

Development of Sustainable Strategies Supporting Transportation Planning and Conservation Priorities across the West

by

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LIST OF ACRONYMS

ACE-II	Areas of Conservation Emphasis, California's state CHAT
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CAPS	Crucial Areas Planning System, Montana's state CHAT
CERS	Center for Excellence in Rural Safety
CHAT	Crucial Habitat Assessment Tool
CHEC	California Essential Habitat Connectivity project
CSMPS	I-80 Corridor System Master Plan Study in California, Nevada, Utah and Wyoming
DOT	Department of Transportation
DOW	Department of Wildlife
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FHWA	Federal Highway Administration
GIS	Geographical Information System
GPS	Global Positioning System
IAP	Implementation Assistance Program
IDFG	Idaho Department of Fish and Game
ITD	Idaho Transportation Department
LMA	Land Management Agencies (<i>i.e.</i> , National Park Service, US Forest Service)
MAP-21	Moving Ahead for Progress in the 21 st Century Act, the most recent federal transportation act
JCL	Jimmycomelately Creek, in the state of Washington
L RTP	Long-range Transportation Plan
MPO	Metropolitan Planning Organization
PEIS	Programmatic Environmental Impact Statement
PEL	Planning and Environmental Linkages program of the FHWA
RAMP	Regional Advance Mitigation Planning, started by stakeholders in California
REF	Regional Ecosystem Framework, part of FHWA's Eco-Logical program
RVCOG	Rogue Valley Council of Governments
SHRP2	Strategic Highway Research Program 2
STIP	State Transportation Improvement Program
SWAP	State Wildlife Action Plan
TIGER	Transportation Investment Generating Economic Recovery
UDWR	Utah Division of Wildlife Resources
WAFWA	Western Association of Fish and Wildlife Agencies
WGA	Western Governors' Association
WGWC	Western Governors' Wildlife Council, formed in 2008 to develop regional CHAT
WHCWG	Wildlife Habitat Connectivity Working Group which is active in the state of Washington
WISDOM	Wyoming Interagency Spatial Database & Online Management, Wyoming's state CHAT
WSDOT	Washington State Department of Transportation
WVC	Wildlife-Vehicle Collision
WYDOT	Wyoming Department of Transportation

WYGF Wyoming Department of Game and Fish

EXECUTIVE SUMMARY

The Crucial Habitat Assessment Tool (CHAT) developed by the Western Governors' Association (WGA) is an online system of maps that provides a high-level overview of crucial habitat for pre-planning on a variety of projects across 16 Western states.

Recognizing the transportation sector as an important end-user of the regional and state-level CHATs, WGA and the Federal Highway Administration (FHWA) entered into an agreement in 2013 to identify opportunities to increase the use of CHATs, and other state and regional digital wildlife information, in transportation planning and project implementation. The report, "Development of Sustainable Strategies Supporting Transportation Planning and Conservation Priorities across the West," is the culmination of that collaboration.

Featured content of the report includes:

- results from a questionnaire on transportation professionals' use of CHATs and other state wildlife data;
- best practices for using CHATs and other digital wildlife data to integrate the needs of fish and wildlife into transportation plans, programs and projects;
- a matrix of opportunities to expand the use of CHATs and other digital wildlife data by transportation professionals; and
- a description of how CHATs intersect with Eco-Logical, FHWA's ecosystem-based approach to transportation planning.

Questionnaire

In the first six months after the regional CHAT launched, a questionnaire was administered to state department of transportation (DOT) leaders from all 16 states that contributed to the regional CHAT and to representatives of five federal land management agencies. An analysis of the responses revealed several major findings:

- Ninety-two percent (92%) of respondents indicated that their agencies consider fish and wildlife in transportation planning and projects, but many – including the majority of federal respondents – were unaware of or unfamiliar with CHATs.

CHAT History

The Western Governors' Association formed the Western Governors' Wildlife Council in 2008 to develop a web-based, west-wide Crucial Habitat Assessment Tool (CHAT) to more efficiently inform infrastructure, land use, and conservation planning.

The Western Governors' CHAT was launched with data from 16 western states in 2013. The governors handed off management of CHAT to the Western Association of Fish and Wildlife Agencies (WAFWA) in 2015, which renamed it the Western Association of Fish and Wildlife Agencies Crucial Habitat Assessment Tool.

The WAFWA CHAT can be found at:
www.wafwachat.org

- State CHATs tended to be used more and ranked more highly than the regional CHAT. Over half of the respondents said they do not use the regional CHAT because it does not meet their specific data or informational needs.
- Respondents believe the best ways to increase attention to wildlife by transportation professionals are to increase funding and the early integration of wildlife's needs into planning processes.

Best Practices

The report outlines best practices for using CHATs and other digital wildlife data to integrate the needs of fish and wildlife into state and federal transportation plans, programs and projects. The report describes eight different best management practices (BMPs) to assure the greatest consideration for wildlife in transportation plans and programs:

- 1) Incorporate wildlife information before budgets are set.
- 2) Set joint transportation and wildlife priorities.
- 3) Employ a transportation-wildlife liaison.
- 4) Expand the role of wildlife biologists.
- 5) Use CHATs in mitigation planning.
- 6) Invest in innovative technologies, research and monitoring.
- 7) Increase the use and understanding of CHAT websites.
- 8) Use FHWA's Eco-Logical approach to improve cooperation among agencies.

The BMP section includes 11 case studies demonstrating the application of such practices and concludes by suggesting five potential future priorities to increase the use of CHATs:

- 1) Update data regularly.
- 2) Develop finer scale CHAT data.
- 3) Improve integration of CHAT websites and other wildlife data sources.
- 4) Expand CHAT outreach.
- 5) Align highway safety and wildlife priority areas.

Opportunities Matrix

The report explores the current use of regional and state CHATs and other digital wildlife data by transportation professionals and identifies opportunities to expand future use. Opportunities, evaluated by DOT representatives from the 16 states involved in the regional CHAT effort, were compiled into a matrix. The report highlights several notable results:

- Although only four state DOTs of the 16 filling out the matrix now use the regional CHAT, 10 identified opportunities to increase the use of regional CHAT information, particularly in pre- and post-STIP (State Transportation Improvement Program) processes.

- Six of the 16 state DOTs filling out the opportunities matrix currently use state CHAT data (there are currently 10 state CHATs); there was near consensus that there is the potential to use state CHAT data in nearly all of the transportation processes in the future.
- All 16 state DOTs currently use other, non-CHAT digital wildlife data for nearly all the transportation processes evaluated. Fifteen of the 16 state DOTs responded that opportunities exist for the continued use, or increased use, of non-CHAT digital wildlife data.

Eco-Logical

CHATs intersect with Eco-Logical, the FHWA's ecosystem-based approach to transportation planning. The report concludes that Eco-Logical provides an overarching framework to facilitate collaborative planning, while CHATs provide spatially explicit, digital wildlife data that can be used as an input within that framework. The report further identifies four steps within the Eco-Logical framework during which the regional or state CHATs could be used to better inform transportation infrastructure and conservation planning:

- Characterize resource status and integrate natural environment plans.
- Create a Regional Ecosystem Framework (REF).
- Develop a crediting system.
- Update the REF and plan.

The report also identifies five opportunities for strengthening the nexus between CHATs and Eco-Logical:

- 1) case studies
- 2) webinars
- 3) peer learning exchanges
- 4) conferences and meetings
- 5) annual reports and other documentation

Future Steps

During the course of this project, a host of opportunities to increase the use of digital wildlife data, including CHATs were identified:

- 1) Increase outreach to raise awareness of CHATs among federal and tribal land managers and state and municipal transportation staff.
- 2) Explore data refinements to state and regional CHATs.

- 3) Expand use of CHATs to inform other wildlife mitigation inquiries, including programmatic wildlife mitigation plans, cost-benefit modeling, and other analyses to identify highway segments where human safety and wildlife connectivity priorities overlap.
- 4) Assess whether CHATs should be modified to meet more user needs. This could include meeting new needs of existing users as well as reaching new users in other sectors (*i.e.*, energy, transmission, etc.).
- 5) Investigate DOT responses to the opportunities matrix by asking states to provide their rationale for determining whether regional or state CHATs are currently, or could potentially be, used during the eight transportation processes included in the matrix.
- 6) Strengthen the nexus between CHATs and Eco-Logical by illustrating the benefits of incorporating CHATs into the Eco-Logical framework.
- 7) Overcome cultural barriers to the consideration of wildlife by elevating wildlife values within transportation planning and project processes.
- 8) Increase funding, both for the purpose of wildlife mitigation measures and for ongoing support of CHATs.

Exploration of any or all of these next steps is likely to advance the use of digital wildlife data, including CHATs, within transportation planning and projects in the future.

1. INTRODUCTION

1.1. Project Background

In 2007, the Western Governors' Association (WGA) embarked on their Wildlife Corridors and Crucial Habitat Initiative in an effort to improve wildlife data delivery for purposes of identifying and conserving crucial wildlife habitat and corridors across the West. The WGA formed the Western Governors' Wildlife Council (WGWC) in 2008 and charged it with the development of a web-based west-wide Crucial Habitat Assessment Tool (CHAT) to more efficiently and effectively inform infrastructure, land use, and conservation planning across the West. In April 2015, the Western Governors passed off oversight and management of CHAT to the Western Association of Fish and Wildlife Agencies (WAFWA), which renamed it the Western Association of Fish and Wildlife Agencies Crucial Habitat Assessment Tool.

CHAT is an online system of maps that displays crucial wildlife habitat based on commonly agreed upon definitions developed by the WGWC. The 16 individual states participating in the regional CHAT's development compiled information within their borders in cooperation with their neighbours to increase understanding of areas important to wildlife. This information was then stitched together across the entire west and made available via a web application to help inform infrastructure and conservation planning efforts. This regional CHAT not only provides information across 16 western states, but also links to state-level CHATs, which are similar web-based tools that focus exclusively within state boundaries. While the regional CHAT is a pre-planning tool, in the past two years, the state CHATs have evolved and added data and information for more diverse uses in addition to pre-planning.

The transportation sector is an important potential end-user of CHAT information at both the state and regional levels. In recognition of this, the WGA and the FHWA signed a project agreement to identify specific ways in which CHATs can support transportation planning and projects. It is hoped that these strategies can help build a collaborative approach by advancing the use of CHAT information by the transportation sector, thereby enabling more efficient, economic and sustainable transportation outcomes.

1.2. The Project's Primary Tasks

The WGA-FHWA agreement identified four primary project tasks aiming to explore and define sustainable strategies for the transportation sector to address conservation priorities.

The first substantive task was to explore how transportation agencies are currently using digital fish, wildlife and habitat data and to gauge their familiarity with, and use of, CHAT information. To complete this task, an electronic questionnaire was issued to gain input from state, federal and tribal transportation personnel.

Building on the questionnaire's results, the second task was to develop a report that describes the best practices (*i.e.*, exemplary methods, systems and procedures) for using CHATs and other digital wildlife data to integrate the needs of fish and wildlife into state and federal transportation plans, programs and projects.

The third task was to build on results of the previous tasks to explore potential opportunities to take advantage of the new regional and state CHAT data, as well as other digital wildlife data (*e.g.*, state natural heritage data), in transportation processes. A second objective of this task was to identify limits on the capacity for digital wildlife data to inform transportation projects. These objectives were accomplished by developing a matrix of opportunities for using digital wildlife data during transportation processes based on input from transportation personnel.

The fourth and final task was to assess how CHATs intersect with the FHWA's ecosystem-based approach to transportation planning, known as the integrated "Eco-Logical" framework. To fulfill this task, ways in which the use of CHAT data within the Eco-Logical program may benefit transportation planning efforts among WGA member states are described. Also identified are potential opportunities to align these two initiatives by promoting incorporation of CHAT data within the Eco-Logical framework.

In addition to the activities described above, two workshops were convened to support completion of the four tasks. Members of the project's steering committee and invited experts gathered for two days at each workshop to give presentations, discuss various facets of each task, and attend field trips to local highway wildlife mitigation projects. The first workshop was co-hosted by the Montana Department of Transportation and Department of Fish, Wildlife and Parks in Missoula, Montana, on September 25-26, 2014. The second workshop was held on May 28-29, 2015, in Bend, Oregon, and was co-hosted by the Oregon Departments of Transportation and Fish and Wildlife.

1.3. Organization of the Final Report

Reports on each task, which were written independently and finalized at different times throughout the duration of the two-year project, are gathered together here as successive chapters in this final report (Table 1).

Table 1: Organization of the final report's chapters as they relate to the project's four major tasks.

TASK	SUBJECT	COMPLETION DATE	FINAL REPORT CHAPTER
1	Questionnaire	8/1/2014	3
2	Best Management Practices	3/30/2015	4
3	Opportunities	Same as Final Report	5
4	Eco-Logical	Same as Final Report	6

The executive summary is a succinct collection of all the findings from the four reports and any suggested next steps for expanding the use of regional and state CHAT information by the transportation sector. Chapter 1 of the final report provides a history of the project and an explanation of the four main project tasks. Chapter 2 provides an overview of regional and state CHAT information and the legal and policy framework governing use of wildlife data within transportation planning and projects. Chapter 3 is the final report on the questionnaire regarding use of digital wildlife data in transportation planning, and Chapter 4 is the final report on best

management practices for incorporating wildlife considerations into highway plans and projects. Chapter 5 is the final report on the matrix of opportunities identified for improving the future uptake of digital wildlife data by the transportation sector. Chapter 6 is the final report on the nexus between CHAT data and the FHWA's Eco-Logical framework. Chapter 7 summarizes the project's findings. Finally, Chapter 8 identifies steps for improved integration of digital wildlife data into transportation plans and programs in the future.

2. BACKGROUND

2.1. Brief Overview of Regional and State CHAT Information

2.1.1. Purpose of CHATs

The state and regional CHATs are designed to serve as a strategy for providing easy access to fish and wildlife data and information for use where highway and other infrastructure construction projects intersect with these resources. To differentiate, the regional CHAT is primarily intended for use in early land use planning, providing a “first look” at crucial wildlife habitat at a coarse scale, so that these wildlife values can be better incorporated into initial planning processes with minimal investment by project developers. The regional CHAT is a non-regulatory tool and is not intended as a basis for project-level approval. The individual state CHATs serve the same strategy but in some cases offer additional data suitable for purposes of planning and project development at scales finer than the regional CHAT. Still, state CHATs typically do not offer site-level data appropriate for site-specific resource evaluation at this time.

2.1.2. Overview of Regional CHAT Information

The regional CHAT maps crucial habitat across the west as an aggregated “roll-up” or synthesis of multiple data layers that were developed by the Western Governors’ Wildlife Council based on commonly agreed upon definitions. These include Species of Concern, Species of Economic and Recreational Importance, Landscape Condition, Intact Landscapes, Natural Vegetation, Landscape Corridors, Species Corridors, Freshwater Integrity, and Wetland and Riparian Areas.

While general themes to be included in the crucial habitat “roll-up” are consistent across states, individual states’ definitions of crucial habitat may differ for a variety of reasons: states may or may not have included commonly derived regional datasets in their roll-up; states may have instead incorporated other datasets in their roll-up method, such as state-created datasets that better reflect unique state priorities; states may have ranked the contribution of individual data layers to crucial habitat ranks differently; and states may have selected different map resolutions at which to analyze and display their data. Thus, while the regional CHAT does not provide a seamless map of crucial habitat across the West, it does represent an important step in this direction by providing a continuous spatial representation of crucial habitat defined by consistent general themes. Discontinuities at state borders are often driven by unique state identities, perspectives, and stages of CHAT development, and may be of use in helping state wildlife agencies and CHAT users recognize different habitat priorities among neighboring states, providing a starting point for working with those differences.

Just as states had the option to choose which data to include in their crucial habitat synthesis, they also had the opportunity to choose which map layers are viewable and downloadable by the public, on their state CHAT as well as the regional CHAT. Thus, while synthesized crucial habitat ranks are viewable for all states in the regional CHAT, the ability to view and download underlying component map layers varies by state. Table 2 summarizes which data layers are viewable and downloadable from the regional CHAT for each state. Note that layers marked as downloadable from the regional CHAT can have their values displayed in a table through the

online CHAT interface for a user-selected point or area, and can be displayed as a map layer when added to a user's personal geographic information system (GIS) workspace, but currently cannot be displayed as a map layer within the online regional CHAT unless otherwise indicated.

Table 2: Overview of data layers available to view and/or download from the regional Crucial Habitat Assessment Tool website.

	Crucial Habitat (CH) Rank		Terrestrial CH Rank		Aquatic CH Rank		Species of Concern (SOC)		Terrestrial SOC		Aquatic SOC		Landscape Condition		Intact Landscapes		Natural Vegetation		Landscape Corridors		LS Condition Summary		Species Corridors		Freshwater Integrity		Wetland & Riparian Areas		Spp of Econ/Rec Importance (SERI)		Terrestrial SERI		Aquatic SERI	
	View ¹	DL ²	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL	View	DL
Alaska	Y	Y	Y	N	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
Arizona	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
California	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
Colorado	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Idaho	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	N	N	Y	Y	Y	Y
Kansas	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N
Montana	Y	Y	N	N	N	N	Y	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	N
Nebraska	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N
Nevada	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N
New Mexico	Y	Y	N	N	N	N	Y	Y	N	N	N	Y	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Oklahoma	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	Y	N	N	N	N	N	Y	N	N	N	N
Oregon	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	N	N	Y	Y	N	N
South Dakota	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Utah	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	N	N
Washington	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wyoming	Y	Y	N	N	N	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N	N	N	N	Y	N	N	N	N	Y	Y	N	N	N	N	N	N

¹ The ‘View’ column indicates whether the dataset is viewable as a map layer in the regional CHAT.² The ‘DL’ column indicates whether the dataset is downloadable from the regional CHAT, as of 17 July 2015 (Y = Yes; N = No). Darker green further denotes instances in which the data are available (Y = Yes). Even though some data may not be directly downloadable from the regional CHAT, many states provide data and/or analyses upon request, and some layers only available for download from the regional CHAT are viewable on the state CHAT websites (see Table 3).

2.1.3. Overview of State CHAT Information

Ten western states currently offer state CHATs. The Southern Great Plains CHAT, encompassing southeastern Colorado, eastern New Mexico, western Kansas, and the Oklahoma and Texas panhandles, also offers crucial habitat data for the Lesser Prairie Chicken. This overview is based on information available on the CHAT websites as of January 30, 2015 (Table 3).

State CHATs differ in the number and type of data layers they offer, the resolution of data offered, the form of their data (raster versus vector), data update frequency, download capabilities, and the user interface. These differences likely reflect the influence of a variety of factors, including state-specific habitat priorities, data needs, intended users of the CHAT, resources available for and/or committed to wildlife habitat mapping efforts, and the progression of CHAT development. All are accompanied by reports detailing important information for CHAT users, such as the source data and methods used to develop the offered data layers and descriptions of the intended usage of the data.

Some state CHATs offer their data only through their state CHAT, while other states offer their individual data layers on the regional CHAT as well. States may also offer layers on their state CHAT that are not part of the regional CHAT. Most states offer data at the same resolution seen in the synthesized crucial habitat layer on the regional CHAT, which is meant to provide a coarse-scale overview for pre-planning stages. Two states – Washington and Wyoming – offer finer-scale polygon, line, and point data with potential use for site-level evaluation. However, because these state CHATs do not specify the scale limitations of vector data, they should be interpreted with caution at the site-level, and users are encouraged to contact these states to discuss appropriate usage. While some states offer direct download of data layers from their CHATs, many offer downloads only by request. Most of these inter-state differences in data format and availability likely reflect carefully considered state-specific priorities and perspectives pertaining to wildlife habitat and the use of digital data for incorporating wildlife values into the planning process. However, it is important to note that many state CHATs have only recently been developed, and some differences among states may be resolved in future iterations as CHAT interfaces and data continue to evolve.

Table 3: Overview of features, capabilities, and data layers offered by different state Crucial Habitat Assessment Tool websites as of 30 January 2015.

	CHAT Available	CHAT Name	Resolution	Layers Included	Downloadable	Release Date	Last Update	CHAT weblink
Alaska	Yes	Alaska CHAT	10 mi ² hex grid	Map interface not yet available. Map images available for Terrestrial & Aquatic SOC ¹ ; Freshwater Integrity; Species Richness; CH ² Rank	Select summarized data only. Others by	Dec 2014	Dec 2014	http://www.adfg.alaska.gov/index.cfm?adfg=chat.main
Arizona	Yes	HabiMap Arizona	1 mi ² hex grid	Wildlife waters; AZ important bird Areas; wildlife Linkages; Biotic Communities; Amphibian, Bird, Fish, Reptile, Mammal Potential Distributions; SHCG ³ index; SERI ⁴ index; SOC index; Sportfish index; Riparian areas; Unfragmented Areas; Wildlife	By request	Nov 2011	Jan 2015	http://habimap.org/
California	Yes	Areas of Conservation Emphasis	2.5 mi ² hex grid	Native Species Richness Indices; Rarity-Weighted Richness Indices; Rare Species Richness Indices; Sensitive Habitats; Stressors; Essential Habitat Connectivity; Limited Data Areas; Reference layers	By request	Jul 2010	Dec 2014	http://www.dfg.ca.gov/biogeo data/ace/
Colorado	No							
Idaho	No							
Kansas	Yes	Kansas Natural Resource Planner	1 mi ² hex grid	Terrestrial/Aquatic SOC; Intact Landscapes; Natural Vegetation; Crucial Habitat; Landscape Condition; Lesser Prairie Chicken range, focal areas, connectivity; Greater Prairie Chicken range, priorities; Whooping crane corridor; Fisheries condition; Wetlands; Riparian Corridors; Reference	Yes	Aug 2013	Dec 2013	http://kars.ku.edu/maps/naturalresourceplanner/
Montana	Yes	Crucial Areas Planning System	1 mi ² hex grid	Terrestrial/Aquatic Species Richness; Terrestrial/Aquatic SOC; Terrestrial/Aquatic Game Quality; Aquatic Connectivity; Large Intact Block Connectivity by Guild; Riparian/Wetland Areas; Watershed Integrity; Habitat for Big Game, Bighorn Sheep/Mountain Goat, Forest Carnivore, Prairie Grouse; Development/Infrastructure; Reference layers	By request	Sept 2011	Unknown	http://fwp.mt.gov/fishAndWildlife/conservationInAction/crucialAreas.html
Nebraska	No							
Nevada	Yes	NV CHAT	1 mi ² hex grid	Terrestrial SOC; Terrestrial SERI; Wetlands & Riparian Areas; Landscape Condition, Crucial Habitat Rank	Yes	Dec 2013	Nov 2014	http://www.ndow.org/Nevada_Wildlife/Maps_and_Data/NVCHAT/
New Mexico	Yes	NM CHAT	1 mi ² hex grid	CH Rank; SOC Rank; Terrestrial/Aquatic SERI Rank; Wildlife Corridor Rank; Wetland/Riparian Rank; Large Natural Areas Rank; Natural Vegetation Rank; Freshwater Integrity Rank; FWS Critical Habitat; Reference layers	Yes	Dec 2013	Unknown	http://nmchat.org/
Oklahoma	No							
Oregon	Yes	Compass	1 mi ² hex grid	Complied, Terrestrial, Aquatic CH Rank; Terrestrial/Aquatic SOC Rank; Terrestrial SERI; Wetland/Riparian Areas; Natural Vegetation; Large Natural Areas; Landscape Connectivity; Freshwater Integrity; Conservation Opportunity Areas; Vulnerable Habitat; Wildlife Linkage Buffers by Guild; Sage-Grouse Core Areas, Priority Fish Passage Barriers; Elk/Deer	Yes	Dec 2013	Feb 2014	http://www.dfw.state.or.us/maps/compass/
South Dakota	No							
Utah	No							
Washington	Yes	Priority Habitat & Species (PHS)	Vector data; scale limit not specified.	All species & habitats on PHS list: State-listed & Candidate Species; Vulnerable Species Aggregations; SERI; Species of Tribal Importance; SOC; Habitats with unique/significant value to diverse species assemblage	Can request report or printed map	Jun 2011	Unknown	http://wdfw.wa.gov/mapping/phs/
Wyoming	Yes	WISDOM	Vector data; scale limit not specified.	Crucial Stream Corridors; Terrestrial/Aquatic Conservation Areas; Terrestrial/Aquatic/Combined Crucial Priority Areas; Terrestrial/Aquatic/Combined Enhancement Priority; Non-game Wildlife Areas; Priority Wetlands; USFWS Critical Habitats; Big Game Crucial Ranges/Migration Corridors; Sage Grouse Core/Connectivity Areas; Reference Layers	By request	Aug 2012	Sept 2014	http://wisdom.wygis.org/
Southern Great Plains	Yes	SGP CHAT	1 mi ² hex grid	Lesser Prairie Chicken Estimated Occupied Range & Crucial Habitat; Focal Areas & Connectivity Zones; Infrastructure Habitat Impacts; Landscape Impact Summaries; Energy Development Features; Crop and Land Cover	Yes	Sept 2011	Jan 2015	http://kars.ku.edu/maps/sgp chat/
Westwide	Yes	West-wide CHAT	Varies; 1-10 mi ² hex grid	See Table 2	Yes	Dec 2013	Nov 2014	http://www.westgovchat.org

¹SOC: Species of Concern; ²CH: Crucial Habitat; ³SHCG: Species & Habitat Conservation Guide; ⁴SERI: Species of Economic & Recreational Importance

2.2. Legal and Policy Framework

Federal and state transportation and natural resource managers have at their disposal a broad spectrum of federal and state laws and policies that provide support for the use of wildlife data, including CHATs, as deemed appropriate during transportation planning and projects. Legal and policy support for such use runs the gamut and includes, but is not limited to:

- Federal laws, such as *Moving Ahead for Progress in the 21st Century*, the *National Environmental Policy Act*, the *Endangered Species Act*, and the *Clean Water Act*;
- Corresponding state versions of these same or similar transportation or natural resource management laws;
- Federal and state policies allowing for the consideration of wildlife and other pertinent environmental data during planning, such as:
 - forest and resource management planning;
 - strategic growth planning;
 - climate disruption, climate adaptation and resiliency planning;
 - transportation planning, including policies aimed at improving safety, such as *Toward Zero Deaths: A National Strategy on Highway Safety*, and ecosystem-based planning, such as FHWA's *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* and its *Planning and Environmental Linkages* (PEL) program; and,
 - guidelines, manuals, handbooks, procedures, memoranda, and other policy documents, aimed at mitigating the disruptive effects of roads on our natural resources.

A comprehensive list could potentially include hundreds of individual federal and state laws, policies and related regulatory guidelines that provide support for the use of wildlife data in transportation planning and projects, depending upon how fine a filter is used. Such a list, however, is beyond the limited scope of this report, which focuses upon best management practices with respect to the use of digital wildlife data. This legal and policy summary accordingly does not purport to be exhaustive; rather, it focuses on a short list of illustrative federal and state laws and policies that support use of wildlife data during transportation planning and projects.

This narrowed approach is also consistent with the priorities identified by federal, state and tribal transportation and land management agency representatives during the electronic questionnaire portion of the project, completed in 2014, which is included in Chapter 3. When asked in the Questionnaire – Part 1, Question 5, to describe, in a word or a phrase, the primary reason their agency considers fish and wildlife data during transportation planning and projects, the top three responses were: (1) natural resource management and environmental stewardship (56.5%); (2) compliance with mandates, regulations, or agency missions (39.1%); and (3) public safety (30.4%).

2.2.1. Legal

2.2.1.1. Federal Legal Framework

The *Federal Aid Highway Act*, 23 U.S.C. §§ 101 *et seq.*, requires that all federal aid highway projects be reviewed for any “possible adverse economic, social, and environmental effects” and that final decisions on such projects be “made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing such adverse effects.” (23 USC § 109(h)). Federal law also dictates a standard process for developing statewide long- and short-range transportation plans for highway projects that rely on federal funding (23 U.S.C. § 135; 23 CFR part 450, subpart B). Statewide long-range transportation plans, known as “LRTPs,” are designed to provide strategic direction to guide the state’s future investments in transportation. Typically covering a period of 20-25 years, the LRTP is developed through a continuous, statewide process of planning, implementation, operation and preservation, and evolves over time to reflect changing needs, resources and priorities (23 CFR § 450.214). Short-range plans, known as statewide transportation improvement programs or STIPs, consist of a statewide prioritized listing or program of transportation projects; they typically cover a period of 4-5 years and are consistent with the LRTP and other related state plans (*id.* § 450.216).

Enacted in 2012, the *Moving Ahead for Progress in the 21st Century Act* (MAP-21), built upon existing transportation law by expressly authorizing state, federal and tribal managers to take steps to reduce the number of motorist collisions with wildlife and to ensure connectivity among habitats disrupted by roads. In assessing the effects of roads on the environment and human safety, project managers may use wildlife data, potentially including CHATs, to identify and prioritize environmental or wildlife-related mitigation, either on a stand-alone basis or as part of an eligible transportation project under the Surface Transportation Program (§ 1108); Highway Safety Improvement Program (§ 1112); Tribal and Federal Lands Transportation programs (§ 1119); Federal Lands Access Program (§ 1119); and Transportation Alternatives Program (§ 1122). Managers may also use digital wildlife data to identify and avoid or mitigate potentially adverse environmental effects of a transportation project when developing LRTPs (both statewide and metropolitan), STIPs, and/or programmatic mitigation plans (§§ 1201-1202, 1311).

In addition to federal transportation law, highway projects and plans that are federal activities are also potentially required to adhere to a variety of natural resource regulations, depending on the location and the resources affected. Managers may consider wildlife data, potentially including CHATs, when assessing the impacts of a highway project on the environment when a transportation project involves one or more of the following laws:

- The *National Environmental Policy Act* (NEPA), 42 U.S.C. §§ 4321 *et seq.*, is a decision-making process that requires federal agencies to consider the potential environmental effects of a proposed federal action, including highway projects.
- The *Endangered Species Act* (ESA), 16 U.S.C. §§ 1531 *et seq.*, provides for the “conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend.” Section 7 specifically requires federal agencies to ensure

that federal actions are not likely to jeopardize the continued existence of a listed species or to modify its critical habitat; the ESA further requires use of the “best scientific and commercial data available.”

- Among other things, the *Clean Water Act* (CWA), 33 U.S.C. § 1344, prohibits the discharge of dredged or fill material, as the result of a new highway project, into the navigable waters of the United States, including wetlands and tributaries, that result in unacceptable, adverse effects on shellfish beds, fishery areas and wildlife.
- The *Migratory Bird Treaty Act* (MBTA), 16 U.S.C. §§ 703 *et seq.*, seeks to conserve migratory bird species native to the U.S. and its territories and their habitats. Agencies must assure highway projects do not harm these species, or their nests or eggs.

Other statutes governing the oversight of public lands typically provide for consideration of wildlife data for transportation-related projects on public lands. Examples of such laws include:

- The *Federal Lands Policy and Management Act* (FLPMA), 43 USC §§ 1701 *et seq.*, governs management of public lands under the direction of the Bureau of Land Management (BLM); management plans may include provisions to conserve wildlife and habitat and to maintain and improve connectivity.
- The *National Forest Management Act* (NFMA), 16 USC §§ 1600 *et seq.*, sets forth a planning process for land and resource management on public lands administered by the Forest Service; the rules governing such management were recently amended to incorporate connectivity as an express element to consider during planning.
- The *Fish and Wildlife Coordination Act* (FWCA), 16 USC §§ 661-666c, authorizes the U.S. Fish and Wildlife Service (USFWS) to take steps to conserve game and fur-bearing animals, prepare plans to protect wildlife resources, and to evaluate the effect of proposed water resource development projects on fish and wildlife.
- The *National Wildlife Refuge Improvement Act* (NWRIA), 16 USC § 668dd, requires the USFWS to develop a Comprehensive Conservation Plan (CCP) for each national wildlife refuge in the Refuge System. Spanning 15 years, CCPs outline a vision statement and supporting goals, objectives, and long-range strategies for managing wildlife within the Refuge System, and may include provisions to conserve wildlife and habitat and to maintain and improve connectivity.

For a comprehensive digest of the more than 150 federal resource laws that may support use of wildlife data, visit: <http://www.fws.gov/laws/lawsdigest/Resourcelaws.html>.

2.2.1.2. State Legal Framework

Where federal funding is involved, state departments of transportation are bound by federal transportation law, including its focus on public safety and environmental stewardship, as discussed above. Outside of the transportation arena, a number of states have enacted state-specific equivalents of federal laws, such as those governing environmental policy, endangered

species, and clean water/pollution prevention, in addition to other state laws focused on wildlife. Although it is difficult to further generalize state laws that may support use of wildlife data, such as CHATs, several illustrative examples of state-equivalent laws are described below.

- The *Montana Environmental Policy Act* (MEPA), M.C.A. §§ 75-1-101 *et seq.*, requires state officials to follow a public process to identify any significant environmental harms resulting from a state decision, such as a state-funded transportation project or permit authorization.
- The *Kansas Nongame and Endangered Species Conservation Act*, K.S.A. §§ 32-957 through 32-963, 32-960a-b, 32-1009 through 32-1012, 32-1033, as amended, provides protection for listed species and critical habitats affected by proposed state- or publicly-funded activities, such as road and bridge construction, and requires the state Department of Wildlife, Parks and Tourism to conduct an environmental review and, if necessary, to condition any required action permits on mitigation of resulting negative effects on listed species and critical habitats.
- The California statute known as the *Porter-Cologne Water Quality Control Act*, Cal. Water Code §§ 13000 *et seq.*, sets out a comprehensive regulatory framework for protecting the state's water quality and its beneficial uses, including preservation and enhancement of fish, aquatic and wildlife resources.

In addition, as a condition of receiving federal funding under the Wildlife Conservation and Restoration and State Wildlife Grants programs, Congress further requires state wildlife agencies to prepare and submit for approval a “comprehensive wildlife conservation strategy,” also known as a State Wildlife Action Plan or SWAP.¹ SWAPs assess the state's wildlife and identify actions necessary to prevent them from becoming endangered. Although SWAPs vary by state, they generally adhere to a common framework of eight elements aimed at setting state conservation priorities by determining: (1) wildlife populations and habitats; (2) challenges faced by those populations; and (3) proposed solutions. Among other solutions, SWAPs may propose conservation strategies and actions that, if implemented, may help mitigate impacts to fish and wildlife to benefit continued population viability. Originally due in 2005, state wildlife agencies are required to revisit the state's SWAP at least every 10 years. Such reviews will likely provide opportunities to incorporate updated wildlife data, potentially including CHATs.

2.2.2. Policy

2.2.2.1. Federal Policy Framework

The number of federal policies that may entail the use of digital wildlife data to inform federal decision-making is likely to be in the hundreds. We highlight below a handful of illustrative examples of such policies.

¹ Association of Fish and Wildlife Agencies & USFWS. Date unknown. *State Wildlife Action Plans: Working together to prevent wildlife from becoming endangered*. Retrieved February 6, 2015, from: <http://www.fws.gov/midwest/FederalAid/documents/StateWildlifeActionPlansReport.pdf>

- The *Department of Transportation Act of 1966*, as amended, 49 USC § 303; 23 U.S.C. § 138; 23 C.F.R. § 774.1, states that “it is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.” Commonly known as “section 4(f),” the policy calls for the Secretary of Transportation to coordinate with other federal agencies and the states to develop “transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities.” In those cases in which a transportation project requires the use of such land, it may be approved only if: “(1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.” *De minimis* impacts are generally permissible.
- In 1977, President Jimmy Carter adopted Executive Order 11990, 42 F.R. 26961, directing federal agencies to avoid new construction in wetlands, including federally-funded highway construction or improvement projects, unless those agencies first determined that (1) there is no practicable alternative to such construction, and (2) the proposed action includes all feasible measures to minimize harm to wetlands that may result from the project. When such harm is determined, the order requires agencies to adopt mitigation measures, and compensatory wetlands are often restored, created or enhanced as part of the mitigation for a particular project.
- As discussed in Chapters 4 and 6, FHWA’s Eco-Logical approach offers a nine-step approach to collaborative conservation. By providing a voluntary framework for federal, state, tribal and local partners to collaborate, share wildlife data, and identify and prioritize areas of ecological significance during infrastructure planning, design, review, and construction, Eco-Logical, at its core, seeks to pave the way for ensuring that transportation planning and projects consider wildlife and their ecosystems.
- In 2014, Secretary of the Interior Sally Jewell announced a new mitigation policy aimed at shifting away from a project-by-project approach toward a more comprehensive, landscape-level approach to mitigation on the U.S. Department of Interior’s public lands.² The Department envisioned the new strategy would “provide opportunities to build resilience by considering the cumulative effects of development, incorporating conservation principles such as habitat connectivity into landscape strategies, and ensuring that conservation and development activities take place within a comprehensive regional strategy.” To implement its new approach, the Department committed to instituting policy guidance for mitigation strategies under NEPA and other environmental laws and to improving inter-agency coordination on its projects.

² Clement *et al.* 2014. *A strategy for improving the mitigation policies and practices of the Department of the Interior*. A report to the Secretary of the Interior from the Energy and Climate Change Task Force, Washington, D.C. Retrieved February 6, 2015, from: http://www.doi.gov/news/upload/Mitigation-Report-to-the-Secretary_FINAL_04_08_14.pdf

2.2.2.2. State Policy Framework

State policies supporting use of digital wildlife data to inform decision-making are, if anything, more difficult to generalize and likely to outnumber federal policies. We nonetheless include below a handful of illustrative state policies.

- In 2007, the Director of the Washington State Department of Transportation (WSDOT) issued an executive order directing that WSDOT, “in partnership with other agencies, organizations, and the public, ... assure that road and highway programs recognize, together with other needs, the importance of protecting ecosystem health, the viability of aquatic and terrestrial wildlife species, and the preservation of biodiversity.”³ Among its aims, the order provided that “planning should recognize and respond to particular concerns and opportunities for habitat preservation and the need for habitat connections.” It further committed the agency to identify “specific opportunities to restore habitat connectivity already damaged by human transportation corridors. Such opportunities should be prioritized for maximum ecological benefit by taking account of such factors as the multiplicity of benefited species, as well as the opportunity to support recovery of threatened and endangered species, the long-term security and viability of the habitat connection, and the cost-effectiveness of achieving connectivity gains.”
- In April 2009, the New Mexico House of Representatives passed a House Joint Memorial No. 4 calling for “state agencies, using existing resources, with other agencies, Indian nations, tribes and pueblos, and private groups to share information about key wildlife corridors.”⁴ In so doing, the legislature recognized that better data sharing and mapping of the state’s wildlife corridors would help improve planning for development and roads, reduce collisions between motorists and wildlife, and benefit the state’s economy, which it notes receives billions of dollars each year as a result of wildlife recreational opportunities. The Joint Memorial also advised state agencies to consider “existing and future data about wildlife corridors in the planning decisions,” and encouraged agencies to share wildlife corridor data and assess needs, including future funding needs.
- As of 2012, the Center for Excellence in Rural Safety (CERS) at the University of Minnesota reported that more than 30 states (Figure 1), including the majority of western states, have instituted policies aimed at achieving “zero fatalities” (or a comparable objective).⁵ Such a policy could result in states assessing wildlife-related human fatalities using wildlife data to evaluate potential mitigation measures (e.g., wildlife crossing structures, animal detection systems, etc.).

