

Chapter 3

Organizations Participating in WIST Validation

3.0 Overview

This chapter presents an overview of the agencies and organizations that participated in the study process described in Chapter 2. The partners in the Federal Committee for Meteorological Services and Supporting Research (FCMSSR), plus the U.S. Postal Service, are described in Section 3.1. The programs of these agencies have been and will continue to be the focus for federal WIST technology transfer activities, as well as supporting research and development (R&D). Section 3.2 describes state and local agencies that participated with the FCMSSR partners in validating the weather information for surface transportation (WIST) needs compiled in the templates in Appendix B.

3.1 Federal Entities

The federal partners in FCMSSR have constituencies that they serve, whether through regulation, oversight, inspection, management, operations, or assistance. For this report, these various constituencies have been grouped according to the transportation sector of predominant interest to them. The assessment of WIST needs for which each agency has mandated responsibility or a mission interest was also segregated by transportation sector. Table 3-1 shows this relationship for all the participating federal entities. As this summary table illustrates, the interests and responsibilities of most of the federal entities cut across multiple transportation sectors.

The major surface transportation and weather-related agencies, offices, and programs of the federal entities shown in Table 3-1 are introduced briefly below. More detailed descriptions, provided by the federal entities for this report, are in Appendix F.

3.1.1 Department of Transportation

As the federal entity with primary responsibility for shaping and administering policies and programs to protect and enhance the safety, adequacy, and efficiency of transportation systems and services, the Department of Transportation (DOT) has broad and deep involvement with WIST user communities in all six of the surface transportation sectors covered by this study. As Table 3-1 indicates, operating administrations within DOT that have constituencies in these sectors are the Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA), Federal Transit Administration, Federal Railroad Administration, Federal Aviation Administration (FAA), Maritime Administration, Saint Lawrence Seaway Development Corporation, Research and Special Programs Administration (RSPA), the U.S. Coast Guard, and the Transportation Security Administration (TSA).

Federal Highway Administration. The roads and highways of the United States are planned, built, and operated through a division of responsibilities between the federal government, represented by the FHWA, and the states. The FHWA performs its mission through two main programs. The Federal-Aid Highway Program provides federal financial assistance to the states

to construct and improve the National Highway System, urban and rural roads, and bridges. The Federal Lands Highway Program provides access to and within national forests, national parks, the Tribal nations, and other public lands.

Table 3-1 Federal Agency Responsibilities and Interests by Transportation Sector^a

Federal Entities	Transportation Sectors					
	Road	Rail	MTS	Pipeline	Transit	Airport Ground Ops
Department of Transportation						
Center for Climate Change	X		X		X	
Federal Aviation Administration						X
Federal Highway Administration	X					
Federal Railroad Administration		X				
Federal Transit Administration	X	X	X		X	
Maritime Administration			X			
National Highway Traffic Safety Admin.	X	X				
Research & Special Programs Administration	X	X	X	X	X	X
Office of Emergency Transportation	X	X	X	X	X	X
Office of Hazardous Materials Safety	X	X	X	X		X
Office of Pipeline Safety				X		
St. Lawrence Seaway Corporation			X			
Transportation Security Administration ^b	X	X	X	X	X	X
U.S. Coast Guard ^b			X			
Department of Energy						
National Transportation Program	X	X	X			X
Power Marketing Administrations	X					
Department of Defense						
Defense Logistics Agency				X		
U.S. Air Force	X					X
U.S. Navy	X		X			X
U.S. Transportation Command	X	X	X		X	X
Military Traffic Mgmt Command	X	X	X		X	X
Department of Commerce (NOAA)						
National Ocean Service			X			
NOAA Corps			X			
National Weather Service	X	X	X	X	X	X
Department of the Interior						
Bureau of Indian Affairs	X	X	X	X	X	X
Bureau of Land Management	X	X	X	X	X	X
Bureau of Reclamation	X		X			
Fish and Wildlife Service	X		X		X	
National Park Service	X		X			
U.S. Geological Survey			X			
Department of Agriculture						
Agricultural Marketing Service	X	X	X	X	X	X
Farm Service Agency	X	X	X	X	X	X
Forest Service	X	X	X	X	X	X
Office of the Chief Economist	X	X	X	X	X	X
Environmental Protection Agency	X					
Federal Emergency Management Agency ^b	X	X	X			
National Aeronautics and Space Administration	X	X	X			
Nuclear Regulatory Commission	X	X	X			
U.S. Postal Service	X	X	X			

^a An "X" in the matrix indicates an agency responsibility or interest in that sector.

^b Entities designated for transfer to the new Department of Homeland Security.

