perry	Oct 2007	Oct 2008		2/25/09		Apr 2009	Oct 2009	1/11/10	1/14/10	Dec 2009	Mar 2010	Apr 2010	May 2010	May 2010	Aug 2010	
Huleia	Perry	Oct 2007	June 2009		9/28/09		Jan 2010	Mar 2010		May 2010	Aug 2010	Nov 2010	Jan 2011	May 2011	May 2011	Aug 2011	
Hanalei	Perry	Oct 2007	June 2009		9/28/09		Jan 2010	Mar 2010		May 2010	Aug 2010	Nov 2010	Jan 2011	May 2011	May 2011	Aug 2011	
Kilauea Point	Perry	Oct 2007	June 2009		9/28/09		Jan 2010	Mar 2010		May 2010	Aug 2010	Nov 2010	Jan 2011	May 2011	May 2011	Aug 2011	
PRE-PLANNING BEGINNING IN FY09																	
Rose Atoll NWR/MNM	Perry	Apr 2009	n/a*		11/9/09		Dec 2009	Feb 2010		Mar 2010	May 2010	Aug 2010	Sep 2010	Dec 2010	Dec 2010	Jan 2011	
Palmyra Atoll	Beauregard	Aug 2009	n/a*		Dec 2009		Apr 2010	May 2010		Jun 2010	Aug 2010	Nov 2010	Dec 2010	Mar 2011	Mar 2011	Apr 2011	
Kingman Reef	Beauregard	Aug 2009	n/a*		Dec 2009		Apr 2010	May 2010		Jun 2010	Aug 2010	Nov 2010	Dec 2010	Mar 2011	Mar 2011	Apr 2011	
PRE-PLANNING BEGINNING IN FY10																	
Pacific Remote Islands MNM**	Beauregard	Aug 2009	n/a*		Dec 2009		Apr 2010	Jun 2010		Aug 2010	Sep 2010						
Johnston Atoll	Beauregard	Aug 2009	n/a*		Dec 2009		Apr 2010	Jun 2010		Aug 2010	Sep 2010						
Wake Atoll	Beauregard	Aug 2009	n/a*		Dec 2009		Apr 2010	Jun 2010		Aug 2010	Sep 2010						
Marianas Trench MNM	Perry	Jan 2010	n/a**		Jan 2010		Feb 2010	Apr 2010		May 2010	July 2010						
Mariana Arc of Fire	Perry	Jan 2010	n/a**		Jan 2010		Feb 2010	Apr 2010		May 2010	July 2010	Oct 2010	Oct 2010	Dec 2010	Dec 2010	Jan 2011	
Mariana Trench	Perry	Jan 2010	n/a**		Jan 2010		Feb 2010	Apr 2010		May 2010	July 2010	Oct 2010	Oct 2010	Dec 2010	Dec 2010	Jan 2011	
PRE-PLANNING BEGINNING IN FY11																	
Oahu Forest	TBD	Jan 2011	Aug 2012		Oct 2012		Jan 2013	July 2013		Aug 2013	Nov 2013	Apr 2014	July 2014	Oct 2014	Oct 2014	Jan 2015	
Guam Overlay	Perry	TBD															

Color key: Complete Past due(?) Due in the next 3 months Dates need review

* To streamline the process and facilitate completion of CCP/MMPs by January 2011 as required by proclamation, proposed skipping preplanning report and going directly to preplan with alternatives.

** Pre-planning Report due with Scoping Report

Appendix H

Region 1 Refuges and Hatcheries

Transportation Planning Organizations

Planning Level	State	Organization Name	Contact Name, Position	Address	E-mail	Phone
HI	Hawaii	Hawaii	Glenn M. Yasui Highways Administrator	869 Punchbowl Street, Room 513 Honolulu, HI 96813		808-587-2220
			Ray McCormick District Engineer	1720 Haleukana Street Lihue, HI 96766		808-241-3000
			Ferdinand Cajigal Engineering Program Manager	650 Palapala Drive Kahului, HI 96732		808-873-3538
			Pratt Kinimaka Engineering Program Manager	727 Kakoi Street Honolulu, HI 96819		808-831-6703
			Damon Allen District Engineer	600 W. Prairie Coeur d'Alene, ID 83815-8764		208-772-1201
			James F. Carpenter District Engineer	2600 Frontage Road, P.O. Box 837 Lewiston 83501-0837		208-799-5090
ID	ITD 3	ITD 3	Dave Jones District Engineer	8150 Chinden Boulevard P.O. Box 8028 Boise, ID 83707-2028		208-334-8300
			Devin O. Rigby District Engineer	216 South Date Street Shoshone, ID 83352-0820		208-886-7800
			Ed Bala District Engineer	5151 South 5th, P.O. Box 4700 Pocatello, ID 83205-4700		208-239-3300
			Blake Rindlisbacher District Engineer	206 North Yellowstone Highway, P.O. Box 97 Rigby, ID 83442-0097		208-745-7781
			Gary Farnsworth Area Manager	63020 OB Riley Road Bend, OR 97701	Gary.C.Farnsworth@odot.state.or.us	541-388-6071
			Doug Tindall Deputy Director	355 Capitol St. NE, Rm. 135 Salem, OR 97301-3871		503-986-3435
OR	Eastern Oregon	Eastern Oregon	Tom Davis	3012 Island Ave. La Grande, OR 97850-9497	Thomas.J.Davis@odot.state.or.us	541-889-9115 ext. 224
			David Kim Area Manager Metro Central	123 NW Flanders St. Portland, OR 97209		503-731-4998
			Susan D. Keil Director	1120 SW Fifth Ave, Rm 800 Portland, OR 97204	Director@pdxtrans.org	503-823-5185
			Norman C. "Butch" Hansen South Central Oregon Area Manager	2557 Altamont Drive Klamath Falls, OR 97603-5701	norman.c.hansen@odot.state.or.us	541-883-5662

Department of Transportation Regions

Planning Level	State	Organization Name	Contact Name, Position	Address	E-mail	Phone
Department of Transportation Regions	OR	Southwest	Mark Usselman South West Oregon Area Manager		mark.ussleman@odot.state.or.us	541-396-3707
		Willamette Valley & Coast	Tim Potter Area Manager	885 Airport Road SE, Bldg P Salem, OR 97301-4788	James.T.Potter@odot.state.or.us	503-986-2900
Department of Transportation Regions	WA	North Central	Dan Sarles Acting Region Administrator and Assistant Region Administrator for Engineering	1551 N. Wenatchee Ave. Wenatchee, WA 98807	SarlesD@wsdot.wa.gov	509-667-3000
		Olympic	Kevin Dayton Region Administrator	P.O. Box 47440 Olympia, WA 98504-7440	daytonk@wsdot.wa.gov	360-357-2600
Metropolitan Planning Organizations	HI	Oahu MPO	Brian Gibson Executive Director, Oahu MPO	707 Richards Street, Suite 200 Honolulu, HI 96813	OahuMPO@OahuMPO.org	808-587-2015
	ID	COMPASS	Matt Stoll Executive Director	800 S. Industry Way, Suite 100 Meridian, ID 83642	mstoll@compassidahoh.org	208-855-2558 ext. 241
Metropolitan Planning Organizations	WA	Benton-Franklin COG	Gwen Luper Executive Director	P.O. Box 217 Richland, WA 99352-0217	gluper@bfcog.us	509-943-9185
		SW WA RTC	Dean Lookingbill Transportation Director	P.O. Box 1366 Vancouver, WA 98666-1366	dean.lookingbill@rtc.wa.gov	360-397-6067
Regional Planning District	OR	Thurston MPO	Lon Wyrick Executive Director	2424 Heritage Court SW, Suite A. Olympia, WA 98502	wyrick@trpc.com	360-956-7575
		Yakima Valley COG	Page Scott Executive Director	311 North 4th Street, Suite 202 Yakima, WA 98901	scottp@yvcog.org	509-574-1550
Regional Planning District	OR	Cascades West ACT	Linda Modreel ACT Chair	408 SW Monroe Ave., Suite 111 Corvallis, OR 97333	linda.l.modreel@co.benton.or.us	541-766-6800
		Lower John Day ACT	Judge Gary Thompson ACT Chair	500 Court Street P.O. Box 365 Moro, OR 97039	gthompson@co.sherman.or.us	541-565-3312
Regional Planning District	OR	Northeast ACT	Commissioner Fred Warner ACT Chair	3012 Island Avenue La Grande, OR 97850-9497	fwarner@bakercounty.org	541-523-8200
		Northwest Oregon ACT	Shirley Kalkhoven ACT Chair	P.O. Box 928 Salem, OR 97308	shirleyk@nehalem.tel.net	503-368-6770
Regional Planning District	OR	South Central ACT	Brad Winters ACT Chair	513 Center Street Lakeview, OR 97630	bwinters@co.lake.or.us	541-947-6005
		Southeast ACT	Steve Grasty ACT Chair	450 N. Buena Vista, P.O. Box 699 Burns, OR 97720		541-573-6356