³ Washington State Department of Transportation. 2007. Secretarial Order 1031, *Protections and Connections for High Quality Natural Habitats*. Retrieved February 6, 2015, from: http://midcolumbiarereg.com/wp-content/uploads/2014/03/Swaak_documents_website/WSDOT%20Protections%20and%20Connections%20for%20High%20Quality%20Natural%20Habitats%20Executive%20Order%20E1031.01.pdf

⁴ New Mexico, House of Representatives. 2009. Joint Memorial No. 4. Retrieved February 6, 2015, from: <http://www.nmlegis.gov/Sessions/09%20Regular/final/HJM004.pdf>

⁵ Munnich, L.W., Jr. et al. 2012. *Evaluating the Effectiveness of State Toward Zero Deaths Program*, Tech. Report No. CTS 12-39T. Retrieved February 6, 2015, from: <http://www.ruralsafety.umn.edu/research/documents/12-39t.pdf>

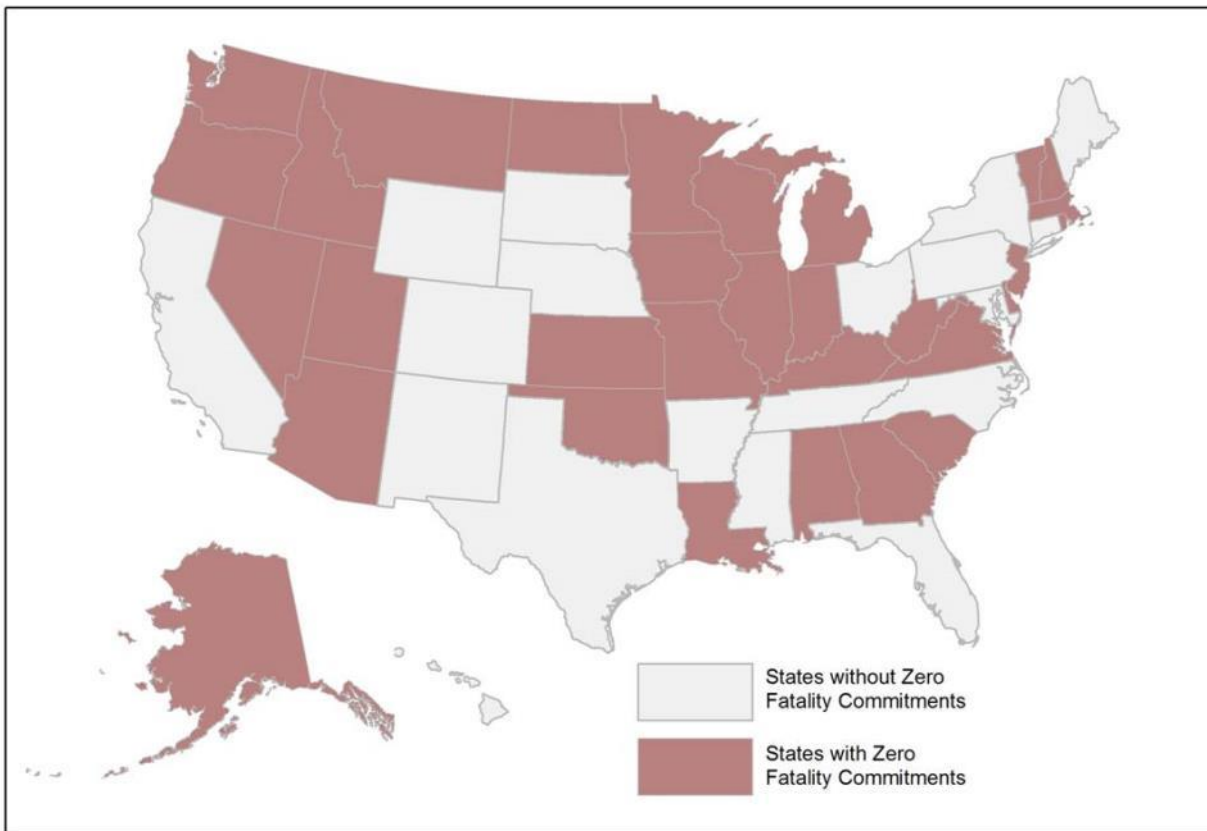


Figure 1: States adopting “zero fatality” language as of March 2012. Source: Produced by the Center for Large Landscape Conservation based on an update of Munnich *et al.* 2012.

- In 2014, the WGA adopted Policy Resolution 2014-14, entitled “*State Wildlife Science, Data and Analysis*,” directing the Western Governors’ Wildlife Council to continue its guidance in the development, management and implementation with partners of the state and regional CHAT. The Policy Resolution urges state and federal agencies, private industry, and interested members of the public to use CHATs to take a “first look” at the location of wildlife resources. In addition to expressly acknowledging the critical role of state wildlife science, data and analysis in informing wildlife management decisions, the Resolution further encourages federal and state agencies to work collaboratively to collect, share, use and regularly update fish and wildlife data “as principal sources to inform their land use, land planning and related natural resource decisions.”

Combined, there are many federal and state laws, regulations, policies and directives that create opportunities for incorporating CHAT information. The consideration of wildlife values required by transportation plans and projects will certainly rely on the best available scientific information, of which CHATs will play an important role.

3. QUESTIONNAIRE REPORT

3.1. Purpose

One of the main tools for decision-making concerning biodiversity management and conservation is geospatially explicit data. The body of digitally available, spatially-explicit fish, wildlife and habitat data is extensive and growing. Not only do 10 out of the 16 regional CHAT states have individual state CHATs, but state fish and wildlife agencies and natural heritage programs collect, compile, update, and store scientific data for many species and habitats within their jurisdictions.

One of the goals of this project was to assess the extent to which practitioners in agencies charged with building and maintaining roads across the West are aware of, and use, digitally available fish, wildlife, and habitat data in transportation planning and projects. The project also sought to assess the early adoption and use of the regional CHAT information and individual state CHATs. Our strategy was to develop and distribute questionnaires to:

1. Evaluate how upper-level managers at state departments of transportation (DOTs) and federal and tribal land management agencies (LMAs) with road responsibilities incorporate fish, wildlife and habitat data into transportation planning and projects.
2. Understand how transportation and natural resource agency personnel use available fish, wildlife and habitat data during the course of their work on transportation plans and projects.
3. Identify opportunities to:
 - Consolidate and coordinate decision-making processes for planning and projects.
 - Advance delivery of web-based tools and applications to promote wildlife conservation.
 - Improve impact avoidance and the more efficient identification of viable and strategic mitigation priorities.
 - Better integrate wildlife data into the FHWA's Eco-Logical process.
 - Support pre-planning decisions to improve regulatory process outcomes.
 - Implement key wildlife connectivity and mitigation components of MAP-21.
 - Develop and implement policies and agreements that facilitate the use of digital fish, wildlife and habitat data transportation planning and projects.

The first substantive task in the WGA-FHWA project was to interview federal, state and tribal transportation and land management agency personnel to better understand opportunities for:

- Coordinating and streamlining decision-making processes at both transportation planning and project levels.
- Improving identification and prioritization of areas for transportation-related wildlife mitigation.
- Making preliminary (first-cut) decisions at the transportation planning and pre-planning level to improve efficiencies.
- Implementing both the safety- and connectivity-related wildlife mitigation components

of MAP-21.

- Integrating digital wildlife information with FHWA's Eco-Logical principles.
- Delivering wildlife data via web-based tools and applications to expedite and coordinate transportation project and plan development and transportation-related wildlife mitigation.
- Developing and implementing policies and agreements that facilitate an integrated approach for using digital wildlife data and to assure wildlife mitigation is employed where it is needed by the transportation sector.

This report is the summary of the initial task that interviewed a variety of potential users of digital wildlife data in the transportation sector via an electronic questionnaire.

3.2. Methods

3.2.1. Target Population

We generally defined our target population to be agencies charged with building and maintaining roads within the geographic area covered by the 16 states involved in the regional CHAT. In addition to state DOTs and federal transportation agencies, we included federal LMAs and tribal agency personnel who, in the course of their management of roads within their jurisdictions, must consider impacts on natural resources.

We designed Part 1 of the questionnaire for supervisory personnel with a broad agency-wide perspective, such as department heads, decision-makers and leaders, in order to better understand how wildlife are considered and data are used at the level of an agency. Understanding there can be a difference between agency-level patterns compared to individual personnel-level patterns, we designed Part 2 of the questionnaire for specific job titles suggested by respondents of Part 1. The job titles – fish and wildlife biologists, environmental specialists, GIS specialists, planners, engineers – were suggested as those for which fish/wildlife/habitat data would be useful in the course of their work. We also distributed the questionnaire to federal transportation liaisons who are federal LMA or regulatory agency employees (*i.e.*, USFWS) that provide expertise to expedite state transportation plans and project reviews.

3.2.2. Questionnaire Development and Review

We developed the questionnaire, in part, to help with the next two tasks for the research project: 1) describing best practices regarding the integration of CHAT information into transportation planning, and 2) identifying future opportunities for programs to support the integration of wildlife conservation efforts into transportation planning. The final questionnaire was also based upon guidance from WGA staff, feedback from this project's Steering Committee and on the authors' professional understanding of the key points and purpose of the research effort.

Both Part 1 and Part 2 of the questionnaire underwent rigorous review by WGA staff and the Steering Committee, which resulted in several rounds of revisions before each was finalized for

distribution. Close-ended questions, when feasible, were preferred to reduce the difficulty that comes with the need to accurately interpret and analyze open-ended responses. The Montana State University Institutional Review Board (IRB) exempted the questionnaire from the requirement of full review [RA101813-EX]. IRB review is often required to assure that the rights of participants are protected when research involves human subjects.

3.3. Delivery Method and Schedule

3.3.1. Questionnaire – Part 1

We generated an email contact list based primarily on suggestions made by the Steering Committee. We filled in any gaps with the authors' professional contacts by conducting an internet search for the appropriate agency leader. There were a total of 28 invitees to which the questionnaire was distributed (Table 4).

Table 4: Target populations for Part 1 and Part 2 of the questionnaire, and the number of invitees per agency, if known.

<i>Part 1: Department heads, decision-makers, leaders</i>	<i>Part 2: Fish and wildlife biologists, environmental specialists, GIS specialists, planners, engineers, and transportation liaisons</i>
<i>16 State DOTs (1 invitee each)</i>	<i>16 State DOTs (number of invitees unknown*)</i>
<i>Federal agencies (2 invitees each)</i> FHWA USFWS U.S. Forest Service (USFS) National Park Service (NPS) Bureau of Indian Affairs (BIA) BLM	<i>Federal agencies</i> FHWA (15 invitees) USFWS (25 invitees) USFS (8 invitees) NPS (1 invitee) BIA (9 invitees) <i>Tribal agencies (17 invitees)</i>
Total number of invitees: 28	Minimum number of invitees: 75

We sent invitations to answer the Questionnaire – Part 1 by using the email function in Survey Monkey (www.surveymonkey.com). This function generates a unique collector link for each email address, allows the tracking of respondents, and automates the sending of email reminders, as appropriate. We sent the initial invitation in six batches between March 3 and March 21, 2014. We sent reminder/extension notices on March 18 and 20, 2014. The questionnaire closed on March 24, 2014. There were no undeliverable emails indicating that all email addresses were active and accurate. While we sent the invitation to a total of 28 invitees, the survey invitation emails may or may not have been forwarded to others. This could be the case if the invitee believed there were other more appropriate agency personnel to respond to the survey or to enlist the help of others since we invited them to work collectively in order to best represent their agency practices as a whole.

3.3.2. Questionnaire – Part 2

We generated an email contact list for federal and tribal personnel largely based on suggestions by the Steering Committee and/or the knowledge of their colleagues within those agencies. We filled in any gaps by conducting an internet search of agency websites. This resulted in a minimum of 75 invitees that represented 16 state DOTs, various federal LMAs and tribal organizations for Questionnaire – Part 2 (Table 4).

We sent the Part 2 invitation using a standard email that included a hyperlink to the survey. We chose to send the Part 2 invitation as a standard email because we wanted to allow recipients the ability to forward the survey link to anyone they deemed appropriate. Because this method did not allow us to track respondents, we sent reminders to everyone on the original email list whether or not they responded. We cannot be assured that they forwarded these reminders to those who they forwarded the questionnaire invitation. We sent the initial invitation on May 6, 2014, and a reminder/extension notice on May 29, 2014. There were six undeliverable emails indicating outdated or incorrect email addresses.

For state DOTs, we enlisted the assistance of one state DOT to send the invitation to the Transportation Research Board Research Advisory Committee listserv. This method is based on the precedent that Research Program Managers within each state DOT will forward information, such as this questionnaire invitation, to the appropriate personnel within their own agencies. This is the most efficient, time-saving and timely method known for contacting personnel with particular and various job titles at state DOTs. The email invitation was sent via the listserv on May 15, 2014. The questionnaire was closed on May 30, 2014.

3.4. Questionnaire – Part 1

3.4.1. Part 1 Results

Question 1. Please tell us the full name of your agency.

Twenty-six (26) respondents answered this question. Sixteen (61.5%) respondents represented each of the 16 state DOTs, while 10 (38.5%) respondents represented federal agencies, including the BIA, FHWA, NPS, USFWS, and USFS. This is a 92.9% percent response rate for both state DOTs and federal agencies that were sent the questionnaire.

Question 2. Does your agency consider fish and wildlife when planning transportation projects?

All 26 (100%) respondents answered this question. Most respondents (24; 92.3%) answered “yes” to this question, while a small minority of state DOT respondents (2; 7.7%) answered “no.” One hundred percent (100%) of federal respondents indicated their agency considers fish and wildlife when planning transportation projects, while 87.5% of state respondents’ agencies do (Figure 2).

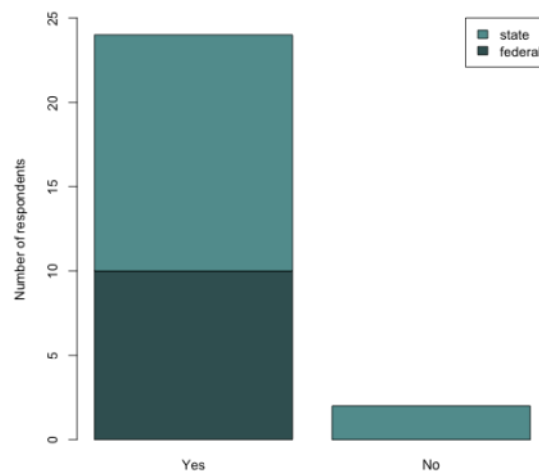


Figure 2. Responses by federal land management and state DOT agency experts indicating whether they consider fish and wildlife when planning transportation projects.

Question 3. In a word or phrase, can you identify the most likely reason fish and wildlife are not considered?

Only the two state DOT respondents who answered “no” to Question 2 were directed to this open-ended question. These respondents indicated that fish and wildlife are not considered because their agency “currently [has] no meaningful long range plan” or due to a “lack of easily accessible data.”

Question 4. Although your agency does not currently consider fish and wildlife, do you believe there is room for this in your planning processes?

Only the two state DOT respondents who answered “no” to Question 2 were directed to this question. Both (100%) responded “yes.”

Question 5. In your opinion, in a word or phrase, what is the primary reason your agency considers wildlife?

Twenty-three (88.5%) respondents answered this open-ended question. Responses could be grouped into four broad categories:

- Natural resource management and environmental stewardship was cited by over half of respondents (13; 56.5%),
- Compliance with mandates, regulations, or agency missions was cited by nine (39.1%),
- Public safety was cited by seven (30.4%), and
- Avoidance of impacts in general was cited by two (8.7%) respondents.

70% of federal respondents and 50% of state respondents indicated stewardship as the primary reason for consideration of wildlife. Percentages do not add to 100% because some respondents included more than one reason.

Question 6. Does your agency use any digital sources of data pertaining to fish or wildlife and/or their habitats? These may include CHATs or other data sources.

Twenty three (88.5%) respondents answered this question. The majority (22; 95.7%) answered “yes,” while one respondent (4.3%) answered “no.” However, this respondent later indicated (Question 29) that his/her state’s wildlife agency uses digital data sources. 100% of federal respondents and 92.3% of state respondents answered “yes” (Figure 3).

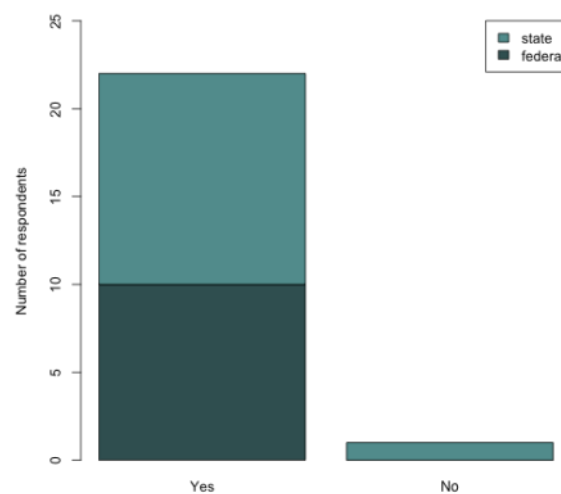


Figure 3. Responses by federal land management and state DOT agency experts indicating whether their agency uses digital data pertaining to fish or wildlife and/or their habitats.

Question 7. Why doesn't your agency use digital sources of data pertaining to fish or wildlife and/or their habitat?

Only the respondent who answered “no” to Question 6 was directed to this question. The respondent indicated that “other sources” were used. Note that this respondent later indicated (Question 29) that his/her state’s wildlife agency uses digital data sources.

Question 8. On a scale of 1 (Never) to 5 (Always), to what extent does your agency use a) state-based and b) regional or west-wide digital sources of data pertaining to fish or wildlife and/or their habitats?

Twenty two (84.6%) respondents answered this question about state-based data sources, while twenty one (80.8%) answered with regard to regional or west-wide data sources.

Most respondents (20; 90.9%) indicated that state-based data are used “3 (Sometimes),” “4 (Frequently),” or “5 (Always).” Eight (80%) federal respondents indicated that state-based data were used “3 (Sometimes)” or “4 (Frequently),” but none indicated that state-based data were “5 (Always)” used. One hundred percent (100%) of state respondents indicated that state-based data were used “3 (Sometimes)” to “5 (Always),” with six (50%) selecting “5 (Always)” (Figure 4).

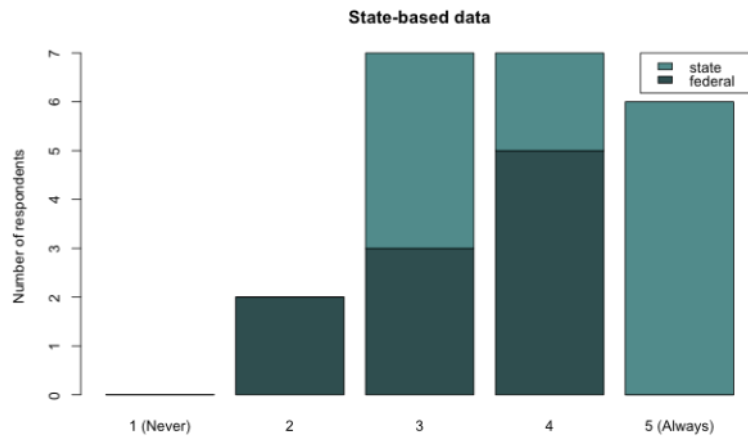


Figure 4. Responses by federal land management and state DOT agency experts indicating to what extent their agency uses state-based wildlife data for transportation plans and projects, 1 being never and 5 being always.

Responses concerning use of regional or west-wide data were bimodal, with 12 (57.1%) indicating that these sources are used “3 (Sometimes)” to “4 (Frequently)” and six (28.6%) respondents indicating that they are “1 (Never)” used. Eight (80%) federal respondents indicated that regional data are used “3 (Sometimes)” to “4 (Frequently),” but none indicated that they were “5 (Always)” used. Seven (63.6%) state respondents indicated that regional data were “1 (Never)” or “2 (Infrequently)” used (Figure 5).

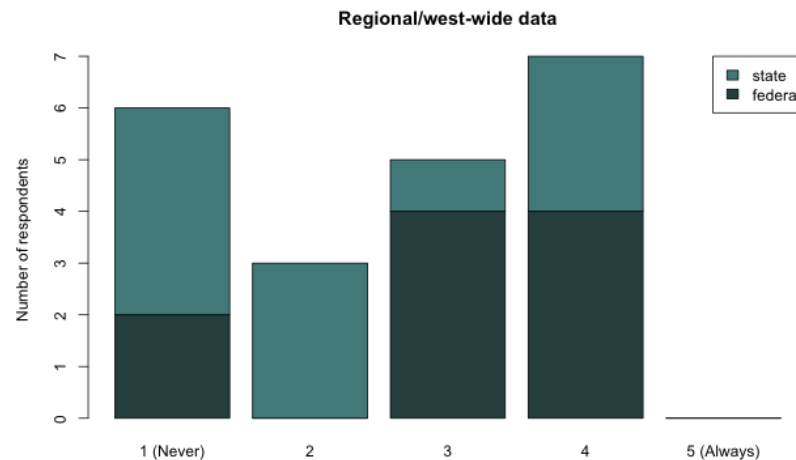


Figure 5. Responses by federal land management and state DOT agency experts indicating to what extent their agency uses regionally-based wildlife data for transportation plans and projects, 1 being never and 5 being always.

Question 9. What job titles in your agency are most likely to use digital sources of data pertaining to fish or wildlife and/or their habitats?

Twenty-two (84.6%) respondents answered this question. Most responses could be grouped into general job descriptions:

- Environmental specialists/coordinators/managers were identified by 14 (63.6%) respondents as likely users of digital data,
- Biologists or other ecologists (*e.g.*, wetlands and connectivity specialists) were identified by 14 (63.6%),
- Planners were identified by eight (36.4%),
- GIS or spatial analysts were identified by four (18.2%),
- NEPA managers were identified by four (18.2%),
- Engineers were identified by two (9.1%),
- Project leaders were identified by two (9.1%), and
- Maintenance personnel were identified by two (9.1%).

Other unique responses included administrative program officers, local agency liaisons, landscape architects, designers, law enforcement rangers, transportation coordinators, and unit managers. Responses did not differ substantially between state and federal respondents (Figure 6). Percentages do not add to 100% because most respondents listed more than one position.

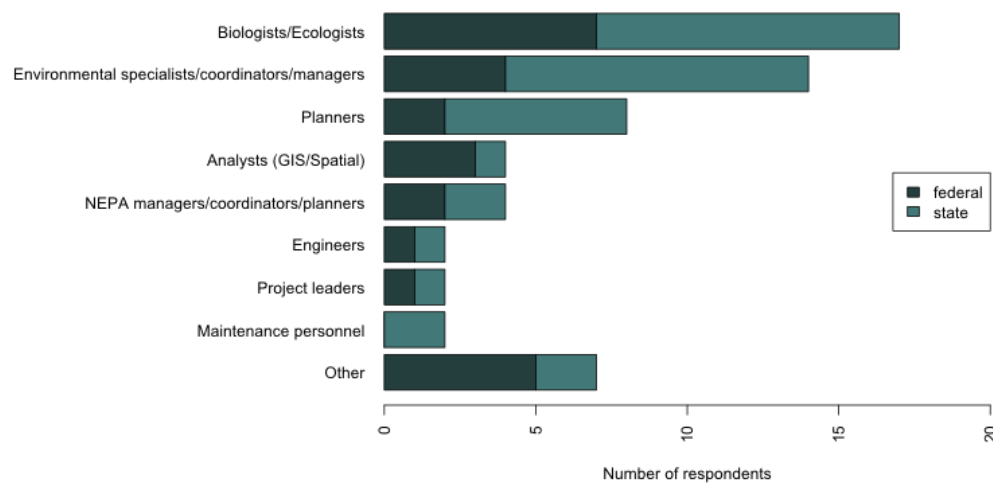


Figure 6. Responses by federal land management and state DOT agency experts indicating which job titles in their agency are most likely to use digital sources of data pertaining to fish or wildlife and/or their habitats.

Question 10. Does your agency use digital sources of data pertaining to fish or wildlife and/or their habitats for any of the following? (See Figure 7 for full list of multiple-choice responses provided.)

Twenty-two (84.6%) respondents answered this question. The most frequently identified uses of digital fish and wildlife data were:

- Environmental studies (22; 100%),
- Site investigation and scoping (21; 95.5%),
- Mitigation (20; 90.9%),
- Design development (19; 86.4%),
- Planning (18; 81.8%),
- Needs assessment and research (16; 72.7%),
- Asset management and maintenance (14; 63.6%), and
- Monitoring (12; 54.5%).

All other uses were indicated by half or fewer of respondents.

Alongside environmental studies, site investigation was also selected by all federal respondents (10; 100%), as opposed to a selection of scoping by all state respondents (12; 100%). Overall, state and federal respondents displayed similar selection patterns, but federal respondents placed greater emphasis on use of digital data in the early stages of needs assessment and programming (federal mean of 80% between these two phases versus the states' mean of 45.6%) (Figure 7).

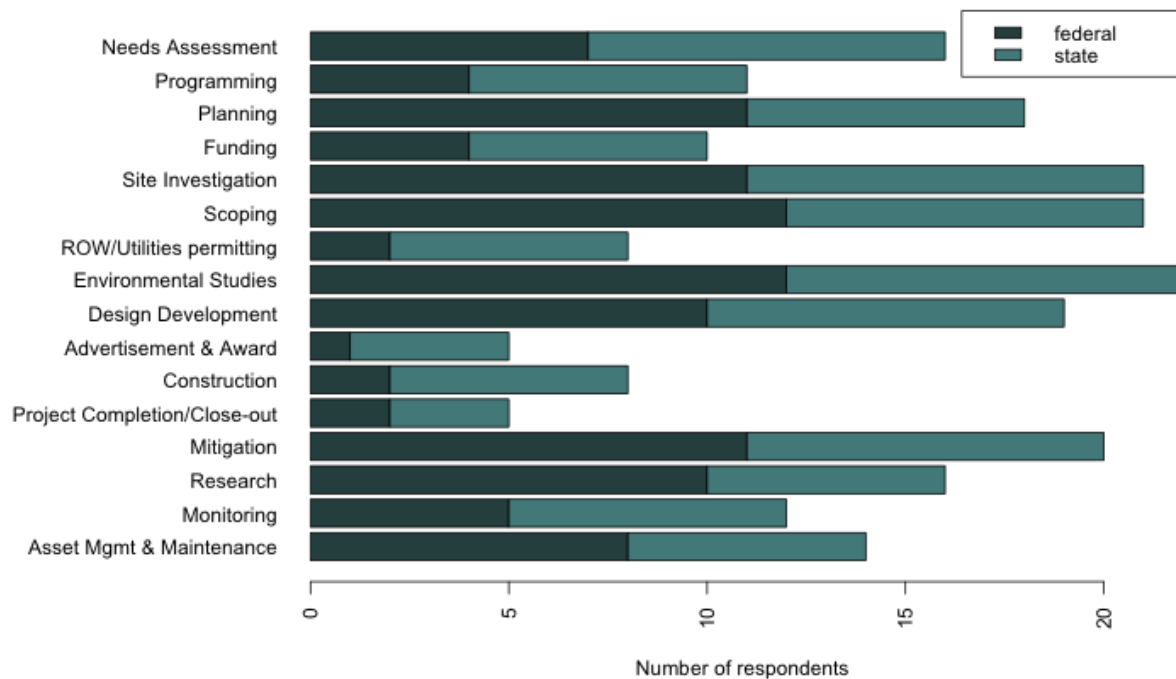


Figure 7. Responses by federal land management and state DOT agency experts indicating for what purposes they use digital wildlife data.

Question 11. What most motivates your agency to use digital sources of data pertaining to fish or wildlife and/or their habitats?

Twenty two (84.6%) respondents answered this question. Most responses could be grouped into four general categories:

- Digital data are accessible and convenient (9; 40.9%),
- Digital data sources offer the most reliable, consistent, and/or current data (8; 36.4%),
- Digital data expedite or increase the efficiency of planning processes (5; 22.7%) , and
- Digital data supports regulatory compliance (*i.e.*, NEPA, ESA) (4; 18.2%).

Forty percent (40%) of federal respondents and 56.3% of state respondents indicated accessibility and convenience as the top motivation for the use of digital data. Federal respondents placed greater emphasis on regulatory compliance (3; 30%) than did state respondents (1; 8.3%). Percentages do not add to 100% because some respondents included more than one factor.

Question 12. On a scale of 1 (Not at all familiar) to 5 (Extremely familiar), please rank your personal familiarity with your state’s CHAT. If your state does not have a state CHAT or if your jurisdiction is not covered by a state CHAT, choose “Not applicable.”

Twenty three (88.5%) respondents answered this question. The most frequent answer received (7; 30.4%) was “1 (Not at all familiar),” followed by “Not applicable” (6; 26.1%), accounting for more than half of respondents. This pattern was driven by federal respondents, 6 (60%) of whom selected “1 (Not at all familiar)” and three (30%) of whom selected “Not applicable.” In contrast, among state respondents, five (38.5%) indicated a familiarity level of “4,” and three (23.1%) indicated a familiarity level of “5 (Extremely familiar)” with their state’s CHAT (Figure 8).

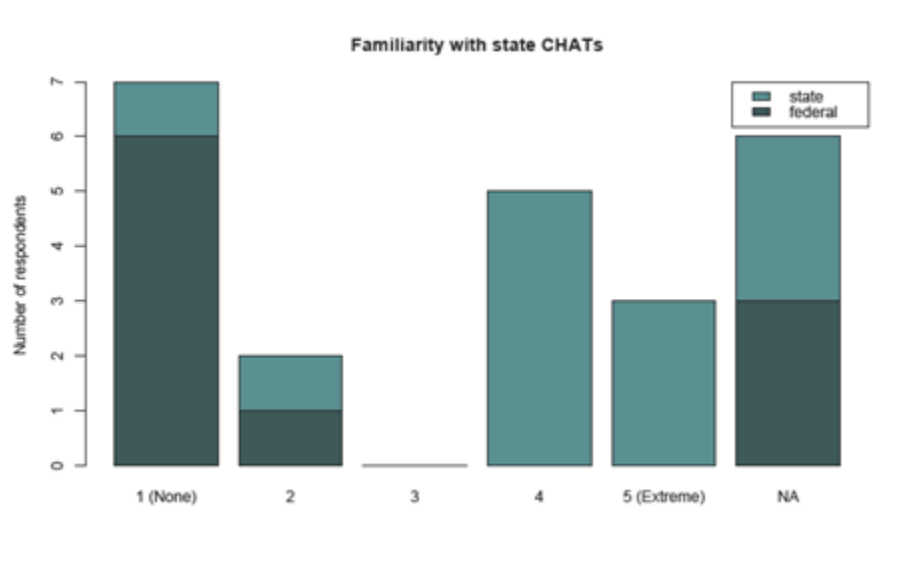


Figure 8. Responses by federal land management and state DOT agency experts indicating their familiarity with state Crucial Habitat Analysis Tools (CHATs), 1 being not at all familiar and 5 being extremely familiar.

Question 13. On a scale of 1 (Not at all familiar) to 5 (Extremely familiar), please rank your personal familiarity with the WGA CHAT that covers 16 states.*

Twenty three (88.5%) respondents answered this question. More than half (14; 60.9%) indicated that they were “not at all familiar” with the regional CHAT, including eight (80%) of federal respondents and six (46.2%) of state respondents. Five respondents (21.7%), including one federal and four state respondents, indicated a low familiarity level of “2.” Zero respondents indicated that they were “extremely familiar” with the regional CHAT (Figure 9).

* This report retains the original wording of the questionnaire, which referred to the regional CHAT as the “WGA CHAT.” As noted, the regional CHAT has since been renamed the WAFWA CHAT.

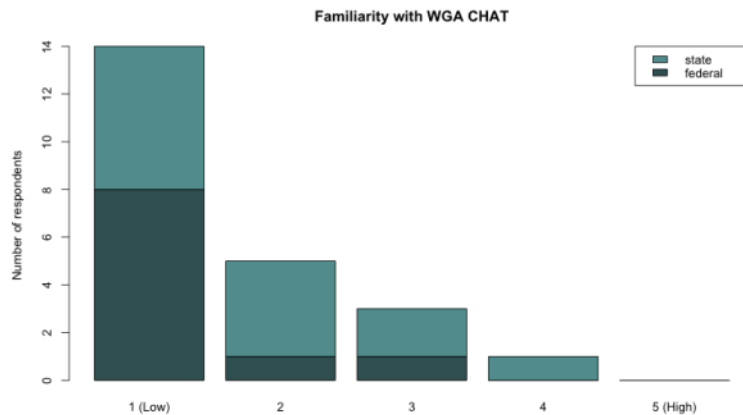


Figure 9. Responses by federal land management and state DOT agency experts indicating their familiarity with the regional CHAT, 1 being not at all familiar and 5 being extremely familiar.

Question 14. On a scale of 1 (Extremely useless) to 5 (Extremely useful), please rate the following...

- a) User interface of state CHAT**
- b) User interface of WGA CHAT**
- c) Usefulness of data contained in state CHAT**
- d) Usefulness of data contained in WGA CHAT**

Twenty-three (88.5%) respondents answered this question. The most frequently selected response in all cases was “NA” (9-14; 39.1% - 60.9%), most likely indicating lack of familiarity with CHATs and/or absence of a state CHAT. Most respondents who did not select NA indicated values of 3-4 (neutral to somewhat useful) for the utility of the state CHAT user interface (9; 64.3%), values of 2-3 (Somewhat useless to Neutral) for the utility of the regional CHAT user interface (7; 77.8%), values of 3-5 (Neutral to Extremely useful) for the utility of the state CHAT data (11; 84.6%), and values of 1-3 (Extremely useless to Neutral) for the utility of the regional CHAT data (7; 77.8%). State respondents tended to rank the user interface and data contained within the state CHATs higher than did federal respondents, but tended to rank the user interface and data contained within the regional CHAT slightly lower than did federal respondents (Figure 10, Figure 11, Figure 12, Figure 13).

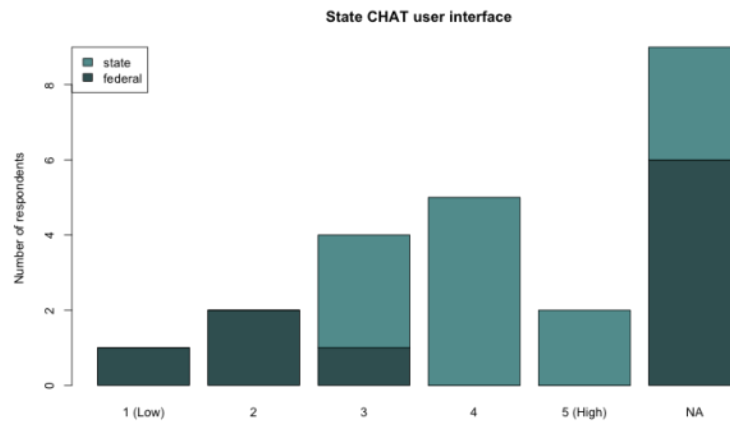


Figure 10. Responses by federal land management and state DOT agency experts indicating their evaluation of the user interface at the website for accessing state CHATs, 1 is extremely useless, 5 is extremely useful and NA is not applicable.

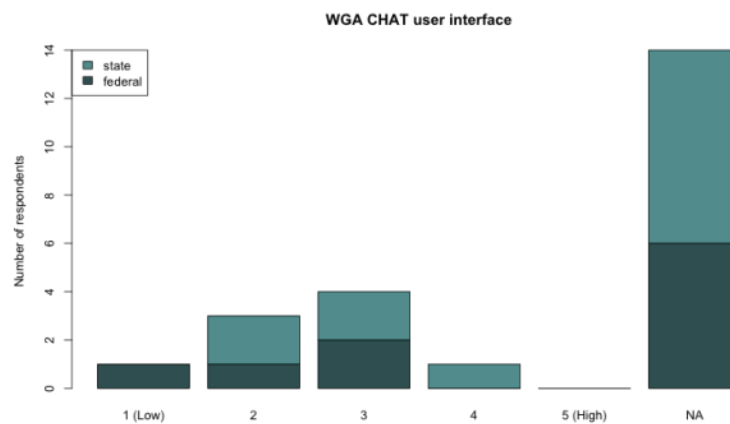


Figure 11. Responses by federal land management and state DOT agency experts indicating their evaluation of the user interface at the website for accessing the regional CHAT, 1 is extremely useless, 5 is extremely useful and NA is not applicable.

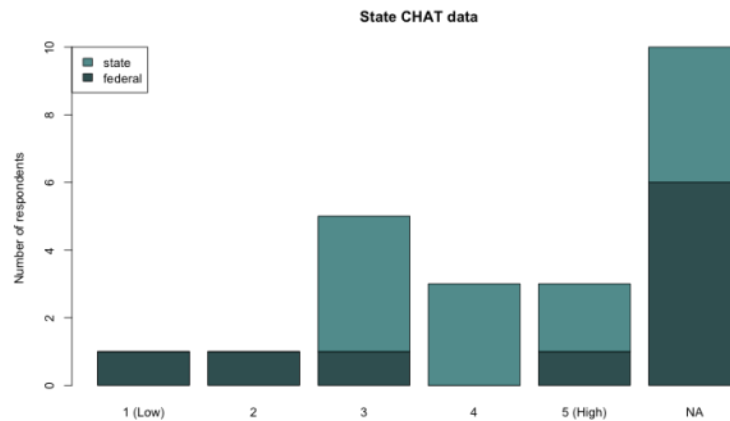


Figure 12. Responses by federal land management and state DOT agency experts indicating their evaluation of the data contained within state CHATs, 1 is extremely useless, 5 is extremely useful and NA is not applicable.

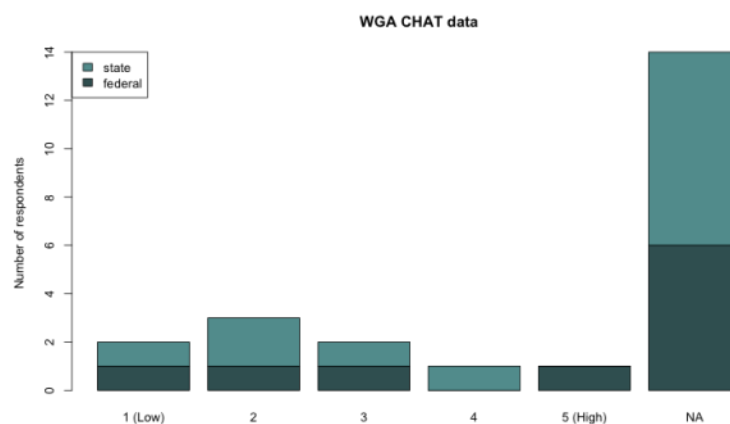


Figure 13. Responses by federal land management and state DOT agency experts indicating their evaluation of the data contained within the regional CHAT, 1 is extremely useless, 5 is extremely useful and NA is not applicable.

Questions 15-17. These were identical to Questions 12-14 and were included for the purposes of maintaining questionnaire logic flow. Responses to these questions are included with Questions 12-14 above.

Question 18. Is any CHAT data being used by your agency for transportation planning?

Twenty-two (84.6%) respondents answered this question. Just over half of respondents (13; 59.1%) answered that “no,” CHAT data are not being used for transportation planning. This pattern was driven by federal respondents, 80% of whom indicated that CHAT data were not

being used. Fifty-eight percent (58.3%) of state respondents answered that “yes,” CHAT data are being used for planning (Figure 14).