The FHWA develops regulations, policies, and guidelines for federal-aid funding, with the aim of achieving FHWA goals for mobility, safety, productivity, the human and natural environment, and national security. It also manages a national research, development, and technology program that includes the Intelligent Transportation System (ITS), through the ITS Joint Program Office. In 1997 the Rural ITS program began a focus on road-weather information. This effort has

A winter storm in the nation's capital. Snowplows work to clear Roosevelt Bridge while passenger cars struggle to cross on the inbound lanes. Copyright AP Wide World Photos.



evolved into the Road Weather Management Program (RWMP) within the FHWA Office of Operations. The RWMP includes work on road-weather sensing related to prediction techniques, dissemination of road-weather information through ITS, the development of decision support applications that use information on weather threats, and the improvement of transportation operations to respond to threats. It has been the FHWA lead office for interagency coordination concerning road-weather information.

Federal Transit Administration. Through its funding program, the Federal Transit Administration assists in developing improved mass transportation systems for cities and communities across the country. Beyond typical bus and rail systems, it supports other forms of public transportation, including commuter ferryboat, trolleys, and people movers. Through its technology programs, it supports research on intelligent transportation systems, alternative fuels, and new communication technologies. Programs and technologies such as the Bus Rapid Transit Initiative and communication-based train control help transit services meet the current and future needs of the traveling public.

National Highway Traffic Safety Administration. NHTSA sets and enforces safety performance standards for motor vehicles and equipment. Through grants to state and local governments, it enables them to conduct effective local highway safety programs. The statistics on highway accidents, including injuries and economic consequences of accidents, cited in this and most other WIST-related reports originate from NHTSA databases.

Federal Railroad Administration. The Federal Railroad Administration promotes safe and environmentally sound rail transportation. It employs safety inspectors to monitor railroad compliance with federally mandated safety standards, including track maintenance, inspection standards, and operating practices. It conducts tests to evaluate research and development projects that support its safety mission and enhance the railroad system as a national transportation resource.

Maritime Administration. The Maritime Administration promotes development and maintenance of an adequate, well-balanced, U.S. merchant marine, sufficient to carry the nation's domestic waterborne commerce and a substantial portion of its waterborne foreign commerce. It also seeks to ensure that the United States enjoys adequate shipbuilding and repair service,

Freight trains travel at reduced speed during a high-heat day, when rail buckling is a potential threat. Copyright AP Wide World Photos.

efficient ports, effective intermodal water and land transportation systems, and reserve shipping capacity in time of national emergency.

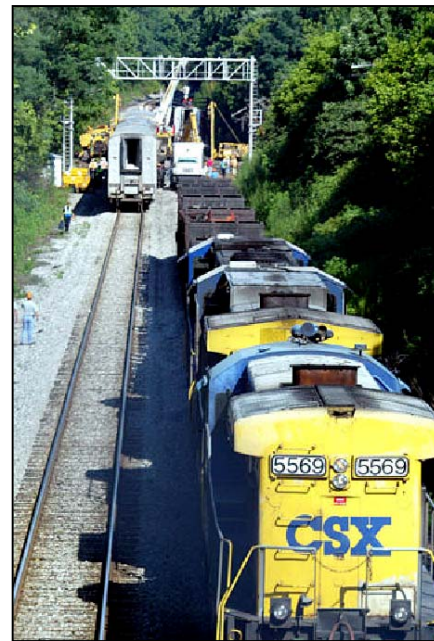
Saint Lawrence Seaway Development Corporation. In tandem with the Saint Lawrence Seaway Authority of Canada, the Saint Lawrence Seaway Development Corporation oversees operations safety, vessel inspections, traffic control, and navigation aids on the Great Lakes and the Saint Lawrence Seaway.

U.S. Coast Guard. The Coast Guard ensures safe and secure transportation on America's waterways and protection of the marine environment. Its mission includes seasonal ice observation and Ice Patrol service whenever icebergs threaten primary shipping routes between Europe, the United States, and Canada.

Research and Special Programs Administration. The RSPA oversees rules governing the safe transportation and packaging of hazardous materials by all modes of transportation, excluding bulk transportation by water. It also assists local and state authorities with training for hazardous materials emergencies. It operates the Volpe National Transportation Systems Center in Cambridge, Massachusetts, which is dedicated to enhancing the effectiveness, efficiency, and responsiveness of other federal organizations with critical transportation-related functions.

Within the RSPA are three offices with special relevance to WIST needs and applications. The **Office of Emergency Transportation** performs coordinated crisis management functions for multimodal transportation emergencies, including natural disasters. Natural disasters include severe weather events such as hurricanes, tornadoes, major flooding, and similar events that cause disruptions in transportation systems. This office also works with other federal and state agencies to ensure relationships are in place before the stress of disaster response begins. The functions of the **Office of Hazardous Materials Safety** include regulatory development, enforcement, training and information dissemination, domestic and international standards, and interagency cooperative activities. The **Office of Pipeline Safety** develops regulations and other approaches to risk management, to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities.