Planning Level	State	Organization Name	Contact Name, Position	Address	E-mail	Phone
		Benton-Franklin-Walla Walla RTPO	Gwen Luper Executive Director	P.O. Box 217 Richland WA 99352-0217	gluper@bfcog.us	509-943-9185
		North Central RTPO	Jeff Wilkens Executive Director	300 South Columbia Street 3rd Floor Wenatchee, WA 98801-6144	jeff@wvwc.org	509.663.9059 ext. 228
		Northeast WA RTPO	Leslie Jones Executive Director	347 W. 2nd, Suite A Colville, WA 99114-2300	ljones@teddonline.com	509-684-4571
		Palouse RTPO	Duane Wollmuth Executive Director	845 Port Way Clarkston, WA 99403	duane@seweda.org	509-751-9144
		Peninsula RTPO	Kevin Dayton Region Administrator	P.O. Box 47440 Olympia, WA 98504-7440	daytonk@wsdot.wa.gov	360-357-2600
	WA	Puget Sound RC	Rick Olson Director, Government Relations & Communications	1011 Western Avenue, Suite 500 Seattle, WA 98104-1035	rolson@psrc.org	206-971-3050
		Quad-County RTPO	Derek Pohle Director of Public Works	124 Enterprise Street S.E. Ephrata, WA 98823	dpohle@co.grant.wa.us	509-754-6082
		Spokane RTC	Glenn Miles Transportation Manager	221 W. First Avenue, Suite 310 Spokane, WA 99201-3645	gmliles@srtc.org	509-343-6370
		SW WA RTC	Dean Lookingbill Transportation Director	P.O. Box 1366 Vancouver, WA 98666-1366	dean.lookingbill@rtc.wa.gov	360-397-6067 ext. 5208
		SW WA RTPO	Steve Harvey Director	207 4th Avenue N., Administration Annex Kelso, WA 98626-4195	steveharvey@cwco.org	360-577-3041

Regional Planning District

- MPO = Metropolitan Planning Office
- RTPO = Regional Transportation Office
- RTC = Regional Transportation Council
- RC = Regional Council
- ACT = Area Commissions on Transportation

Appendix I

Alternative Transportation Priorities and Strategies

Summary

Alternative transportation systems (ATS) are an important component of transportation to and within refuges and hatcheries in Region 1. This section provides background on the definition and benefits of ATS and summarizes the findings of the Regional Alternative Transportation Evaluation and the Region 1 ATS Questionnaire, with implications and recommendations for Region 1.

Key Needs

The stations in Table 1 were identified as having the most critical needs or the greatest potential for ATS (see Table 3 for information on prioritization). A complete listing of other stations with longer-term potential for ATS is included later in this appendix.

Table 1: High Priority ATS Needs by Station

	Refuge	Transit Distance	Trail Distance Quality	Priority
1	Steigerwald Lake NWR <i>Washougal, WA</i>	Less than ½ mile	Direct connection	High
	<ul style="list-style-type: none"> - Extend C-TRAN bus service to refuge entrance, or provide safe pedestrian passage from the current bus stop to refuge entrance. - Promote existing non-motorized access via the Columbia River Dike Trail. 			
2	Kealia Pond NWR <i>Kihei, HI</i>	1-3 miles	Less than ½ mile	High
	<ul style="list-style-type: none"> - Work with Maui Bus to provide a new bus stop near the refuge entrance between Kihei and Maalaea. - Promote existing non-motorized access via the Mokulele Highway bike path. 			
3	Ridgefield NWR <i>Ridgefield, WA</i>	More than 3 miles	1-3 miles	High
	<ul style="list-style-type: none"> - Provide a non-motorized trail to downtown Ridgefield and link with existing sidewalks. - Promote and expand the use of transit for Bird Fest and other special events. 			
4	Tualatin NWR <i>Sherwood, OR</i>	Less than ½ mile	Direct connection (future)	High
	<ul style="list-style-type: none"> - Promote the use of existing Tri-Met bus service for connections to bicycle and light rail networks. - Support and promote the use of trail connections via Metro's Toquin and the City of Sherwood's trail systems. 			
5	Kauai NWRC/Kilauea Point NWR <i>Kilauea, HI</i>	½ - 1 mile	½ - 1 mile	High
	<ul style="list-style-type: none"> - Provide a shuttle to connect Kilauea Point NWR to Kauai Bus service or to the town of Kilauea. - Enhance opportunities for bicycle and pedestrian access. 			
6	Nisqually NWR <i>Olympia, WA</i>	2 miles	More than 3 miles	High
	<ul style="list-style-type: none"> - Work with Intercity Transit to extend bus service between the refuge and the Olympia region. 			

Recommendations

The recommendations in Table 2 may assist Region 1 in enhancing the use of alternative transportation, as specified under the Sustainability goal.

Table 2: ATS Recommendations

Action Item		Description
1	Increase non-motorized connections	<ul style="list-style-type: none"> – Target stations with the greatest potential for new or improved non-motorized infrastructure, as identified in the ATS Questionnaire, for targeted technical assistance. – Encourage stations to apply for Paul S. Sarbanes Transit in Parks (TRIP) grants to fund new infrastructure projects. – Identify MPOs and rural planning agencies that have stations within their boundaries and facilitate participation of FWS staff in their long-range planning efforts. – Include non-motorized access as a component of CCPs, step-down plans, and site design for new facilities.
2	Utilize public or private transit use for festivals and special events	<ul style="list-style-type: none"> – Identify stations with high visitation special events. – Create a best-practices resource or contact manual for stations that currently use transit for special events. – Identify contracting mechanisms to facilitate short-term rentals of transit vehicles for use at events.
3	Enhance connections to local bus routes for urban and suburban stations within transit service areas	<ul style="list-style-type: none"> – Encourage stations to apply for TRIP grants to conduct planning or feasibility studies for transit access. – Encourage stations to contact the TRIP Technical Assistance Center (TAC) for technical assistance on ATS planning.¹ – Identify transit providers with service areas coinciding with station locations (with the assistance of MPOs and State DOTs) and encourage partnerships between providers and station staff.
4	Improve and strengthen partnerships to improve ATS connections and leverage funding	<ul style="list-style-type: none"> – Encourage stations to partner with local governments, transportation planners, transit providers, friends groups, and others to craft appropriate strategies for transportation and visitor management. – Identify timelines for major regional long-range transportation plans (LRTP), transit plans, and bicycle and pedestrian plans to improve FWS participation in the development of the plan. – Partner with local governments and other Federal agencies to apply for grants to fund ATS projects.

ATS Background

As visitation among Region 1 stations grows, ATS will become an increasingly important way to manage visitors sustainably while protecting wildlife. Given the locations and missions of most Region 1 stations, many station staff have not considered the applicability of ATS to their stations' plans and programs. Increasing awareness of ATS and its benefits should be a priority for Region 1; this section offers several insights and strategies for ATS solutions that may be successful in Region 1.

Definition of ATS

- ATS include any travel by means other than personal automobile, such as:
- Motorized transportation systems operating internally within stations
- Shuttles and van transit connecting stations with other destinations
- Regional transit connections (bus, light rail, trolley, commuter rail, passenger rail)
- Bicycle and pedestrian infrastructure (sidewalks, paths, bicycle lanes, regional trails)
- Water-based transportation
- Publicly and privately operated transit systems

Relationship to LRTP Goals

ATS complements several goals of the LRTP, most notably Sustainability but also Natural Resource Protection and Welcome and Orient Visitors. The use of transit, non-motorized, and water-based modes supports the LRTP goals, with the following illustrative examples:

- **Sustainability:** The reduction of personal automobiles in accessing and traveling through stations, both for visitors and staff, can bring about several benefits that reinforce sustainable transportation practices. ATS can reduce the Service’s carbon footprint, reduce the use of carbon-based fuels, enhance accessibility, and reduce air pollutants emitted from vehicles.
- **Natural Resource Protection:** By reducing the use of personal automobiles, FWS can also reduce the impacts that these vehicles have upon natural resources. Vehicular resource impacts include wildlife collisions, invasive species, noise pollution, particulate emissions, erosion, and pollutants that can enter the soil or water. Over the long term, increasing ATS for stations with increasing visitation can minimize the need for new roads or parking, thus preserving more area for wildlife habitat.
- **Welcome and Orient Visitors:** ATS can be a critical visitor management tool for station staff facing increasing visitor demands and limited resources and capacity. The use of transit can enhance visitors’ understanding of the station’s natural resources by facilitating interpretive tours or directing visitors for special events. Signage and orientation information directed at non-automobile modes can also help integrate these modes most appropriately into station transportation. Also, by including refuges and hatcheries on existing non-motorized and transit maps and signage, FWS can welcome visitors to its stations within the context of the broader region.