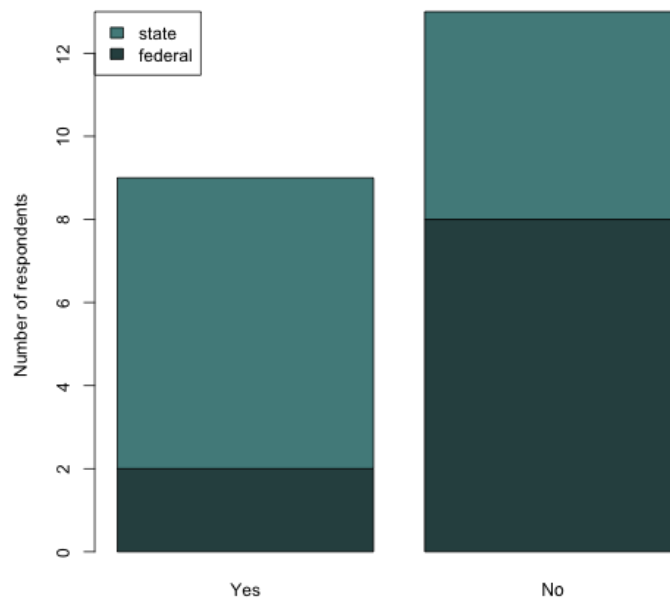


Figure 14. Responses by federal land management and state DOT agency experts indicating whether any CHAT data are being used by their agency for transportation planning.

Question 19. Does your agency use a state CHAT, the WGA CHAT, or both?

Only respondents who did not answer “no” to Question 18 were directed to this question. A total of 10 responses were received. Six (60%) respondents indicated that they only use state CHAT data, while four respondents (40%) indicated that they use both state and regional CHAT data. Two (66.7%) of the three federal respondents who indicated use of CHAT data use both the regional CHAT and their state CHAT, while 71.4% of state respondents used only their state CHAT (Figure 15).

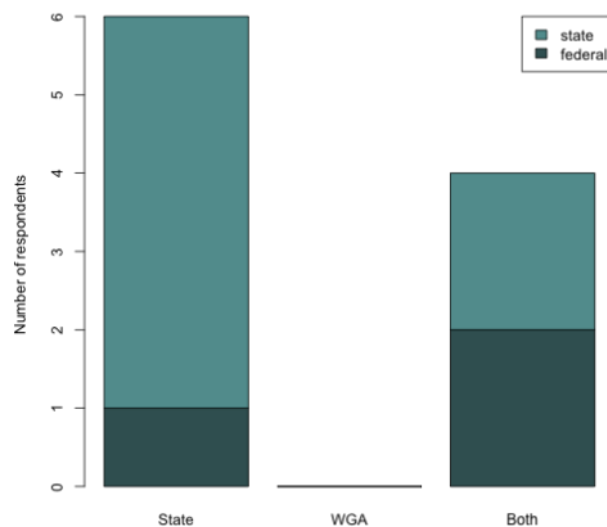


Figure 15. Responses by federal land management and state DOT agency experts indicating whether their agency uses a state CHAT, the regional CHAT, or both.

Question 20. Why isn't any CHAT data being used by your agency for transportation planning?

Only respondents who answered "no" to Question 18 were directed to this question. Most responses could be grouped into three general categories:

- Lack of familiarity with CHAT data (7; 53.8%),
- Lack of coverage of the respondent's geographic area of interest (2; 15.4%), and
- Failure to meet the specific information needs of the respondent (2; 15.4%).

Other responses included use of an internal system or lack of ArcGIS capability, as well as several responses without clear interpretation in the context of the question. Responses did not differ substantially between federal and state respondents.

Question 21. Does your agency use any other source(s) of digital data besides a state CHAT or the WGA CHAT?

Twenty-two (84.6%) respondents answered this question. Most respondents (19; 86.4%) indicated that "yes," other non-CHAT digital data sources are used, including 80% of federal respondents and 91.7% of state respondents (Figure 16).

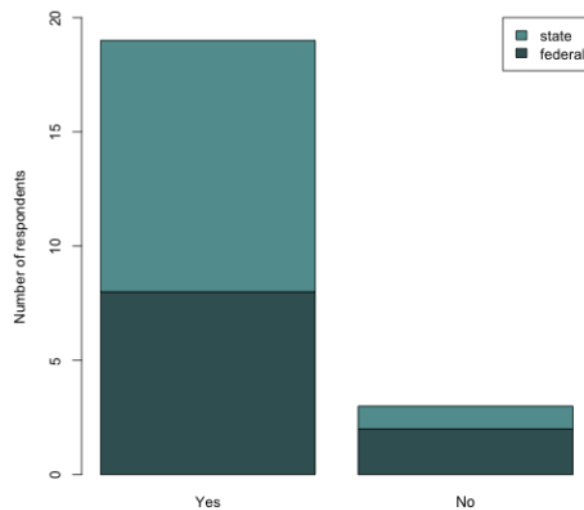


Figure 16. Responses by federal land management and state DOT agency experts indicating whether any other data sources are used besides a state CHAT or the regional CHAT.

Question 22. On a scale of 1 (Extremely useless) to 5 (Extremely useful), please rate the USER INTERFACE to access each of the other sources of digital data your agency uses. Please name each of the digital data sources as appropriate.

Since responses were open-ended and difficult to categorize, please see Appendix C of the stand-alone final questionnaire report for a list of the individual responses received.

Question 23. On a scale of 1 (Extremely useless) to 5 (Extremely useful), please rate the USEFULNESS OF THE DATA ITSELF contained in each of the other sources of digital data your agency uses.

Since responses were open-ended and difficult to categorize, please see Appendix C of the stand-alone final questionnaire report for a list of the individual responses received.

Question 24. If your agency is using other sources of digital fish and wildlife/habitat data in place of, or in conjunction with, CHATs, how could CHATs be improved to the point where they would be used for all your data needs?

Seventeen (77.3%) respondents answered this question. A slight majority of respondents indicated that they were not familiar enough with CHATs to comment (9; 52.9%). Five (29.4%) respondents highlighted a need to integrate more datasets and/or to integrate CHATs with other interfaces. Two (11.8%) respondents called for improved data quality or update frequency, and two (11.8%) questioned how CHATs add value beyond what is offered by other existing data sources. Indications of lack of familiarity with CHATs were more pervasive among federal respondents. Percentages do not add to 100% because some respondents gave more than one answer.

Question 25. How much of your agency's digital fish and wildlife/habitat data needs are or could be met by CHAT (state or WGA combined) as opposed to other sources?

Twenty (76.9%) respondents answered this question. Half (10) of these respondents indicated that their agency's needs are or could be evenly met by CHAT and other data sources. One respondent (5%) indicated that all needs are or could be met by CHAT data, while two respondents (10%) indicated that no needs are met by CHAT data. Federal responses skewed toward fewer than half of needs being met by CHATs, while state responses skewed toward more than half of needs being met by CHATs (Figure 17).

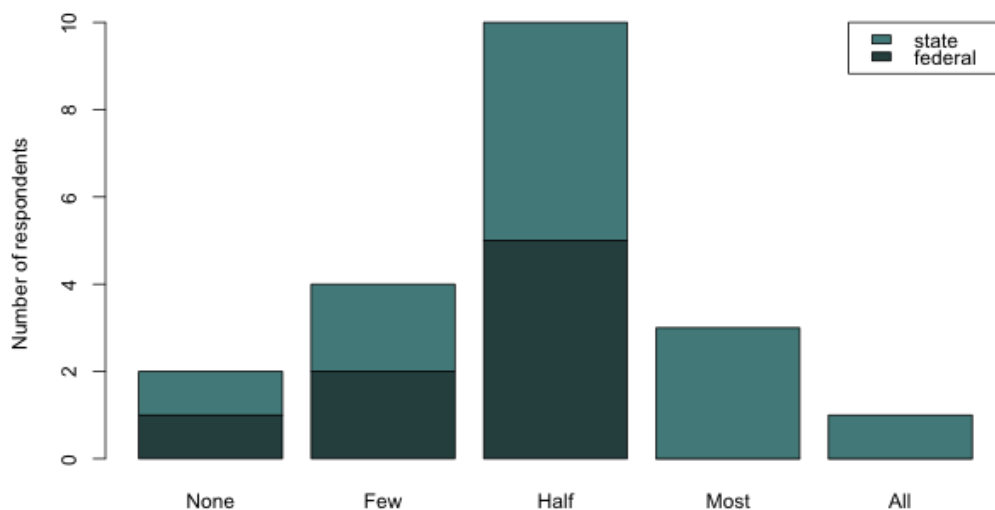


Figure 17. Responses by federal land management and state DOT agency experts indicating what portion of their wildlife informational needs are met by the regional and state CHATs.

Question 26. Please select which, if any, of these tasks/needs are better addressed by CHATs than by other sources.

Fourteen respondents answered this question (53.8%). The task most frequently indicated to be better addressed by CHATs, among both federal and state respondents, was “planning” (13; 92.9%). This was followed by “scoping” (9; 64.3%), “environmental studies” (8; 57.1%), and “site investigation” (7; 50%). All other tasks were selected by fewer than half of respondents. Federal respondents (3; 75%) placed relatively greater emphasis on “environmental studies,” “mitigation,” and “monitoring,” while state respondents (7; 70%) placed relatively greater emphasis on “scoping” (Figure 18).

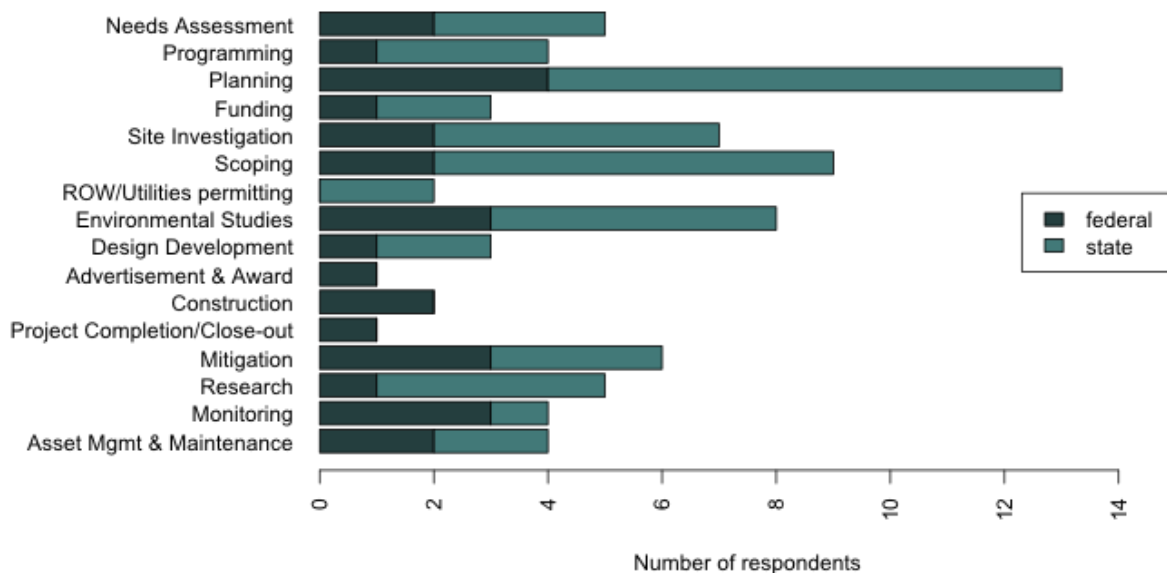


Figure 18. Responses by federal land management and state DOT agency experts indicating which tasks are best addressed by the regional and state CHAT information.

Question 27. Has your agency done any work using digital fish and wildlife/habitat data that we may use as a case study?

One relevant case study was offered by a state DOT respondent.

Question 28. Briefly, what comments or suggestions do you have for those providing the digital fish and wildlife/habitat data used by your agency? Please be sure to record the name of the source and comments directed at each.

Eleven (42.3%) respondents answered this question. Four (36.4%) respondents focused on the need for digital data sources to be verified for accuracy (*e.g.*, by field biologists) and to be updated to include the most current data available, with one respondent indicating lack of correspondence between modeled data and field data. Three (27.3%) respondents suggested additions to the data offered, including identification of areas of future importance, “better descriptions of use corridors,” and added value in the regional CHAT relative to state CHATs. Most (9; 81.8%) respondents were from state agencies. Please see Appendix C of the stand-alone final questionnaire report for the full text of all responses.

Question 29. What methods or information, other than digital data, does your agency use to incorporate fish or wildlife and/or their habitats into your projects?

Twenty-one (80.8%) respondents answered this question. A wide range of alternative methods and information were cited, including field/site surveys, public scoping, professional judgment,

literature research, personal contacts, and coordination with other agencies. Responses did not differ markedly between federal and state respondents.

Question 30. If you could suggest one way to improve attention to, and mitigation for, fish and wildlife conservation in your agency, what would it be?

Twenty-one (80.8%) respondents answered this question. Responses could be grouped into several common themes, including

- Access to reliable, up-to-date information (5; 23.8%),
- Increased education and awareness (4; 19%),
- Funding for mitigation (4; 19%),
- Early integration of mitigation into the planning process (4; 19%), and
- Improved communication and coordination (2; 9.5%).

Question 31. Are you familiar with FHWA's Eco-Logical: Ecosystem Approach to Developing Infrastructure Projects?

Twenty-three (88.5%) respondents answered this question. The majority (19; 82.6%) of those respondents answered that “yes,” they are familiar with Eco-Logical. Familiarity was more common among state respondents (14; 93.3%) than among federal respondents (5; 62.5%) (Figure 19).

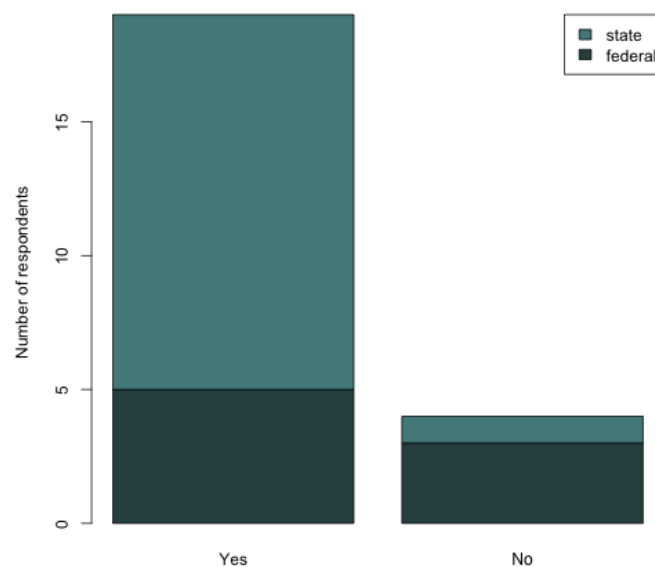


Figure 19. Responses by federal land management and state DOT agency experts indicating familiarity with Eco-Logical.

Question 32. Do you feel that digital sources of data pertaining to fish or wildlife and/or their habitats as a whole increases (or could potentially increase) your agency's ability to align with Eco-Logical principles and objectives?

Nineteen (73.1%) of respondents answered this question, all of whom (100%) indicated that "yes," digital data could or do increase alignment with Eco-Logical principles and objectives.

Question 33. Please explain how digital fish/wildlife/habitat data as a whole increases your agency's ability to align with Eco-Logical principles and objectives.

Eighteen (69.2%) of respondents answered this question. Responses could be grouped into five categories:

- Provision of more information on which to base decisions (6; 33.3%),
- Easy, centralized access to consistent, up-to-date information (4; 22.2%),
- Transparency and a means of standardizing decision-making processes (3; 16.7%),
- Early inclusion of these data in the decision-making process (2; 11.1%), and
- Support for a landscape scale, holistic perspective on highway system impacts (2; 11.1%).

Question 34. Please explain why you feel digital fish/wildlife/habitat data as a whole does not increase your agency's ability to align with Eco-Logical principles and objectives.

No respondents received this question because all indicated that digital data sources do increase their agency's ability to align with Eco-Logical principles in Question 32.

Question 35. Are you aware that the new transportation act, Moving Ahead for Progress in the 21st Century, or MAP-21 for short, includes explicit language within the Surface Transportation, Federal Lands, Tribal Transportation, Highway Safety and other programs authorizing state, federal, tribal, and local transportation officials to spend funds to reduce wildlife-vehicle collisions and promote habitat connectivity?

Twenty-three (88.5%) respondents answered this question. The majority (21; 91.3%) responded that "yes," they were aware of the MAP-21 authorization, including seven (87.5%) federal respondents and 14 (93.3%) state respondents (Figure 20).

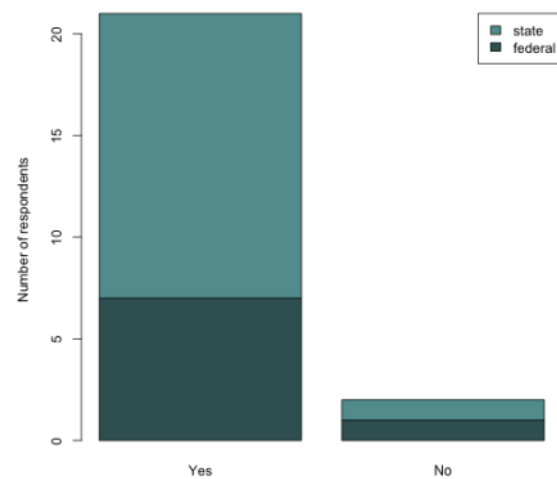


Figure 20. Responses by federal land management and state DOT agency experts indicating awareness of wildlife-related safety provisions of MAP-21.

Question 36. Has your agency allocated more funds for fish and wildlife mitigation under the new MAP-21 language than under the previous transportation act?

This question was only directed to the 21 respondents who answered “yes” to Question 35, all of whom responded. Most (17; 81%) indicated that “no,” their agency had not allocated more funds to mitigation since the passage of MAP-21, including five (71.4%) federal respondents and 12 (85.7%) state respondents (Figure 21).

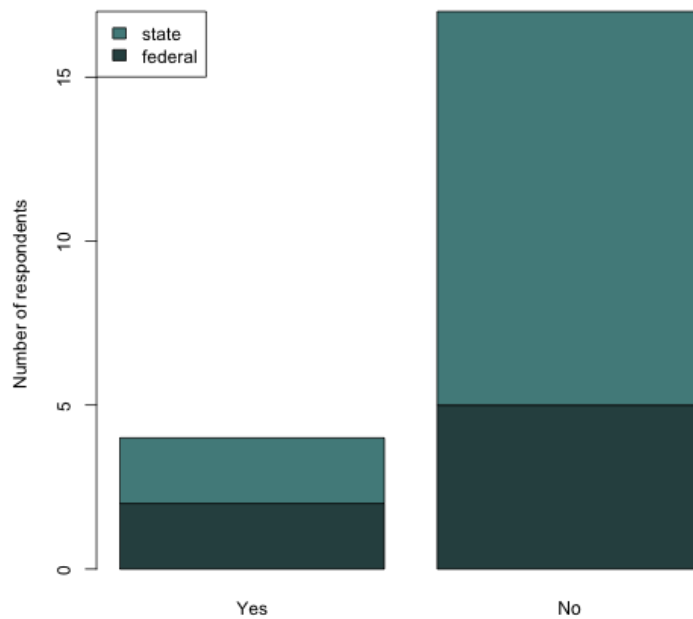


Figure 21. Responses by federal land management and state DOT agency experts indicating whether their agency has allocated more funds to fish and wildlife mitigation under MAP-21.

Question 37. Are you aware of any projects in your state that have resulted from this explicit language in MAP-21?

This question was only directed to the 21 respondents who answered “yes” to Question 35, all of whom responded. Most (16; 76.2%) indicated that “no,” they were not aware of any projects resulting directly from MAP-21 language explicitly authorizing spending on mitigation, including four (57.1%) federal respondents and 12 (85.7%) state respondents (Figure 22).

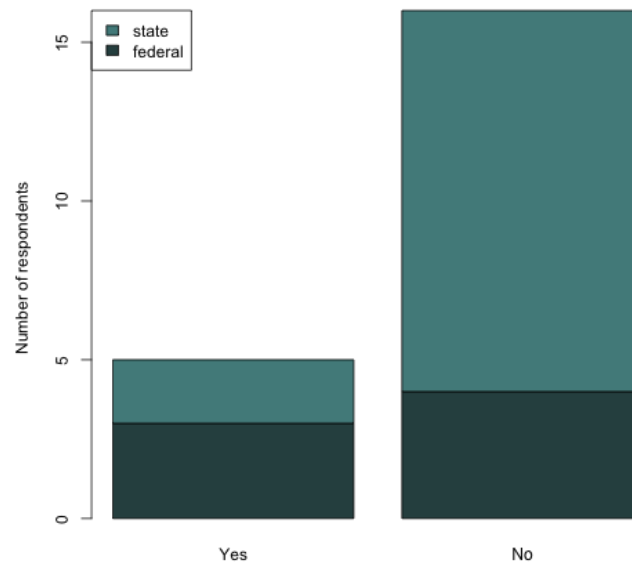


Figure 22. Responses by federal land management and state DOT agency experts indicating awareness of projects resulting specifically from MAP-21 language.

Question 38. What do you think is the number one reason transportation officials are NOT using federal funding to reduce wildlife-vehicle collisions and to improve connectivity?

Twenty three (88.5%) respondents answered this question. Common responses included:

- Lack of sufficient funding and/or the high cost of mitigation (11; 50%),
- Competition with other priorities (8, 36.4%),
- Difficulty in changing the status quo regarding funding for mitigation (2; 9.1%), and
- Lack of supporting data or proven solutions for effective mitigation (2; 9.1%).

Other unique responses cited a lack of knowledge of funding availability, the fact that mitigation is not required for species not listed as threatened or endangered, or disagreed with the question by indicating that federal funding is, in fact, being used for wildlife mitigation.

3.4.2. Part 1 Summary of Key Questionnaire Findings

The questionnaire received a 92.9% response rate. Twenty eight chief executives of the 16 state DOTs and five federal land management agencies with transportation responsibilities were invited to participate and 26 responses were received. Key trends and findings are summarized below.

- **Environmental stewardship drives consideration of fish and wildlife in transportation planning.** Most respondents indicated that their agencies do consider fish and wildlife in their transportation planning and project processes, most often for reasons

associated with environmental stewardship rather than for public safety or regulatory compliance. Some, however, did indicate that multiple factors, typically both stewardship and public safety, played a role in their consideration of fish and wildlife. As expected given the difference in mission and mandate between federal land management agencies and state departments of transportation,⁶ public safety was only cited as a key driver for considering fish and wildlife by representatives of state DOTs.

- **Use of digital data pertaining to fish and wildlife is widespread.** The vast majority of respondents indicated that their agencies make use of digital data pertaining to fish, wildlife, and their habitats. The persons in their agency most likely to use this digital data are either their environmental specialists or biologists for purposes of environmental studies. This is consistent with citation of environmental stewardship as the primary reason for considering fish and wildlife.
- **Many are unaware of and unfamiliar with CHATs.** Given that the release of the regional CHAT and several state CHATs occurred in late 2013 and early 2014, it is not surprising that results of the first questionnaire, which was distributed in early March 2014, indicated a lack of awareness of CHATs. Lack of awareness was especially prominent among federal respondents, and especially with regard to the regional CHAT. A considerable majority of respondents across both state and federal agencies use other data sources in addition to, or instead of, CHATs.
- **State CHATs tend to be used more and ranked more highly than the regional CHAT.** The vast majority of federal respondents indicated that their agencies do not use CHAT data, while a small majority of state respondents indicated that their agencies do use CHAT data. Of those respondents familiar enough with the CHATs to rank their utility, the state CHATs tended to receive higher rankings for both user interface and value of data than the regional CHAT. The most frequent remarks concerning the strengths of CHATs, or recommendations for improvement of CHATs, related to incorporation of more data sources, data verification, and frequent updates of data.
- **There are many potential uses of CHAT information.** The most frequently cited uses for digital fish, wildlife and habitat data in transportation planning were environmental studies, site investigation and scoping, and mitigation. In contrast, the most frequently cited use for CHAT data by both state and federal respondents was for planning purposes. All of these applications were cited by many respondents as good uses of both digital fish, wildlife and habitat data in general and CHAT data specifically. Differences in the relative frequency with which they were cited appears to indicate a real distinction in their perceived uses. This is most likely related to the scale at which they are intended to

⁶ USFWS's mission, for example, is to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. Similarly, the mission of the USDA Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. Although state DOT missions vary, they typically emphasize safety, efficiency, cost-effectiveness and quality of life. While the environment is part of this mission, it is generally not an emphasis.

be used. CHATs, in general, are designed to offer a relatively coarse overview of fish and wildlife issues that may arise early in the planning process for transportation projects. On the other hand, other fish, wildlife and habitat data sources seem to offer project- or site-level data with greater utility for specific project tasks.

- **The awareness of federal policies pertaining to consideration of fish and wildlife in transportation planning is high.** Most respondents were aware of the federal Eco-Logical program, agreed that digital sources of fish, wildlife and habitat data increases the capacity to align with Eco-Logical principles and were able to identify specific ways in which they felt that use of digital data sources can improve alignment with Eco-Logical principles. Most respondents were also aware of MAP-21's wildlife-related safety provisions, but did not feel that more funding had been allocated to mitigation for fish and wildlife as a result of its explicit language authorizing spending on mitigation. Insufficient funding in the context of competition with other agency priorities was most frequently seen as the major impediment to greater efforts for transportation mitigation for fish and wildlife.

3.5. Questionnaire – Part 2

3.5.1. Part 2 Results

Question 1: Please tell us the full name of your organization/agency.

Twenty-eight respondents from thirteen identifiable agencies participated in the second questionnaire from throughout the West (Table 5).

Question 2: Please select your organization/agency type.

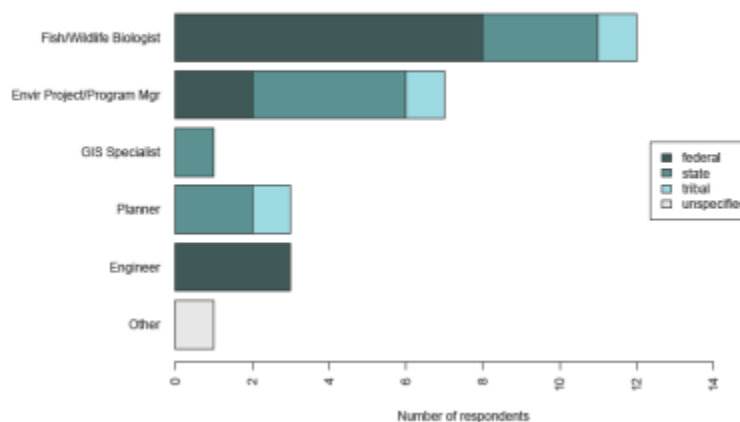
Of the twenty-eight respondents, exactly 50% identified themselves as affiliated with the federal government (excluding the BIA); nine respondents (35.7%) identified themselves as affiliated with a state agency; three respondents (10.7%) identified themselves as affiliated with the BIA or an independent tribe; and one respondent (3.6%) identified an affiliation of “other,” without specifying further.

Table 5. Agency affiliation and corresponding number of participating respondents.

Agency Name	Respondents
BIA	1
Confederated Salish and Kootenai Tribes	1
Duckwater Shoshone Tribe	1
FHWA	4
USFWS	6
USFS	3
Idaho Transportation Department	1
Kansas Department of Transportation	1
Nebraska Department of Roads	1
Nevada Department of Transportation	2
New Mexico Department of Transportation	1
Montana Department of Transportation	2
Wyoming Department of Transportation	1
Other/Unknown	3
Total Respondents	28

Question 3: Please select the option that most closely matches your job description.

Twenty-eight people answered this question. The most popular answer selected by respondents (12; 42.9%) was “fish/wildlife biologist,” followed by “environmental project” (17.9%), “engineer” (14.3%), “planner” (10.7%), “other” (10.7%) and “GIS specialist” (3.6%). Two of the three “other” responses specified that they are “environmental program managers.” The third “other” did not further specify. For purposes of the chart below, “environmental program manager” is combined with “environmental project manager” (Figure 23).

**Figure 23. Types of job descriptions and number per federal, state and tribal questionnaire Part 2 respondents.**

Question 4: In your opinion, which of the following best explains consideration of fish and wildlife in your organization/agency's transportation planning and projects?

Twenty-seven people answered this question. The majority (15; 55.6%) of respondents selected “legal obligation or regulatory compliance” as the reason that best explains consideration of fish and wildlife in their organization/entity's transportation planning and projects. Exactly one-third (9; 33.3%) of respondents selected “environmental stewardship.” The remainder (3) selected “other.” Two of those selecting “other” indicated that there was not a single “best” reason, but rather two reasons. In one case, “public safety” and “environmental stewardship” were given equal weight; in the other, the respondent identified both “environmental stewardship” and “cultural sensitivities.” The third respondent selecting “other” neglected to specify further. No respondents identified “public safety” and no one indicated that their “agency does not consider fish and wildlife.” Federal and state respondents generally agreed that “legal obligation or regulatory compliance” and “environmental stewardship” best explained their consideration of fish and wildlife data (Figure 24).

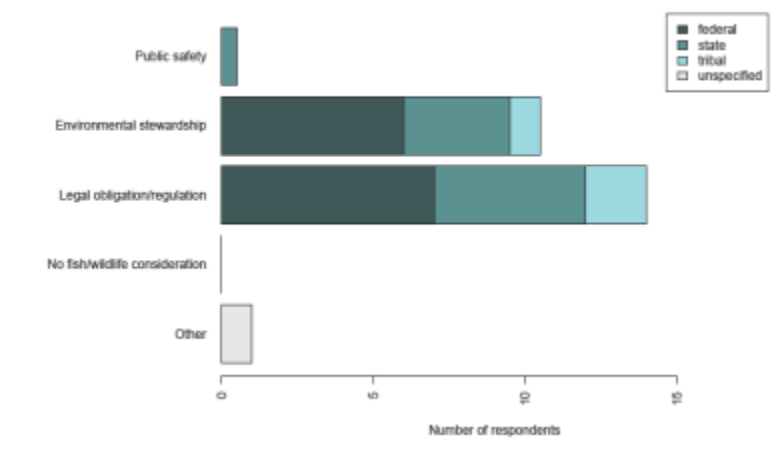


Figure 24. Responses by federal land management, state DOT agency and tribal experts indicating the best explanations for why their agency considers fish and wildlife.

Question 5: Do you yourself make direct use of any digital sources of data pertaining to fish or wildlife and/or their habitats in your role at your organization/agency? These may include CHATs or other data sources.

Twenty-seven people answered this question. Twenty-two (81.5%) of respondents indicated that they make direct use of digital sources of fish/wildlife/habitat data in their roles at their organizations or agencies. Five (18.5%) of respondents indicated that they do not use such data in their organization/agency roles. One hundred percent of the state respondents indicated that they make use of fish/wildlife/habitat data in their agency roles. In comparison, 69.2% of federal respondents use such data; while 30.8% do not (Figure 25).

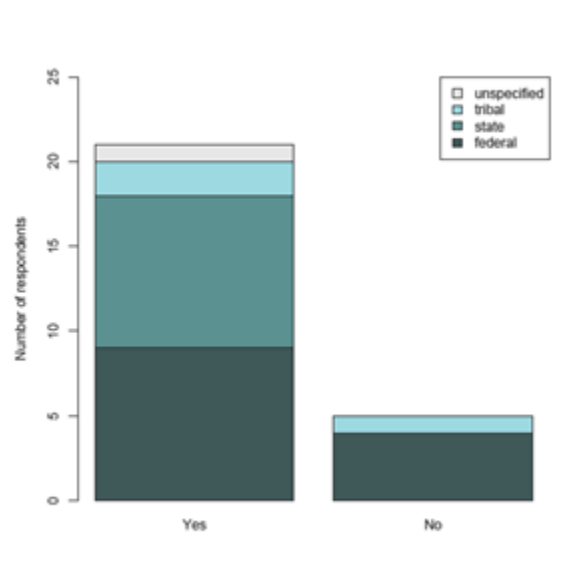


Figure 25. Responses by federal land management, state DOT agency and tribal experts indicating whether they themselves use any digital sources of data pertaining to fish or wildlife and/or their habitats in their organizational/agency roles.

Question 6: Please rank the contribution of the following types of data in your agency/organization's consideration of fish and wildlife. (1=Most important, 6=Least important). Choose only one value for each option.

Answer Options:

- Wildlife-vehicle collision and carcass data
- Game species distribution/population data
- Threatened and endangered species distribution/population data
- Habitat quality/landscape integrity data
- Wildlife corridor/landscape connectivity data
- Other (please specify)

Twenty people answered this question. Of the answer options provided, 16 participants ranked the contribution of “threatened and endangered species distribution/population data” as the most important data for their agency/organization’s consideration of fish and wildlife; overall, this type of data had an average rating of 1.35, the highest ranking by far. The next three highest rated types of data all scored between 3.00 (moderately important) and 4.00 (slightly important): “wildlife-vehicle collision and carcass data,” “wildlife corridor/landscape connectivity data,” and “habitat quality/landscape integrity data,” each of which scored an average rating of 3.11, 3.11, and 3.44, respectively. The least important data identified by respondents were “game species distribution/population data,” with an average rating of 4.25.

Although “threatened and endangered species distribution/population data” was ranked across the board as the number one contributor to an agency/organization’s consideration of fish and wildlife, the rankings for the remaining answer options were reversed between the federal and state respondents. Federal respondents ranking “wildlife corridor/landscape connectivity data” (2.67) and “habitat quality/landscape integrity data” (2.75) as the next two most important

contributors, lagged by “wildlife-vehicle collision and carcass data” (4.11) and “game species distribution/population data” (4.67) (Table 6). In contrast, state respondents ranked “wildlife-vehicle collision and carcass data” (2.00) and “game species distribution/population data” (3.60) as the next two most important contributors (after “threatened and endangered species distribution/population data”), followed by “wildlife corridor/landscape connectivity data” (3.63) and “habitat quality/landscape integrity data” (4.33). Tribal responses are not represented in Table 6 because of low sample size.

Table 6. Comparison of federal and state responses to the different types of fish, wildlife and habitat data their agencies consider, 1 being most important and 6 being least important. (Columns do not add up to 100% because “Other” was excluded.)

Answer Option	Federal	State
Wildlife-vehicle collision and carcass data	4.11	2.00
Game species distribution/population data	4.67	3.60
Threatened and endangered species distribution/population data	1.00	1.75
Habitat quality/landscape integrity data	2.75	4.33
Wildlife corridor/landscape connectivity data	2.67	3.63

Question 7: On a scale of 1 (Never) to 5 (Always), to what extent do you use...

- **State-focused digital data sources**
- **Regional or west-wide digital data sources**

Twenty-two people answered this question with respect to the “state-focused digital data sources,” while only twenty-one answered with respect to “regional or west-wide digital data sources.” The majority (16; 72.7%) of respondents indicated that they always (ranking of 5) or usually (rating of 4) used state-focused digital data sources. Only three respondents (13.6%) indicated they never (rating of 1) or infrequently (rating of 2) used state-focused digital data sources. The results were roughly opposite for regional or west-wide digital data sources, with only five respondents (23.8%) indicating that they always (rating of 5) or usually (rating of 4) use such data. In contrast, the majority (52.4%) indicated that they never (rating of 1) or infrequently (rating of 2) use regional or west-wide digital data sources. Most federal and state respondents reported that they usually (rating of 4) or always (rating of 5) use state-focused digital data sources. Similarly, both reported relatively lower usage of regional or west-wide digital data sources, with the majority of federal respondents using regional or west-wide digital data sources sometimes (rating of 3) or infrequently (rating of 2), while the majority of state respondents split between using such regional data sources infrequently (rating of 2) or usually (rating of 4) (Figure 26 and Figure 27).

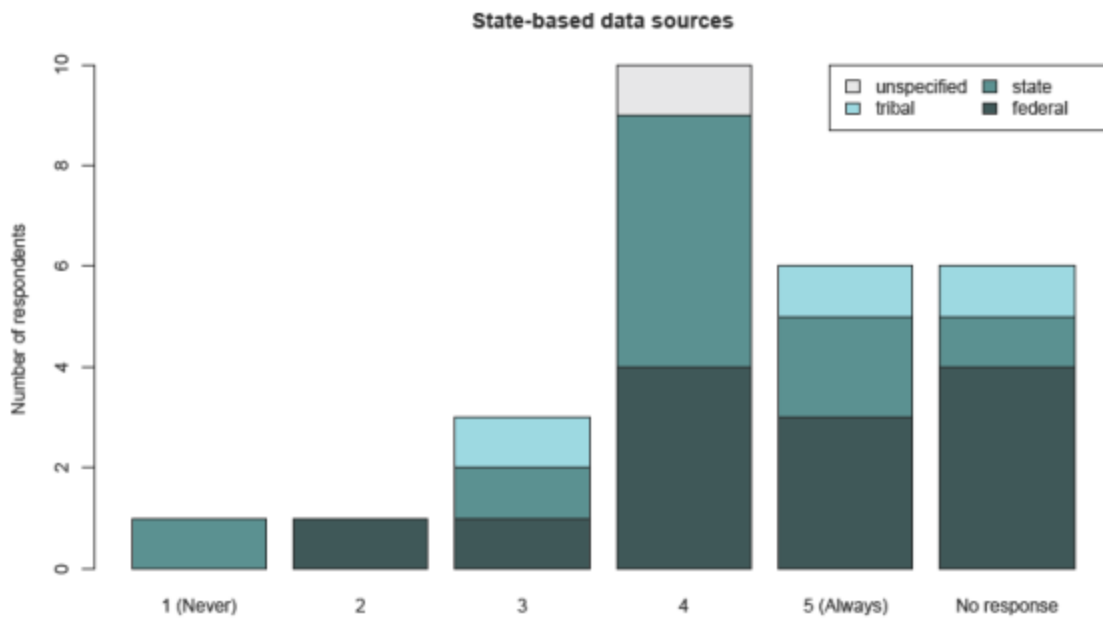


Figure 26. Comparison of combined, federal, state, and tribal responses regarding the extent to which they use state-based digital wildlife data, 1 being never and 5 being always.

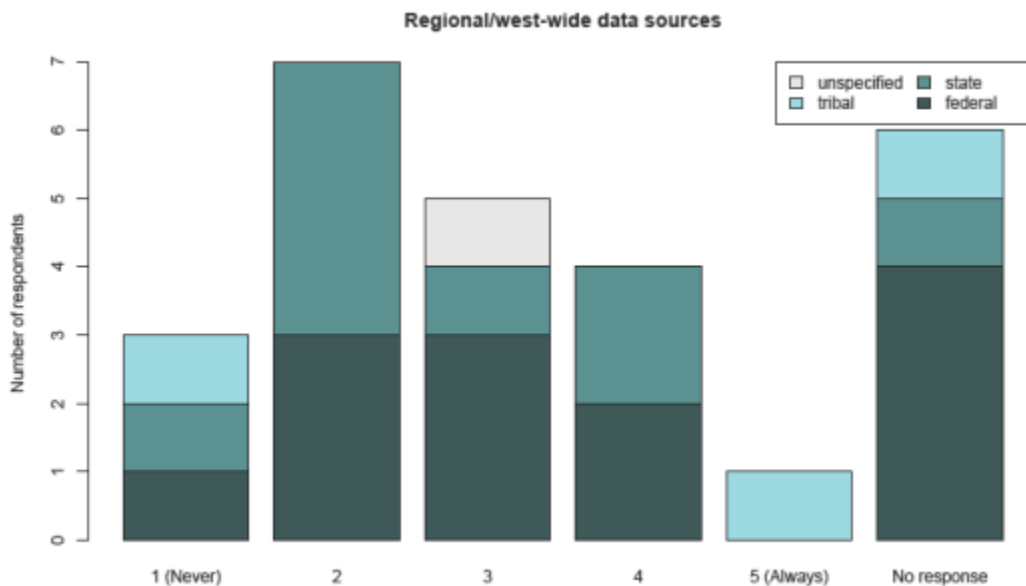


Figure 27. Comparison of combined, federal, state, and tribal responses regarding the extent to which they use west-wide or regional digital wildlife data, 1 being never and 5 being always.