Federal Aviation Administration. The FAA oversees the safety of civil aviation by certifying airports that serve air carriers and enforcing regulations under the Hazardous Materials Transportation Act for shipments by air. It operates a network of airport towers, air route traffic control centers, and flight service stations; develops air traffic rules; allocates the use of airspace; and provides security control of air traffic. At air terminals, the FAA is responsible for



coordinating or controlling operational movements on the ground. It supports the collection of weather information for aviation and other uses through automated observing systems and human weather observers at critical locations. It also supports R&D on aviation weather.

Center for Climate Change and Environmental Forecasting. This DOT-wide virtual organization coordinates Departmental strategies and policies for mitigating transportation's contribution to greenhouse gas emissions and assessing the effects of climate change on the transportation system. Projects sponsored by the Center include impacts of climate change on transportation, fuel options, and data analysis and modeling for transportation greenhouse gases.

Transportation Security Administration. The primary objective of the TSA is to stop terrorist incidents before they can be implemented. Although protecting the traveling public in airports and on airplanes may be the most visible responsibility of the TSA, it also has lead responsibility for security of the nation's highways, waterways, seaports, railways, public transit, and pipelines (DOT 2002b).

3.1.2 Department of Energy

The roles of the Department of Energy (DOE) in surface transportation include the transportation of nuclear materials, through the National Transportation Program, and access by repair crews of the Power Marketing Administrations to electric transmission lines. The National Transportation Program supports infrastructure and coordinates transportation activities for all nonclassified shipments of hazardous materials, including radioactive materials, mixed wastes, and commodities such as coal, other fuels, maintenance materials, and supplies. Within the scope of the WIST study, the information needed by the Power Marketing Administrations is mostly limited to weather elements that affect the ability of repair crews to service power transmission lines.

3.1.3 Department of Defense

In addition to being a consumer of transportation weather information, the Department of Defense (DoD) is also one of the nation's principal producers of weather information. The Air Force and Navy have responsibilities for weather and climate observation and forecasting support, including severe weather warnings, for military installations and military airports, training and maneuver areas, and wherever military operations are underway worldwide. (Civilian/military joint use airports have different arrangements for weather support.)

- The **U.S. Transportation Command** is designated the single manager of the Defense Transportation System. Strategic mobility allows the United States to act upon the world stage at whatever level is chosen by the national leadership. The **Military Traffic Management Command**, which is the overland lift component and primary traffic manager for the U.S. Transportation Command, provides global surface transportation to meet national security objectives in peace and war.
- Within the **U.S. Air Force**, Air Force Weather has the mission of providing timely, accurate, and relevant mission weather and space environmental information to meet

Air Force, Army, Joint, and other defense and intelligence community needs worldwide.

- The **U.S. Navy** has the military requirement to provide meteorological products and services to support Navy, Marine, and Joint forces. It also provides oceanographic support to all elements of the DoD. Operational support within the Navy is provided by elements of the Naval Meteorology and Oceanography Command.

Air Force Weather, the Naval Meteorology and Oceanography Command, and the National Oceanic and Atmospheric Administration (NOAA) have long cooperated in providing weather services and continue to identify new areas of cooperation.

3.1.4 Department of Commerce and the National Oceanic and Atmospheric Administration

NOAA, the nation's primary civilian agency for weather data, is dedicated to predicting environmental change and protecting the environment. NOAA provides services to the nation through five major divisions and numerous special program units. The major divisions are NOAA's National Ocean Service, National Marine Fisheries Service, National Weather Service, Office of Oceanic and Atmospheric Research, and National Environmental Satellite Data and Information Service. NOAA also includes the nation's seventh, and smallest, commissioned service, the NOAA Corps.

As the nation's principal advocate for coastal and ocean stewardship, **NOAA's National Ocean Service** develops the national foundation for coastal and ocean science, management, response, restoration, and navigation. It provides nautical charting products for safe navigation to the marine community and conducts research on the health of the coastal environment. Activities authorized by the Coast and Geodetic Survey Act of 1947 and the 1998 Hydrographic Services Improvement Act include programs for Mapping and Charting, Hydrographic Surveys, Geodesy, and Tide and Current Data. These programs, along with critical weather services described in the next paragraph, are the backbone of the information infrastructure for the U.S. Marine Transportation System (MTS).

NOAA's National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, and adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. The NWS maintains a constant vigil to provide warnings and forecasts of hazardous weather, including thunderstorms, floods, hurricanes, tornadoes, winter weather, tsunamis, and climate events. It is the sole official federal voice for issuing warnings during life-threatening weather situations. The NWS broadcasts life-saving information to the public during severe weather events and other hazardous situations through the NOAA Weather Radio network. Section 1.3.1 opens with a discussion of the technological advances made through the NWS Modernization and the importance of NWS products and services as the foundation for meeting WIST user needs.