Trends and Strategies

The Region’s refuges and hatcheries are diverse in their visitation and associated travel patterns, but a few trends emerge that inform ATS needs and planning:

Refuges and hatcheries near major urban areas and along the I-5 corridor attract (or have the potential to attract) high visitation from urban and suburban residents, and they often have visitor amenities such as hiking trails, auto tour routes, education programs, and wildlife art to serve those visitors.

1. Several stations outside of population centers contain special resources that attract high visitation, making these “destination stations.” Almost all visitors must travel to these stations by personal vehicle.
2. Many stations across the region have special events and festivals with significant spikes in visitation that necessitate temporary visitor management and transportation strategies.
3. Many stations host local and regional school groups for field trips to their natural and cultural resources; a few stations have facilities that can specifically accommodate these groups.
4. The majority of Region 1 stations are outside of the service district of public transit providers.
5. Many of the gateway communities near stations have extensive existing non-motorized infrastructure and residents that frequently bicycle for transportation and recreational purposes.
6. Demographic trends may lead to more elderly residents in the region, including more people who do not or cannot drive. Other regional trends may include smaller vehicles, electric vehicles, and affordability of transportation.

Based on these trends and station characteristics, and informed by the responses from the ATS Questionnaire, the following types of ATS may be most beneficial to Region 1:

1. Non-motorized paths, bicycle lanes, bicycle racks, and signage for non-motorized users to connect stations with existing non-motorized trail networks, gateway towns, and local and regional amenities. In most cases, encourage bicycle use to but not within stations to avoid conflicts between bicycles and wildlife.
2. Transit use for festivals and special events
3. Connections to local bus routes for urban and suburban stations within transit service areas
4. Partnerships with local groups to craft appropriate strategies for transportation and visitor management

Regional Alternative Transportation Evaluation

The FWS and the U.S. Department of Transportation Volpe Center (Volpe Center) conducted a regional alternative transportation evaluation (RATE) in Region 1 to ensure effective integration of alternative transportation systems into the Region 1 LRTP. The Region 1 RATE was also meant to serve as a pilot for the integration of ATS into the National FWS LRTP. Staff from the Volpe Center, FWS Region 1, and Western Federal Lands Highways came together in Portland, Oregon, in October 2010, to discuss alternative transportation needs and constraints in the region and to develop the ATS Questionnaire. Volpe Center staff also visited Ridgefield NWR, Steigerwald Lake NWR, the Mid-Columbia Refuge Complex, and the Spring Creek National Fish Hatchery to identify specific opportunities for ATS in these and other stations. The RATE also provided lessons on how ATS may be instituted more broadly across Region 1.

Based on the station visits and strategic discussions, the following are key findings and outcomes from the RATE:

- The RATE team developed and refined the ATS Questionnaire, which was circulated among all stations in Region 1.
- Many stations already use transit for festivals, working closely with community and regional partners and transit providers to rent vehicles.
- Some stations aiming to increase their visitation and interpretive services found potential for ATS as a tool to help achieve this goal. Other stations expressed reluctance to pursue ATS based on limited staffing to manage existing (or growing) visitation.

Some of the opportunities identified for specific ATS integration into stations include:

- Pedestrian facilities partially cover the distance between the Town of Ridgefield and the Ridgefield NWR's new visitor center. There is an opportunity to create a non-motorized trail to complete the connection.
- A C-TRAN bus stop is located approximately a half mile from the Steigerwald Lake NWR entrance, and C-TRAN (the transit provider in Clark County, WA) offers frequent service to the Washougal/Camas area. Currently, no pedestrian facilities connect the bus stop with the refuge.
- A U-shaped trail connected to the new McNary NWR education center begins and terminates at Lake Road, and pedestrian facilities connecting the trailheads would allow for enhanced visitor experience and safety. A major highway construction project in the region is expected to increase traffic on Lake Road. A safe, off-road pedestrian connection along Lake Road would encourage heavier trail use.
- The Columbia River Heritage Trail, a multi-use, paved trail, runs through the Umatilla NWR and connects to nearby towns.
- Annual festivals, including Ridgefield NWR's Bird Fest and Columbia NWR's Sand Hill Crane Festival, attract thousands of visitors. These events already incorporate ATS for parking shuttles and interpretive tours, and they can be models for other stations.

ATS Questionnaire

The ATS Questionnaire is a tool to identify the broad and specific needs and opportunities for ATS in Region 1, as well as to target areas for future technical assistance from the Regional and Federal levels. Staff from the Volpe Center, FWS Region 1, FWS Headquarters, and Western Federal Lands Highways developed the Questionnaire in conjunction with the RATE with feedback from station staff participating in the RATE. The Questionnaire was available to stations as an online survey. A copy of the questionnaire appears at the end of this appendix, but the circulated version appeared as an online survey format only. Region 1 staff circulated a link to the online ATS Questionnaire via email to all 105 stations in the region, with responses collected between November 15 and December 3, 2010. Twenty-four stations responded to the questionnaire, and the responses from these stations are aggregated and analyzed within this section.

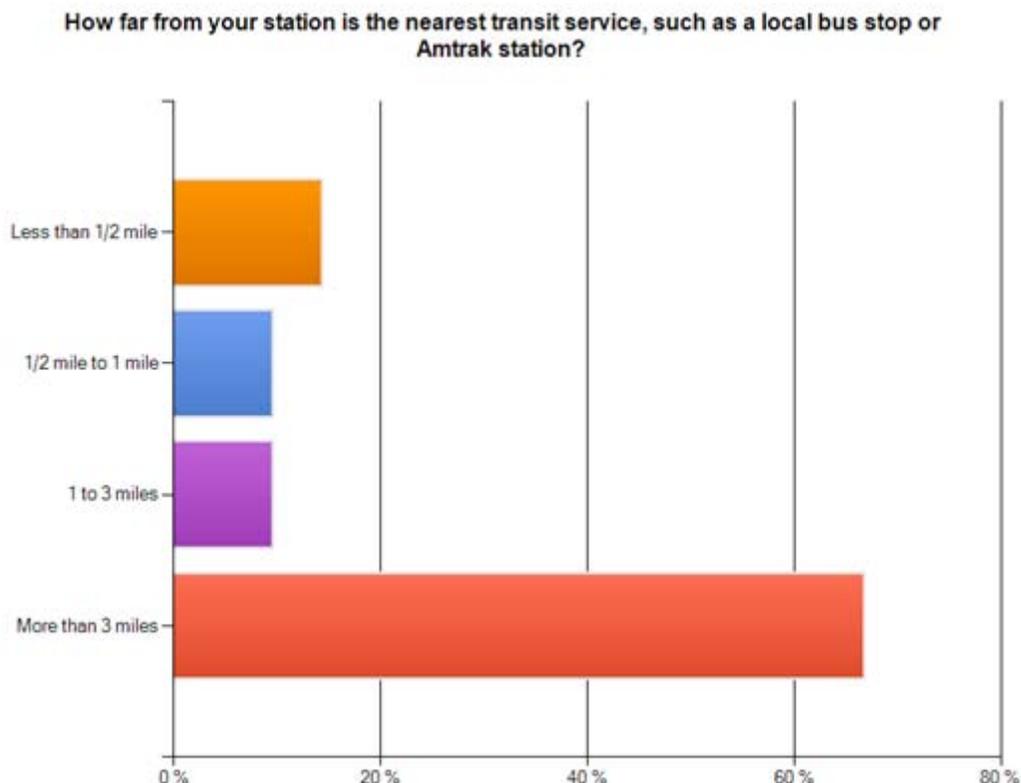
Opportunities for Transit

Many stations are located outside of major metropolitan areas and do not think of transit as a means of visitor access. However, even in non-urban areas, rural transit providers and inter-city transit (including bus and rail) may offer transit services that can be extended to visitor access. Furthermore, many urban refuges are already within a few miles of existing transit service and can capitalize on this mode for station access. As shown in Figure 1, 33 percent of questionnaire respondents had a bus stop or train station within three miles of their station, and approximately 30 percent of respondents also answered that transit might be able to assist their station for both general visitor access and for special events. Also, nearly all stations (95%) with a public use component reported that school groups and friends groups use buses or vans to transport groups to the station.