Question 8: On a scale of 1 (Do not agree at all) to 5 (Strongly agree) please indicate your agreement with the following potential factors in your decision to use digital sources of data pertaining to fish or wildlife and/or their habitats...

Answer Options:

- They are accessible and convenient
- They offer the most reliable, consistent, and/or current information
- They help reduce costs
- They smooth and expedite our processes
- I am legally obligated to do so
- Other (please specify and indicate level of agreement)

Twenty people answered this question. The average ratings for four of the identified factors were between 3.00 (“neutral”) and 4.00 (“mostly agree”). “They are accessible and convenient” garnered the highest ranking overall, with an average rating of 3.55. “They offer the most reliable, consistent, and/or current information” was next, with an average rating of 3.35, followed closely by “they smooth and expedite our processes,” at 3.25. The two remaining factors, “they help reduce costs” and “I am legally obligated to do so” scored the lowest, with average ratings of 3.25 and 2.65, respectively, where a rating of three is “neutral” and a rating of 2.00 is “mostly disagree.” Federal and state participants generally were neutral to mildly positive regarding the effect of the potential factors on their decision to used digital sources of wildlife data. The factors generating positive agreement (above the neutral rating of 3.00) on behalf of federal respondents were that “they offer the most reliable, consistent, and/or current

information” (rating of 3.89), “they are accessible and convenient” (3.67) and “they smooth and expedite our processes” (3.56). For state respondents, the factors generating positive agreement were “they are accessible and convenient” (3.50), “they help reduce costs” (3.25) and “they smooth and expedite our processes” (3.13). Being “legally obligated to do so” generated mild disagreement (below the neutral rating of 3.00) for both federal and state respondents (Table 7). Tribal responses are not represented in Table 7 because of low sample size.

Table 7. Comparison of federal and state responses regarding the effect of the potential factors on their decision to use digital sources of wildlife data, 1 being do not agree at all and 5 being strongly agree.

Answer Options	1 (Strongly disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly agree)	Rating Average
<i>Federal Respondents</i>						
They are accessible and convenient	1	2	0	2	4	3.67
They offer the most reliable, consistent, and/or current information	0	2	0	4	3	3.89
They help reduce costs	1	1	4	2	1	3.11
They smooth and expedite our processes	0	1	4	2	2	3.56
I am legally obligated to do so	4	0	2	1	2	2.67
<i>State Respondents</i>						
They are accessible and convenient	0	0	6	0	2	3.50
They offer the most reliable, consistent, and/or current information	1	2	3	1	1	2.88
They help reduce costs	0	1	4	3	0	3.25
They smooth and expedite our processes	1	1	2	4	0	3.13
I am legally obligated to do so	3	0	3	0	2	2.75

Question 9: On a scale of 1 (Extremely useless) to 5 (Extremely useful), please rate the following... (Note: If you are not familiar with CHATs or your state CHAT is not available, please choose Not familiar/Not available).

Answer Options:

- User interface of state CHAT
- Usefulness of state CHAT data
- User interface of WGA CHAT
- Usefulness of WGA CHAT data

Nineteen people answered this question. Of those responding to this question, the vast majority selected “not familiar/not available” for questions related to the state CHAT (11 respondents) and the regional CHAT (12 respondents). Those responses are accordingly excluded from the analysis. Of those respondents who are familiar with CHATs, the average ratings for all of the answer options ranged between 3.00 (“neutral”) and 4.00 (“moderately useful”). The “user interface of state CHAT” ranked the highest, with a rating average of 3.50, while the “usefulness

of state CHAT data” had an average rating of 3.25. The ratings for the regional CHAT were more neutral, with the “user interface of WGA CHAT” having an average rating of 3.14, and the “usefulness of the WGA CHAT data” having an average rating of 3.00 (Figure 28, Figure 29, Figure 30, and Figure 31).

In general, state respondents were relatively neutral in terms of whether the state and regional CHAT data, as well as their user interfaces, were useful, with the regional CHAT data scoring the lowest (2.40), followed by the regional CHAT user interface (2.60), and the state CHAT data (2.83) – where a rating of 2.00 is “moderately useless” and a rating of 3.00 is “neutral.” The only factor to score above 3.00 for the state respondents was the state CHAT user interface, which scored 3.17. Of the eight state respondents who completed the question, only two (2; 25%), indicated that they were not familiar with CHATs or that their state CHAT was not yet available. In comparison, of the nine federal respondents who completed the question, eight (88.9%), indicated they were not familiar with CHATs or that their state CHAT was not yet available. (The single federal respondent who was familiar with CHAT selected a rating of 4.00, or useful, for the user interface and usefulness of the data for both state and regional CHATs.).

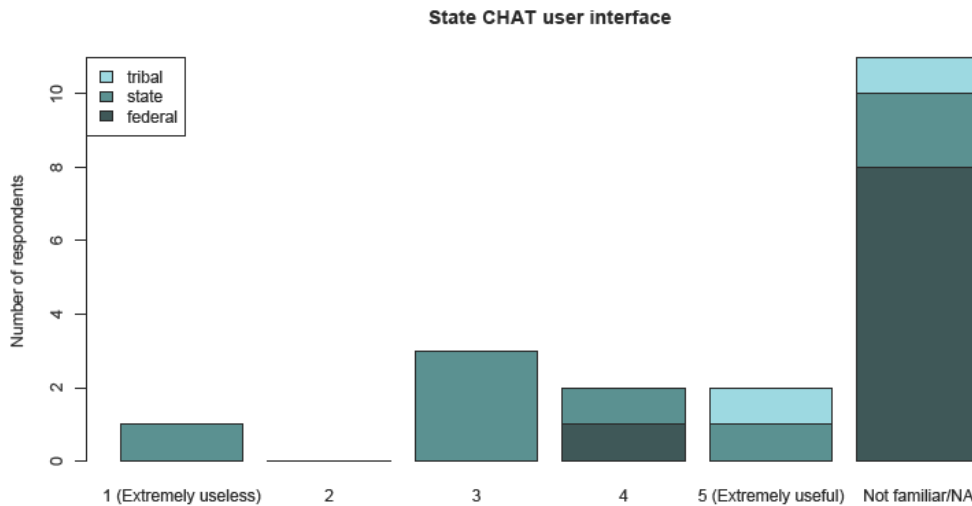


Figure 28. Comparison of combined, federal, state, and tribal responses regarding the usefulness of the state CHATs interface for web site visitors, 1 being extremely useless and 5 being extremely useful.

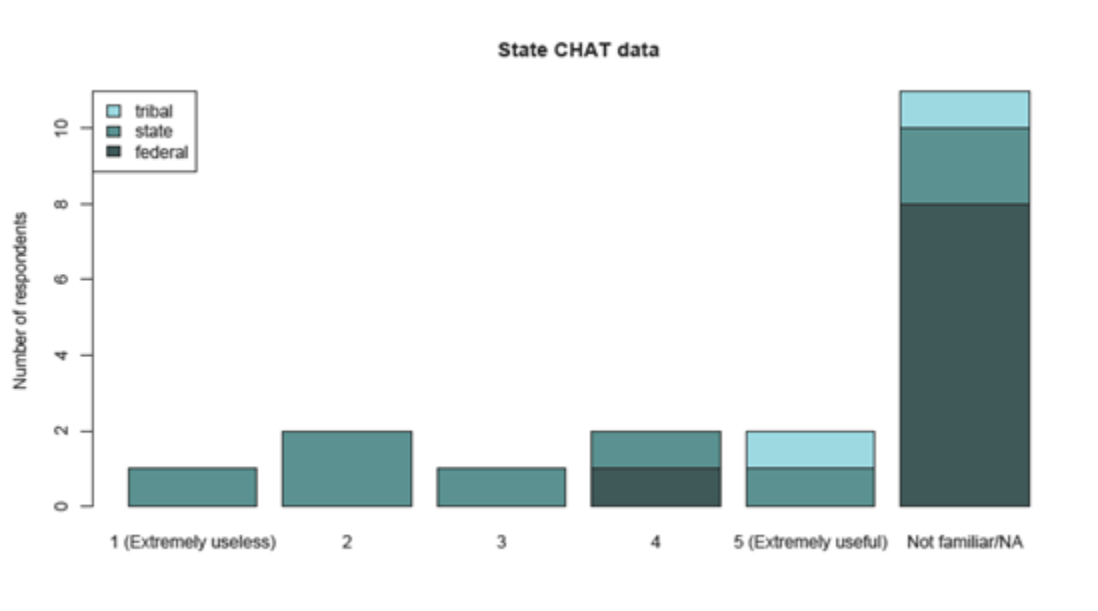


Figure 29. Comparison of combined, federal, state, and tribal responses regarding the usefulness of the state CHAT data, 1 being extremely useless and 5 being extremely useful.

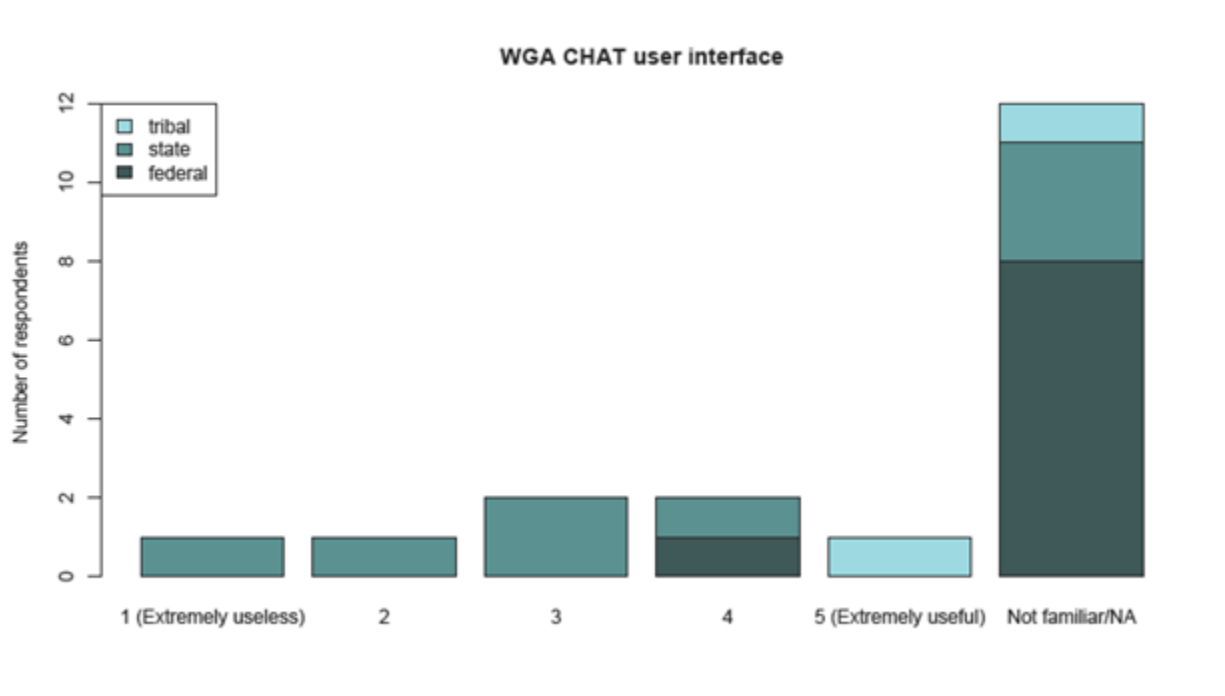


Figure 30. Comparison of combined, federal, state, and tribal responses regarding the usefulness of the regional CHAT interface for web site visitors, 1 being extremely useless and 5 being extremely useful.

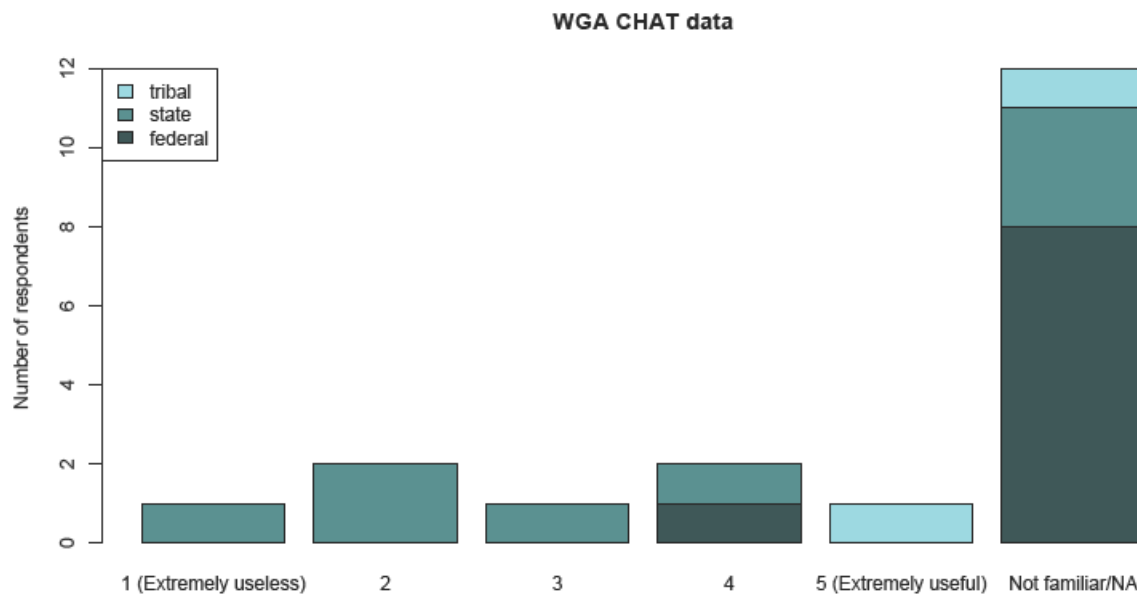


Figure 31. Comparison of combined, federal, state, and tribal responses regarding the usefulness of the regional CHAT data, 1 being extremely useless and 5 being extremely useful.

Question 10: Do you yourself make direct use of any CHAT data (state and/or westwide) in your role at your organization/agency?

Nineteen people answered this question. Of those respondents, 26.3% indicated that they make direct use of any CHAT data in their role at the agency/organization. In comparison, the vast majority do not. Specifically, almost 73.7% responded that they do not make direct use of such data in their agency/organization roles. The state respondents were evenly split, with 50% reporting that they make direct use of CHAT data (either state and/or west-wide) within their agency and 50% reporting that they do not. In contrast, no federal respondents reported making direct use of CHAT data within their agencies (Figure 32).

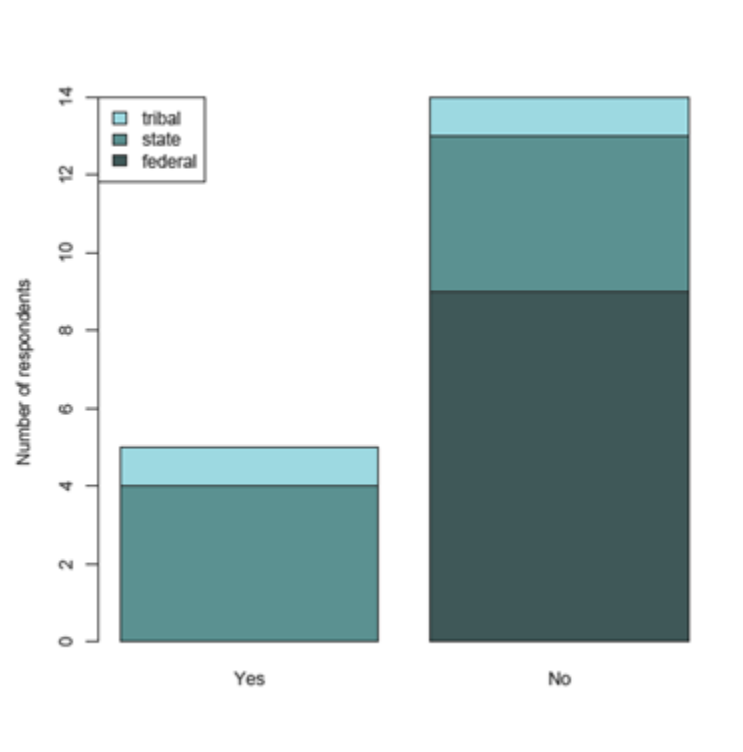


Figure 32. Comparison of combined, federal, state and tribal respondents who reported making direct use of CHAT data.

Question 11: Which of the following best explains why you do not use CHAT data? Choose one response.

Answer Options:

- I was not aware of CHAT data
- My geographic area of concern is not covered by CHAT
- My specific informational needs are not met by CHAT data

Ten people answered the portion of the question that addresses state CHATs. Of these, five respondents (50%) “were not aware of CHAT data.” Two of these ten respondents (20%) indicated that they did not use state CHATs because their “geographic area of concern is not covered by CHAT,” and the same number (20%) did not use state CHATs because they do not meet their “specific informational needs.”

Fifteen people answered the portion that addresses the regional CHAT. Although a significant percentage (33.3%) indicated that they don’t use the regional CHAT because they were “not aware” of it, almost half of those fifteen (46.7%) don’t use the regional CHAT because it does not meet their “specific informational needs.” A small minority of these fifteen respondents (13.3%) don’t use the regional CHAT because their “geographic area of concern is not covered by CHAT.”

Of the fifteen federal respondents who answered this question, 60% indicated they do not use CHAT data because they were not aware of it. In contrast, of the state respondents, not a single one indicated that s/he did not use CHAT data because of a lack of awareness; rather, state respondents indicated they do not use CHAT either because their “geographic area of concern is not covered” or because their “specific informational needs are not met.” (Figure 33 and Figure 34).

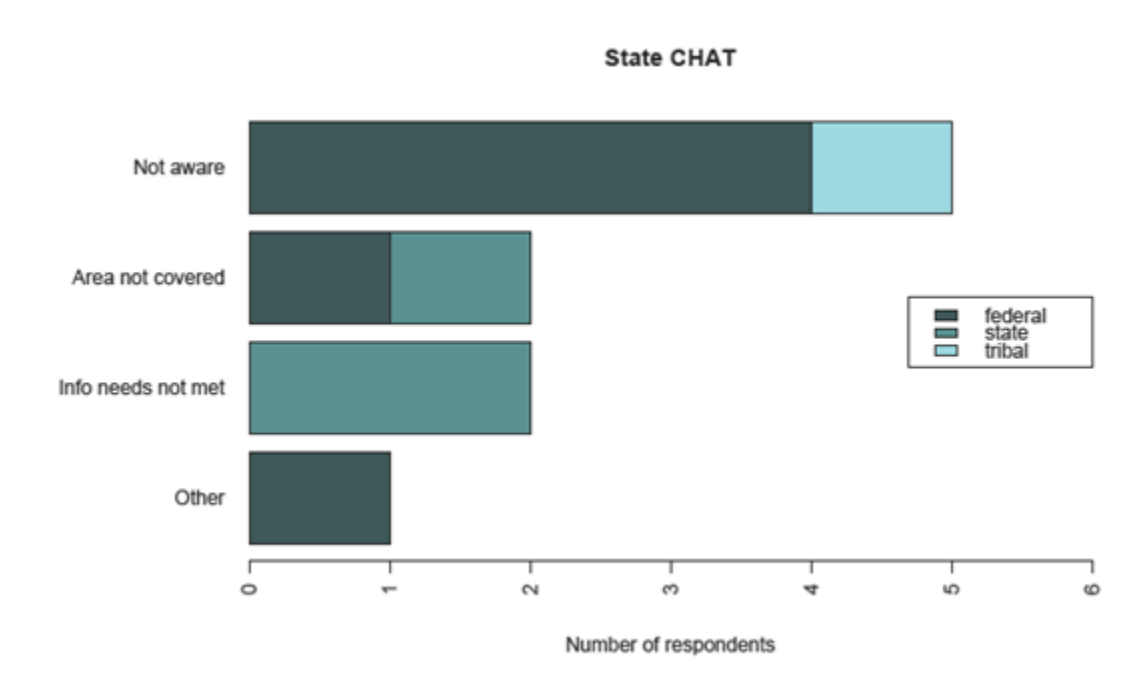


Figure 33. Comparison of combined, federal, state, and tribal respondents explaining why they do not use state CHAT data.

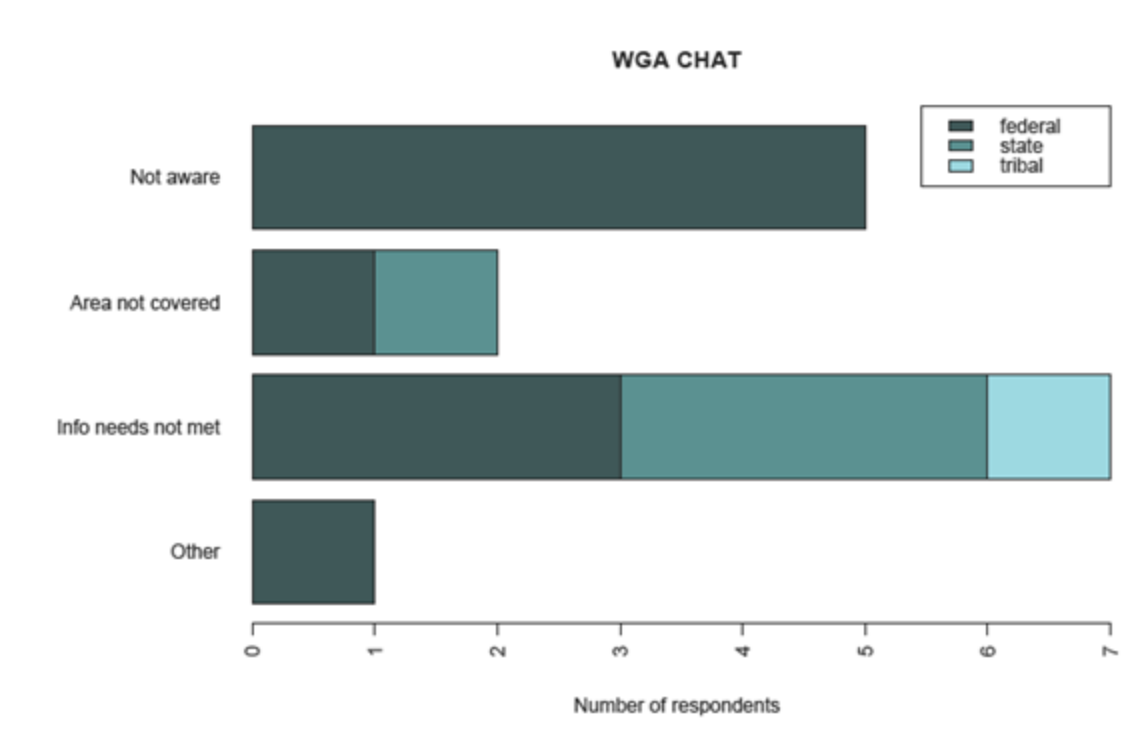


Figure 34. Comparison of combined, federal, state, and tribal respondents explaining why they do not use regional CHAT data.

Question 12: If you use other sources of digital fish and wildlife/habitat data in place of, or in conjunction with, CHATs, which of the following characteristics would best improve CHATs to the point where they would be used for more of your data needs? Please select up to three choices.

Answer Options:

- Offer finer scale (site- or project-level) data
- Incorporate more sources of data
- Improve quality of data
- Ensure data are updated frequently
- Include projections of future conditions
- Simplify user interface
- I'm not familiar enough with CHATs to answer this question

Nineteen people answered this question. The highest ranking answer overall (42.1%) is that respondents were “not familiar enough with CHATs to answer this.” For those who were sufficiently familiar, the characteristic that would best improve CHATs is that if “offer finer scale (site- or project-level) data” (36.8%), followed by “ensure data are updated frequently” (31.6%), “incorporate more sources of data” (26.3%). Characteristics that scored the lowest include: “improve quality of data” (15.8%), “include projections of future conditions” (10.5%) and “simplify user interface” (5.3%). When asked what characteristics would best improve CHATs, the top three answers from state respondents were “offer finer scale (site- or project-

level) data” (62.5%), “incorporate more sources of data” (50.0%), and “ensure data are updated frequently” (50.0%). In comparison, the number one choice selected by federal respondents was “I’m not familiar enough with CHATs to answer this question,” followed distantly by the need to “offer finer scale (site- or project-level) data” (22.2%) and to “ensure data are updated frequently” (22.2%) (Figure 35).

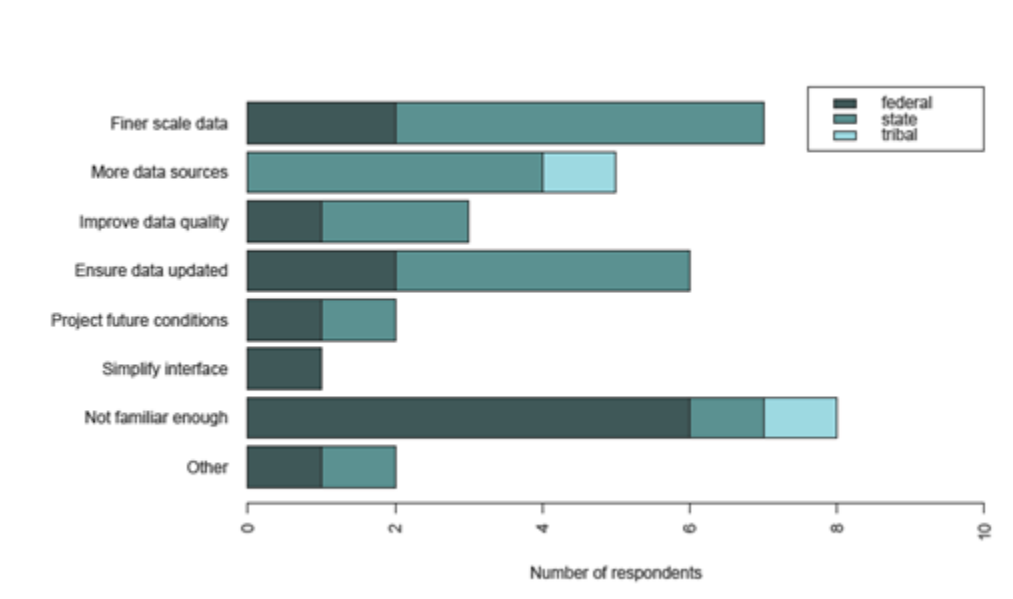


Figure 35. Comparison of combined, federal, state, and tribal responses regarding what characteristics would best improve CHATs.

Question 13: Which of the following considerations do you think would most increase attention to, and mitigation for, fish and wildlife in your agency’s transportation plans and projects. Please select up to three choices.

Answer Options:

- More education and awareness
- Better communication and coordination among department divisions
- Increased funding for mitigation
- Easy access to up-to-date data
- Elevate/add fish and wildlife stewardship as an agency priority
- Early integration of mitigation in the planning process
- Legal requirements for mitigation

Twenty-one people answered this question. The majority (11; 52.4%) of respondents identified “increased funding for mitigation” as the number one consideration that would most increase attention to, and mitigation for, fish and wildlife in their agency’s transportation plans and projects. Respondents also ranked “early integration of mitigation in the planning process” highly (47.6%). Almost two-fifths (38.1%) identified “legal requirements for mitigation” as an important consideration, followed “better communication and coordination among department

divisions” (33.3%), “elevate/add fish and wildlife stewardship as an agency priority” (33.3%), “more education and awareness” (23.8%) and “easy access to up-to-date data” (23.8%). When asked to select up to three considerations that would most increase attention to and mitigation for fish and wildlife during transportation planning and projects, federal respondents identified “increasing funding for mitigation” (58.3%), “early integration of mitigation into the planning process” (41.7%), and “better communication and coordination among department divisions” (41.7%). In response to the same question, state respondents identified “legal requirements for mitigation” (57.1%), “early integration of mitigation in the planning process” (57.1%) and (tied for third place) “increased funding for mitigation” (42.9%) and “elevate/add fish and wildlife stewardship as an agency priority” (42.9%) (Figure 36).

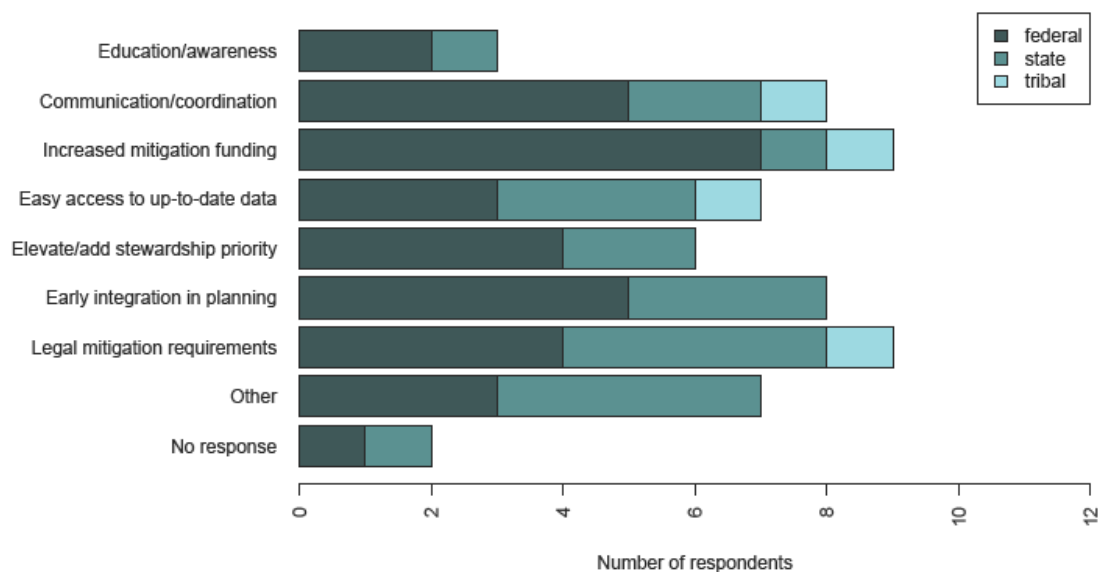


Figure 36. Comparison of combined, federal, state, and tribal responses regarding what would most increase attention to and mitigation for fish and wildlife during transportation planning and projects.

Question 14: Please rank the following ways in which you think digital fish/wildlife/habitat data as a whole most increases your organization/agency’s ability to align with the principles and objectives of FHWA’s Eco-Logical: Ecosystem Approach to Developing Infrastructure Projects. As in, fish/wildlife/habitat data...

Answer Options:

- Provides more information to guide decisions
- Provides easy access to consistent, up-to-date information
- Increases transparency and trust in decisions
- Enables exploration and analysis of alternative scenarios
- Allows earlier inclusion of fish and wildlife in the planning process
- Other (please specify and rank level of importance)

Twenty people answered this question. “Allows earlier inclusion of fish and wildlife in the planning process” was the most highly ranked (1.67) way identified by respondents in which digital fish/wildlife/habitat data as a whole most increases their agency/organization’s ability to align with the principles and objectives of the FHWA’s Eco-Logical approach to developing infrastructure projects. “Provides more information to guide decisions” ranked second highest (2.17), followed by “enables exploration and analysis of alternative scenarios” (2.61), “provides easy access to consistent, up-to-date information” (3.00), and, lastly, “increases transparency and trust in decisions” (3.50). When asked to rank the ways in which digital fish and wildlife/habitat data most increase one’s agency’s ability to align with the principles and objectives of Eco-Logical, federal and state respondents agreed that the top two ways were that it “allows earlier inclusion of fish and wildlife in the planning process” (rating of 1.90 by federal respondents and 1.42 by state respondents), and that it “provides more information to guide decisions” (rating of 2.30 by federal respondents and 2.14 by states) (Table 8). Tribal responses are not represented in Table 8 because of low sample size.

Table 8. Comparison of federal and state responses ranking how fish/wildlife/habitat data increase their ability to align with the principles of the FHWA’s Eco-Logical ecosystem approach to developing infrastructure.

Answer Option	Federal	State
Provides more information to guide decisions	2.30	2.14
Provides easy access to consistent, up-to-date information	3.30	2.86
Increases transparency and trust in decisions	3.60	3.71
Enables exploration and analysis of alternative scenarios	2.50	3.00
Allows earlier inclusion of fish and wildlife in the planning process	1.90	1.43

Question 15: The Moving Ahead for Progress in the 21st Century Act, or MAP-21 for short, includes explicit language within the Surface Transportation, Federal Lands, Tribal Transportation, Highway Safety and other highway programs authorizing state, federal, tribal, and local transportation officials to spend funds to reduce wildlife-vehicle collisions and promote habitat connectivity. Do you feel there has been more emphasis on fish and wildlife mitigation since MAP-21’s passage?

Twenty-one people answered this question. Fewer than one-tenth (2; 9.5%) of respondents felt there has been more of an emphasis on fish and wildlife mitigation since MAP-21’s passage. More than three-quarters (76.2%) did not feel there has been more emphasis. Almost 15 percent (14.3%) were not sure. Although both federal and state respondents agreed that there had not been more emphasis on fish and wildlife mitigation since MAP-21’s passage, 83.3% of the federal respondents answered “no.” Although a majority (57.1%) of state respondents also answered “no,” the percentage was much lower, and relatively higher percentages were “not sure” (28.6%) or answered yes (14.3%), there had been more emphasis (Figure 37).

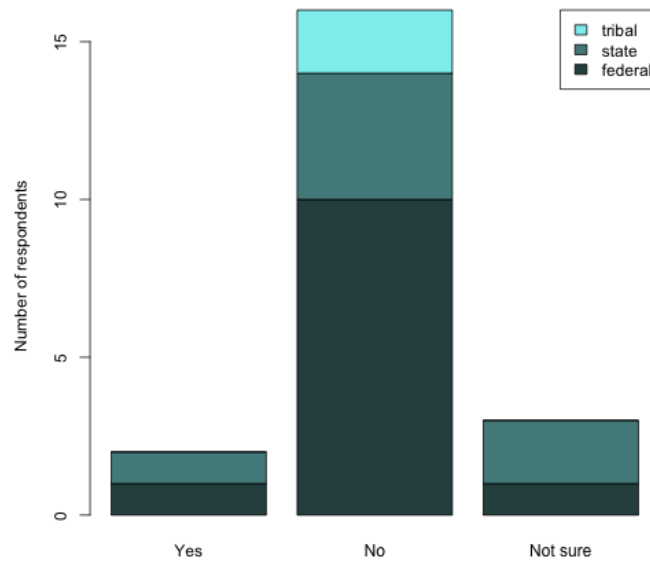


Figure 37. Comparison of combined, federal, state, and tribal responses regarding whether there has been more emphasis on fish and wildlife mitigation since MAP-21's passage.

Question 16: Do you feel that an allocation of federal funding – in addition to spending authorization under MAP-21 – for projects aiming to reduce wildlife-vehicle collisions and promote habitat connectivity would allow your agency to increase emphasis on fish and wildlife mitigation?

Twenty-one people answered this question. Almost exactly two-thirds (14; 66.7%) of respondents agreed that an allocation of funding (in addition to spending authorization) under MAP-21 for projects aimed at reducing wildlife-vehicle collisions and promoting habitat connectivity would increase their agency's emphasis on fish and wildlife mitigation. Although a significant number (23.8%) were unsure about the effect, 9.5% believed doing so would not allow their agency to increase its emphasis on fish and wildlife mitigation. Although roughly a quarter of each group were "not sure," the majority of federal and state respondents agreed that an allocation of federal funding to reduce wildlife-vehicle collisions and to promote habitat connectivity would increase emphasis on fish and wildlife mitigation. Specifically, 75% of federal respondents and 57.1% of state respondents answered "yes," an allocation of funding – in addition to spending authorization – would increase fish and wildlife mitigation (Figure 38).

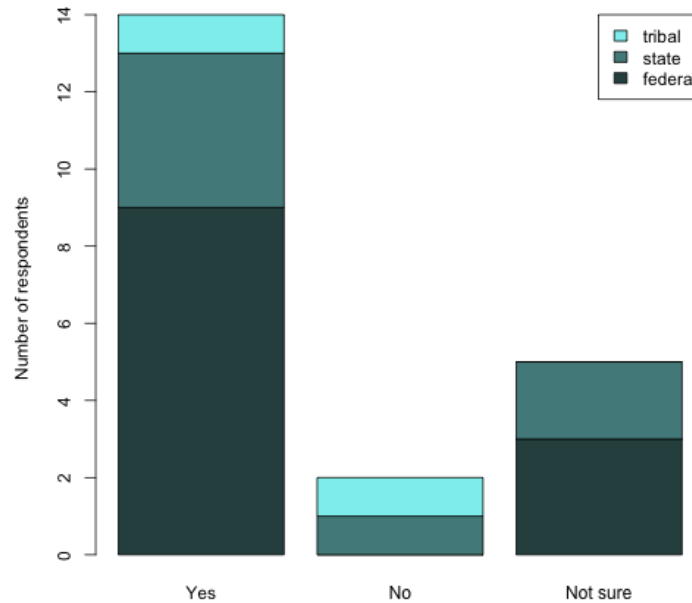


Figure 38. Comparison of combined, federal, state, and tribal responses regarding whether an allocation of federal funding would increase fish and wildlife mitigation.

Question 17: Are you aware of any case studies where MAP-21 funding has been allocated to wildlife-related mitigation?

Twenty-one people answered this question. Roughly half (10; 47.6%) of the respondents were not aware of any MAP-21 wildlife-related mitigation case studies, while roughly half (47.6%) were not sure. One person said s/he was aware of such a case study, although the unique response lacked sufficient detail to identify the specific case study described (“research, such as deer movement, mitigation techniques, and data integration”). The vast majority of federal and state respondents, 100% and 85.7%, respectively, were either not sure or unaware of any such case studies (Figure 39).

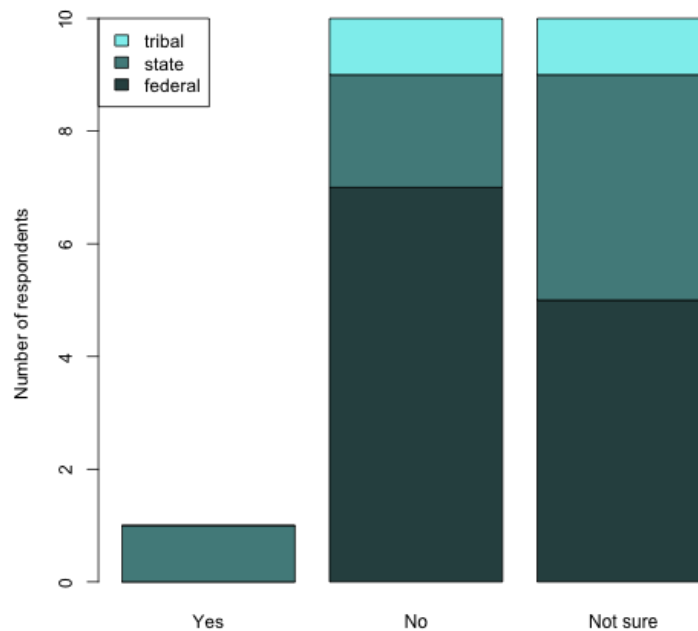


Figure 39. Comparison of combined, federal, state and tribal responses regarding whether respondents were aware of any examples of mitigation projects that were funded as a result of MAP-21.