Transit use for special events, which is already occurring throughout the region, may be the greatest short-term opportunity for transit. Sixty-five percent of respondents have at least one special event with high visitation. Types of events include festivals centered around wildlife (bird festivals, salmon festivals, etc.), fishing events, open houses, children’s activity days, and miscellaneous events. More than half of respondents have events in the spring, with many events also occurring in the fall and a small number in the summer and winter. The seasonality of events suggests that stations may be best served by short-term rentals or contracts with public or private transit providers. Daily visitation at these festivals generally ranges from 150 to 1,800, with an average of 550 daily visitors. However, the Wenatchee River Salmon Fest hosted by the Leavenworth National Fish Hatchery, in late September attracts 10,000 visitors. Stations currently use overflow lots on-site to manage heavy visitation for events, but some stations, including Columbia NWR and Nisqually NWR, rent vans and buses to shuttle visitors between the refuge, parking lots, and other event sites. Ridgefield NWR also hires charter buses to offer birding tours on its auto route; the refuge does not allow private vehicles along this route during Bird Fest and they have received positive feedback for this program.

Internal transit does not play a major role in Region 1, due to the relatively low levels of visitation and congestion on internal station roads. However, internal transit may have a future role for some stations with high visitation, particularly for “destination” stations such as Kealia Pond NWR and Kauai NWR in Hawaii.

Figure 1: Distance to Transit

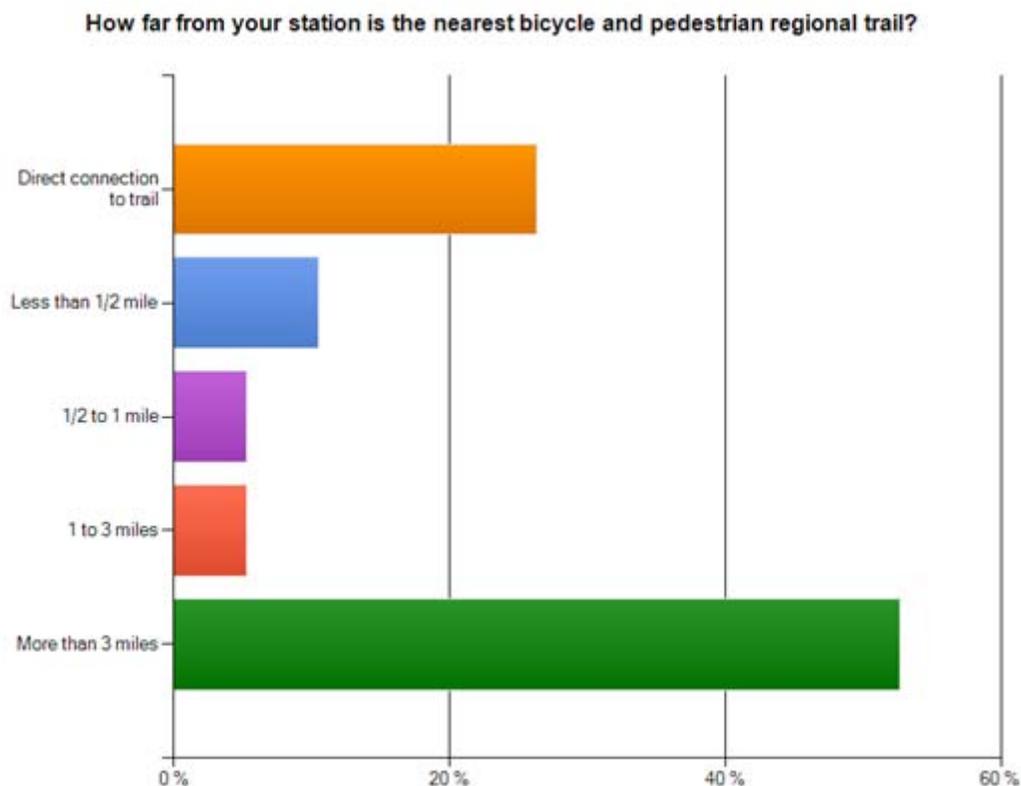


Opportunities for Trails

Bicycle and pedestrian access is viable for many of the region's refuges and hatcheries, both rural and urban. Urban stations can connect into metropolitan non-motorized networks of paved trails and bicycle lanes, while rural stations can seek specific connections locally to gateway towns and regional destinations. Many rural and small urban counties also have bicycle and pedestrian trails or trail plans.

The majority (53 percent) of stations responding to the questionnaire has a regional non-motorized trail within three miles, and 26 percent have a trail with a direct connection to the station, as seen in Figure 2.

Figure 2: Distance to Trails



Questionnaire respondents also called for more non-motorized connections as a means to enhance their visitor program. As shown in Figure 3, 55 percent of respondents would like new bicycle paths for access to their station, 35 percent would like new pedestrian paths for access to their station, and 25 percent would like new pedestrian paths within their station. Other opportunities for enhancing visitor programs at stations include new transit service and promotion and marketing.

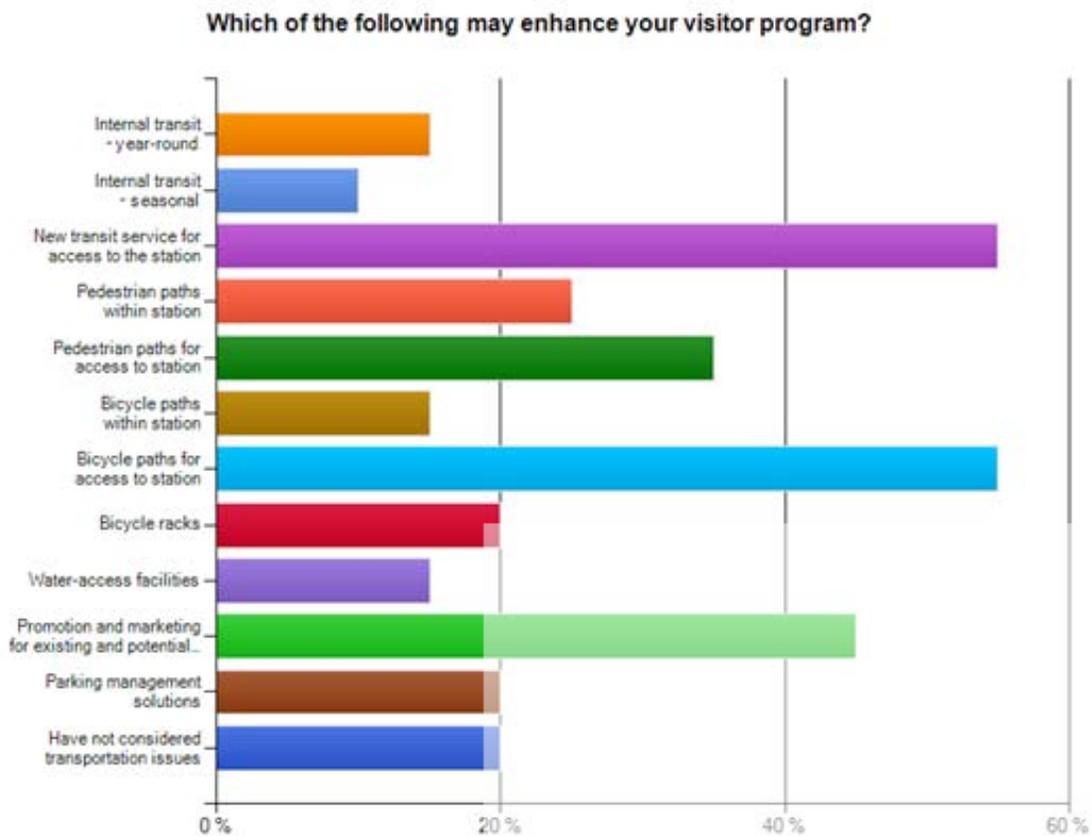
Visitor Characteristics

Among questionnaire respondents, the most popular visitor activity was wildlife observation, closely followed by environmental education, photography, and interpretation. These activities can be conducive to transit; refuges in Region 1 and in other regions have successfully used vans or buses for environmental education programs or to promote wildlife observation. For many refuges, a significant number of visitors also hunt and fish. Both of these activities require special equipment that may be challenging to bring to the station using ATS. However, refuges may consider transit use, outfitted with special storage capabilities, for seasonal hunting events. Refuges can also provide water-based access opportunities, such as connections to regional canoe and kayak trails or dock infrastructure, to visitors who enjoy fishing and wish to access the refuge or travel within the refuge by boat.

Questionnaire respondents indicated that overall station visitation is likely to grow in the coming years. Seventy-one percent of respondents expect visitation at their stations to increase, and the remaining 29

percent expect visitation to remain the same. No respondents anticipate decreasing visitation. A slight majority of respondents (52 percent) are actively trying to increase visitation, while the rest of respondents are not actively trying to increase or decrease visitation. Anecdotally, some stations expressed concern with staff and station capacity to handle increasing visitation. Of the questionnaire respondents, 19 percent noted that they share a high level of concern with managing transportation for future visitors. Thirty-eight percent felt this issue may be a future concern, and 43 percent expressed little or no concern.

Figure 3: Visitor Program Enhancements



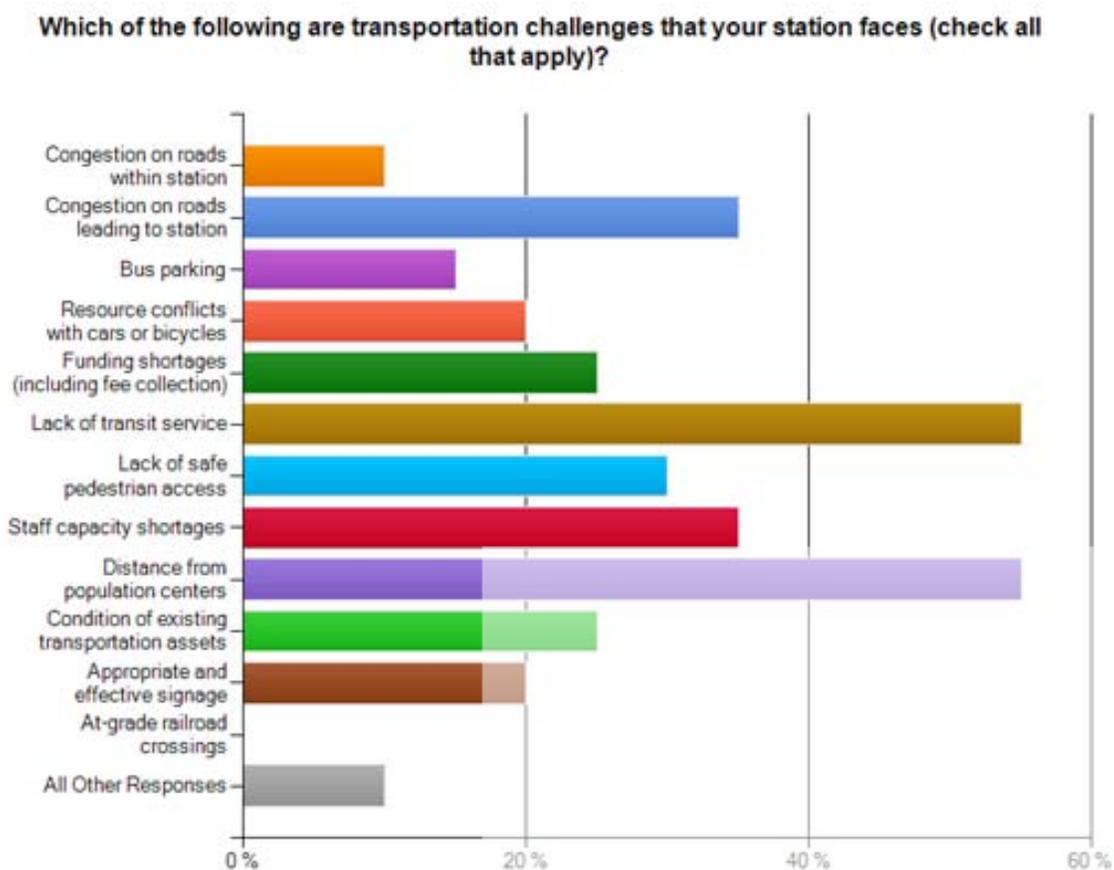
Key Transportation Challenges

The top transportation challenges cited by stations, as measured by the number of respondents, are:

- Distance from population centers (55 percent)
- Lack of transit service (55 percent)
- Lack of safe pedestrian access (30 percent)
- Staff capacity shortages (35 percent)
- Congestion on roads leading to station (35 percent)

As shown in Figure 4, other challenges include condition of existing transportation assets, resource conflicts with cars or bicycles, funding shortages, and appropriate and effective signage. Additionally, many stations used an open-response section of the questionnaire to cite poor conditions, maintenance challenges, congestion, or inadequate capacity of existing infrastructure as their most significant transportation problems. ATS can offer a means of accommodating visitors without additional strain on road infrastructure. Finally, several stations used the questionnaire to comment that their access roads are unsafe for bicyclists and pedestrians, even though the station is located in an area with a strong bicycling community or within walking distance of gateway towns. These challenges represent opportunities to improve safety for non-motorized users and to improve ATS.

Figure 4: Transportation Challenges



Promotion and Partnerships

Several stations cite the importance of advertising and awareness of existing programs, such as facility tours and non-motorized trail connections. Forty-five percent of respondents thought that promotion and marketing for existing and potential ATS would enhance their visitor program.

Many stations also recognize that partnerships are their best opportunity for improved ATS. They cite relationships with County recreation departments, city transportation departments, regional transit providers, and other Federal agencies as a means to add new bus stops near the refuges and hatcheries, expand transit service, build connections to bicycle trails, or provide sidewalks along unsafe highways.

Partnerships can help station staff to promote existing ATS connections and develop new connections. FWS should encourage partnerships between stations and local transportation planners. Station staff should be engaged in the development of city, county, and regional plans (such as long-range transportation plans, rural transportation plans, transit plans, and bicycle and pedestrian plans). Regular communication with these planners can help ensure that the station is considered when the city, county, or region is developing long-term trail routes, bicycle paths, and transit service.

Planning for ATS in Region 1

Funding

ATS projects often have different scales, constraints, and cost structures than the transportation infrastructure projects that Region 1 typically funds with Refuge Roads Program (RRP) and Deferred Maintenance funds. Also, while RRP can fund ATS studies, several key ATS infrastructure needs, such as transit vehicles and new pedestrian or bicycle paths, are not eligible expenses under RRP or Deferred Maintenance funds. However, ATS projects may qualify for a number of State and Federal funding sources, some of which are dedicated solely to ATS. These are described in detail in Section 3.3 of the LRTP.

The Paul S. Sarbanes Transit in Parks (TRIP) program offers a dedicated funding source for planning for and constructing ATS in Federal lands. Federal Land Management Agencies (FLMAs) are eligible to apply for funds, as are partner agencies (including local and State government agencies) with the support of the FLMA. Funded projects may provide access to public lands, in addition to ATS within public lands, making this grant an important funding source for many of the potential non-motorized and transit connections described in this Appendix. Since FY 2006, FWS and its partners have received over \$9 million in funding from the TRIP program and its predecessor, the Alternative Transportation in Parks and Public Lands program. The Service received \$6.4 million for implementation projects and \$2.6 million for planning projects.

Additional funding programs with greatest applications for ATS are:

- Transportation Enhancements
- Recreational Trails Program
- Rivers, Trails, and Conservation Assistance Program

Station staff may perceive challenges in navigating the various funding sources for ATS, and the Region 1 staff should offer technical assistance, where feasible, in clarifying the applications for these sources or helping stations identify funding sources to meet their transportation needs. The TRIP Technical Assistance Center (TAC) also offers transportation-related technical assistance to all Federal Land Management Agencies to help land managers develop and implement alternative transportation projects.i

Stations may also find success in working with partners to leverage additional funds for ATS projects. Local governments, friends groups, resource agencies, and non-profit organizations often stand to benefit from the institution of ATS infrastructure based on its potential to reduce congestion, reduce resource impacts, and enhance recreation and mobility for station visitors and local residents. Partners may have access to other funding sources or grants, and stations may be more competitive for funding if they apply jointly with partners.

Project Selection

The project selection process, as delineated in Chapter 3, considers ATS and non-ATS projects jointly in establishing Region 1's five-year Transportation Improvement Plan. The review and validation of projects incorporates the LRTP goals and objectives, which include sustainability and ATS considerations. Sustainability goals and related ATS objectives have a "Medium" ranking priority. As ATS projects may meet some of the objectives under other goal areas, the transportation coordinators and regional management team (described in Chapter 3) should consider ATS projects holistically with regards to their ability to protect natural resources and aid with visitor management. The Management Team should also consider the ability of ATS projects to meet regional priorities, particularly given the ancillary benefits that ATS projects often have upon their surrounding communities. Regional priorities directly impacted by ATS, such as reduced fuel use and increased access for underserved populations, may become more important in the coming decades. One area for future consideration may be the development of quantifiable criteria for ATS in the project selection process.