Question 18: Do you have any further comments or suggestions you'd like to offer as the Western Governors' Association and its member states seek to improve CHATs and increase use of CHATs by the transportation sector?

See Appendix E of the stand-alone final questionnaire report for free text responses.

3.5.2. Part 2 Summary of Key Questionnaire Findings

Twenty-eight individuals responded to the second questionnaire. It is not possible to assess response rate because the number of individuals who received Part 2 is unknown. This is because the survey invitation was forwarded on by others within agencies and via a listserv used by DOT Research Program Managers who forward survey invitations to appropriate staff. While this method is the most efficient manner known for reaching DOT staff, there is no reporting as to whom the invitation was sent. It is unclear whether the low number of respondents was a function of a lack of interest in, or awareness of, the topic, a reaction to receipt of two similar questionnaires within a short period of time, or a limitation in the distribution approach. Distribution of Questionnaire 2 relied heavily upon internal agency distribution via listservs, agency outreach, and individual email lists. Unlike Questionnaire 1, results of Questionnaire 2 should be interpreted as responses of individual personnel of federal, state and tribal agencies, and not as representative of agency beliefs or attitudes. Despite a low response rate, we identified several themes or trends of interest and summarize those below.

- **The primary reason agencies consider fish and wildlife in transportation planning is because they are legally required to do so.** When asked what best explains consideration of fish and wildlife in their agency’s transportation planning and projects, the majority of both federal and state respondents selected “legal obligation or regulatory compliance.” The next most popular answer was “environmental stewardship.” Only one state DOT respondent indicated that they did so because of “public safety.” Although it is not surprising that federal land managers ranked “environmental stewardship” highly, given their agency missions,⁷ it is remarkable that only one state DOT respondent identified public safety as important in terms of fish and wildlife consideration.
- **State DOTs consider wildlife-vehicle collision and game species data more important than habitat quality and connectivity data, while federal agencies responded conversely.** When asked to rank the contribution of different types of data in their agency’s consideration of fish and wildlife (on a scale of 1 to 6, with 1 being “most important”), “threatened and endangered species distribution/population data” was ranked highest by both state and federal respondents. Federal respondents, however, ranked “wildlife corridor/landscape connectivity data” and “habitat quality/landscape integrity data” as the second and third most important contributors, respectively, to their agency’s consideration of fish and wildlife. In contrast, state respondents ranked “wildlife-vehicle collision and carcass data” and “game species distribution/population data” as the second and third most important contributors, respectively, to their agency’s consideration of fish and wildlife.
- **The overwhelming majority of federal land managers were not familiar with CHATs.** A number of questions asked respondents whether they were familiar with and/or made direct use of the regional and state CHATs. For example, respondents were asked to rate the usefulness of regional and state CHAT data and their user interfaces. In reply, eight out of nine federal respondents indicated they are not familiar with CHATs, or that their state CHAT is not yet available. Similarly, when asked whether they make direct use of any CHAT data in their agency role, almost three-quarters of all respondents indicated they do not make direct use of such data, including 100% of federal respondents who do not directly use CHAT data.
- **Over half of the respondents do not use the regional CHAT because it does not meet their specific informational needs.** Although roughly a quarter of respondents do not use the regional CHAT because they are “not aware” of it, over half do not use the regional CHAT because it does not meet their “specific informational needs.” For those with sufficient familiarity, the characteristic that would best improve CHATs is if it were to “offer finer scale (site- or project-level) data.”

⁷ As noted in the Part 1 Summary, the missions of the USFWS and USFS focus, respectively, on conserving fish, wildlife, plants, and their habitats, and sustaining the health, diversity, and productivity of the Nation’s forests and grasslands for the continuing benefit of the American people. In contrast, although state DOT missions vary, they typically emphasize safety, efficiency, cost-effectiveness and quality of life. While the environment is part of this mission, it is generally not an emphasis.

- **Respondents identified increased funding and early integration in the planning process as important to increasing attention to mitigation.** When asked to select up to three considerations that would most increase attention to and mitigation for fish and wildlife during transportation planning and projects, the two most popular responses were “increased funding for mitigation” and “early integration of mitigation in the planning process.”
- **Digital fish, wildlife and habitat data help agencies align with the FHWA’s Eco-Logical approach.** The top three ways in which digital wildlife data increase respondents’ agencies’ ability to align with the principles and objectives of Eco-Logical are: (1) “allows earlier inclusion of fish and wildlife in the planning process,” (2) “provides more information to guide decisions,” and (3) “enables exploration and analysis of alternative scenarios.”
- **Passage of MAP-21 has not led to a greater emphasis on fish and wildlife mitigation.** More than three-quarters of respondents did not believe there has been more emphasis on fish and wildlife mitigation since passage of MAP-21. More than two-thirds agreed that an allocation of funding (in addition to spending authorization) under MAP-21 for projects aimed at reducing wildlife-vehicle collisions and promoting habitat connectivity would increase their agency’s emphasis on fish and wildlife mitigation.

3.6. Comparison of Results of Questionnaire – Part 1 to Questionnaire – Part 2

A comparison of the results of Part 1 (aimed at assessing current agency-wide practices related to the use of digital sources of fish, wildlife and habitat data) and Part 2 (aimed at understanding individual practices within specific roles based on respondents’ personal work experience) of the Questionnaire reveal the following similarities and differences:

- Respondents to Part 1 identified environmental stewardship as the primary reason their agency considers fish and wildlife in transportation planning and regulatory/mandatory considerations ranked second. In contrast, when asked to identify what best explains their agency’s consideration of fish and wildlife in transportation planning, the majority of Part 2 respondents indicated that they do so because of a legal or regulatory compliance obligations. Environmental stewardship was ranked second. Thus the top two reasons for both respondent groups were the same, with the relative importance of each reversed.
- While the great majority of respondents to both Part 1 and Part 2 use digital sources of fish, wildlife and habitat data, many were unaware of or unfamiliar with CHATs. This was especially true for federal land managers. Moreover, respondents from both parts tended to give state CHATs higher rankings for both user interface and data value than the regional CHAT.

- Both Part 1 and Part 2 respondents recommended a number of potential improvements for CHATs, including offering more data sources, offering finer scale data and updating data frequently.
- Awareness of federal policies, including MAP-21 and Eco-Logical, was high among both Part 1 and 2 respondents. However, respondents for both parts indicated that they do not believe that passage of MAP-21 has led to a greater emphasis on fish and wildlife mitigation. Insufficient funding similarly was identified by both sets of respondents as a major barrier to mitigation.

3.7. Future Steps

There is a clear need to conduct additional outreach to federal land management agencies regarding the availability of state and regional CHAT information.

As indicated, the overwhelming majority of federal respondents indicated they are not familiar with CHATs or that their state CHAT is not yet available. Similarly, not a single federal respondent indicated s/he makes direct use of the data. This would seem to identify a clear need for additional efforts to reach out to and educate decision-makers and, in particular, federal land managers, about the existence of the regional and state CHATs and how they may be used to improve consideration of fish, wildlife and habitat data during transportation planning.

The #1 suggestion for improving CHATs is to offer finer scale data.

For those respondents with sufficient familiarity, the characteristic that would best improve CHATs is if it were to “offer finer scale (site- or project-level) data.” The second most popular response for improving CHATs is to “ensure [its] data are updated frequently.” It would be useful to explore what type of finer scale (site- or project-level) data could be added to CHATs and to determine how often the existing data are being updated and whether it is beneficial and/or possible to adopt a set schedule for such updates (*e.g.*, quarterly, semi-annually) that is consistent across the western states. These updates could then be scaled up into the regional CHAT.

There is a need to further explore how to improve the regional CHAT so that it can meet “specific informational needs.”

Over half of those responding do not use the regional CHAT because it does not meet their “specific informational needs.” While this response may simply indicate a need for finer scale data as discussed above, it is also possible that specific types of data (*e.g.*, data pertaining to occurrence of a particular species, wildlife migration or corridor data, wildlife road mortality data) are not currently offered by the regional CHAT. It would be useful to explore this topic further to determine what “specific informational needs” are not being met by the regional CHAT; whether those needs are being currently met by other sources of digital fish, wildlife and habitat data; and, if not, whether it is possible to enhance or supplement the regional CHAT, so that it meets those needs in the future.

The #1 suggestion for increasing fish and wildlife mitigation is to increase funding.

When asked to select up to three considerations that would most increase attention to, and mitigation for, fish and wildlife during transportation planning and projects, the number one response was “increased funding for mitigation.” “Early integration of mitigation in the planning process” and “legal requirements for mitigation” were ranked second and third, respectively. Respondents generally agreed that an allocation of funding (not simply spending authorization under MAP-21) for projects aimed at reducing wildlife-vehicle collisions and promoting habitat connectivity would increase their agency’s emphasis on fish and wildlife mitigation. Another alternative would be to dedicate federal funding that would be available solely for mitigation. It may also be useful to explore ways in which mitigation could be added to a “standard operating procedure” or via project planning checklists, to ensure that officials consider fish and wildlife as early in the transportation planning process as is feasible.

3.8. Summary

The first substantive task in the project was to interview federal, state and tribal transportation and land management agency personnel to better understand opportunities for:

- Coordinating and streamlining decision-making processes at both transportation planning and project levels.
- Improving identification and prioritization of areas for transportation-related wildlife mitigation.
- Making preliminary (first-cut) decisions at the transportation planning and pre-planning level to improve efficiencies.
- Implementing both the safety- and connectivity-related wildlife mitigation components of MAP-21;
- Integrating digital wildlife information with FHWA’s Eco-Logical principles.
- Delivering wildlife data via web-based tools and applications to expedite and coordinate transportation project and plan development and transportation-related wildlife mitigation.
- Developing and implementing policies and agreements that facilitate an integrated approach for using digital wildlife data and to assure wildlife mitigation is employed where it is needed by the transportation sector.

It was determined an electronic questionnaire was the most efficient means to interview the variety of potential transportation and land management users of CHAT and other digital wildlife-related information across the West. Questionnaire – Part 1 focused on state transportation department supervisory personnel who have a broad agency-wide perspective, as well as similar leadership from the five federal LMAs with highway and road responsibilities, and the FHWA. Questionnaire – Part 2 was sent to biologists, environmental specialists, GIS specialists, planners, engineers, and similar professionals for whom fish/wildlife/habitat data is or might be useful in the course of their work on transportation plans and projects.

Questionnaire – Part 1 received a 92.9% response rate. Twenty eight upper-level managers of 16 state DOTs, five federal land management agencies with transportation responsibilities and the FHWA were invited to participate, and 26 responses were received, which included all 16 state DOTs involved in the regional CHAT.

Key trends and findings from the Questionnaire – Part 1 are summarized below.

- Environmental stewardship (more than safety or regulations) drives consideration of fish and wildlife in transportation planning, though regulatory mandates were identified as the second most common reason for considering fish and wildlife.
- Use of digital data pertaining to fish and wildlife is widespread.
- Many transportation offices are unaware of, and unfamiliar with, individual state CHATs and the regional CHAT. Additional outreach should be undertaken.
- State CHATs tend to be used more and be ranked more highly than the regional CHAT.
- There are many potential uses and users of CHAT information. Frequently cited users included environmental specialists, biologists, and planners. Frequently cited uses included planning, scoping, environmental studies, and site assessment.
- Awareness of federal policies pertaining to the consideration of fish and wildlife in transportation planning is high.

Twenty-eight individuals responded to Questionnaire – Part 2. It is not possible to assess response rate to this survey because the distribution list was undisclosed and the survey may have been forwarded on by others as appropriate. Therefore, the number of individuals who received it is unknown. Respondents represented seven state DOTs, and half of the respondents were federal employees. It is unclear whether the low number of respondents was a function of a lack of interest/awareness, that some recipients may have seen and contributed responses to Questionnaire – Part 1, or a limitation in the distribution approach, which relied on listservs and other anonymous sources. While Questionnaire – Part 1 was distributed to department heads and was thus geared toward organizational level conclusions, Questionnaire – Part 2 was aimed at individual use by agency staff. Thus, unlike Questionnaire – Part 1, results of Questionnaire Part – 2 should be interpreted as responses of individual personnel of federal, state and tribal agencies, and not as representative of agency-wide beliefs or attitudes.

From Part 2 of the questionnaire, several themes or trends of interest emerged, as summarized below.

- The primary reason agencies consider fish and wildlife in transportation planning is because it is legally required, with stewardship cited as the next most common reason.
- States consider wildlife-vehicle collisions and game species data more important than habitat quality and connectivity data, while federal land management agencies responded conversely.
- The overwhelming majority of federal respondents were not familiar with state CHATs or the regional CHAT.
- Over half of the respondents indicated they do not use the regional CHAT because it doesn't meet their specific informational needs.

- Increased funding and early integration in the planning process were selected as important ways to increase attention to mitigation for fish and wildlife.
- CHATs and other digital fish and wildlife data allow better alignment with the FHWA's Eco-Logical approach in three key ways; specifically, by: (1) allowing earlier inclusion of fish and wildlife in the planning process, (2) providing more information to guide decisions, and (3) enabling exploration and analysis of alternative scenarios.

In addition, a comparison of the results of Part 1 (aimed at assessing current agency-wide practices related to the use of digital sources of fish, wildlife and habitat data) and Part 2 (aimed at understanding individual practices within specific roles based on respondents' personal work experience) of the Questionnaire reveal several similarities and differences, as outlined below.

- Respondents to Part 1 identified environmental stewardship as the primary reason their agency considers fish and wildlife in transportation planning and regulatory/mandatory considerations ranked second. In contrast, when asked to identify what best explains their agency's consideration of fish and wildlife in transportation planning, the majority of Part 2 respondents indicated that they do so because of a legal or regulatory compliance obligations. Environmental stewardship was ranked second. Thus the top two reasons for both respondent groups were the same, the first and second reasons simply being in reverse order.
- While the great majority of respondents to both Part 1 and Part 2 use digital sources of fish, wildlife and habitat data, many were unaware of or unfamiliar with CHATs. This was especially true for federal land managers. Moreover, respondents from both parts tended to give state CHATs higher rankings for both user interface and data value than the regional CHAT.
- Both Part 1 and Part 2 respondents recommended a number of potential improvements for CHATs, including offering more data sources, offering finer scale data and updating data frequently.
- Awareness of federal policies, including MAP-21 and Eco-Logical, was high among both Part 1 and 2 respondents. Respondents for both parts did not, however, believe that passage of MAP-21 has led to a greater emphasis on fish and wildlife mitigation. Insufficient funding similarly was identified by both sets of respondents as a major barrier to mitigation.

The following four suggestions were made:

- WGA (now WAFWA) and state providers of CHATs should spend more time and effort conducting outreach to federal land management agencies on the availability of CHATs and the information they provide.
- WGA (now WAFWA) should further explore how to improve the regional CHAT so that it can meet various agencies' specific informational needs.
- The most important future improvement to state and regional CHATs is to offer finer scale data than what is currently available.
- Additional funding will help improve attention to, and mitigation for, fish and wildlife resources by the transportation sector.

4. BEST PRACTICES REPORT

4.1. Organization of the Best Practices Report

Section 4.2 describes a series of best management practices, which are the most effective, highest quality, currently available applications that deliver, benefit from, and use CHAT information and other digital wildlife data. Best practices may involve state departments of transportation and/or wildlife as well as their federal, tribal and local counterparts. When possible, the authors also seek to identify implementing strategies with each best practice.

Section 4.3 focuses on case studies of exemplary best practices using digital wildlife data or CHAT information. These case studies describe plans, projects, analyses or programs that efficiently and effectively use digital wildlife data.

Section 4.4 describes various priorities for the transportation sector to improve and enhance its use of CHAT information. These priorities are informed by the project's Steering Committee's deliberations, a two-part questionnaire administered to state and federal transportation professionals, and a workshop with transportation practitioners and biologists held in September 2014 in Missoula, Montana.

4.2. Best Practices

Best practices are the most effective, highest quality, currently available applications that deliver, benefit from, and use CHAT information and other digital wildlife data. We sought to identify implementing strategies with each best practice, if possible. The selection of these best practices was informed by the two-part questionnaire (see Chapter 3), as well as a workshop with transportation practitioners and biologists held in Missoula, Montana, in September 2014.

4.2.1. Incorporate Wildlife Information before Budgets are Set

Incorporate wildlife information into transportation plans and projects before budgets are set. Advanced stages of system-level and project-level transportation plans often begin to identify and make resource decisions and lock in commitments early in their processes. These planning processes present an opportunity for CHAT information to be utilized early in plan development, particularly if it helps identify important wildlife conservation needs surrounding various highway locations throughout a region, state or area (*i.e.*, highway corridor).

There are numerous planning processes where it would be beneficial to consider CHAT information and other relevant wildlife data before plan or project budgets are set. These include but are not limited to state DOTs and their statewide master transportation plans, modal plans, highway corridor plans, and facility plans (*i.e.*, interchanges). For local governments, pre-budget delivery of CHAT information could help inform comprehensive land use development plans to inform future housing and transportation needs. For federal land management agencies (FLMAs), awareness of wildlife concerns along their roads based on state or regional CHAT information and other digital wildlife data could be incorporated during development of regional long-range transportation plans or individual FLMA management unit plans (*i.e.*, national forest travel plans), prior to plan budgets being set.

4.2.2. Set Joint Transportation and Wildlife Priorities

Have transportation and wildlife agencies set joint priorities to emphasize important locations for wildlife-friendly highway projects and increase the probability of acquiring otherwise competitive funds. When examining findings from this project's questionnaire, comments that arose throughout the two-day workshop in 2014, and discussions among the Steering Committee members, it became apparent that it is not a common practice in the West for transportation and wildlife agencies to gather on a regularly scheduled basis to share information and set mutually agreeable priorities. Although the practice is beginning to occur more frequently, mutual priority setting typically occurs on a more *ad hoc* basis.

The benefit of such cooperation is that it results in the identification of areas of joint priority for transportation safety and wildlife conservation, such as those with habitat or populations of species of greatest conservation need. These areas of common wildlife-safety interest allow wildlife and transportation agencies to set mutually agreeable objectives for mitigation that can then be communicated to planners, project engineers, and decision-makers. It also provides an opportunity to identify species that occupy portions of the planning area or may be affected by a project. In addition to identifying joint priority areas, these meetings often assess funding needs and evaluate opportunities where a mix of transportation and non-transportation funds, such as conservation funds, can be brought together and leveraged.

Collaboration and coordination between state DOTs and departments of wildlife (DOWs) to set joint priorities in multi-dimensional landscapes may have added value for each entity where transportation and wildlife agencies both meet their objectives. For example, spending funds to improve motorist safety by reducing wildlife-vehicle collisions with large ungulates may help a DOT meet its crash reduction goals, and at the same time provide safe passage for smaller animals that don't threaten the safety of drivers, such as those on a state's list of species of greatest conservation need. Thus safety dollar funds may benefit conservation and vice versa.

Setting joint priorities at multiple scales may require transportation and wildlife agency personnel to increase the number of scheduled formal meetings. Regional (multi-state) efforts can help identify wildlife mitigation priorities for a common highway (see case study regarding I-80, Section 4.3.5.3) or a vulnerable species common to many states (*i.e.*, bighorn sheep). State-wide and project-level joint priority setting results may be incorporated into state-wide or local plans and can be stand-alone projects (see Wyoming case study, Section 4.3.3), if funds are available.

4.2.3. Employ a Transportation-Wildlife Liaison

Employ a wildlife agency biologist as a transportation liaison to facilitate improved exchange of CHAT and other digital wildlife data and to fulfill transportation agency needs. A transportation-wildlife liaison position, which may be jointly funded by state DOTs and DOWs, helps facilitate the sharing of wildlife information so that DOTs have the appropriate digital data for the appropriate geography covered by their plans or projects. The wildlife liaison position would require familiarity with and delivery of CHAT information and other digital wildlife data from the state DOW to the state DOT. The liaison would also coordinate development of plans and analyses for wildlife connectivity and other crucial habitats and for managing the priorities set for habitat protection, and then communicate those priorities through the DOT's established

avenues and processes. Alternatively, an existing or new DOT position could be expanded to informally subsume the duties of a liaison, albeit under a different job title.

Both the Arizona Department of Transportation and WSDOT have hired a former biologist with their state DOWs. Although not jointly funded, both states have benefitted from the former DOW staffer's knowledge of the type of information available and how to access such information at the wildlife agency. In addition, they have familiarity with the digital format needed by the DOT. Equally important is that the former DOW biologists are aware of the various planning, programming and project development processes that their DOT must go through and which data best serves the needs of each process.

The best means of establishing a jointly funded position is for both the wildlife and the transportation agency directors, or their proxies, to agree on the cost share and incorporate the transportation liaison position into their annual budgets. Lack of joint funding does not, however, preclude creation of such a position, whether formally or informally.

Similar to state DOW liaisons, the USFWS also has staffers in its Conservation Planning Assistance Program that interact with, and support, transportation planning. As CHAT information progresses, these USFWS biologists may benefit from a better understanding of, and familiarity with, the data available in regional and individual state CHATs. It is important to note that although the regional CHAT is a non-regulatory tool, it can provide a high-level first look for early planning.

Ultimately, state transportation liaisons working in cooperation with their USFWS counterparts supply DOTs with the best available digital wildlife data and CHAT information. With proper training, wildlife-transportation liaisons at both state and federal agencies can be well versed in the strengths and limitations of CHAT websites, data, and analyses that are needed by DOTs for their different types of plans and projects.

4.2.4. Expand the Role of Wildlife Biologists

Eighty percent of success is showing up.
— Woody Allen

Have wildlife agency biologists present during long-term system and advanced project planning to increase the consideration of wildlife by transportation agencies. State-wide, regional, federal land management agency, and metropolitan long-term transportation plans, as well as tribal roads plans, STIPs, project programming and other advanced project plans all create opportunities for wildlife agency biologists to share CHAT information and other digital wildlife data with transportation planners and project personnel. At a minimum, state DOWs should be involved during transportation plan updates and any environmental reviews triggered by the plans, both for state and federal transportation plans. Having a state DOW staffer present to support the information needs of transportation staff during their development of each planning process has several advantages:

- Direct delivery of state wildlife information. There is no need for interpretation by DOT environmental staff or others regarding the data, information, priorities or any concerns or sensitive wildlife areas.
- Direct communication of wildlife values with transportation planners. Transportation planners are often referred to wildlife reports, state wildlife action plans, biological assessments or other wildlife documents, many of which can often be voluminous, making it difficult to locate information pertinent to the transportation agency's needs. Having a wildlife biologist present to sort through the documents with planners to locate exacting information improves the potential for the best, most appropriate information to be used for the plans.
- Wildlife biologists can provide direct interpretation of the strengths and weaknesses of data and analyses. Given the technical nature of utilizing geospatial data, which ranges from understanding applicable spatial scales and resolutions to interpreting model analyses and results, a transportation planner should not be expected to possess the expertise to wield such data on their own. Having a wildlife biologist present during transportation planning allows an opportunity for professional explanation and clarification of the wildlife data and information best suited for use in a particular plan.

Ultimately, it is highly beneficial to have wildlife biologists work closely with transportation planners so they are aware of the best available CHAT and other digital wildlife data and to ensure its appropriate use.

4.2.5. Use CHATs in Mitigation Planning

Use CHAT information to inform mitigation decisions during transportation planning and infrastructure. High quality CHAT information is useful to support mitigation decisions by transportation planners and project managers by helping to identify priority conservation areas, as well as other important natural resources and their locations. Access to both the regional and state CHAT information gives planners and project managers important information that they can use to avoid, minimize and mitigate the effects of transportation infrastructure on biodiversity.

4.2.6. Invest in Innovative Technologies

Continued investment in new technologies, research and monitoring of wildlife mitigation projects may improve adaptive management. Over the last decade, federal land management and transportation agencies have become increasingly aware of the effects that roads have on wildlife. Significant advances in our understanding of these impacts have been made; however, the means to adequately mitigate these impacts have been slower in coming.⁸ Presently there is an urgent need to provide transportation agencies with guidance on the use and effectiveness of wildlife crossings to mitigate habitat fragmentation and reduce the number of wildlife-vehicle collisions. However, there are no guiding principles of ecological performance for wildlife

⁸ Transportation Research Board, 2002. Environmental research needs in transportation. Conference proceedings 28. National Academy Press, Washington, D.C.

crossings. Many transportation agencies are building costly structures for wildlife connectivity, yet the fundamental research to determine the most effective approaches is in short supply.^{9,10}

Conservation value accrues to wildlife passages on highways only if animals use them in a way that brings about connectivity.¹¹ In general, there has been a lack of indicators or criteria developed pre-construction to adequately assess how well crossing structures ultimately perform in meeting land management and transportation objectives. Up until now, research that assesses the efficacy of wildlife crossings has been focused on the total number of crossings, but not how populations or ecosystems benefit by having the measures in place.

It is critical to know the performance of wildlife crossings at the population level. Recently, some investigations have employed rigorous study designs to evaluate the performance of highway mitigation measures, including a pre-construction versus post-construction comparison of animal movements across highways or using a before-after-control-impact (BACI) study design.^{12,13} Pre-construction data must be collected to increase the power of post-construction data analyses evaluating wildlife mitigation effectiveness. Evaluations of wildlife crossing mitigation on Montana US 93 (Evaro Hill to Polson, Montana) were designed in a pre- versus post-construction comparison at the population level.¹⁴ Similar research is being collected by WSDOT along Interstate 90 Snoqualmie Pass East Project in a pre- versus post-construction design to assess mitigation performance.¹⁵ Research like the Montana US 93 study provides a more accurate assessment of the demographic consequences of roads and the utility of wildlife crossings in enhancing populations.

Lastly, adaptive management derives benefits from measured observations from monitoring to inform decision-making with regard to planning and design of subsequent phases of a project. An example of adaptive management would be changing the design of wildlife crossing structures on subsequent phases of highway reconstruction after obtaining empirical data from the use of structures from earlier phases. Monitoring ultimately provides management with sound data for mitigation planning and helps to streamline project planning. Regular communication and close coordination between research and management is necessary for

⁹ National Research Council. 2005. Assessing and managing the ecological impacts of paved roads. The National Academies Press, Washington, DC.

¹⁰ Clevenger, A.P. 2012. Mitigating continental scale bottlenecks: How small-scale highway mitigation has large-scale impacts. *Ecological Restoration*, 30:300-307.

¹¹ Beier, P. and R. Noss. 1998. Do habitat corridors provide connectivity? *Conservation Biology*, 12:1241-1252.

¹² Van Manen, F., M. McCollister, J. Nicholson, L. Thompson, J. Kindal, M. Jones. 2012. Short-term impacts of a 4-lane highway on American black bears in Eastern North Carolina. *Wildlife Monograph*, 181:1-35.

¹³ Lebarrière, D. and L. Fahrig. 2012. Measures to reduce population fragmentation by roads: what has worked and how do we know? *Trends in Ecology and Evolution*, 27:374-380.

¹⁴ Huijser, M., E. Fairbank, W. Camel-Means, J. Purdum. 2013. US 93 Post-construction wildlife-vehicle collision and wildlife crossing monitoring and research on the Flathead Indian Reservation between Evaro and Polson, Montana. Annual Report 2013. Report prepared for Montana Department of Transportation, Helena, Montana.

¹⁵ Wagner, P. 2006. Improving mobility for wildlife and people: Transportation planning for habitat connectivity in Washington State. Page 79, in: *Proceedings of the 2005 International Conference on Ecology and Transportation*, edited by C. Leroy Irwin, Paul Garrett, and K.P. McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University.

adaptive management to be effective. This will allow for timely changes to project design plans that reflect the most current results from monitoring activities.

4.2.7. Increase Access to CHAT Websites

State and regional CHAT websites are intended to provide information regarding fish and wildlife resources to users of varying technical ability, ranging from interested citizens to planners with GIS expertise. Several CHAT sites offer excellent examples of intuitive interface designs and features that help make information more accessible and useable by diverse audiences. We highlight several particularly useful features that would further facilitate access and use of CHATs:

- Arizona and Montana offer tutorial videos helping new users to navigate their CHATs, and their map interfaces include brief, nontechnical descriptions of each data layer accessible with a single click.
- The regional, Kansas, Oregon, and the Southern Great Plains CHATs clearly identify the date on which their maps were last updated. Arizona's CHAT offers a 'What's New' menu helping returning users to easily locate the latest information.
- Most CHATs include reference layers to help users identify relevant jurisdictional boundaries or geographic features.
- Arizona provides a simple means of saving user-created map images; New Mexico provides selection tools allowing a subset of data to be downloaded for a location of interest; and the Southern Great Plains CHAT allows users to estimate the cumulative impacts incurred at a point or along a linear feature.
- Arizona, California, Montana, and the Southern Great Plains CHATs include layers pertaining to stressors (*e.g.*, energy development features, housing density) that may impact fish and wildlife.
- California explicitly identifies areas with limited data where estimated impacts may be artificially low.

4.2.8. Use FHWA's Eco-Logical Approach to Improve Cooperation

In the planning and delivery of infrastructure, experience has shown it can be piecemeal and ineffective to use project-by-project, site-by-site, or single resource approaches. Federal agencies recognized that jurisdictional boundaries and authority can limit what needs to be done and found that many trans-boundary successes occurred through partnerships – both public and private.

In many cases, success depended upon a broad landscape scale and cooperative approach that delivered multiple benefits for the environment and local economies and communities. In other instances, using a non-piecemeal approach to mitigation actions for a group of projects made planning for wildlife connectivity improvements across roadways more achievable. In response to these challenges and lessons learned, several initiatives emerged as drivers for improved practices, including a federal multi-agency agreement for an ecosystem approach; an Executive Order for cooperative conservation; an Executive Order for environmental stewardship and streamlining for transportation; a recent Department of the Interior Secretarial Order adopting a

landscape-level mitigation strategy; and a multi-agency “Eco-Logical” initiative and publication. The latter is described in detail in this section.

For the Eco-Logical initiative, FHWA mobilized an interagency steering team of eight federal agencies in 2002 to collaborate on an approach to develop transportation and infrastructure in ways that are more sensitive to terrestrial and aquatic habitats, while concurrently promoting safety, social well-being, and economic development. The resulting ecosystem approach is summarized in the multi-agency signatory document, entitled “Eco-Logical: An Ecosystem Approach to Developing Ecosystem Projects.” Known as Eco-Logical, it is a process that balances conservation with sustainable use. To implement this approach, Eco-Logical endorses a framework with elements of integrated planning, adaptive management, and performance measurement, and options for compensatory mitigation of unavoidable impacts. For example, Eco-Logical’s compensatory mitigation options include a concept known as “ecosystem-based mitigation,” which is defined as “the process of restoring, creating, enhancing, and preserving habitat and other ecosystem features in conjunction with or in advance of projects in areas where environmental needs and the potential environmental contributions have been determined to be greatest.”¹⁶ Planning and project uncertainties are reduced and support for projects is increased, so that infrastructure projects can move forward more quickly and improve sustainability of ecosystems and habitat connectivity at a broader landscape scale.

Another touchstone of Eco-Logical is its reliance on collaboration and integrated decision-making during infrastructure planning, project development, environmental review, and design to maximize benefits and avoid, minimize, and provide effective compensatory mitigation for adverse infrastructure impacts. To foster collaboration, Eco-Logical sets forth a nine-step, non-prescriptive framework for integrating planning across the public and private sectors, premised upon the belief that no single agency, acting alone, can effectively implement an ecosystem-based approach to infrastructure planning. These steps, which can be modified to adapt to various partnerships and conditions, are:

- | | |
|--------|---|
| Step 1 | Build and strengthen collaborative partnerships |
| Step 2 | Characterize resource status and integrate natural environment plans |
| Step 3 | Create a Regional Ecosystem Framework (REF) (overlay of various layers, including conservation strategies and transportation plans) |
| Step 4 | Assess effects on conservation objectives |
| Step 5 | Establish and prioritize actions |
| Step 6 | Develop a crediting system |
| Step 7 | Develop programmatic consultation, a biological opinion or a permit |
| Step 8 | Implement agreements, adaptive management and delivery projects |
| Step 9 | Update the REF and plan |

¹⁶ USDOT (U.S. Department of Transportation), Research and Innovative Technology Administration, Volpe National Transportation Systems Center. 2006. Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects, Report No. DOT-VNTSC-FHWA-06-01.

Use of Eco-Logical's innovative framework empowers federal, non-governmental organizations, tribal, regional, state and local agencies and the private sector to work collaboratively to identify and capitalize on opportunities for community and environmental benefits beyond a project-by-project approach, across a broad landscape scale to deliver multiple benefits for the long-term.

To test the Eco-Logical approach and encourage awareness and adoption among transportation and resource agencies, FHWA established its Eco-Logical Grant Program in 2007. The program funded 15 projects across the country in ten different states and one six-state region of the U.S. Environmental Protection Agency. During this time, additional states began programs that related closely to the Eco-Logical approach, including the Vermont Staying Connected Initiative and the Maryland Watershed Resources Registry. Though FHWA did not track these efforts as part of its Eco-Logical Program, it documented many of these practices through its State Practices Database.

Through research undertaken as part of the second Strategic Highway Research Program (SHRP2), additional areas of the country were asked to pilot test the Eco-Logical approach. Subsequently, SHRP2's initiative to implement Eco-Logical – the Implementation Assistance Program (IAP) – provided awards to a total of 13 state DOTs and metropolitan planning organizations (MPOs) that are actively pursuing Eco-Logical. These recipient agencies are using this funding to leverage existing knowledge and applications of Eco-Logical, collaborate with partners, use and share data, and streamline practices. At present, there are approximately 25 states that have applied the Eco-Logical approach in some form. The majority of the applications occur at a regional level, rather than statewide. By implementing Eco-Logical, FHWA and its partners intend to continue to expand the number of states and MPOs using the Eco-Logical approach. For a detailed discussion of the relationship between CHATs and Eco-Logical, see Chapter 6.

4.3. Case Studies

This section will describe some of the best illustrations of incorporating wildlife values into different types of transportation plans and projects, at various temporal and spatial scales. We sought examples that were broadly applicable and highly successful. Some are early adoptions of new approaches; others are more tested over time. Organizationally, we present the eleven case studies based primarily on the temporal length of the planning process and secondarily on their spatial breadth or scope.

4.3.1. Long-term or System Planning – 10-20 Year or Longer Time Horizons

4.3.1.1. Case Study: Washington's Long-Term Transportation Plan, 2007-2036

Each state DOT is required by law to develop a 20+ year long range transportation plan. These federally mandated documents outline strategies and actions for addressing the transportation issues and needs of each state DOT. The actions in the plan are general (as opposed to project-specific or region-specific). The plan is not rigid or fixed, but part of a continuous process as priorities, strategies and/or needs change. The plan serves as a framework for preparing future,

more project-specific transportation plans, such as a statewide transportation improvement program. Plans often define pragmatic investment choices for the DOT and often include goals and performance measures for natural (*i.e.*, wildlife) and environmental (*i.e.*, clean water) resources.

The Washington Transportation Plan for 2007-2036 is a long-term plan that gives full consideration to the state's fisheries and incorporates their needs, particularly by accommodating the safe passage of aquatic species throughout the state's highway system. The plan notes that WSDOT works with the state Department of Fish and Wildlife to "inventory, identify, and prioritize fish passage barriers that should be removed along the state highway system." As part of the plan, the agencies have jointly identified 1,500 fish passage barriers on state-owned highways.

As of early 2015, seven years into the plan, 282 barriers have been removed (see Figure 40). In the plan, the agencies confirm that the effort to fix barriers remains a top priority for WSDOT and adopt a joint approach to identifying, prioritizing and fixing connectivity issues. This example demonstrates how state transportation and wildlife agencies can work together at the 20-year planning time horizon to address issues of common interest.

Fish Passage Barrier Removal Projects on Highways **Moose Creek under SR 530 at milepost 44 near** **Darrington in Snohomish County**



Before
Two corrugated steel culverts are too high and too steep to provide adequate passage

After
New Bottomless culvert replaces the two round steel culverts, eliminating the barrier

Figure 40: Example of a fish passage barrier removal project in the Washington Transportation Plan for 2007-2036. Source: Washington State Department of Transportation.

4.3.2. Advanced Planning, Projects, Tools – 5-10 Year Time Horizons

4.3.2.1. Case Study: Montana's Libby North Corridor Study

In 2006, the Montana Department of Transportation (MDT) initiated the Libby North Corridor Study. The study was completed for a 14-mile length of MT Highway 567 that connects the communities of Libby and Yaak, a narrow winding road within the Kootenai National Forest in northwestern Montana, which was experiencing an accident severity rate more than double the statewide average for similar roads. This heavily-forested area contains bull trout, Canada lynx, gray wolf, grizzly bear, and 11 other sensitive species. Due to environmental concerns, including a district court order protecting Cabinet-Yaak grizzly bear against “take” anywhere they occur, MDT was uncertain if roadway improvements would be allowed along the corridor. MDT thus initiated a pre-NEPA corridor study to determine the needs, objectives, and constraints, prior to recommending roadway improvements. MDT collaborated with USFWS, local governments, other agencies, and the public to identify roadway concerns and constraints to develop improvement recommendations that addressed roadway safety, minimized impacts to resources, and maintained the character of the corridor.

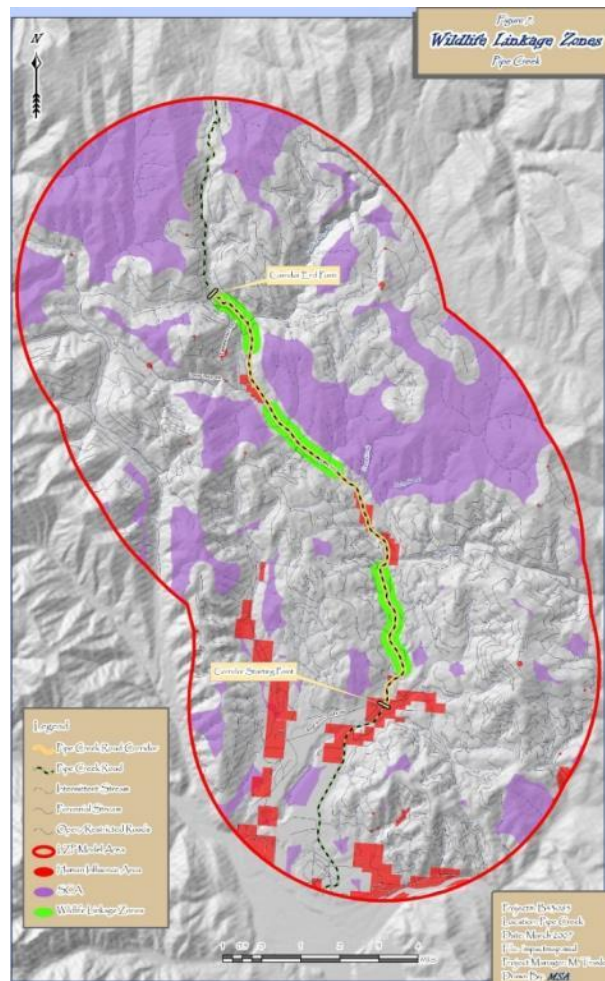


Figure 41: Wildlife linkage zones and developed areas are shown in green and red, respectively, along the Libby North corridor. Source: Montana Department of Transportation.