Specifically, Region 1 should consider the following in project selection to support and increase ATS:

- During the call for projects, specifically remind stations to include ATS in their project submittals, and include a definition of ATS in the call for projects.
- When evaluating a road infrastructure project or improvement, consider whether an ATS project could alleviate the need for the improvement or could add supplemental benefits to the road project with little or no additional costs.
- Request letters of support from partner agencies involved in ATS project proposals to better understand the regional benefits of the project.

List of Potential Projects

The list of potential projects (Table 3) includes projects identified in the ATS Questionnaire, the FWS Transit & Trails Assessment,[□] the RATE, and conversations with Regional FWS staff. The priority ranking is based on information provided by station and regional staff. High-priority potential projects are those with more immediate potential to institute ATS or the most pressing transportation needs. Medium- and low-priority projects may also demonstrate need and potential for ATS projects, but the conditions at these stations are currently less feasible for ATS or information is lacking as to their conditions.

Table 3: All Potential Projects in Region 1

	Refuge	Transit Distance	Trail Distance	Priority
1	Steigerwald Lake NWR <i>Washougal, WA</i>	Less than ½ mile	Direct connection	High
	<ul style="list-style-type: none"> – Extend C-TRAN bus service to refuge entrance, or provide safe pedestrian passage from current bus stop to refuge entrance. – Promote existing non-motorized access via the Columbia River Dike Trail. 			
2	Kealia Pond NWR (HI) <i>Kihei, HI</i>	1.5 miles	Less than ½ mile	High
	<ul style="list-style-type: none"> – Work with Maui Bus to provide a new bus stop near the refuge entrance between Kihei and Maalaea. – Promote existing non-motorized access via the Mokulele Highway bike path. 			
3	Ridgefield NWR <i>Ridgefield, WA</i>	More than 3 miles	1-3 miles	High
	<ul style="list-style-type: none"> – Provide a non-motorized trail to downtown Ridgefield and link with existing sidewalks. – Promote and expand the use of transit for Bird Fest and other special events. 			
4	Tualatin NWR <i>Sherwood, OR</i>	Less than ½ mile	Direct connection (future)	High
	<ul style="list-style-type: none"> – Promote the use of existing Tri-Met bus service for connections to bicycle and light rail networks. – Support and promote the use of trail connections via Metro’s Toquin and the City of Sherwood’s trail systems. 			
5	Kauai NWRC/Kilauea Point NWR <i>Kilauea, HI</i>	½ - 1 mile	½ - 1 mile	High
	<ul style="list-style-type: none"> – Provide a shuttle to connect the Kilauea Point NWR to Kauai Bus service or to the town of Kilauea. – Enhance opportunities for bicycle and pedestrian access. 			
6	Nisqually NWR (WA) <i>Olympia, WA</i>	2 miles	More than 3 miles	High
	<ul style="list-style-type: none"> – Work with Intercity Transit to extend bus service between the refuge and the Olympia region. 			
7	McNary NWR <i>Pasco, WA</i>	More than 3 miles	2 miles	Medium
	<ul style="list-style-type: none"> – Provide pedestrian facilities along Lake Road to offer safe pedestrian access between trailheads. – Provide a bicycle and pedestrian trail to connect with the Snake River Bridge and the extensive regional trail network. 			

Table 3: All Potential Projects in Region 1

	Refuge	Transit Distance	Trail Distance	Priority
8	Leavenworth National Fish Hatchery Complex <i>Leavenworth, WA</i>	Less than ½ mile	More than 3 miles	Medium
	<ul style="list-style-type: none"> – Provide a regional, non-motorized trail for pedestrian and bicycle access to the complex, with potential connection to the Apple Capital Loop Trail. – Promote the use of existing LINK bus service. 			
9	Turnbull NWR <i>Cheney, WA</i>	More than 3 miles	Direct connection	Medium
	<ul style="list-style-type: none"> – Connect the Columbia Plateau Bicycle Trail to the station’s public use area, visitor contact area, and headquarters. 			
10	Koontenai NWR <i>Bonnors Ferry, ID</i>	More than 3 miles	Direct connection	Medium
	<ul style="list-style-type: none"> – Partner with the County to provide a bicycle path connecting the refuge to Bonnors Ferry. 			
11	Umatilla NWR <i>Umatilla, OR</i>	More than 3 miles	Direct connection	Medium
	<ul style="list-style-type: none"> – Promote and enhance connections via the Columbia River Heritage Trail. 			
12	Quinault NFH <i>Quinault, WA</i>	More than 3 miles	More than 3 miles	Medium
	<ul style="list-style-type: none"> – Potential connection with Olympic National Park via transit. 			
13	Oregon Coast NWR Complex <i>Western Oregon</i>	Unknown	Unknown	Medium
	<ul style="list-style-type: none"> – Provide a short-run shuttle bus in coordination with Ecola State Park. – Identify other opportunities for comprehensive transportation links throughout the refuge, including the use of transit for special events. 			
14	James Campbell NWR <i>Hale’iwa, HI</i>	3.5 miles	Unknown	Medium
	<ul style="list-style-type: none"> – Work with The Bus to provide transit service to the refuge. 			
15	Deer Flat NWR <i>Nampa, ID</i>	On-demand transit	4	Medium
	<ul style="list-style-type: none"> – Provide a non-motorized connection between the refuge and the Nampa to Stoddard Trail. – Consider potential for transit as a means to access the refuge. 			
16	Willamette Valley NWRC <i>Corvallis, OR</i>	More than 3 miles	More than 3 miles	Low
	<ul style="list-style-type: none"> – Provide a Rail Trail for walkers and bicyclists. – Use mini-buses to connect to the Corvallis Transit System. 			
17	Little Pend Oreille NWR <i>Colville, WA</i>	More than 3 miles	More than 3 miles	Low
	<ul style="list-style-type: none"> – Improve safety for bicycle access along State and County roads leading to refuge. 			
18	Abernathy Fish Technology Center <i>Longview, WA</i>	More than 3 miles	More than 3 miles	Low
	<ul style="list-style-type: none"> – Improve safety for bicycle access to refuge through a bicycle path along Highway 4. 			
19	Willapa NWRC <i>Ilwaco, WA</i>	More than 3 miles	NA	Low
	<ul style="list-style-type: none"> – Improve bicycle and pedestrian access between new station visitor center and the town of Ilwaco. 			

Region 1: Alternative Transportation Refuge Questionnaire

Background:

Region 1 has initiated a Long Range Transportation Plan (LRTP) to establish goals and objectives for transportation planning, improve the Service's transportation infrastructure, and optimize transportation funding decisions. The use of alternative transportation systems and access to stations brings potential benefits of resource protection, greenhouse gas emission reductions, and visitor management solutions. FWS and the U.S. Department of Transportation Volpe Center are conducting a regional alternative transportation evaluation (RATE) in Region 1 to ensure effective integration of alternative transportation systems into the LRTP. Completing this survey helps the Region identify future needs and opportunities.

Alternative transportation systems generally include any travel means other than personal automobile, such as:

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

Current examples of alternative transportation systems in FWS include the Columbia River Dike Trail, offering non-motorized access to Steigerwald Lake NWR in Washougal, WA, and the Tri-Met bus that connects the Tualatin River NWR to other transit in Portland, OR.

Please help us by answering the following brief questions:

1. What is your station name?

2. Is your station open to public use?

3. How far from your station is the nearest transit service, such as a local bus stop or Amtrak station?

Less than 1/2 mile 1/2 to 1 mile 1 to 3 miles More than 3 miles

Name of transit service provider: _____

4. Is there an opportunity for transit to assist you with special events at your station?

5. Is there an opportunity for transit to provide access for your general visitor (not during special events)?

6. How far from your station is the nearest bicycle and pedestrian regional trail?

Direct connection to trail Less than 1/2 mile 1/2 to 1 mile
 1 to 3 miles More than 3 miles

Name of trail: _____

7. How would you estimate that most visitors access your station? (Please fill in approximate percentages):

Personal vehicle _____ Public transit _____ Private transit (school bus, groups) _____
 Water-based access (including kayaks and canoes) _____ Walking _____
 Bicycling _____ Other _____

8. Do school groups or friends groups provide transportation to your station via bus or van?

9. Which of the following are transportation challenges that your station faces (check all that apply)?

- Congestion on roads within station
- Congestion on roads leading to station
- Bus parking
- Resource conflicts with cars or bicycles
- Funding shortages (including fee collection)
- Have not considered transportation issues

- Lack of transit service
- Lack of safe pedestrian access
- Staff capacity shortages
- Distance from population centers
- Condition of existing transportation assets
- Appropriate and effective signage
- At-grade railroad crossings

10. Which of the following may enhance your visitor program?

- Internal transit – year-round
- Internal transit – seasonal
- New transit service for access to the station
- Pedestrian paths within station
- Pedestrian paths for access to station
- Have not considered transportation issues

- Bicycle paths within station
- Bicycle paths for access to station
- Bicycle racks
- Water-access facilities
- Promotion and marketing for existing and potential alternative transportation systems
- Parking management solutions

11. How would you estimate the demographics of your visitors?
 Please rate each group using the following categories:

	Significant	Some	Few	None	No Information	
<input type="checkbox"/>	Families					
<input type="checkbox"/>	Youth/school groups					
<input type="checkbox"/>	Senior citizens					
<input type="checkbox"/>	Mobility-impaired visitors					
<input type="checkbox"/>	Minority populations					
<input type="checkbox"/>	Low-income populations					
<input type="checkbox"/>	People who would use transit					
<input type="checkbox"/>	People who would bicycle					

13. How would you estimate where your visitors live?
Please rate each group using the following categories:

Significant	Some	Few	None	No Information	
<input type="checkbox"/>	Within 10 miles of stations				
<input type="checkbox"/>	Within 50 miles of station				
<input type="checkbox"/>	Tourists (more than 50 miles from station)				
<input type="checkbox"/>	International visitors				

14. How would you estimate the activities enjoyed by your visitors?
Please rate each group using the following categories:

Significant	Some	Few	None	No Information	
<input type="checkbox"/>	Hunting				
<input type="checkbox"/>	Fishing				
<input type="checkbox"/>	Wildlife Observation				
<input type="checkbox"/>	Photography				
<input type="checkbox"/>	Environmental Education				
<input type="checkbox"/>	Interpretation				

15. Does your station have any special events with high visitation?

16. Please provide a few details about the special event(s):

What is the name of the event? _____

What is the event date? _____

What is the approximate visitation for the event? _____

17. How do you handle heavy visitation for the event(s)?

- Use of transit
- Use of overflow lots on-site
- Partnerships for expanded parking off-site
- Other (please specify) _____

18. What are the most significant transportation problems or needs currently facing your station?

19. In the future, what might be the greatest opportunities for new or improved alternative transportation at your station?

Appendix J

Guidance on the Federal Lands Highway Refuge Roads Program

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Guidance Document For The Refuge Roads Program

Prepared by the Federal Highway Administration
in cooperation with the U.S. Fish and Wildlife Service

Revised September 14, 2005

Background:

The document provides guidance to help identify projects and project enhancements that may be funded under the Refuge Roads program (RRP) category. The basic eligibility requirements were established by the Transportation Equity Act for the 21st Century (TEA-21) and modified by Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The legislation is codified in Title 23 - United States Code (23 USC). Section 204 of 23 USC requires that funds made available for refuge roads shall be used only to pay the cost of:

- A) Maintenance and improvements of refuge roads.
- B) Maintenance and improvement of eligible enhancement projects noted below that are located in or adjacent to wildlife refuges:
 - 1) Adjacent vehicular parking areas,
 - 2) Interpretive signage,
 - 3) Provisions for pedestrians and bicycles and
 - 4) Roadside rest areas including sanitary and water facilities
- C) Administrative costs associated with such maintenance and improvements.

Examples of eligible items are included in the Appendix.

The construction of new roads is not authorized.

Title 23 USC 202(e) requires that the funds be distributed base upon relative need of the various refuges. In order to establish priorities, Title 23 USC 204(a)(6) requires that the Federal Highway Administration (FHWA) and Fish and Wildlife Service (FWS) develop and adopt by rule, safety, bridge, pavement, and congestion management systems as appropriate.

Public Roads:

Title 23 USC 101 (a) (28)) defines Refuge roads as public roads that:

- 1) Provide access to or within a unit of the National Wildlife Refuge System and,
- 2) Title and maintenance responsibility are vested in the United States Government.

Public roads are defined by 23 USC 101 (a) (27) as any road open to public travel. Because of the unique usage of refuge roads, this has to be further clarified by these guidelines. In order to be considered Public Roads, refuge roads must be opened to the general public during substantial parts of the year. Seasonal closures during nesting periods and inclement weather are permitted. However, roads only opened by permit to specific public interests, such as to hunters for specified hunting periods or photographers to access photo blinds, are not considered public roads.

Scope of Improvements:

Roads:

The refuge road funds may only be used for rehabilitation to extend the service life of an existing road and enhance safety. Such work is also known as Resurfacing, Restoration, and Rehabilitation, (3-R). 3-R work includes the placement of additional surfacing materials and/or other work necessary to return an existing roadway including shoulders, the roadside, and appurtenances, to a condition of structural adequacy.

Most 3-R work occurs on the existing road bench. Refuge Roads work generally will not involve widening beyond the existing road bench or require the construction of new retaining walls, or cuts and fills. Exceptions where RRP projects could occur off of the road bench include work on drainage structures, existing retaining walls, slope failures, bridges, and spot traffic safety improvement work.

Construction of new roads is not authorized.

Bridges:

Eligible refuge road funded work on bridges includes approach fill rehabilitation, superstructure (deck, rails & girders) replacements, abutment and foundation repairs, abutment slope protection, foundation scour repair and protection work, and piling replacements. Small bridges or large box culverts may be replaced as part of a road improvement project.

Safety Projects:

Reconstruction of refuge roads for spot traffic safety improvement project work to correct identified safety problems at high accident locations may be undertaken with RRP funds. Such work is limited to specific sites (e.g. a curve or intersection) where a history of accidents have been documented, and where solutions have been developed to reduce accidents at the site. Studies of high accident sites may be funded out of a Region's RRP program.

Many of the limitations noted in this guidance do not apply to safety improvement work. Work could include roadway widening, realignments, new paving, new guardrails or walls, new sidewalks or bicycle paths for separation of traffic, street lighting, traffic signals or other improvements which can be expected to reduce the rate or severity of accidents at that location. In addition, needed safety work such as turning lanes on non-refuge roads intersecting with refuge roads may be included in RR funded projects. These projects must be coordinated with the agency having jurisdiction of the intersecting roadway and funding should be split with that agency if possible.

Design Standards:

Because this is a 3-R program and designers will be required to stay within the existing roadway prism, design standards for new construction and re-construction are typically not applicable. Since FWS has not developed 3-R design criteria, AASHTO design criteria should be the basis for development of design exceptions where traffic safety experience does not warrant improvements to full design criteria. Achievement of AASHTO standards usually will not be possible without demonstrated and documented safety deficiencies as noted above.

Program Effectiveness Measures:

The planned performance measure for refuge roads is the change in the condition of roads and bridges as measured by the Road and Bridge Inventory systems. Besides this degree of improvement shown for FWS Regions in the annual Road Inventory Program (RIP) condition surveys, the ratio of administrative costs to construction costs, and the average cost per mile for projects in each Region will be used by FWS and FHWA to measure how efficiently and effectively each Region operates its program.

Project Selection Priorities:

23 USC 202 (e) and 204 (k) (3) also provides guidance on criteria for selection of projects to be improved under the RR program. Projects shall be selected taking into consideration:

- (1) The comprehensive conservation plan for each refuge.
- (2) The need for access as identified through land use planning
- (3) The impact of land use planning on existing transportation facilities
- (4) The National Wildlife Refuge System Administration Act of 1966

Since 23USC requires funding to be eligible based upon the relative needs of the various refuges, the selection process should favor project items that improve the condition rating factors that help establish the needs. These factors include the road condition rating which considers the number of miles of fair, poor, and failed (deficient) roads.

23 USC 204(a)(6) also requires that roads in the Federal Lands Highway program develop asset management systems to help insure the efficient use of FLH funds. These include safety, bridge, pavement and congestion management systems as applicable. The guidelines for the Fish and Wildlife Service management systems are codified in 23 CFR 972.

The requirement for a bridge management system is being met by existing FWS bridge management program. The requirement for a pavement management system is being met by the FHWA inventory and condition assessment program for FWS managed public use roads. Given the limited number of areas with congestion and safety programs, these programs are not applicable to most refuges. The Regions will consider congestion and safety in project selection, and identify any areas of specific concern to the national refuge roads coordinator.

Appendix

Eligibility

Except when unusual safety concerns require, the following work that will not be funded under the RRP program:

- 1) constructing new parking areas or pullouts, widening off of the present road bench,
- 2) realigning and relocating roads (vertical or horizontal realignments), and
- 3) constructing new pedestrian trails or bicycle paths.
- 4) recurring maintenance practices such as grading roads and mowing roadsides.