Due to unique concerns related to the court order, MDT used readily available geospatial data on road density, vegetative cover, human development, and riparian habitat to create a linkage zone prediction model (Figure 41). This model was used to predict wildlife habitat linkage potential during the development of improvement recommendations for the corridor. The model defined “favorable habitat and areas of potential wildlife avoidance, using grizzly bears as the indicator species, to determine potential cross-highway linkage areas.”

In completing pre-NEPA studies, MDT used guidance for linking planning and NEPA reviews, thereby allowing MDT to make the Libby North corridor safer for the public while minimizing impacts to local resources. For more information on the Libby North corridor study, visit online at: www.mdt.mt.gov/pubinvolve/libby/

4.3.3. Case Study: Wyoming’s Trappers Point Wildlife Corridor Project

The Wyoming Department of Transportation (WYDOT) thought that the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant program offered by the US Department of Transportation might be the perfect opportunity to solve some of its wildlife and fish passage issues. Since 2009, Congress has dedicated more than \$4.1 billion to fund TIGER projects during six rounds of applications. In 2009, WYDOT teamed with the Wyoming Game and Fish Department (WYGF) and sought information from other agencies such as the Bighorn and Bridger-Teton national forests to develop a list of state fish and wildlife mitigation priorities. The resultant priority list of safe passage projects were geographically spread across all five WYDOT Districts. WYDOT then included that priority list in its TIGER grant proposals; unfortunately, it was unsuccessful in garnering TIGER funds.

The top priority project along US Highway 191 in District 3, however, subsequently qualified for State Transportation Improvement Program funding. Known as the Trappers Point Wildlife Corridor and Highway Safety project, the effort focused on reducing wildlife-vehicle collisions and providing safe passage for animals using one of the largest wildlife migratory corridors in the lower 48 states. The area’s topography creates a natural bottleneck known as Trappers Point (Figure 42). The project constructed six highway underpasses and two overpasses connected with fencing to direct species, such as pronghorn and mule deer, to the structures. In 2011, it received the FHWA’s Exemplary Ecosystem Initiatives award.

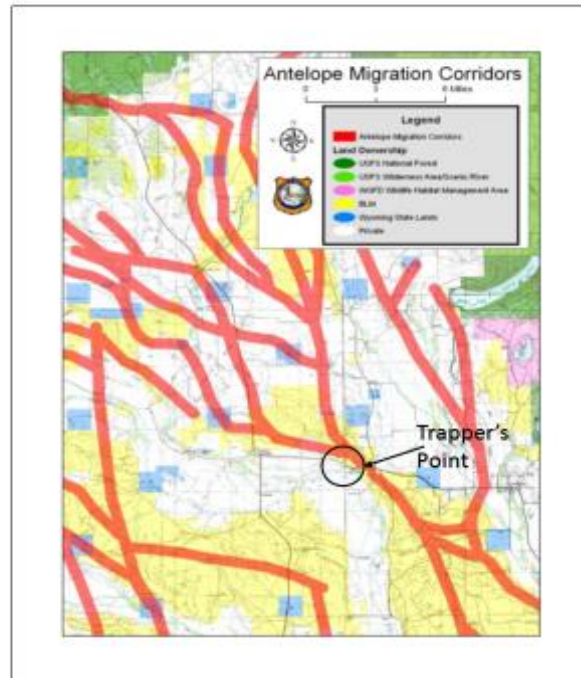


Figure 42: Trappers Point Wildlife Corridor and Highway Safety project area along US Highway 191 in western Wyoming. Source: Wyoming Game and Fish Department.

Although WYDOT's joint effort with WYGF and federal land managers to set state-wide priorities for wildlife and fish passage in 2009 may not have been successful in garnering TIGER Program grants, it is still being used today. Many projects on the priority list continue to be actively pursued, and others have already been completed.

4.3.4. Case Study: California's Preliminary Environmental Reports

To receive federal funds, federal legislation requires states to develop a statewide transportation improvement program or a STIP. Before being programmed and before funds can be received, the California Department of Transportation (CalTrans) requires a Project Initiation Document (PID) for each project in the STIP. Most projects also require a Preliminary Environmental Analysis Report (PEAR), which becomes an attachment to the PID.

The PEAR is the first environmental assessment done for each project. It outlines the primary environmental components that might affect the project design, alternatives, schedule, and costs. It also develops the project's purpose and need statement, estimates mitigation costs associated with the project's environmental components, and identifies other technical studies that may be needed.

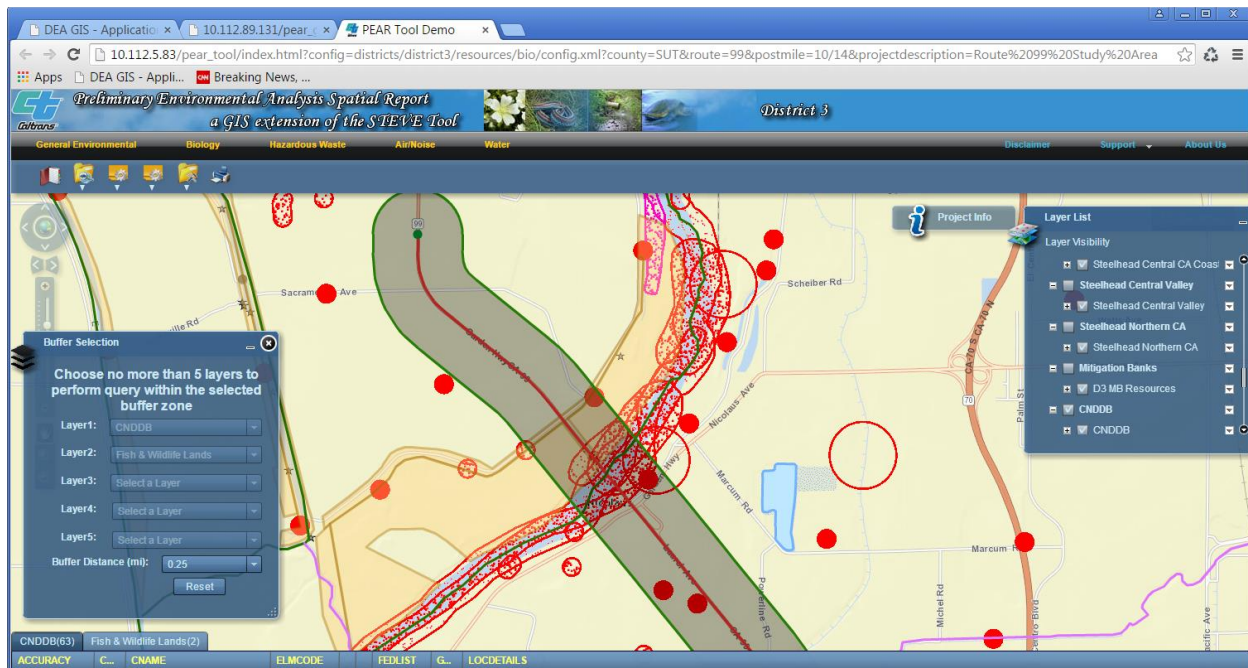


Figure 43: Screen shot of five data layers of information from the Preliminary Environmental Analysis Report (PEAR) GIS Tool. Source: PEAR GIS Tool, Division of Environmental Analysis, California Department of Transportation.

To assist with early project scoping and PEAR development, Caltrans is currently developing a web-based GIS application called the PEAR tool to provide districts a map-based view of projects (Figure 43).¹⁷ To date, it has been tested in a pilot study in four Caltrans districts. It is intended to provide a standard and efficient framework for districts to collect, structure, and report data. The tool will initially be used for capital transportation improvement projects and other projects for which capital funding is sought. However, it is anticipated that as the tool is further developed and used, it will also be employed by districts to assist in long-range transportation plan development and system planning. The PEAR tool includes data layers for biological resources as well as other technical areas including but not limited to: cultural resources, water quality, hydrology, floodplains, community impacts, geotechnical, and hazardous waste to provide the initial “first look” at a project’s potential environmental impacts. Biological data layers presently included in the PEAR tool include: vegetation, essential habitat connectivity areas, natural landscape blocks, fish passage assessments, essential fish habitat, and listed salmonid critical habitat, among others.

¹⁷ The solid red circles, red open circles and red polygons depict California Natural Diversity Database wildlife species, for example giant garter snake, Swainson’s hawk, bank swallows, Sacramento Valley tiger beetle, etc. The light brown polygons represent California Department of Fish and Wildlife lands. The green line represents the Chinook salmon critical habitat. The light purple line represents the Steelhead Salmon critical habitat. The grey shaded area around Highway 99 is a 0.5 mile buffer around the project area. The red line within the buffer is the post mile limits for the project. This information is used by Caltrans biologists to ascertain potential project impacts within and surrounding the project area and is subsequently included in the PEAR and the PID for programming project funds.

4.3.5. Analyses and Evaluations

4.3.5.1. Case Study: State CHAT – Kansas’ Natural Resource Planner

Linear infrastructure, such as roads, railways, pipelines, and electric transmission lines, has potential effects on wildlife, including habitat loss, habitat fragmentation, direct mortality, and reduced habitat quality. Specifically, transmission lines may have negative impacts on lesser prairie chicken populations due to habitat fragmentation and reduced habitat quality, especially because lesser prairie chickens often avoid vertical structures.

ITC Great Plains, LLC recently completed building a 122-mile, 345 kilovolt transmission line known as the Kansas V-Plan. The company describes the project as “a high-voltage transmission line designed to connect eastern and western Kansas to improve electric reliability and enable energy developers to tap into the transmission grid, further establishing a competitive energy market in the state.”¹⁸

During the early stages of planning, ITC Great Plains and the Kansas Department of Wildlife, Parks and Tourism used the Kansas state-level CHAT, known as the Natural Resource Planner, to avoid routing the transmission line through critical lesser prairie chicken habitat (Figure 44). In taking a proactive approach to siting, these groups were able to achieve a common goal in helping to avoid future listing of the lesser prairie chicken, and ITC Great Plains was able to save valuable time and money in the planning process, avoiding the delays of the “back-and-forth” that often ensues between builders and state departments of wildlife.

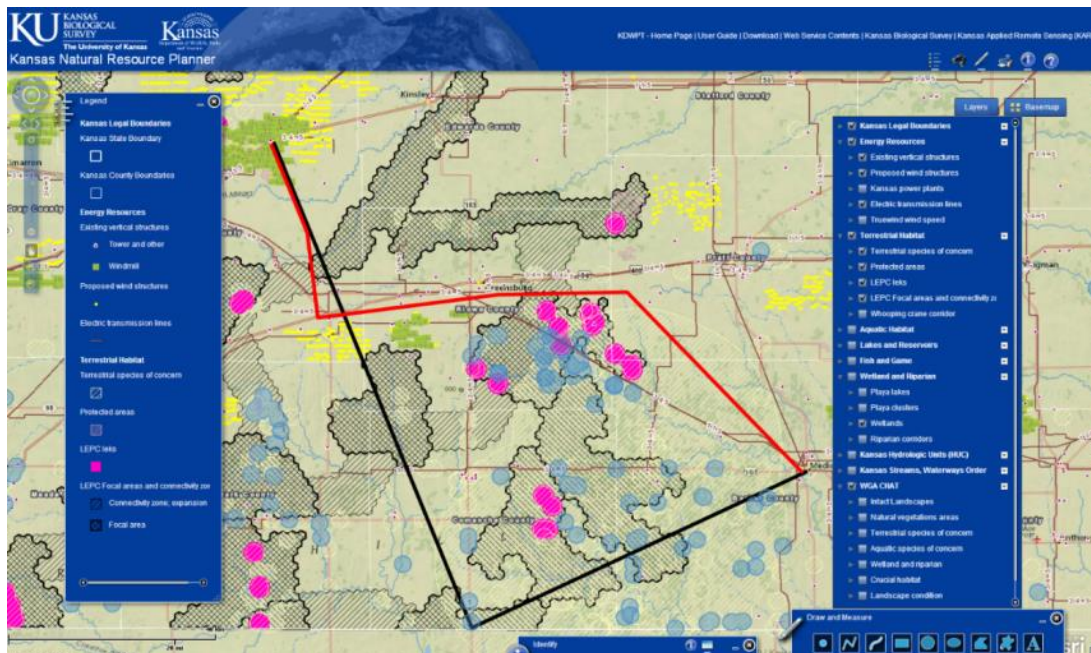


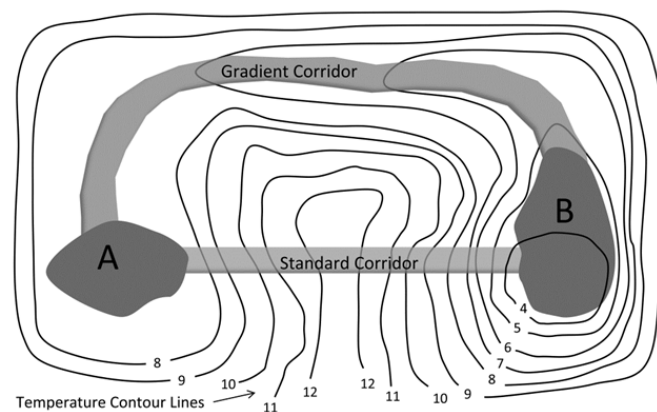
Figure 44: Screen shot showing an example of how the Kansas state CHAT (known as the Natural Resource Planner) was used to help avoid important lesser prairie chicken habitat. Source: Kansas Biological Survey.

¹⁸ ITC Kansas V-Plan description. Retrieved on March 27, 2015, from: <http://www.itc-holdings.com/itc-great-plains/projects/item/62-kansas-v-plan.html>

4.3.5.2. Case Study: Washington's Wildlife Habitat Connectivity Working Group

The Wildlife Habitat Connectivity Working Group (WHCWG) is a public-private partnership whose mission is to promote the “long-term viability of wildlife populations in Washington State through a science-based, collaborative approach that identifies opportunities and priorities to conserve and restore habitat connectivity.” The WHCWG is co-led by WSDOT and the state Department of Fish and Wildlife; membership is open and currently includes state and federal agencies, conservation organizations, tribal entities, and universities.

The primary goal of the WHCWG is to identify opportunities and priorities for conserving and restoring wildlife and habitat connectivity. As a science-based collective, this goal is addressed by creating analyses and tools for managers and the public. This is done by performing regionally based habitat and linkage assessments, utilizing to a large extent the capabilities of GIS and other computer modeling systems, and making these outputs available to interested parties. These assessments build upon existing state and regional wildlife and habitat science and inventories including Washington's state-specific CHAT, entitled the Priority Species and Habitat List (PSHL). Connectivity analyses at the statewide scale integrate both a landscape integrity approach and current condition information on 16 focal species, and provide a look at the most robust wildlife corridors in light of climate change.¹⁹ The WHCWG has produced a suite of publicly available maps, data layers, and GIS tools (Figure 45). Additional work has continued to validate existing models and to “step down” analyses to a finer scale at the eco-regional level.



Patches A and B are separated by a temperature gradient (contour lines). Patch A can be connected to Patch B by a standard cost distance corridor, which (all else being equal) finds the shortest path between the patches, or by a climate gradient corridor of the most unidirectional change in the temperature gradient.

Figure 45: A simple graphic displaying the concept of a climate gradient corridor. Credit: Nunez *et al.* 2013.

¹⁹ Nuñez, T.A., J.J. Lawler, B.H. McRae, D.J. Pierce, M.B. Krosby, D.M. Kavanagh, P.H. Singleton, J.J. Tewksbury. 2013. Connectivity Planning to Address Climate Change. *Conservation Biology*, 27 (2): 407-416.

There are numerous examples of ways in which the outputs and tools of the WHCWG have been utilized by federal and state agencies as well as non-profit organizations. For example, in 2012, the U.S. Forest Service used WHCWG results and products in order to address ecological connectivity in land management planning. Both the Colville National Forest and Okanogan-Wenatchee National Forests are revising their land management plans, which cover approximately 5 million acres. The forests rely on this CHAT data to support their effort to address ecological connectivity. For a thorough list including more than 25 examples, visit: <http://www.waconnected.org/wp-content/uploads/2013/05/2013AprUsesWHCWGProducts.pdf>

4.3.5.3. Case Study: I-80 Corridor System Master Plan Study

The I-80 Corridor System Master Plan Study (CSMPS) is a joint effort by California, Nevada, Utah and Wyoming to identify action strategies based on existing information and to build a network of stakeholders along the 1,173 mile corridor between San Francisco, California, and Cheyenne, Wyoming. This effort recruited 250 stakeholders, both organizations and individuals, to collectively create a vision for the future and determine how to achieve it.²⁰ There were ten different working groups empaneled to explore a variety of topics, including a Wildlife Crossings Working Group.



Figure 46: Screen shot of I-80 CSMPS study area and some existing and proposed wildlife crossings in Nevada and Utah represented by red deer heads. Source: Nevada Department of Transportation.

²⁰ I-80 Stakeholder Network homepage. Retrieved on March 27, 2015, from: <http://www.i80vision.org/home>

The I-80 CSMPS Wildlife Crossing Working Group was formed to explore “the various dynamics of road ecology while considering enhanced infrastructure that can improve the safety of motorists and wildlife by reducing wildlife-vehicle collisions, decreasing habitat fragmentation, and increasing landscape connectivity.” The group used mule deer as a focal species and incorporated data from statewide habitat connectivity plans, the Western Regional Partnership, and other GIS wildlife data sets to create an interactive web map (Figure 46). Some of the features that can be explored within the web map include known migration routes and barriers, hotspots of deer-vehicle collisions, and existing or planned crossing structures. To view the map online: <http://ndot.maps.arcgis.com/home/webmap/viewer.html?webmap=c37fbc8d50514fdd882e6c2b109bfe3e>

4.3.6. Projects

4.3.6.1. Case Study: BLM and State Use of CHAT in Southern Utah

Every year, more than 100 wildlife-vehicle collisions occur on a 12.5-mile stretch of US Highway 89 in Kane County, Utah, east of the small town of Kanab. The vast majority of these collisions have been with mule deer of the Paunsaugunt herd, whose summer grounds on the Paunsaugunt Plateau and winter grounds in northern Arizona are separated by the highway. In order to address both motorist safety and wildlife health, the Utah Division of Wildlife Resources (UDWR) and Utah Department of Transportation convened a coalition consisting of the BLM, Arizona Game and Fish Department, Kane County officials, sportsmen and conservationists to develop a plan to address the highest-risk area along the highway as well as to investigate potential funding options.

This coalition of state, federal and local partners developed a plan for both sides of this portion of Highway 89 by utilizing regional and state-specific CHAT habitat data along with collision site and GPS collar data. With access to all of these vital data, managers installed escape ramps every 1.5 to 2.5 miles and constructed three new wildlife underpasses, in addition to the four existing structures at locations where culverts for drainage cross under the highway. The existing fencing was also upgraded to wildlife exclusionary fencing along both sides of the road in order to effectively funnel wildlife to, and through, the seven crossing structures (Figure 47). For more information, visit: <http://westgov.org/images/dmdocuments/WGA%20Utah%20Case%20Study%20April%202014.pdf>



Figure 47: Mule deer from the Paunsaugunt herd investigate and travel through a highway crossing structure on U.S. 89, east of Kanab, Utah. Credit: P. Cramer, USU, UDWR and UDOT.

By accessing CHAT data and using it in concert with other important digital data, federal and state agencies ensured that the mitigation structures along U.S. Highway 89 were properly located, resulting in effective mitigation of wildlife-vehicle collisions. In the words of Ashley Green of the UDWR: “These are expensive projects, and having good datasets is really important to be sure that the projects you get on the ground are in the right place.”

4.3.6.2. Case Study: Washington’s Jimmycomelately Ecosystem Restoration

The Jimmycomelately (JCL) Creek watershed and the more geographically encompassing Sequim Bay ecosystem is traversed by US Highway 101 near Blyn, Washington (Figure 48). Over 27 partner organizations are working together to restore and protect the aquatic and terrestrial resources in this area including the S’Kallam Tribe, WSDOT, and the state Department of Fish and Wildlife. In addition to addressing the need to improve the area’s transportation system, these partners sought multiple benefits for the natural resources, including reducing flood hazards to homes, utilities, Highway 101 and other roads; restoring fish and shellfish populations; protecting the threatened chum salmon, *Onchorhynchus keta*; improving water quality; and improving channel and estuarine habitats and ecological function.



Figure 48: Aerial photo of restored JCL Creek, Sequim Bay estuary and Highway 101 bridge. Credit: David Woodcock, Greywolf Photography.

The project used a wide array of fish and wildlife data from many sources and agencies. As a result, WSDOT was well informed as it designed the new Highway 101 bridge to accommodate flooding and sediment transport to the bay, and to provide for both fish and wildlife passage. To mitigate for the Highway 101 improvements' impacts on wetlands, WSDOT completed compensatory efforts across the Blyn Basin. Importantly, the partners monitored and evaluated the project to evaluate its effectiveness for eight years, from 2004 through 2011. This project illustrates how a diverse partnership can work with a transportation agency to use fish and wildlife data to assure that multiple goals are met, both for the highway system and for natural resources.

4.3.7. Other Planning and Project Tools

4.3.7.1. Case Study: Rogue Valley's Regional Ecosystem Framework

A 300-square mile river valley currently home to 200,000 residents, Rogue Valley, Oregon, is witnessing double-digit population growth typical of many western U.S. towns. Surrounded by mountains, this rapid and sometimes uncoordinated growth has come at the expense of sensitive ecological areas like oak woodlands, salmon streams, and wetlands. At the same time, improvements to the transportation network have sometimes lagged behind development due to a lack of readily accessible environmental information to inform current and future transportation planning. Epitomizing the fate of many western towns in danger of losing the very amenities that make them unique and desirable, the National Academies' Transportation Research Board selected the Rogue Valley to pilot test and customize the first three steps of the nine-step process ultimately incorporated into the FHWA's Eco-Logical framework; step three of the framework entails creation of a regional ecosystem framework (REF).

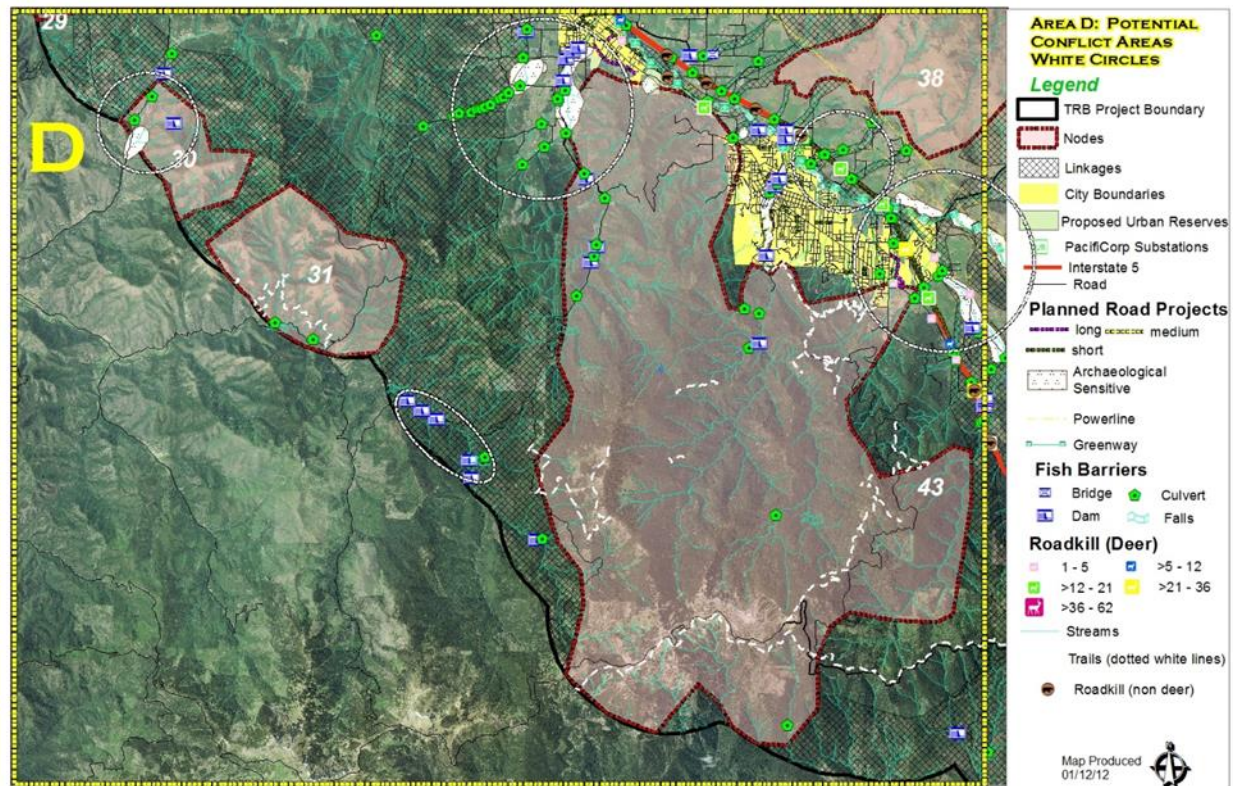


Figure 49: Map overlaying ecological data with planned transportation projects. White circles denote potential conflict areas. Source: Rogue Valley Council of Governments.

The Rogue Valley Council of Governments (RVCOG) convened a stakeholder committee representing diverse public and private sector interests and a technical committee of local resource experts to help integrate efforts and planning and create the customized REF. Consisting of almost 200 data sets collected from federal, state, county, municipal, utility, non-profit, and private individual sources, the REF's data library includes several layers from the Oregon Department of Fish and Wildlife that are now fully integrated in Oregon's state CHAT, known as Compass. The REF has been used to generate maps depicting (1) ecologically and environmentally sensitive areas (nodes) and connections between the nodes (linkages); (2) areas of potential opportunities and conflict with long range planning projects; and (3) areas of potential archeological and historical importance. The results have also been used to update the valley's long-range Regional Transportation Plan. By providing easily accessible environmental information (Figure 49), the REF enables decision-makers to take an ecosystem-based approach to more effectively integrate and balance protection of ecologically sensitive areas with much-needed transportation improvements for multiple long-term benefits. For more information, visit: http://rvcog.org/MN.asp?pg=NR_TRB_Home_Page

4.3.7.2. Case Study: California's Essential Habitat Connectivity Project

As a result of legislative direction, CalTrans and state Department of Fish and Wildlife led a collaborative effort to map (1) essential wildlife corridors and habitat linkages and (2) environmental resource impacts. They were to make this information available for planning at multiple scales for a variety of interests. Information from the California Essential Habitat

Connectivity project (CEHC) is now available to be incorporated into planning processes by federal, state, metropolitan and local transportation agencies. Presently, regions are using CEHC to conduct finer-scale essential connectivity assessments to aid with regional mapping and development decisions.

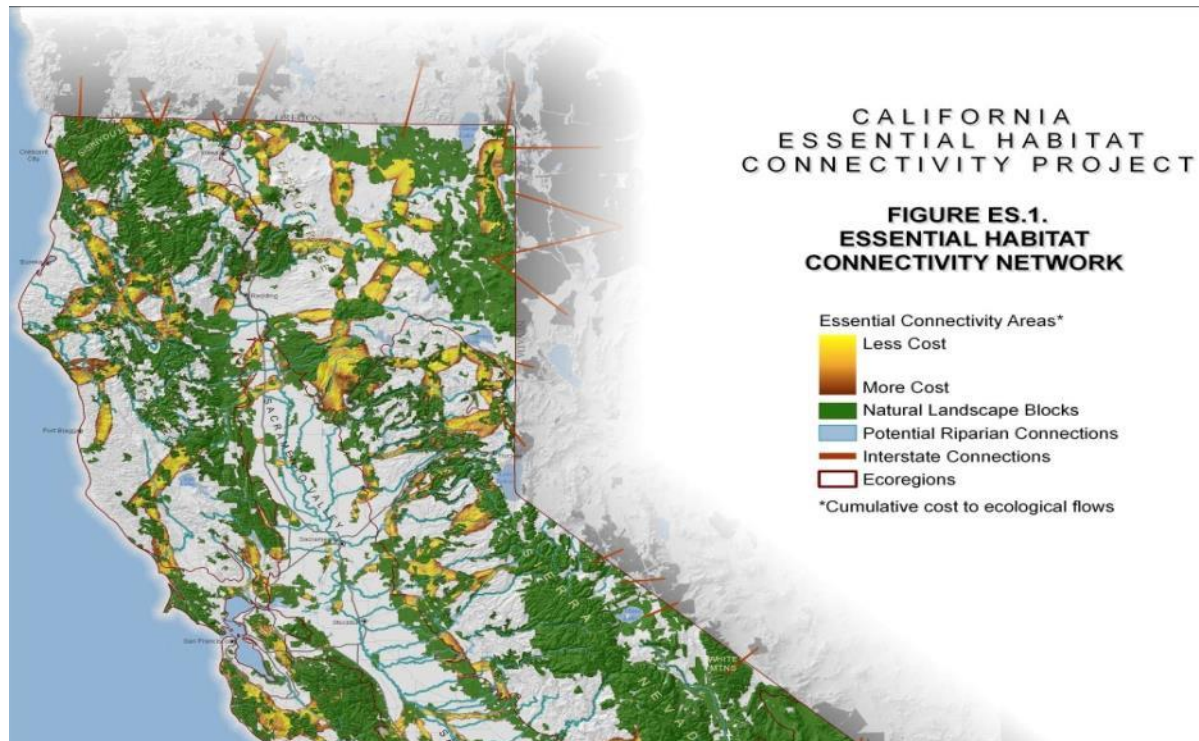


Figure 50: The main output layer of the CEHC, displaying Natural Landscape Blocks and Essential Connectivity Areas. Source: California Department of Transportation.

The inclusive CEHC effort involved participation by local, state, and federal agencies, non-profit organizations, counties and others. The project was funded in large part by the FHWA. It produced a statewide wildlife habitat connectivity model and resultant map (Figure 50), an assessment of the relative biological value of identified Essential Connectivity Areas (ECAs), and a final report designed to help transportation officials and other end-users interpret and implement its findings.

The peer-reviewed CEHC final report contains a wealth of information. Numerous strategies are delineated that aid in integrating and institutionalizing the findings of the CEHC. These strategies for transportation officials and other interested parties include considerations for road development in ECAs and programs for addressing existing road impacts. The report also provides guidance on generating regional and local frameworks for integrating connectivity data into transportation planning, county zoning and finer scale projects. For more information, visit online at: http://www.dot.ca.gov/hq/env/bio/project_materials.htm

4.4. Priorities for Implementation and Moving Forward

The development of state and regional CHATs as both tools and clearinghouses for digital information on wildlife is a recent development. This report thus presents best practices in use today to incorporate digital wildlife information and CHATs into transportation plans and projects. Transportation planning, however, involves a broad spectrum of temporal (*e.g.*, long-range transportation plans, intermediate-range corridor studies, short-range STIPs) and spatial (*e.g.*, multi-state, state-wide, regional, local) scales. As a result, it is likely that future innovation and improved collaboration among federal, tribal, state and municipal transportation agencies and regional and state CHAT data providers will continue to advance the use of digital wildlife data during transportation planning, review, design and construction. With an eye towards the future, members of the Steering Committee, questionnaire respondents and other project stakeholders identified the following priorities for implementation and moving forward.

4.4.1. Update Data Regularly

Regularly updating CHAT information helps data remain current and applicable to planning needs. This might mean adding new layers to CHATs as new data become available, or revising existing layers to reflect changes in the information and values on which they were based. It would be beneficial to users for CHATs to clearly state the date on which they were last updated and consider including update release notes to help returning users easily identify which information has changed since their last visit. Establishing a regular schedule for revisiting CHAT data helps ensure that data is current and that updates are methodically completed.

4.4.2. Develop Finer Scale CHAT Data

State CHATs may want to offer finer scale information than what is currently available through the regional CHAT to meet state-specific priorities and planning needs. Such finer scale data may also be appropriate for conducting highway corridor-level project planning to assess preliminary impacts. While the regional CHAT is intended to provide a high-level, seamless overview of crucial habitat values across the West, state CHATs can add value by providing information that is more tailored to individual species, habitats, or stressors of concern, and that is appropriate for use at the site level. These additional data sources are expected to help represent and address state-specific priorities, resources, and planning needs. Most currently available state CHATs offer additional, finer-scale data layers for use in conjunction with regional “rolled-up” CHAT layers.

4.4.3. Improve Integration of CHAT Websites and Other Wildlife Data Sources

The regional CHAT currently links directly to each state CHAT portal (or, for those states that do not yet have CHATs, to the state’s fish and wildlife management agency homepage). However, state CHATs typically do not link directly to the regional CHAT or to the CHATs of bordering states. Providing such easily accessible links will likely better promote and streamline trans-boundary planning efforts.

Many other sources of wildlife information that are available and used by transportation and wildlife agency personnel for planning and project purposes are, generally, not yet integrated with CHATs. States may want to identify and link to external web-based portals that provide other key sources of wildlife information used in planning and projects, but are not currently offered through CHAT portals.

4.4.4. Explore Use of CHATs to Inform a Programmatic Mitigation Plan

Using state and regional CHATs can inform and advance programmatic wildlife mitigation planning. One potential vehicle for doing so is the new federal transportation provision that allows states and metropolitan planning organizations to develop programmatic plans to address the potential environmental impacts of future transportation projects (23 USC § 169). Such plans may be developed on a regional, ecosystem, watershed, or statewide scale and may encompass multiple environmental resources within a defined geographic area or focus on a specific resource, such as aquatic resources, parkland, or wildlife habitat. By using CHATs to inform and potentially identify priority locations for mitigation within a programmatic plan, state DOTs may be able to invest today in a conservation-related advanced mitigation project, such as a wildlife crossing, in order to offset the effects of a future road project within the same ecosystem, watershed, or other relevant geographic area.

4.4.5. Secure Ongoing Funding Support

States may benefit by exploring innovative opportunities to develop ongoing funding support to update and improve the regional and state CHATs and to expand their use by the transportation and other infrastructure-dependent sectors. In addition to pursuing public-private partnerships and other similarly innovative private or non-governmental funding sources, states could explore securing funding from the current transportation law's two percent (2%) federal set-asides for State Planning and Research (SPR) from the following program apportionments:

- National Highway Performance Program;
- Surface Transportation Program;
- Highway Safety Improvement Program; and/or
- Surface Transportation Program.

States could alternately consider whether it is appropriate to earmark some portion of the 25% set-aside for Research, Development, and Technology Transfer from each state's total SPR funding to support updating, improving and increasing the dissemination and use of the regional and state CHATs.

4.4.6. Increase Use of CHATs in the Eco-Logical Framework

As discussed above, Eco-Logical sets forth a nine-step, non-prescriptive framework for integrating planning and collaboration across the public and private sectors. Inclusion of CHATs in Regional Ecosystem Frameworks may improve the ability of agencies and partners to identify ecologically significant locations, areas to be avoided by infrastructure projects, and potential

compensatory mitigation opportunities in concert with the delivery of transportation improvements and community benefits.²¹

4.4.7. Expand CHAT Outreach

Currently, outreach activities to increase awareness of the regional and state-specific CHATs have focused primarily on project-level personnel, typically state transportation agency personnel charged with deploying on-the-ground projects. Expanding outreach activities to raise awareness of CHATs among federal and tribal land managers and state and municipal transportation staff involved in long- or intermediate-range state-wide and regional planning and programming may foster earlier incorporation of wildlife values during these processes.

4.4.8. Align Safety and Wildlife Priority Areas

CHATs, along with addition spatial data from state DOWs, may be used to identify key wildlife habitat and corridors. Spatial data available from state DOTs may be used to identify road kill hotspots where human safety is a significant concern. Overlaying regional and/or state CHATs with these complementary spatial data may allow states to more easily identify those highway sections where state DOT and DOW priorities overlap. States will then be able to better assess which factors or values to include, and how to weight those factors/values, within a decision matrix analysis aimed at ranking or otherwise prioritizing the areas of overlap.

Similarly, states may also cooperate on a regional or west-wide scale to prioritize and mitigate areas that are a concern for both human safety and wildlife. Such large-scale, trans-boundary planning, free of artificial jurisdictional boundaries, may enhance wildlife connectivity and help maintain intact ecosystems.

4.4.9. Use Broader Wildlife Data to Improve Cost-Benefit Modeling

The cost-benefit model is a valuable decision support tool for transportation agencies and natural resource management agencies when deciding on the implementation of mitigation measures aimed at reducing wildlife–vehicle collisions (WVCs) and providing safe crossing opportunities for wildlife. Although economic evaluations should not be the sole parameter for deployment of wildlife mitigation measures, the output of such economic models is helpful to decision-makers. Many project engineers and transportation planners across the West have demonstrated via economic cost-benefit studies that reducing crashes with large animals on highways can often economically justify the added cost of construction and maintenance of wildlife crossings (*i.e.*, underpasses and fencing) and other counter measures.

The development and use of cost-benefit analyses that take into consideration broader economic values for wildlife than the current standard practice could help increase favorable decisions for wildlife mitigation. Currently, most transportation cost-benefit models associated with wildlife primarily use data on collisions with large mammals. These WVC records are comprised mostly of deer (*Odocoileus* spp.), since these species make up more than 90% of recorded collisions with large animals and other ungulates (*i.e.*, elk, moose) in the U.S. One current weakness to this

²¹ Chapter 6 identifies a variety of ways to increase use of CHATs within Eco-Logical.

approach is that the quality and completeness of crash and carcass data with large animals is often inconsistent, patchy, and usually underestimates the amount of WVCs occurring. The result is that the models underestimate the cost side of the equation.

More fundamentally, current cost-benefit analyses by transportation agencies are mostly based on the costs associated with vehicle repair and human safety, and not so much with the value of the wildlife. Examples of monetary value of animals currently not included in these cost-benefit analyses include general ecosystem services; economic benefits associated with viewing wildlife, regardless of size; not becoming endangered or threatened and avoiding the expenses associated with an Endangered Species Act listing process; the value to states for a hunting tag for trophy animals, or the fines associated with the illegal take of a trophy animal (restitution). For example, a single hunting tag for a trophy bighorn sheep may generate nearly one half million dollars.²² The restitution value per animal for trophy ungulates and grizzly bears varies from \$6,000 for elk, to \$15,000 for bighorn sheep to \$25,000 for grizzly bear in Wyoming.²³ Similar values are also available for birds.²⁴

Collecting and incorporating better WVC, carcass and crash data, and for more species, in concert with incorporating the conservation, hunting and restitution values of various species of interest or known valuations can greatly strengthen cost-benefit analyses. The inclusion of species described above could significantly lower the economic thresholds and make it financially attractive to implement mitigation measures for wildlife, large and small. These additional economic considerations will strengthen current cost-benefit analyses, many of which have already demonstrated that investments in wildlife crossings often make good economic sense and are a wise use of taxpayer dollars.

4.5. Summary of Best Practices

The term “best practice” is defined as an exemplary method, system, procedure or technique that has been demonstrated by research or practice to reliably lead to a desired result. Best practices are intended to provide helpful guidance to state and federal transportation professionals working for transportation and wildlife agencies.

During the project, stakeholders identified the following best practices:

- 1) Incorporate wildlife information before budgets are set;
- 2) Set joint transportation and wildlife priorities;
- 3) Employ a transportation-wildlife liaison;
- 4) Expand the role of wildlife biologists;
- 5) Use CHATs in mitigation planning;

²² Spokesman Review. Record \$480K bid for Montana bighorn tag. February 15, 2013. Spokane, WA, USA. Retrieved January 26, 2015, from: <http://www.spokesman.com/blogs/outdoors/2013/feb/15/record-480k-bid-montana-bighorn-tag/>

²³ Wyoming Game and Fish Department. 2013. Annual Report. Cheyenne, WY, USA. Retrieved January 26, 2015, from: https://wgfd.wyo.gov/web2011/Departments/WGFD/pdfs/WGFDANNUALREPORT_20130005237.pdf

²⁴ Shwiff, S.A., H.T. Smith, A.M. Bard, T.V. Harbor, G.W. & R.M. Engeman. 2003. An economic analysis of a simple structural method to reduce road-kills of royal terns at bridges. *Caribbean Journal of Science*, 39(2):250-253.

- 6) Invest in innovative technologies, research and monitoring;
- 7) Increase better use and understanding of CHAT websites; and
- 8) Use FHWA's Eco-Logical approach to improve cooperation.

Application of these best practices is illustrated using 11 case studies. They vary across temporal and spatial scales, the stakeholders involved, and the digital wildlife data used.

Potential future priorities to encourage increased use of CHAT information by the transportation sector include:

- 1) Update data regularly;
- 2) Develop finer scale CHAT data;
- 3) Improve integration of CHAT websites and other wildlife data sources;
- 4) Explore use of CHATs to inform a programmatic mitigation plan;
- 5) Secure ongoing funding support;
- 6) Increase use of CHATs in the Eco-Logical framework;
- 7) Expand CHAT outreach;
- 8) Align safety and wildlife priority areas; and
- 9) Use broader wildlife data to improve cost-benefit analyses.

5. OPPORTUNITIES REPORT

5.1. Introduction

5.1.1. Organization of the Opportunities Matrix Report

The goal of the opportunities matrix was to build on the results of the questionnaire and the best management practices to explore potential opportunities to take advantage of the new regional and state CHAT data. It also aimed to explore opportunities for use of other digital wildlife data, such as state natural heritage data or threatened and endangered species information.

In the course of developing the opportunities matrix, a related objective was to identify the limits of wildlife data and information in assisting transportation projects in terms of budget, scheduling, implementation and mitigation.

The opportunities matrix summarizes input from state DOT personnel, in communication with their state DOW, regarding which transportation processes offer the best opportunity for the transportation sector to use digital wildlife data. There are many different transportation plans, programs and projects in each of the 16 states. Some are identical, or nearly so, across multiple states, such as state long-range transportation plans required by the federal transportation act. Others are more specific to individual states. This project sought to identify common components of plans and programs where digital wildlife information could be used by the transportation sector.

This section provides an overview of the task of developing the opportunities matrix as well as identifying limitations on the use of CHAT and other wildlife data. Section 5.2 presents the process by which the opportunities matrix was developed. Section 5.3 describes the eight common transportation planning processes included in the matrix, including examples of each as they relate to the use of CHATs or other digital wildlife data, and reports on the matrix results. Section 5.4 summarizes opportunities for future use of regional CHAT, state CHAT, and other data sources. Section 5.5 discusses the limitations of the use of CHAT information for transportation plans, programs and projects by state agencies. Section 5.6 identifies additional state DOT needs in transportation planning, programs and project implementation that, if met, would help increase the use of CHAT information. Finally, Section 5.7 provides a summary of the contents of this chapter.

5.2. Identifying Opportunities to Use Wildlife Data in Transportation Processes

5.2.1. Introduction

There are many different types of transportation plans, programs or projects for which agencies have opportunities to use, review and/or incorporate digital wildlife information. Not all transportation processes need to evaluate impacts to wildlife, but many do use or have the potential to use wildlife data. CHAT information can be an ideal tool for first-cut and due

diligence reviews for transportation infrastructure projects and planning. One example of the wide variety of transportation plans a state regularly develops occurs in California, where Caltrans has identified over 19 local, regional, state or system plans or processes, as depicted in Figure 51 below. This Caltrans example illustrates how transportation planners have many opportunities to incorporate CHATs and other digital wildlife data into their transportation processes.

Statewide Planning & Programming Process

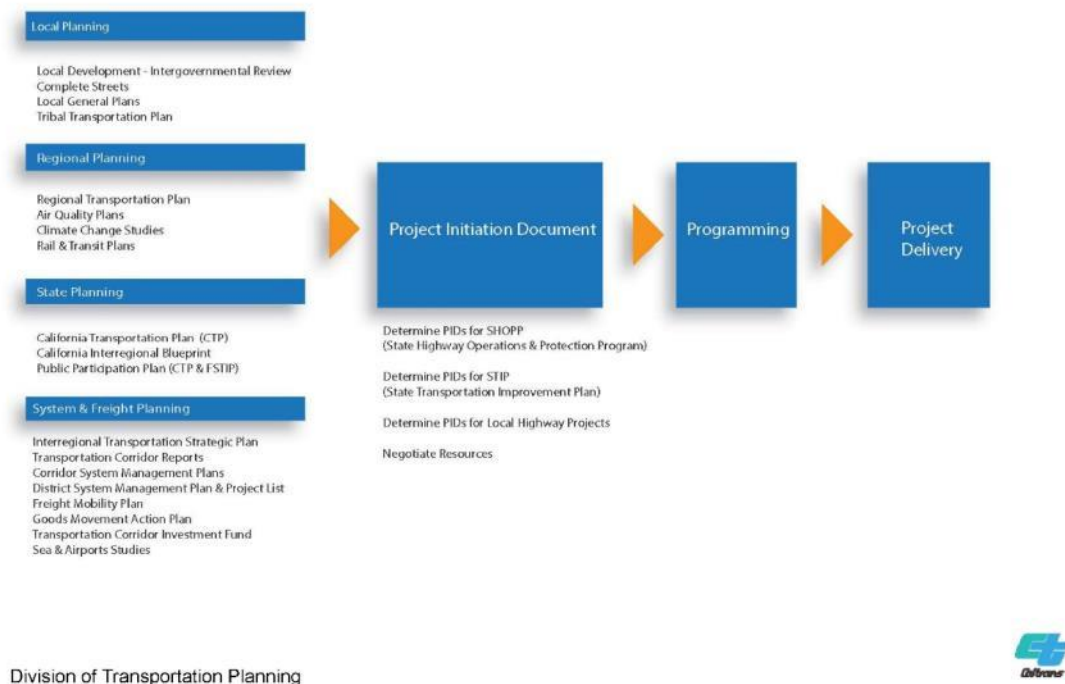


Figure 51: Example of California’s statewide planning and programming processes. Source: Caltrans.

The federal transportation act, MAP-21, also includes many provisions relevant to the increased use of CHAT information in transportation processes. They include, but are not limited to:

- Metropolitan Planning, Sections 1105, 1201
- State-wide Transportation Planning, Section 1202
- Federal Lands Transportation Program, Section 1119
- Accelerating Project Delivery, Sections 1305, 1310, and 1311

To increase integration of digital fish and wildlife information into transportation planning, a matrix was developed identifying such opportunities by state. Steps taken to create the matrix included:

1. Developing a list of transportation processes with the potential to use CHATs and other digital wildlife data.
2. Evaluating the current use of regional CHAT, state CHATs and other digital wildlife data by state DOTs for each of the transportation processes developed in Step 1.
3. Asking each state DOT, conferring with its state DOW, to identify the potential to use the regional CHAT, state CHAT or other digital wildlife data for each of the transportation processes developed in Step 1.
4. Collating and summarizing the information gathered in an opportunities matrix.

These steps are described in further detail in the following report sections.

5.2.2. Condensing Diverse Transportation Plans, Programs and Projects into Common Processes

Transportation processes and related terminology can vary by state, so this project sought to categorize transportation plans, programs or projects into broad categories so that each state DOT had a common platform for discussion and evaluation. The intent was to create types of transportation processes that (1) were more similar than different and (2) would potentially have comparable needs for the use of wildlife data.

To reconcile differences in transportation processes, transportation and wildlife professionals met on May 28-29, 2015, in Bend, Oregon, to develop common terminology for state transportation processes and shape the design of the opportunities matrix (Figure 52). The workshop was co-hosted by Oregon DOT and the Oregon Game and Fish Department, and 13 of the 16 participating states were represented at the workshop, including 11 state DOT representatives and seven state DOW representatives:

- State DOTs: Alaska, Arizona, California, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Washington and Wyoming
- State DOWs: Arizona, Idaho, Montana, New Mexico, Oregon, Utah and Washington

A key outcome of the workshop was a succinct list of eight general transportation processes that state DOTs could consider for opportunities to use CHAT information or other digital wildlife data. These eight processes are:

1. Strategic Plans or Policies
2. Long Range or System Plans
3. Short Range Plans
4. Programming, Funding, and Internal Project Scoping (Pre-STIP)
5. Project Design, Environmental Review and Public Scoping (Post-STIP)
6. Mitigation
7. Construction

8. Operations

These eight processes were used to create the matrix of opportunities below (Figure 52).

MATRIX OF OPPORTUNITIES	STATE:						
	TYPE OF DATA AVAILABLE IN STATE: Regional CHAT, State CHAT, Other Digital Wildlife Data						
	Regional		State		Other Digital Wildlife Data		
	YES or NO?		YES or NO?		YES or NO?		
TRANSPORTATION PROCESSES	Current Use: GREEN (ALWAYS) - G, YELLOW (SOMETIMES)-Y, RED (NEVER)-R						COMMENTS
	Potential Use: High - H, Medium - M, Low - L, No - N						
	Current	Potential	Current	Potential	Current	Potential	
Strategic Plans or Policies							
Long Range or System Plans							
Short Range Plans							
Programming, Funding, Internal Project Scoping (pre-STIP)							
Project Design, Environmental Review & Public Scoping (post-STIP)							
Mitigation							
Construction							
Operations							

Figure 52: The opportunities matrix filled out by each of the 16 western state DOTs in consultation with their state wildlife agency.

5.2.3. Completing the Opportunities Matrix

The purpose of the opportunities matrix was to determine whether different types of digital wildlife data *are currently* or *could potentially be* used during various transportation processes. The three types of digital wildlife data included in the matrix were regional CHAT, state CHAT or other digital wildlife data.

Each state DOT representative who attended the workshop was tasked with completing the matrix, which was also electronically mailed to those state DOT representatives who were not in attendance. Respondents were encouraged to discuss the matrix with others in their agency and with state wildlife agency personnel who were familiar with CHATs. All 16 state DOTs filled out the matrix, although there were some portions of the matrix that could not be answered by a state or were incomplete.

For each transportation process and each information type, state representatives were asked to indicate whether these sources of data were currently being used by their state DOT in its transportation processes. Respondents indicated whether the particular data type is always being used (green “A”), is sometimes being used (yellow “S”) or is never used (red “N”).

Representatives were then asked to perform the same evaluation for the potential to use the three wildlife information types to inform DOT transportation processes, indicating whether there is a high (“H”), medium (“M”), or low (“L”) potential for the information type’s use in the future or, alternatively, whether there is no (“No”) potential for its use in the future. For example, if a state does not currently have, and is not planning to develop, a state CHAT, it would indicate there is “No” future potential to use the state CHAT during any of the eight identified processes. Other self-explanatory terms were used by state DOTs as they filled out the matrix, even though the terms were not offered in the instructions that accompanied the matrix. Not applicable was used for one transportation process by one state in the current use portion of the matrix and low-medium was used in the potential use portion of the matrix by one state.

5.3. Opportunities Matrix Results

All 16 states provided information for the opportunities matrix, which has been broken out into three separate matrices pertaining to regional CHAT, state CHATs and other digital wildlife information (Figure 53, Figure 54, Figure 55). As shown below, although there were some clear consistencies in how states are using CHATs and other digital wildlife data within the eight transportation processes, there was also a wide variety of responses regarding current and potential uses. The three matrices are discussed in the following section.

DISCLAIMER: There is significant variability in the state responses that could potentially be explained by different assumptions and definitions. For example, Caltrans assumed that they would only use the Regional CHAT for multi-state projects, and would use their state CHAT, ACE-II, for intrastate projects. (See Appendix A of the stand-alone final opportunities matrix report for all comments and additional examples.) Furthermore, CHAT usage was defined for purposes of this matrix as use of the designated online portals for the regional and state CHATs and included in the instructions for filling out the matrix. In some cases, the same information could have been accessed via other means. In these cases, even though a data layer may have been available via a CHAT web portal, for purposes of the matrix, access via a non-CHAT portal constitutes use of “other digital wildlife data,” rather than use of CHATs.

	Regional CHAT															
	Current Use															
TRANSPORTATION PROCESSES	AK	AZ	CA ¹	CO	ID	KS	MT	NE	NV	NM	OK	OR	SD	UT	WA	WY
Strategic Plans or Policies	N	N	N	N	N	N	N/A	N	N	N	N	N	N	A	N	
Long Range or System Plans	N	N	N	N	N	N	N	N	N	N	N	N	N	A	N	N
Short Range Plans	N	N	N	S	N	N	S	N	N	N	N	N	N	A	N	N
Programming, Funding, Internal Project Scoping (pre-STIP)	N	N	N	S	N	N	N	N	N	N	S	N	N	A	N	N
Project Design, Environmental Review & Public Scoping (post-STIP)	N	N	N	S	N	N	S	N	N	N	A	N	N	S	N	N
Mitigation	N	N	N	S	N	N	N	N	N	N	A	N	N	S	N	N
Construction	N	N	N	N	N	N	N	N	N	N	A	N	N	S	N	N
Operations	N	N	N	N	N	N	N	N	N	N	N	N	N	S	N	N
	Potential Use															
Strategic Plans or Policies	No	H	No	M	No	L	M	L	M	No	No	No*	L	H	L	
Long Range or System Plans	No	H	M	M	No	M	No	L	M	No	L	No*	L	H	No	M*
Short Range Plans	No	M	L	H	No	M	L-M	No	M	No	L	No*	L	H	No	M*
Programming, Funding, Internal Project Scoping (pre-STIP)	No	M	M	H	No	M	No	No	M	No	M	M*	L	H	No	M*
Project Design, Environmental Review & Public Scoping (post-STIP)	No	M	L	H	No	L	L	No	L	M	H	No*	M	H	No	No*
Mitigation	No	M	L	H	No	L	L	No	L	M	H	No*	M	H	No	M*
Construction	No	No	L	L	No	L	No	No	No	M	M	No*	L	M	No	No*
Operations	No	No	L	L	No	L	No	No	L	No	M	No*	L	M	No	No*

¹California indicated low to moderate use potential only for projects that cross state boundaries. If a project is completely intrastate, CA would use ACE (state CHAT).

Current Use		Potential Use			
N	Never	No	No	N	= No*
S	Sometimes	L	Low	S	= M*
A	Always	L-M	Low-Medium	A	= H*
N/A	Not applicable	M	Medium		
	No response provided	H	High		
			No response provided		

*For Potential Use, some states responded with colors from Current Use instead of the L/M/H/No categories. The above is our interpretation of their responses.

Figure 53: Matrix of current and potential use of the regional CHAT information for eight different state transportation processes in 16 western states.

	State CHAT															
	Current Use															
TRANSPORTATION PROCESSES	AK	AZ	CA	CO ²	ID ¹	KS	MT	NE ¹	NV	NM	OK ¹	OR	SD ¹	UT ²	WA	WY
Strategic Plans or Policies	N	S	N	S	N	N	N/A	N	N	N	N	N	N	A	N	
Long Range or System Plans	N	S	N	N	N	N	N	N	N	N	N	N	N	A	N	S
Short Range Plans	N	S	N	S	N	N	S	N	N	N	N	N	N	A	N	S
Programming, Funding, Internal Project Scoping (pre-STIP)	N	S	N	A	N	S	S	N	N	N	N	N	N	A	N	S
Project Design, Environmental Review & Public Scoping (post-STIP)	N	S	N	A	N	A	S	N	N	N	N	N	N	S	N	A
Mitigation	N	S	N	S	N	S	N	N	N	N	N	N	N	S	N	S
Construction	N	N	N	N	N	S	N	N	N	N	N	N	N	S	N	S
Operations	N	N	N	S	N	S	N	N	N	N	N	N	N	S	N	S
	Potential Use															
Strategic Plans or Policies	No	H	No	H	H	L	M	L	M	M*	No	M*	L	H	L	
Long Range or System Plans	No	H	H	M	H	M	L	L	M	M*	L	M*	L	H	No	M*
Short Range Plans	H	M	L	H	H	M	L-M	L	M	M*	L	M*	L	H	No	M*
Programming, Funding, Internal Project Scoping (pre-STIP)	Unk	H	M	H	H	H	L	L	M	M*	M	M*	L	H	No	M*
Project Design, Environmental Review & Public Scoping (post-STIP)	L	H	L	H	H	H	L-M	L	L	M*	H	M*	M	H	No	H*
Mitigation	L	H	L	H	H	H	L-M	No	L	M*	M	M*	M	H	No	M*
Construction	No	No	L	M	L	H	No	No	No	M*	H	No*	L	M	No	M*
Operations	Unk	No	L	M	L	H	No	No	L	M*	M	M*	L	H	No	M*

¹State does not have a public web portal for state CHAT information.

²State does not have a public web portal for state CHAT information; DOT may access state CHAT information via other means.

Current Use		Potential Use			
N	Never	No	No	N	= No*
S	Sometimes	L	Low	S	= M*
A	Always	L-M	Low-Medium	A	= H*
N/A	Not applicable	M	Medium	*For Potential Use, some states responded with colors from Current Use instead of the L/M/H/No categories. The above is our interpretation of their responses.	
	No response provided	H	High		
		Unk	Unknown		
			No response provided		

Figure 54: Matrix of current and potential use of the state CHAT information for eight different state transportation processes in 16 western states.

	Other Digital Wildlife Data															
	Current Use															
	AK	AZ	CA	CO	ID	KS	MT	NE	NV	NM	OK	OR	SD	UT	WA	WY
TRANSPORTATION PROCESSES																
Strategic Plans or Policies	N	A	N	S	N	N	N/A	A	S	A	N	N	S	A	A	
Long Range or System Plans	N	A	S	S	N	N	N	A	S	A	N	N	S	A	A	N
Short Range Plans	S	A	N	S	N	N	A	A	S	A	N	N	S	A	A	N
Programming, Funding, Internal Project Scoping (pre-STIP)	Unk	A	A	S	S	S	S	A	S	A	S	S	S	A	A	N
Project Design, Environmental Review & Public Scoping (post-STIP)	A	A	A	A	S	A	A	A	A	A	S	A	A	S	A	S
Mitigation	A	A	S	S	S	A	S	A	A	A	S	A	A	S	A	S
Construction	S	A	N	N	N	S	N	A	N	A	S	N	S	S	A	S
Operations	Unk	A	N	S	N	S	A	A	S	A	N	A	S	S	A	S
	Potential Use															
Strategic Plans or Policies	No	H	No	H	H	L	M	H	H		No	No*	M	H	H	
Long Range or System Plans	No	H	M	M	H	M	M	H	M		No	M*	M	H	H	No*
Short Range Plans	H	H	M	H	H	M	H	H	M		No	M*	M	H	H	No*
Programming, Funding, Internal Project Scoping (pre-STIP)	Unk	H	H	H	H	H	L-M	H	H		M	H*	M	H	H	No*
Project Design, Environmental Review & Public Scoping (post-STIP)	H	H	H	H	H	H	H	H	H		H	H*	H	M	H	M*
Mitigation	H	H	M	H	H	H	H	M	H		M	H*	H	M	H	M*
Construction	L	H	No	M	L	H	No	H	No		M	No*	M	M	H	M*
Operations	Unk	H	L	M	L	H	H	H	L		L	H*	M	M	H	M*

Current Use

N	Never
S	Sometimes
A	Always
N/A	Not applicable
Unk	Unknown
	No response provided

Potential Use

No	No
L	Low
L-M	Low-Medium
M	Medium
H	High
Unk	Unknown
	No response provided

*For Potential Use, some states responded with colors from Current Use instead of the L/M/H/No categories. Below is our interpretation of their responses.

N	=	No*
S	=	M*
A	=	H*

Figure 55: Matrix of current and potential use of other digital wildlife information for eight different state transportation processes in 16 western states.

5.3.1. Opportunities for the Use of CHAT Information and Other Wildlife Data

5.3.1.1. Strategic Plans or Policies

Following is an overview of the eight transportation processes that are listed in the opportunities matrices. Each explanation includes examples of plans or programs typical of these eight common processes.

Overview

Strategic plans and state policies may seek to guide transportation agencies to consider and incorporate the needs of wildlife into their planning and projects. Different western states have done this through legislative processes or via executive action. The results typically have

directed state DOTs to more fully evaluate the effects of their transportation systems on wildlife and habitat connectivity. The following are three examples of specific state actions:

1. WSDOT issued a habitat connectivity directive that mandates consideration of habitat values and wildlife movement needs in all transportation activities. This was given via Executive Order (EO) 1031, *Protections and Connections for High Quality Natural Habitat*. It is intended to be used as guidance for identifying highway segments where wildlife movements are important to consider in transportation planning, project development and operation of the transportation system. <http://www.wsdot.wa.gov/publications/manuals/fulltext/M31-11/appendixa.pdf>
2. The New Mexico House of Representatives passed House Joint Memorial 21 in the 46th Legislature. It requested that the New Mexico Congressional delegation seek federal appropriation for feasibility studies that identified priority crossings to reduce wildlife-vehicle collisions on state roads. <http://wildfriends.unm.edu/Legislation/04HJM21.htm>
3. Colorado passed the Wildlife Crossing Zones Traffic Safety Act in 2010. The legislation directed the Colorado DOT (CDOT) and DOW to work together to identify up to 100 miles of state highways where signs and reduced speeds could be implemented to protect motorists and wildlife. [http://www.leg.state.co.us/clics/clics2010a/csl.nsf/fsbillcont2/AA1F8597156DB47E872576A80027B757/\\$FILE/1238_enr.pdf](http://www.leg.state.co.us/clics/clics2010a/csl.nsf/fsbillcont2/AA1F8597156DB47E872576A80027B757/$FILE/1238_enr.pdf)

All three of these examples of state activities that offered strategic direction require that high quality wildlife information be made available to transportation agencies. However, these examples predate the development of CHATs. Today, similar plans or policies mandating identification of sites where wildlife values intersect state highways could be more readily met via state and regional CHAT websites.

Another avenue for integrating wildlife considerations at a statewide policy level is through department-wide goals for sustainability or environmental stewardship. Many states may have current or proposed statewide policies on environmental stewardship and sustainability that encourage the consideration of habitat connectivity and other environmental objectives during transportation decisions.

Opportunities Matrix Results

Regional CHAT: Regional CHAT data were rarely used for strategic plans or policies. Only one state agency indicated they used regional CHAT for such planning (Figure 53). Nearly two-thirds of the states believed there was little or no potential for using regional CHAT data to create strategic plans or policies, while the others believed there was moderate or high potential for using regional CHAT data for such plans.

State CHAT: Few states used their state CHAT data for strategic plans or policies. Only three of state agencies responding indicated they regularly used state CHAT data for this activity (Figure 54). However, roughly half the states believed there was moderate to high potential for using state CHAT data for developing state strategic plans or policies.

Other digital wildlife data: There was a near equal response by state agencies using and those not using other digital wildlife data for strategic plans or policies (Figure 55). The majority of

state respondents believed that other digital wildlife data had a moderate to high potential for assisting in developing strategic plans or policies.

5.3.1.2. Long-range or System Plans

Overview

Each state DOT is required by federal law to develop a long-range (*i.e.*, 20+ years) transportation plan. The actions in the plan are general as opposed to project-specific or region-specific. Plans often define pragmatic investment choices for the DOT and often include goals and performance measures for natural (*e.g.*, wildlife) and environmental (*e.g.*, clean water) resources.

Other types of plans that are long-term or have decadal time horizons are system plans, multi-state or intrastate highway corridor plans, or highway planning studies that are developed for specific routes. Often, portions of these plans and studies are dedicated to issues surrounding wildlife, fisheries and safety, which often can include issues related to wildlife-vehicle collisions. The following are examples of long-range or system plans:

1. In 2012, the Nevada Department of Transportation initiated the I-80 Corridor System Master Plan with four state DOTs (California, Nevada, Utah and Wyoming) to explore I-80 in an ecosystem context while considering enhanced infrastructure to improve the safety of motorists and wildlife. Other digital wildlife data were used in this process and included: species distributions and seasonal ranges, current and historical corridors, habitat maps and waterways. http://www.nevadadot.com/uploadedFiles/NDOT/About_NDOT/NDOT_Divisions/Planning/MultiModal/I80_2014_Appendix_18.pdf
2. Many states conduct studies of highway segments to assess the current condition and evaluate potential needs and future improvement options. For example the Montana DOT's Paradise Valley Corridor Planning Study evaluated over 50 miles of road for over a 20-year time horizon. <http://www.mdt.mt.gov/pubinvolve/paradisevalley/>

Opportunities Matrix Results

Regional CHAT: As with strategic plans or policies, regional CHAT data were rarely used for long-range or systems transportation plans (Figure 53). Only one state agency indicated they ever used regional CHAT for long-range or systems plans. More than half the states believed there was little or no potential for using regional CHAT data to create long-range and systems plans.

State CHAT: State CHAT data were rarely used by state agencies for long-range or systems transportation plans. All but three state agencies indicated they never used state CHAT for long-range planning (Figure 54). However, well over half the states believed there was moderate to high potential for using state CHAT data to create long-range plans.

Other digital wildlife data: There was a mixed response regarding agency use of other digital wildlife data for long-range or systems planning; many states sometimes or never used this type of data (Figure 55). In contrast, a large majority of states believed that digital wildlife data has a moderate or high potential for assisting in long-range or systems plans.

5.3.1.3. Short-range Plans

Overview

State DOTs develop short-range transportation plans and programs that span 2- to 10-year horizons. Unlike long-range plans, the actions in these plans are more targeted in time and space and often are tied to budget approval cycles as fiscally unconstrained or constrained actions. Plans can define strategic investment choices for the DOT and often include project-specific or region-specific goals and performance measures for improving motorist safety, reducing wildlife-vehicle collisions and ensuring terrestrial and aquatic connectivity. Some projects may require programmatic environmental impact statements (PEIS) to provide public input on proposed transportation projects. Below are two examples of a state short-range plan and a study process that support use of wildlife data during transportation planning and projects.

1. Colorado DOT prepared an Environmental Impact Statement (EIS) to evaluate alternatives for improving the transportation corridor between Denver and Glenwood Springs along Interstate Highway 70 (<https://www.codot.gov/projects/i-70mountaincorridor/final-peis>). The EIS states that the effects on biological resources were evaluated by overlaying the project footprint of each alternative on a GIS containing the locations of specific resources, such as vegetation, wildlife habitat and fisheries. Data quantifying biological resources were acquired generally through federal, state and local agency coordination.
2. Planning and Environmental Linkages (PEL) is a study process approach that is typically used to identify transportation issues, along with environmental concerns, in a corridor or a specific location. It is generally conducted before any project construction phasing is identified and before specific problems and solutions are known. PEL studies typically link planning to environmental issues and result in useful information that can be carried forward into the NEPA process.

Opportunities Matrix Results

Regional CHAT: Regional CHAT data were rarely used for short-range transportation plans (Figure 53). Only three state agencies indicated they used regional CHAT for short range planning. Nearly two-thirds of the states believed there was little or no potential for using regional CHAT data to create short-range plans, while the others believed there was moderate or high potential for using regional CHAT data for creating short-range plans.

State CHAT: State CHAT data were more widely used for short-range transportation plans than strategic or long-range planning (Figure 54). Roughly a third of state agencies indicated they regularly used state CHAT for short-range planning. Further, well over half the states believed there was moderate to high potential for using state CHAT data to create short-range plans.

Other digital wildlife data: The majority of states currently use other digital wildlife data for short-range transportation planning, although six states indicated it is never used (Figure 55). Similar to long-range or systems plans, the majority of state respondents believed that digital wildlife data had a moderate to high potential for assisting in developing short-range transportation plans.

5.3.1.4. Programming, Funding, Internal Project Scoping (pre-STIP)

Overview

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 and internal project scoping. The STIP is ideally suited to conduct a systems- or landscape-level analysis of transportation-wildlife conflicts and identify and prioritize mitigation opportunities at a statewide scale. Once projects are approved and funded through the STIP process, the project's purpose, need and objectives are further developed and refined during project review; data are collected from the project area or highway corridor to design alternatives, assess their impacts and communicate with the public. However, to date, fish and wildlife concerns rarely have been included in a formal STIP planning process.

Opportunities Matrix Results

Regional CHAT: Regional CHAT data were rarely used for pre-STIP planning (Figure 53). Three state agencies indicated they used regional CHAT for pre-STIP planning; however, the large majority never used regional CHAT data. The potential use of regional CHAT for pre-STIP planning was high. Roughly two-thirds of the respondents indicated that there was moderate to high potential use, while a third indicated there was little if any potential for using regional CHAT data in pre-STIP planning.

State CHAT: Currently, state CHAT data are occasionally used for pre-STIP planning of transportation investments and projects (Figure 54). More than two-thirds of the respondents believed there was moderate or high potential for pre-STIP planning, including a third of the respondents indicating high potential.

Other digital wildlife data: All but one state regularly used other digital wildlife data for pre-STIP activities (Figure 55). Wyoming was the only state that indicated it never uses digital wildlife data for transportation activities occurring pre-STIP. Similarly, there was overwhelming support by all but one state regarding the potential use of digital wildlife data for pre-STIP activities.

5.3.1.5. Project Design, Environmental Review and Public Scoping (post-STIP)

Overview

Once projects are approved and funded through the STIP process, the project's purpose and needs are identified; data are collected from the project area or highway corridor to design alternatives, assess their impacts and communicate with the public. States may want to offer finer scale CHAT data than what is currently available through the regional CHAT to meet state-specific priorities and project-specific planning needs.

Opportunities Matrix Results

Regional CHAT: Regional CHAT data were rarely used for post-STIP planning (Figure 53). Four state agencies indicated they used regional CHAT for post-STIP planning; however, the large majority of state agencies indicated they never used regional CHAT data. The majority of respondents felt there was little if any potential use of regional CHAT for post-STIP planning.

Only a third of the respondents indicated that there was moderate to high potential for using regional CHAT data in post-STIP planning exercises.

State CHAT: State CHAT data are regularly used by state agencies for post-STIP planning and assessments, with three states indicating they were always used for these purposes (Figure 54). Similar to pre-STIP work, a majority of states believed there was great potential for state CHAT data to be used for post-STIP work, with nearly half the states indicating there was high potential.

Other digital wildlife data: All 16 states indicated they used other digital wildlife data for post-STIP activities (Figure 55). Similarly, there was unanimous support by 15 of the agencies (with one not reporting) regarding the potential use of digital wildlife data for post-STIP activities.

5.3.1.6. Mitigation Planning

Overview

State and regional CHATs can inform and advance programmatic wildlife mitigation planning. Such plans may be developed on a regional, ecosystem, watershed or statewide scale and may encompass multiple environmental resources within a defined geographic area or focus on a specific resource, such as aquatic resources, parkland or wildlife habitat. By using CHATs to inform and potentially identify priority locations for mitigation within a programmatic plan, state DOTs may be able to invest in a conservation-related advanced mitigation project, such as a wildlife crossing, to offset the effects of a future road project or several projects within the same ecosystem, watershed or other relevant geographic area. Some examples are shown below:

1. A coalition of state, federal and local partners developed a plan for both sides of Highway 89 in southern Utah by using regional and state-specific CHAT habitat data along with collision site and GPS collar data. With access to all of these data, managers installed three new wildlife underpasses with fencing to funnel wildlife to seven crossing structures. For more information, visit: <http://westgov.org/wildlife-corridors-and-crucial-habitat>
2. The Wildlife Corridor and Highway Safety project focused on reducing wildlife-vehicle collisions and providing safe passage for animals using one of the largest wildlife migratory corridors in the lower 48 states. The WYDOT project constructed six highway underpasses and two overpasses connected with fencing to direct species, such as pronghorn and mule deer, to the structures. In 2011, it received the FHWA's Exemplary Ecosystem Initiatives award.

Opportunities Matrix Results

Regional CHAT: Similar to the previous plans presented above, regional CHAT data were rarely used for mitigation planning (Figure 53). Only three state agencies indicated they used regional CHAT for planning mitigation. With regard to the potential use of regional CHAT data for mitigation planning, a large majority of state agency respondents believed it had little if any potential use.

State CHAT: The majority of states do not currently use state CHAT data for mitigation planning, as only a third indicated they occasionally used it for this purpose (Figure 54).

However, the majority of states indicated there was moderately high potential for using state CHAT to assist with planning and implementation of mitigation measures.

Other digital wildlife data: All 16 states indicated they used other digital wildlife data for mitigation planning activities (Figure 55). Similarly, there was unanimous support by 15 of the agencies (one not reporting) regarding the potential use of digital wildlife data for planning and implementation of mitigation measures.

5.3.1.7. Construction

Overview

Construction is the implementation phase of transportation projects where roadways are built or improvements made to existing roadways to increase safety and accommodate traffic levels. At this level of planning and implementation state CHAT data or other digital data may be used less because they are typically consulted in the earlier planning and design process. State CHAT or digital data may only be of value to the construction phase should minor changes or adjustments be made to the project design.

Opportunities Matrix Results

Regional CHAT: State respondents rarely used regional CHAT data for the construction phase of transportation projects (Figure 53). Only two states indicated they used regional CHAT data in the construction phase. The potential use of regional CHAT for construction had little support as the large majority of states felt there was little or no potential use. Only two states indicated there was moderate potential for using regional CHAT data in the construction phase of transportation projects.

State CHAT: The survey results showed that state respondents rarely used state CHAT data for the construction phase of transportation projects (Figure 54). Only three states indicated they used state CHAT data in the construction phase. The potential use of state CHAT for construction was low as the large majority of states felt there was little or no potential use. There were only two agencies that indicated there was high potential for state CHAT in assisting the construction phase of transportation projects. Two of the comments that accompanied the states' responses were that, during the construction phase, issues were resolved in the field rather than relying on data.

Other digital wildlife data: The majority of states currently use other digital wildlife data for activities related to construction, although a total of 12 states indicated it is only sometimes or never used for construction (Figure 55). A majority of state respondents believed that digital wildlife data have a moderate to high potential for assisting with construction-related activities of transportation projects.

5.3.1.8. Operations

Overview

Operations is the final phase of the transportation development process that may have started many years or decades prior with long-range planning. Operations consists of ensuring that a given highway corridor or road segment is ensuring the safe and efficient movement of goods,

services and people. Operations may include not only the maintenance of assets but the monitoring of performance and investments.

Opportunities Matrix Results

Regional CHAT: State respondents rarely used regional CHAT data for the operations phase of transportation projects (Figure 53). Only one state indicated they used regional CHAT data for this transportation process. The potential use of regional CHAT for operation had little support as the large majority of states felt there was little or no potential use. Only two states indicated there was moderate potential for using regional CHAT data in the operation phase of transportation projects.

State CHAT: The survey results showed that state respondents rarely used state CHAT data for the operations phase of transportation projects (Figure 54). Only four states indicated they used state CHAT data for this activity. The potential use of state CHAT for operations was mixed. Roughly half indicated there was moderate to high potential while the other half indicated there was little or no potential at all. Only two agencies believed there was high potential for state CHAT in assisting operations work. Two comments that were included in responses pointed out that state CHAT data was not at a scale that was fine enough for use (see Appendix A of the stand-alone final opportunities matrix report).

Other digital wildlife data: The majority of states responding regularly used other digital wildlife data for operational activities (Figure 55). There was overwhelming support by all agencies for the potential use of digital wildlife data in operations. All states agreed on the value of digital wildlife data for activities related to operations with responses ranging from high to low potential.

5.4. Summary of Opportunities

5.4.1. Regional CHAT Opportunities

Currently, regional CHAT data are rarely used by state agencies (Figure 56). Eleven of the 16 states indicated they have never used regional CHAT data for any of the eight transportation processes. Regional CHAT data were least used for strategic planning or policy work and in long-range planning. The latter might be explained by the challenges in coordinating long-range plans across multiple jurisdictions. The few agencies that used regional CHAT data, did so for short-range planning and pre- and post-STIP activities.

The potential use of regional CHAT data for transportation was viewed quite differently (Figure 57). The majority of states believed the greatest use of regional CHAT data would be for pre-STIP planning activities. There was mixed response by the states regarding the potential for use in most other transportation processes, except there was nearly unanimous agreement that regional CHAT data would be of little to no value for construction and operations activities. Alaska presumably did not see any value in regional CHAT data for transportation because they have no neighboring states.

Regional CHAT data have the greatest potential for short-range plans, pre- and post-STIP activities, mitigation and, to a lesser extent, long-range planning. Planning for multi-state highway or rail corridors could benefit from using regional CHAT data, because it represents a more uniform data set across multiple states. When planning for large transportation corridors,

the regional CHAT could be used for various alignments and/or alternative layouts as an early, due diligence review of critical resources.

5.4.2. State CHAT Opportunities

State CHAT data are not currently used by many state agencies with CHATs (Figure 56). However, the responses indicated that there was slightly more use of state CHAT data than regional CHAT data for the eight transportation processes. It is currently used mostly for pre- and post-STIP activities and least used for long-range planning, operations, construction and strategic planning or policy.

Overall, there were mixed responses regarding the potential use of state CHAT data for the eight transportation processes (Figure 57). The greatest potential was for use in pre- and post-STIP activities and mitigation planning.

State CHAT is a useful data set during early, system planning needs assessments as a high-level natural resource data layer for conducting constraints analyses. During project-level review, additional, finer scaled wildlife and project-level data may be more appropriate to use to assess project impacts on natural resources.

5.4.3. Other Digital Wildlife Data

Currently, other digital wildlife data are widely used by state agencies in the eight transportation processes (Figure 56). Digital wildlife databases at state natural heritage programs, threatened and endangered species information from the USFWS, or a state DOT's own wildlife-vehicle collision data are frequently accessed for plans and projects. Few states reported not using digital wildlife data for any of the processes. It was rarely used in short-range planning and construction activities, while it was most commonly used in pre- and post-STIP activities and planning mitigation measures for wildlife.

There was a mixed response regarding the potential use of other digital wildlife data for the eight transportation processes (Figure 57); however, there was more widespread considerations for its potential use compared to its current use. The greatest potential use of other digital wildlife data is for pre- and post-STIP activities, short-range transportation plans and mitigation planning.