Regions can obtain assistance for RRP project planning, design, compliance and construction contracting services from the Regional Engineering Offices, their respective Federal Lands Highways (FLH) Divisions, other Federal agencies (e.g. Corps of Engineers, Bureau of Reclamation, Forest Service, etc.) or consulting engineering firms. Such activities, including program formulation and coordination and project tracking, may be paid for out of available Regional RRP funds.

Project administrative costs such as travel for on-site reviews and meetings related to the RRP program may be included in estimated project costs. However, salaries of permanent staff in FWS Regions and Refuge field stations, who are base funded, can not be charged to the FLH Program project accounts. The only exception to this may occur to pay the overtime portion of force account work. However, this higher rate should have been used in the documentation justifying the use of force account work versus doing the work by contract.

The costs for any planning studies such as Road System Evaluations, or RRP Engineering Studies, will be the responsibility of each Region using their RRP funds.

As part of an overall RRP improvement project, Regions may use RRP funding for sign upgrades to meet the Manual of Uniform Traffic Control Devices standards. However, routine replacement due to wear and age is ineligible for FLH Program funding.

On a specific road improvement project, no more than 5% of the individual RRP improvement project funds may be used for non-roadway related improvements. Stand alone enhancement projects not associated with a specific road improvement project are not eligible for funding.

Specific Examples of Project Refuge Road Eligibility Criteria

The following lists provide general guidance as to what may be funded.

WORK ITEMS THAT ARE ELIGIBLE FOR FUNDING:

Project Support Items:

- Traffic engineering and safety studies.
- Identification and surveillance of accident locations.
- Road Inventories.
- Bridge, pavement, safety and congestion management systems.
- Necessary environmental studies and resource investigations confined to the general roadway construction limits.
- Project-related re-vegetation and control of invasive plants.
- Necessary architectural and landscape engineering services.
- Engineering design for roads, bridges, adjacent vehicle parking areas, provisions for pedestrian and bicycles, and roadside rest areas including sanitary and water facilities.
- Construction engineering for contract administration, inspection and testing.
- Necessary interagency program/project formulation meetings.
- Interagency program review meetings (per interagency agreement).
- Necessary interagency project coordination.
- Research part of coordinated technology implementation program.

Construction and Improvements Items:

- Resurfacing (milling, recycling and overlaying) existing pavements.
- Excavating and replacing failed base courses and poor subgrade materials.
- Replacing, upgrading or relocating deteriorated, undersized or poorly located drainage structures (aprons, inlets, culverts and headwalls etc.).
- Improvements to facilitate wildlife crossings, passage of aquatic organisms and habitat connectivity.
- Repair or upgrading existing guardrails or guardwalls.
- Minor widening of the roadway, realigning of intersections, adding of turn lanes, intersection islands, or pullouts, flattening of curves, or adjusting curve superelevation if the work can be accomplished on the existing road bench.
- Repairing, rehabilitating or replacing existing retaining walls if the estimated cost of a single wall or site is \$200,000 or less.
- Repairing and or stabilizing landslides, severely eroding or failing slopes if the estimated cost of a single site is \$200,000 or less.
- Projects off of the roadway bench may be allowed to widen or realign the road, construct new pullouts or add other features such as comfort stations and interpretive signage provided that they total no more than 5% of the project's construction costs.
- Removing or grinding existing pavement to convert a road to an aggregate surface.
- Replacing, upgrading or adding new pavement markings and signage to address changing traffic patterns, new uses or safety problems as well as to meet current standards if occurring in conjunction with an RR roadway project. Sign or marking replacement due to age, damage or deterioration is not eligible for funding, unless undertaken as part of a road rehabilitation project.
- Engineered pavement overlays that add structural value, design life or improved skid resistance.

- Double bituminous surface treatments and chip seals that are part of predefined stage construction or form final surface on low volume roads.
- Engineered rehabilitation or reconstruction of pavement structures, bridges and bridge decks.
- Engineered spot safety improvements resulting from safety studies.
- Upgrading of substandard traffic barriers and bridge rails to current standards.
- Replacement of nonstandard traffic regulatory and guide signs.
- Upgrading substandard or nonconforming traffic markings (one time only).
- A single refuge entrance sign if the sign conforms to FWS standards, is in a safe location, is part of an adjacent Refuge Roads project, and is of reasonable cost (\$10,000 maximum including design, materials and installation).
- Accommodating traffic and pedestrians through construction zones.
- Public approach roads and interchange ramps that are under the jurisdiction and responsibility of the FWS.
- Installation of warranted roadway lighting.
- Adjustment of utilities directly related to roadway work.
- Conduits crossing under the roadway to accommodate future planned utilities.
- Landscaping and native plant seeding of areas disturbed by the RRP program projects.
- Landscaping required to meet Environmental Impact Study mitigation measures resulting from roadway construction.
- Construction of erosion control and environmental mitigation measures directly related to roadway construction.
- Experimental features where there is a planned monitoring evaluation schedule.
- Public parking lots or pull-offs to trail heads adjacent to RRP projects, interpretive areas, public lodging, visitor center, (including necessary supporting retaining walls, protective railings and adjacent perimeter sidewalk).
- Provisions for pedestrians and bicyclists within/adjacent to roadway prism when warranted for safety reasons.
- Maintenance and improvement of existing recreational trails in accordance with the FHWA/ FWS Recreational Trails Guidance with total funding not to exceed 5% of the national program funds.
- Restoration of borrow pits created by projects funded from the RRP program.
- Force account and day labor, including materials and equipment rental being performed in accordance with approved plans and specifications, that has been determined to be cost-effective (public interest).
- All the aforementioned work can be performed on existing parking areas, pullouts, sidewalks or bicycle paths if the work is incidental to a RRP roadway project.

WORK ITEMS THAT WILL GENERALLY NOT BE ELIGIBLE FOR FUNDING:

(Funding will be determined on a case-by-case exception basis taking into consideration overall relative Refuge Road program priorities)

Project Support Items:

- Acquisition of scenic easements and scenic or historic sites.
- Brochures for public use unless they are prepared for refuges with roads impacted by improvements.

Construction and Improvements Items:

- Acquisition of alternative transportation systems unless it would facilitate visitor access and improve usage of the roadway system.
- Bike paths, unless they are part of the refuge unit's approved Comprehensive Conservation Plan, constructed in conjunction with RR program projects, and are:
 - part of a roadway prism necessary for safety reasons and if bike traffic warrants.
 - independent paths used for transportation and safety reasons based on accident and traffic data analysis.
- Construction of visitor information centers and related items.
- Construction of roadside rest area including sanitary and water facilities.
- Bridge painting work on structures (painting of major large structures considered on a case-by-case exception basis).
- Public roads which provide access to areas under the jurisdiction and responsibility of the FWS but which are not owned by the Service and/or are not required to be maintained by the Service.

WORK ITEMS THAT ARE NOT ELIGIBLE FOR FUNDING:**Project Support Items:**

- General refuge planning.

- Non-program specific conferences, field trips, or training conferences.
- Cultural resources investigations and work outside roadway construction limits

Construction or Improvements Items:

- Construction of new access roads, new campground roads and related parking areas.
- Cyclic roadway maintenance work including chip and slurry seals (seal coats), pavement patching, roadway grading, shoulder and ditch grading, cleaning culverts, snow removal, roadside mowing, vegetation control, normal sign repair and traffic markings.
- Seal coats on top of new asphalt concrete pavements.
- Cyclic bridge maintenance work including cleaning and repairing bridge joints, cleaning repairing bridge drainage, and repairing other bridge appurtenances.
- Landscaping and irrigation systems of areas not disturbed by refuge road construction.
- Landscaping of disturbed areas with non-native plant species.
- Utilities and buildings not disturbed by construction.
- Sanitation facilities not disturbed by construction.
- Walls and erosion protection that are not part of or support the roadway prism.
- Recreational boat launching facilities and ramps.
- General refuge development projects.
- Roads that serve only an administrative site such as refuge housing, maintenance area or refuge dormitory (or a combination of these).
- Roads that provide access to Refuge Headquarters which are not open to the general public (i.e., not a visitor center).
- Roads that are primarily used for administrative purposes and open to the public only for very limited periods during the year under restrictive conditions.
- Restoration of borrow pits (or portions of borrow pits) created by projects funded with non Refuge Road program funds.
- Repairs to or replacement of fences not disturbed by Refuge Road construction.

Long Range Transportation Plan for Fish and Wildlife Service Lands in Region 1

U.S. Fish & Wildlife Service - Region 1