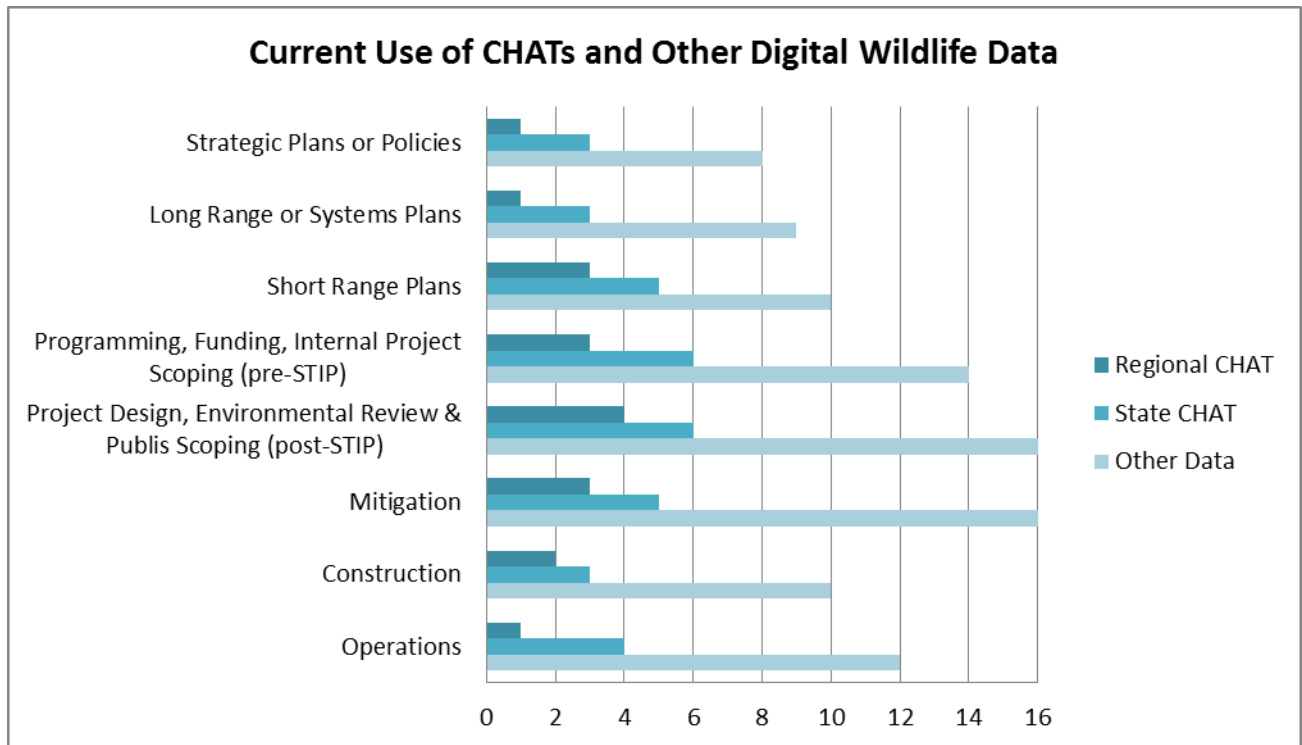


Figure 56: Summary of 16 state DOT responses regarding their current use of regional and state CHAT information and other digital wildlife data during the eight transportation processes, where an affirmative response (*i.e.*, low, medium or high) is tabulated as a “one” and a negative response (*i.e.*, no, n/a or no answer) is tabulated as a “zero.”

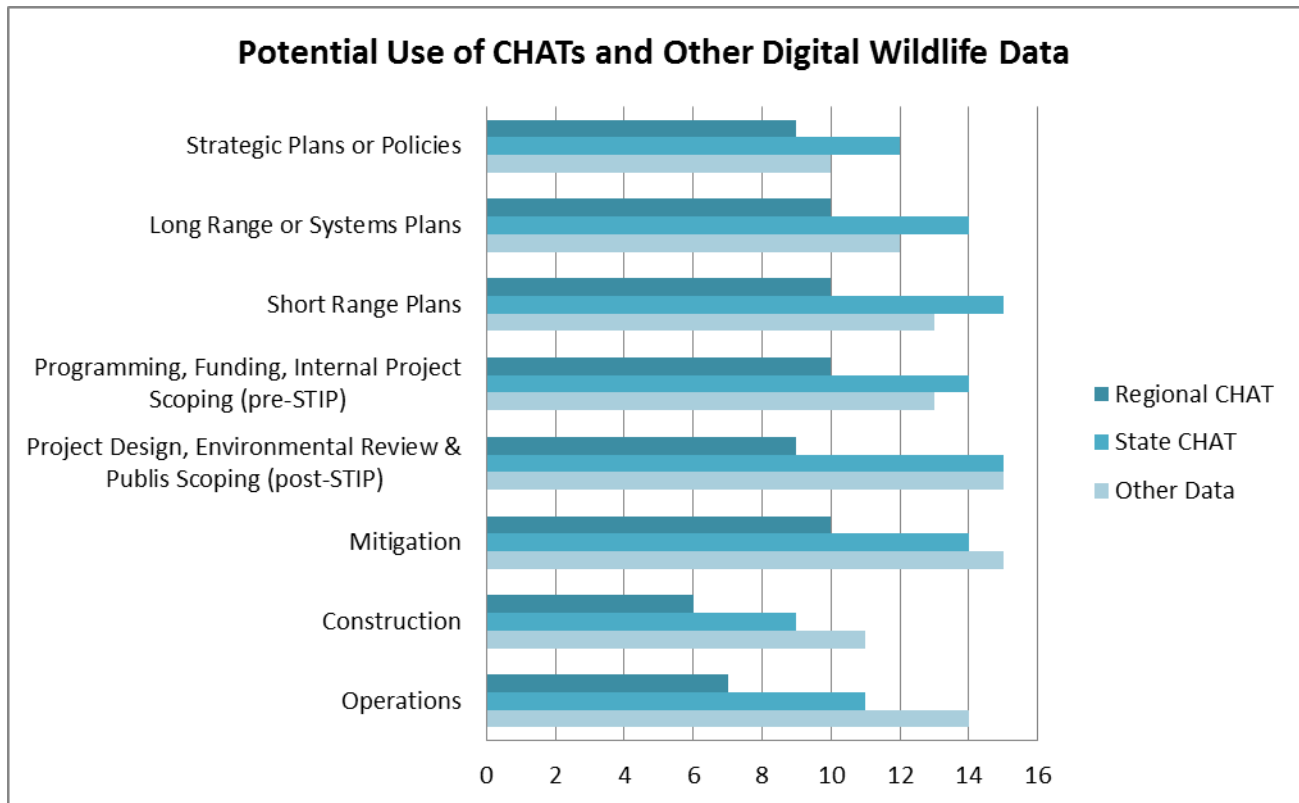


Figure 57: Summary of 16 state DOT responses regarding their potential to use regional and state CHAT information and other digital wildlife data during the eight transportation processes in the future, where an affirmative response (*i.e.*, low, medium or high) is tabulated as a “one” and a negative response (*i.e.*, no, n/a or no answer) is tabulated as a “zero.”

5.5. Limits to the Use of CHAT Information in Transportation Processes

CHATs can be a useful tool for transportation planning, but there are challenges that may limit their use. In this project’s two-part questionnaire, respondents indicated that there should be further exploration by those responsible for the regional and/or state CHATs to better understand how they can meet various agencies’ informational needs. One such need was for finer scale data and layers of synthesized data. Based on the results of the questionnaire, it was recommended that the top future improvement for the regional and state CHATs would be to offer finer scale data or provide links to where finer scale data can be obtained.

In the best management practices report for this project (see Chapter 4), three of the priorities for implementation and moving forward were related to CHAT limitations. The first, similar to the questionnaire results, was to incorporate finer scale data into the state CHATs. The second was to update the CHAT information on a regular basis. Third, improving the integration of CHAT websites with other digital wildlife data and between state and regional CHATs was deemed important.

At the second project workshop, attendees representing the various western state DOTs and/or DOWs stated that a potential improvement to the CHATs would be for the fish and wildlife

values available from the CHAT websites to be more self-explanatory. Attendees thought this would be an improvement for transportation sector users, so they would not have to contact wildlife experts to interpret the data presented by the CHAT.

One promising result from the Questionnaire – Part 1, Question 25 was that more than half of the state transportation agency respondents felt their needs for fish and wildlife data are being or could be met by a combination of the regional and state CHATs.

5.6. Additional Needs

At the second workshop, an hour was allocated to identify needs in transportation planning, programs and project implementation that would help increase the use of CHAT information. Representatives from 12 of the 16 western states, FHWA and WAFWA were present for the discussion. Five key areas of need were described by the group:

1. Overcoming institutional/cultural barriers within DOTs. It was agreed that DOWs and DOTs address wildlife issues from a different perspective. It was suggested that what is needed is a cultural shift by DOTs to more fully value ecological resources as a key element in their plans and projects. Currently, this seems uncommon, unless required by statute (*i.e.*, Endangered Species Act, Clean Water Act). A cultural shift might be needed to have more openness for DOTs to incorporate wildlife information into transportation processes. One suggestion for making wildlife considerations more of a priority was to incorporate it with other standing DOT priorities like safety (*e.g.*, wildlife-vehicle collision “hot spots”). It was also suggested that if DOWs could convey the cost savings of early engagement to DOTs, that might encourage earlier consultation with DOWs, and help in overcoming institutional and cultural barriers to the consideration of wildlife during transportation planning. Lastly, it was suggested that trainings for transportation planners and program personnel in regards to wildlife needs and information available via CHATs would be worthwhile.

2. Increasing state DOTs ownership of wildlife values. The group explored different ways that wildlife values could be elevated within a DOT’s planning and project processes so that they would receive more attention and potential mitigation efforts. To do so, it was suggested that some DOTs may need to receive more direction from their high level administrators, such that the agency’s leadership encourages planners and project managers to focus more of their efforts on wildlife needs. Attendees also recommended celebrating wildlife mitigation successes to drive more of the same efforts for transportation projects or plans to consider wildlife. Another recommendation was to elevate sustainability as an overall goal for projects, so that projects that protect wildlife and connectivity may rate higher than those that give these issues little attention.

3. Increasing communication/alignment between agencies. A discussion on this topic included an important dialogue acknowledging that the missions of transportation and wildlife agencies are fundamentally different. This appeared to be one difference that could explain some of the institutional and cultural barriers. Therefore, employees and managers of the two types of agencies often approach wildlife issues from a different perspective. While conservation of species is central to the function of the wildlife agencies, supporting state conservation goals through project mitigation should be a high priority for transportation planners and decision-makers. More exploration of achieving common ground is needed to overcome the institutional

barriers between DOTs and DOWs so that the needs of wildlife may be better assimilated in transportation plans, programs and projects.

4. Joint priority setting. DOT attendees of the workshop encouraged DOWs to communicate more clearly and more often to the transportation agencies about the location of wildlife priorities. It was advised that a wildlife priorities map may be useful and that CHATs could potentially be the source of the information for the identification of state wildlife priority areas. It was suggested that state wildlife agencies reach out to local partners like MPOs and counties to help them incorporate wildlife priorities into their road planning and projects. Similarly, conversations should also be conducted with the FHWA Office of Federal Lands Highways. Another opportunity for DOWs to engage the transportation sector and set common goals is during the revision process for their State Wildlife Action Plans

5. Funding for wildlife mitigation. The group had a short discussion about how states are currently paying for wildlife mitigation projects. Almost everywhere in the West, wildlife mitigation competes for limited transportation dollars. Also, it was noted that there is a socio-economic dilemma in that a single pedestrian fatality may be viewed as a higher safety priority than thousands of wildlife-vehicle collisions; as a result, the economic argument for wildlife mitigation can often be a difficult battle. One suggested solution is for transportation agencies to seek partners to help pay for wildlife mitigation such as non-profit organizations, wildlife groups and/or other agencies. An example of partnering in Nevada was given, where the DOW has contributed financially for research and implementation of the state DOT's wildlife mitigation projects. For one such project on U.S. 93, the Nevada DOW paid for fencing accompanying the wildlife crossing structures. It was noted such contributions also help the wildlife agency get a seat at the table in highway project planning and that, due to the partnership of the two agencies, the projects were completed.

5.7. Summary

This task to explore opportunities for future CHAT use is built on the results of the questionnaire and the best management practices. It seeks to explore potential areas that could take advantage of the new regional and state CHAT data, as well as other digital wildlife data, such as state natural heritage data or threatened and endangered species information (although some of this information has the potential to be accessed through CHAT portals). The opportunities are summarized in a matrix. The opportunities matrix compiles and summarizes information for all 16 western states participating in the project. Where state DOT respondents indicated that digital data are not used or do not have potential use, there is no explanation that accompanies the negative responses due to the format in which responses were requested. Thus, this report is unable to explain why the state DOTs did not think CHAT information does not have the potential to be helpful for some of the transportation processes.

Although only four state DOTs of the 16 filling out the matrix now use the regional CHAT, 10 identified opportunities to increase the use of regional CHAT information, particularly in pre- and post-STIP (State Transportation Improvement Program) processes.

Six of the 16 state DOTs filling out the opportunities matrix currently use state CHAT data (there are currently 10 state CHATs); there was near consensus that there is the potential to use state CHAT data in nearly all of the transportation processes in the future.

All 16 state DOTs currently use other, non-CHAT digital wildlife data for nearly all the transportation processes evaluated. Fifteen of the 16 state DOTs responded that opportunities exist for the continued use, or increased use of, non-CHAT digital wildlife data. Although only four state DOTs responded that they currently use the regional CHAT, 10 of the 16 state DOTs filling out the matrix identified opportunities to increase the use of the Regional CHAT information in pre- and post- STIP processes.

Some of the CHAT limitations identified by this task were similar issues identified earlier in the project; for example, fine scale CHAT data is rarely available and that the CHAT data needs to be more self-explanatory to DOT users.

Project stakeholders further identified the following key areas of need:

1. Overcoming institutional and cultural barriers within state DOTs.
2. Increasing state DOTs ownership of wildlife values.
3. Increasing communication/alignment between agencies.
4. Setting joint priorities by State DOTs and state DOWs.
5. Increasing funding for wildlife mitigation.

6. ECO-LOGICAL REPORT

6.1. Introduction

This chapter discusses the intersection between CHATs and the FHWA's ecosystem-based approach to transportation planning, known as the integrated "Eco-Logical" framework. Among other things, it discusses ways in which use of CHATs within the Eco-Logical program may benefit transportation planning efforts among WGA member states and potential opportunities to align these two initiatives by promoting use of CHATs within the Eco-Logical framework.

6.2. What Have We Learned?

6.2.1. Intersection of CHATs and Eco-Logical

As discussed in Chapter 4, Eco-Logical provides an overarching framework to facilitate collaborative planning. In contrast, CHAT provides spatially explicit, digital wildlife data that can be used, where available, as an input within the broader Eco-Logical framework. Section 6.3 below describes four specific steps within the Eco-Logical framework during which the regional or state CHAT could be used to help better inform infrastructure and conservation planning.

Eco-Logical is a nine-step, voluntary framework for federal, state, tribal and local partners to collaborate, share data, and identify and prioritize areas of ecological significance during infrastructure planning, design, review, and construction.²⁵ The framework includes elements of integrated planning, adaptive management, and performance measurement, and can provide options for compensatory mitigation for those impacts deemed to be unavoidable.²⁶ Use of Eco-Logical is designed to reduce planning and project uncertainties and increase stakeholder support for projects, with the goal of enabling infrastructure projects to move forward more quickly while maintaining or improving the sustainability of ecosystems and habitat connectivity at a broader landscape scale. Transportation planners and other decision-makers are free to use the Eco-Logical framework in its entirety, or to "pick and choose" those elements deemed most beneficial, based upon the task at hand. At its core, Eco-Logical seeks to pave the way for ensuring that transportation planning and projects consider wildlife and their ecosystems.

In comparison, as discussed in Chapter 2, CHAT is an online system of maps that provides access to digital geospatial data pertaining to fish, wildlife, and/or their crucial habitats. CHAT is comprised of very broad, coarse-scale data and thus can be an ideal tool for first-cut, due diligence review and planning for infrastructure projects, including transportation. In addition to the regional CHAT, which is comprised of information stitched together across 16 western

²⁵ "Eco-Logical" is the moniker adopted and used by FHWA. Some of the principles, processes and beneficial outcomes of the Eco-Logical approach may also be found in a watershed-based, landscape-scale or ecosystem-level approach. Despite terminology differences, these similar approaches are also likely to benefit by using CHAT information to inform decisions.

²⁶ USDOT (U.S. Department of Transportation), Research and Innovative Technology Administration, Volpe National Transportation Systems Center. 2006. Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects, Report No. DOT-VNTSC-FHWA-06-01.

states, 10 western states have developed individual state-level CHATs that provide more site-specific information.

Use of CHATs within long-range planning processes, such as Eco-Logical, is further supported by key sections of MAP-21, including:

- Metropolitan Planning §§ 1105, 1201 (23 USC §§ 104, 134);
- Statewide Non-MPO Transportation Planning §§ 1202, 52005 (23 USC §§ 135, 505);
- Federal Lands Transportation Program (FLTP) and Federal Lands Access Program (FLAP) § 1119 (23 USC §§ 201, 203);
- Accelerating Project Delivery § 1305 (23 USC § 139);
- Integration of Planning and Environmental Review § 1310 (23 USC § 168);
- Programmatic Mitigation Plans § 1311 (23 USC § 169).

6.2.2. Familiarity with and Benefits of Using CHAT within Eco-Logical

As discussed above, questionnaire respondents indicated they are familiar with the Eco-Logical framework, and that use of CHATs and other digital fish and wildlife data would allow better alignment with Eco-Logical's goals. Specifically, the Questionnaire – Part 1, Question 31 asked respondents whether their agency is familiar with FHWA's Eco-Logical approach to developing infrastructure projects. The vast majority (82.6%) of respondents answered "yes," with state respondents (93.3%) being more familiar than federal respondents (62.5%). Respondents to Part 1, Questions 32-33 further indicated that they felt digital sources of data pertaining to fish or wildlife and/or their habitats as a whole increases (or could potentially increase) their agency's ability to align with Eco-Logical's principles and objectives primarily by (1) providing more information on which to base decisions; (2) providing easy, centralized access to consistent, up-to-date information; and (3) ensuring transparency and a means of standardizing decision-making processes. Building upon Part 1 of the questionnaire, Part 2, Question 14 asked respondents to rank the ways in which they think digital fish/wildlife/habitat data as a whole most increases their agencies' ability to align with the principles and objectives of Eco-Logical, with 1 being most important and 6 being least important. The top three responses were (1) allows earlier inclusion of fish and wildlife in the planning process; (2) provides more information to guide decisions; and (3) enables exploration and analysis of alternative scenarios. For more information, see Chapter 3, Questionnaire – Part 1, Questions 31-33, and Questionnaire – Part 2, Question 14.

6.2.3. Identification of Eco-Logical as a Best Practice

As discussed in Chapter 4, project stakeholders identified use of the Eco-Logical approach as a best practice that improves coordination among agencies and interested stakeholders. In particular, use of the Eco-Logical framework was perceived as empowering federal, tribal, regional, state and local agencies, non-governmental organizations, and the private sector to work collaboratively to pro-actively identify and capitalize on landscape-level opportunities for community and environmental benefits beyond those produced using a project-by-project approach. Use of CHAT data within the Eco-Logical framework, as discussed in the next section, was further identified as a key opportunity for implementation moving forward.

6.3. Potential Opportunities to Use CHATs within the Eco-Logical Framework

As described below, incorporating CHAT information within steps 2, 3, 6 and 9 of the Eco-Logical framework presents a key opportunity to increase the use of CHATs. Anticipated benefits of doing so include improving the ability of agencies and partners to identify ecologically significant locations that may be affected by an infrastructure project, areas to be avoided, and potential compensatory mitigation opportunities in concert with the delivery of transportation improvements and community benefits.

As explained in Chapter 4, the Eco-Logical framework sets forth a nine-step, non-prescriptive approach to integrating planning across the public and private sectors (Figure 58). During the second project workshop, participants identified Step 2 – Characterize resource status and integrate natural environment plans; Step 3 – Create a Regional Ecosystem Framework; Step 6 – Develop a crediting system; and Step 9 – Update the REF and plan, as potential opportunities to directly use regional and state CHAT within the Eco-Logical process. A brief description of how CHATs could be used during these steps follows.



Figure 58: Diagram of the nine-step Eco-Logical framework. Source: FHWA.

- **Step 2 – Characterize Resource Status and Integrate Natural Environment Plans:** Step 2 involves characterizing the status of pertinent resources and integrating natural environment plans and data. The purpose of this step is to develop an overall conservation strategy that integrates restoration and conservation priorities, typically by building off of existing natural resource data and regional plans that have already been developed. Outcomes include compiling data into a refined map of conservation, preservation and restoration areas to form the basis for a REF and cumulative effects analysis. These analyses can be used to inform project planning and development at varying scales – from statewide to project-level. Decisions can then be made to guide

transportation investments to allow for the largest gains to promote watershed and species eco-regional health. Regional and state CHATs, where available, are potential sources of habitat data that could be compiled, reviewed and integrated during Step 2.

- **Step 3 – Create a Regional Ecosystem Framework.** Step 3 entails creating a map that overlays geospatially-mapped environmental plans and data, including digital wildlife data, with transportation plans and projects, land use and other relevant data. The purpose of Step 3 is to integrate the conservation and restoration strategy prepared in Step 2 with transportation and land use data and plans to create the REF. This allows decision-makers to identify areas where deficiencies on the highway system intersect with key conservation and mitigation areas to guide asset management and investment decisions to maximize multi-environmental benefits. The principal outcome is the creation of an REF and sub-tasks include gathering, reviewing and integrating relevant data inputs, including regional or state CHATs, where available.
- **Step 6 – Develop a Crediting System.** Step 6 involves developing a consistent strategy and defining metrics to measure ecological impacts, restoration benefits, and long-term performance – with the goal of ensuring that the analyses throughout the life of the project are in the same units and language, to the maximum extent possible. CHATs could potentially be used in this step as an input to a defined metric that measures and tracks progress toward ecosystem goals and objectives.
- **Step 9 – Update the REF.** Step 9 includes integrating new and/or updated data into the REF, thereby ensuring that the REF and integrated plan contain current information from a living database. To the extent the REF was created prior to CHAT becoming available, the regional or state CHAT could be incorporated during Step 9. Where the existing REF already includes CHAT, but the CHAT is subsequently updated or refined, the new CHAT layer could be incorporated during this step.

6.4. Future Opportunities to Strengthen the CHAT/Eco-Logical Nexus

The following section identifies potential opportunities to raise awareness and encourage the use of CHATs as part of FHWA's ongoing implementation of Eco-Logical.

6.4.1. Case Studies

One possible way to raise awareness and increase the use of CHATs within the Eco-Logical framework is to develop case studies that provide on-the-ground examples of how state and federal transportation planners are successfully using CHATs during specific steps of the Eco-Logical framework, including the benefits likely to accrue as a result of such use. FHWA could post the resulting case studies on the Eco-Logical website and highlight examples during subsequent outreach and educational events aimed at promoting the use of Eco-Logical's tenets. Although not exhaustive, several potential case studies were identified during the course of this project, including:

- **Caltrans/RAMP/ACE-II** – In 2008, a coalition of stakeholders launched the Regional Advance Mitigation Planning (RAMP) working group. RAMP is composed of

representatives from over 14 agencies, including the Caltrans, FHWA, and a variety of other federal and state agencies and non-governmental organizations. The group's goal is "to develop a more comprehensive approach to mitigating unavoidable biological resource impacts potentially caused by state infrastructure projects, such as roads and levees." Within the RAMP working group, Caltrans is considering using data from its state CHAT, ACE-II, along with several other data sets, to address Step 2 of the Eco-Logical framework at a regional level. For more information on RAMP, visit: <https://rampcalifornia.water.ca.gov/web/guest/home>.

- **ITD/IDFG MOU** – The Idaho Transportation Department (ITD) is currently working on the Lead Adopter and User Incentive project using the Eco-Logical framework. The goal of the project is "to work with the Idaho Department of Fish and Game (IDFG) to improve data delivery and data-sharing ... [to] refine, develop, and update the DSS/Crucial Habitat Assessment Tool (CHAT) and other Idaho fish and wildlife-related data layers; and establish interagency data-sharing protocols and applications." Additionally, the User Incentive project will update the existing Memorandum of Understanding (MOU) between ITD and IDFG, with a focus on improving coordination and data sharing during transportation planning. Although not yet complete, the initiative has already indirectly benefitted transportation planning in Idaho by strengthening the relationship between ITD and IDFG. For more information, visit: <http://www.environment.fhwa.dot.gov/ecological/AnnualReport2013-14/annualreport.asp#itd>.
- **Arizona I-11 corridor** – In 2014, the Arizona DOT completed a two-year Planning and Environment Linkages (PEL) study along the proposed I-11 corridor. Like Eco-Logical, PEL represents a collaborative and integrated approach to considering environmental and other factors early during the transportation decision-making process. Although not yet funded, the I-11 corridor, also known as "Canamex," would connect Phoenix and Las Vegas and, ultimately, stretch north, potentially as far as Canada, and south to Mexico. To aid in analyzing the potential environmental effects of the new highway corridor, the Arizona Game and Fish Department adapted the Arizona state CHAT, known as HabiMap, for use during regional- and local-scale project evaluations. Because it incorporates many of the same principles as Eco-Logical, use of the adapted HabiMap during the PEL study could potentially provide valuable lessons for future use of HabiMap within Eco-Logical.

This list could be supplemented with additional case studies identified during future collaborative planning efforts utilizing the Eco-Logical framework.

6.4.2. Webinars

FHWA hosts a collection of educational webinars across a range of pertinent topics on its Eco-Logical website. Existing webinars can be viewed at http://www.environment.fhwa.dot.gov/ecological/ImplementingEcoLogicalApproach/Webinar_Series.asp. A new webinar, or series of webinars, could be devised to educate practitioners and share information on how to practically

and successfully integrate their regional or state CHAT data within the Eco-Logical framework. Ideally, the session would be interactive, or, at a minimum, allow for a question and answer period at the end.

6.4.3. Peer Learning Exchanges

Developing and providing ongoing technical support and hosting for one or more electronic or in-person peer learning exchanges presents another opportunity to strengthen the nexus between CHATs and Eco-Logical. Although there are many types of potentially suitable peer learning exchanges, the most valuable methods for delineating and clarifying the process of integrating CHATs within Eco-Logical likely include:

- Peer Discussions – Small-scale group discussions on specific issues
- Workshops – Meetings that provide training in specific skills or techniques
- Roundtables – Larger panel, or roundtable, discussions of a particular topic
- List Serves – Group email lists aimed at rapidly sharing information and promoting dialogue on common issues

6.4.4. Conferences and Meetings

FHWA currently is working to raise awareness about Eco-Logical and to provide funding and support for implementing the framework. Among other things, these efforts involve outreach and education in the form of presentations at conferences and meetings. It is likely that these existing mechanisms could be easily amended to include a discussion of how to successfully integrate CHATs during implementation of Eco-Logical, at little cost and with considerable potential benefit.

For a list of past and upcoming conferences and meetings, visit: http://www.environment.fhwa.dot.gov/ecological/ImplementingEcoLogicalApproach/Meetings_Conferences.asp.

6.4.5. Annual Reports and Other Documentation

Every year, the FHWA, in concert with the John A. Volpe National Transportation Systems Center, produces an Eco-Logical Program Annual Report. (To view a copy of the most recent annual, visit: http://www.environment.fhwa.dot.gov/ecological/eco_gp_reports.asp.) This report, which typically includes updates on important developments and successes in implementing Eco-Logical, constitutes a key outreach publication for the program. Developing and including within the annual report a recommendation that practitioners integrate CHATs within, among other things, Step 3 (Create an REF) of the Eco-Logical framework, along with techniques for doing so and illustrative case studies, would undoubtedly raise awareness about the benefits of using CHATs.

Other potential opportunities to increase awareness and use of CHATs within Eco-Logical could entail including a segment on regional and state CHATs and their benefits within the FHWA's forthcoming Practitioner's Handbook (currently in development) as well as within other similar outreach and educational materials aimed at promoting the use of Eco-Logical.

The “Implementing Eco-Logical” program was initiated under the Strategic Highway Research Program 2 (SHRP2) in order to operationalize the Eco-Logical approach. Executed by FHWA in conjunction with the American Association of State Highway and Transportation Officials and the Transportation Research Board, the program expressly aims to “increase awareness of the tools and resources available to aid in the adoption of Eco-Logical” and “provide champions, advocates and partners with support tools, evidence, and data to communicate with their peers about the benefits of Eco-Logical” (**Error! Reference source not found.**) Similarly, FHWA’s *Plan Works and Decision Guides*, <https://fhwaapps.fhwa.dot.gov/planworks/DecisionGuide>, includes guides to help transportation professionals incorporate PEL studies into transportation processes such as long-range planning, programming, corridor planning, and environmental analyses. Such programs may provide additional opportunities in the future to promote and strengthen the nexus between CHATs and collaborative processes such as Eco-Logical and PEL.

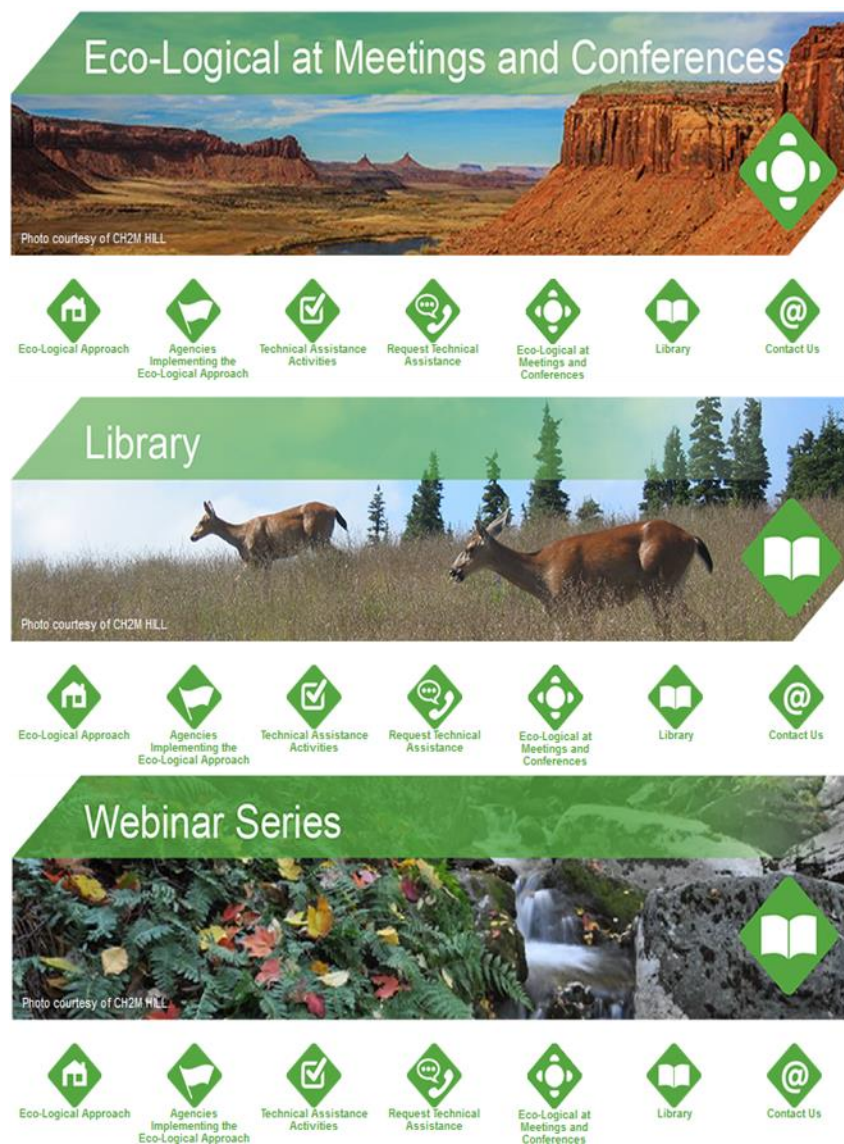


Figure 59: Eco-Logical resources available online at the FHWA “Implementing Eco-Logical” website.
Source: FHWA.

6.5. Summary

This report examines the relationship between the FHWA's ecosystem-based approach to transportation planning, known as "Eco-Logical" and concludes that Eco-Logical provides an overarching framework to facilitate collaborative planning, while the regional and state CHATs provide spatially explicit, digital wildlife data that can be used as an input within that framework. The report describes lessons learned regarding the connection between Eco-Logical and CHATs as revealed by the questionnaire, via case studies of best management practices and at both project workshops. These findings include:

- Transportation experts from the five federal land management agencies and the 16 state DOTs involved in creation of the regional CHAT are familiar with Eco-Logical's nine-step framework for transportation planning.
- Questionnaire respondents unanimously agree that use of digital wildlife data in state transportation processes allows for a better alignment with Eco-Logical's goals, primarily because such data provide more information on which to base decisions.
- The best management practices report identifies use of Eco-Logical as one of eight exemplary practices being employed today that support the use of CHATs and other digital wildlife data during transportation planning and projects.
- Steps 2, 3, 6 and 9 of the Eco-Logical framework are key opportunities to directly use CHATs within the Eco-Logical process. Those steps are described briefly below:

Step 2 – Characterize Resource Status and Integrate Natural Environment Plan,

Step 3 – Create a Regional Ecosystem Framework (REF),

Step 6 – Develop a Crediting System and

Step 9 – Update the REF.

The report concludes by identifying the following five opportunities for strengthening the nexus between CHATs and Eco-Logical:

- 1) Case studies,
- 2) Webinars,
- 3) Peer learning exchanges,
- 4) Conferences and meetings, and
- 5) Annual reports and other documentation.

7. SUMMARY OF FINDINGS

This project explored the different facets of the regional and state CHATs and other digital wildlife data. For purposes of this project, the use of regional and state CHAT information is defined by accessing the data through the regional or state CHAT web portals. Other digital wildlife data is defined as information accessed at non-CHAT websites or by other electronic means, even if this data could have also have been found at the CHAT sites. The results of the project's four principal tasks are summarized below.

7.1. Questionnaire

Although the findings from the questionnaire included responses regarding a diverse mix of issues such as wildlife regulations, federal policies and the impact of the most recent transportation act, we focus here on CHATs and other digital wildlife information and data. State DOT leaders from the 16 states that contributed to the regional CHAT and five federal land management agencies responded to the questionnaire. The overwhelming majority (92%) of respondents indicated that their agencies do consider fish and wildlife in their transportation planning and project processes, primarily for reasons associated with environmental stewardship.

- Many respondents were unaware of, and unfamiliar with, CHATs. Given that the public launch of the regional and several state CHATs occurred in late 2013 and early 2014, it is not surprising that results of the questionnaire, which was distributed in March 2014, indicated a lack of awareness of CHATs. Such lack of awareness may also be attributed to inconsistent language. For example, state CHATs have many different acronyms, depending on the state, such as ACE-II (California), WISDOM (Wyoming), and CAPS (Montana). An added complication is that some DOTs and federal managers may access a digital wildlife data layer available through CHATs via another, non-CHAT web service or application. Even though that same data layer is also available via a CHAT web portal, for purposes of this project, such access was deemed to constitute use of "other digital wildlife data," not use of CHATs.
- The overwhelming majority of federal land managers were not familiar with CHATs.
- State CHATs tend to be used more and ranked more highly than the regional CHAT.
- The most frequently cited uses for digital fish, wildlife and habitat data were environmental studies, site investigation and scoping, and mitigation. In contrast, the most frequently cited use for CHAT data was for planning purposes.
- State DOTs consider wildlife-vehicle collision and game species data to be more important than habitat quality and connectivity data, while federal agencies responded conversely.
- Over half of the respondents do not use the regional CHAT because it does not meet their specific informational needs.
- Respondents recommended a number of potential improvements for CHATs, including offering more data sources, offering finer scale data and updating data frequently.

7.2. Best Management Practices

Eight different best management practices were identified to assure the greatest consideration for wildlife in transportation planning and programs, they include:

- Incorporate wildlife information before budgets are set.
- Set joint transportation and wildlife priorities.
- Employ a transportation-wildlife liaison.
- Expand the role of wildlife biologists.
- Use CHATs in mitigation planning.
- Invest in innovative technologies, research and monitoring.
- Increase use and understanding of CHAT websites.
- Use FHWA's Eco-Logical approach to improve cooperation.

Eleven case studies demonstrated the application of these best practices.

7.3. Opportunities for Increasing CHAT Usage

Representatives from the 16 states involved in the regional CHAT effort evaluated their current uses of regional CHAT, state CHAT and other digital wildlife data, as well as opportunities to expand such use in the future. These results were subsequently compiled into an opportunities matrix. The key findings were:

- The majority of states believed the greatest use of regional CHAT data would be for pre-STIP planning activities.
- There were mixed responses across the states regarding the potential for use of the regional CHAT in most other transportation processes, except that there was nearly unanimous agreement that it would be of little to no value for construction and operations activities.
- The completed opportunities matrix indicated that there was slightly more use of state CHAT data than regional CHAT data for the eight transportation processes.
- The greatest potential for future use of state CHAT was identified for pre-STIP and post-STIP planning activities and mitigation planning.
- Other digital wildlife data have the greatest potential to be used for pre-STIP and post-STIP activities, short-range transportation plans, and mitigation planning.

7.4. The CHAT and Eco-Logical Nexus

Questions about the FHWA's Eco-Logical program and its connection to the use of CHAT information were explored during the project's questionnaire, via case studies of best management practices and at both project workshops. Collectively, the most important results were:

- Transportation experts from the federal agencies and the 16 state DOTs that participated in the project (*i.e.*, questionnaire, workshops) were familiar with the Eco-Logical framework.
- The use of CHATs and other digital fish and wildlife data by state transportation processes would improve alignment with Eco-Logical's goals.
- The four most important Eco-Logical steps that present opportunities for incorporating CHATs within Eco-Logical are:
Step 2 – Characterize Resource Status and Integrate Natural Environment Plans;

Step 3 – Create a Regional Ecosystem Framework (REF);
Step 6 – Develop a Crediting System; and
Step 9 – Update the REF.

8. FUTURE STEPS

During the course of this two-year project, members of the Steering Committee, questionnaire respondents, workshop participants, and other project stakeholders identified a host of potential opportunities to advance the use of digital wildlife data, including CHATs. These potential future steps are summarized below.

1. **Increase outreach activities** aimed at raising awareness of CHATs among federal and tribal land managers and state and municipal transportation staff involved in long- or intermediate-range state-wide and regional planning and programming.
2. **Explore data refinements** to the state and regional CHATs, including regularly updating data sources, developing finer scale data, improving integration of CHAT and other wildlife data sources, and exploring ways in which CHATs could be enhanced or supplemented to meet users' specific information needs.
3. **Expand the use of CHATs** to inform other wildlife mitigation inquiries, including programmatic wildlife mitigation plans; cost-benefit modeling (*i.e.*, assessing where wildlife-vehicle collision costs exceed mitigation costs); and other analyses, such as overlaying CHATs with wildlife-vehicle collision "hot spot" data to identify highway segments where human safety and wildlife connectivity priorities overlap.
4. **Reconsider the goal of CHATs** to assess whether it should be modified, for example, by expanding or otherwise altering the purpose to meet more user needs in the future. This could include meeting new needs of existing users as well as reaching new users in other sectors (*i.e.*, energy, transmission, etc.).
5. **Investigate DOT responses to the opportunities matrix** by asking the states to provide their rationales for determining whether regional or state CHATs are currently or could potentially be used during the eight transportation processes included in the matrix.
6. **Strengthen the nexus with Eco-Logical** by, among other things, developing case studies, workshops, webinars and other peer-exchange activities aimed at illustrating the benefits of incorporating CHATs within Eco-Logical's ecosystem-based approach to transportation planning. It may also be beneficial to include a discussion of CHATs within future annual reports and other forthcoming documentation on implementing Eco-Logical created by the FHWA.
7. **Overcome cultural barriers of state DOTs** to more fully consider wildlife by elevating wildlife values within transportation planning and project processes. Suggested approaches include tying wildlife considerations to other mission-critical transportation priorities such as human safety; appealing to the states' bottom line by documenting cost savings resulting from early consideration of wildlife during planning and design; and increasing communication and coordination between state transportation and wildlife agencies.
8. **Increase funding**, both for purposes of wildlife mitigation measures generally and for ongoing CHATs support. In addition to securing stable funding to support continued hosting of and improvements to CHATs, another possible next step is to explore ways to increase the amount of transportation funding allocated to fish and wildlife mitigation.

Exploration of any or all of these next steps is likely to continue to advance the use of digital wildlife data, including CHATs, within transportation planning and projects in the future.