3.1.5 Department of the Interior

Within the Department of the Interior are a number of bureaus and offices with interests related to WIST. These include the Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Fish and Wildlife Service, U.S. Geological Survey, and the National Park Service.

- The **Bureau of Indian Affairs** is responsible for 50,000 miles of road on Tribal lands. An additional 25,000 miles of Indian Reservation Roads, which are public roads that provide access to and within Tribal reservations, trust land, restricted Tribal land, and Alaskan native villages, are under the jurisdiction of the Bureau of Indian Affairs and the Tribal nations.
- The **Bureau of Land Management** manages 266 million acres of federal land and 570 million acres of subsurface federal mineral resources. On these public lands, it administers about 85,000 right-of-way authorizations, including a variety of transportation-related systems for roads, railroads, and pipelines. It maintains and manages an additional 81,000 miles of roads for public use on the public lands. and 180,000 miles of rivers and streams running through them.
- The **Bureau of Reclamation** has constructed more than 350 large dams and reservoirs in the 17 western states, including Hoover Dam on the Colorado River and Grand Coulee Dam on the Columbia River. These dams affect major inland waterways and lakes, particularly for recreational boating.
- The **Fish and Wildlife Service** operates the National Wildlife Refuge System, which comprises 10,000 miles of roadway, about half of which is open to the public. It maintains 10,000 miles of dikes and 23,000 water control structures to maintain habitat.
- The **National Park Service** is responsible for roadways and navigable waterways within the National Park System, which comprises 384 areas covering more than 83 million acres in 49 states, the District of Columbia, American Samoa, Guam, Puerto Rico, Saipan, and the Virgin Islands.
- The **U.S. Geological Survey (USGS)** serves the nation as an independent fact-finding agency that collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. The USGS collects surface-water data, such as gauge height (stage) and streamflow (discharge), which, along with data collected by the U.S. Army Corps of Engineers, are used by the NWS River Forecasting Centers to make critical flood forecasts throughout the nation.

3.1.6 Department of Agriculture

The U.S. agricultural sector is the largest user of freight transportation, accounting for nearly one-third of all freight transportation services in the United States. Trucks are the primary movers of agricultural products, accounting for 45 percent of all commodity transport, mainly for short hauls. Rail is the predominant transportation mode for long hauls in regions far from barge-loading locations. Railways transport 32 percent of agricultural products. Barges, which account for 12 percent of agricultural transport, handle large volumes of field crops, fertilizer, and

pesticides. The remaining 11 percent of agricultural commodities are transported by pipelines, air freight, and other modes.

- The purpose of the **Agricultural Marketing Service** is to ensure an efficient transportation system for rural America, beginning at the farm gate. This system moves agricultural and other rural products on the nation's highways, railroads, airports, and waterways and into the domestic and international marketplace. The program supplies research and technical information to producers, producer groups, shippers, exporters, rural communities, carriers, government agencies, and universities.
- The **Farm Service Agency** arranges for commercial ocean, ground (motor carrier and rail), and air transportation to deliver agricultural commodities domestically and worldwide.
- The **Forest Service** manages public lands in National Forests and National Grasslands. Forest roads and recreational boating within these public lands are under its jurisdiction.
- The **Office of the Chief Economist** advises the Secretary of Agriculture on the economic implications of policies and programs affecting the U.S. food and fiber system and rural areas, including issues related to transport of agricultural products.

3.1.7 Other Federal Entities

Five additional federal entities have WIST-related interests and participated in the WIST needs identification and validation process:

The **U.S. Environmental Protection Agency (EPA)** ensures that environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade. The EPA also ensures that human health and safeguarding the environment are considered in establishing environmental policy. Because air quality and water quality are major EPA responsibilities, the effects of surface transportation systems on air and water pollution come under the EPA's regulatory authority.

Two primary areas of **Federal Emergency Management Agency (FEMA)** responsibility with implications for WIST are evacuation management and response to nuclear, biological or chemical (including hazardous materials, or HAZMAT) incidents. Evacuation management includes the movement of people and resources such as emergency equipment and relief supplies in response to major catastrophic events such as earthquakes, flooding, fires, and hurricanes. Response to nuclear, biological, or chemical events includes evacuation of people and care for victims. To respond effectively to these events, FEMA incorporates atmospheric transport and diffusion information into emergency decision-making processes.

The principal WIST-related interests of the **National Aeronautics and Space Administration (NASA)** involve the ground transport of spacecraft, vehicles, and equipment from one facility to another, particularly to launch facilities. The most prevalent mode of transportation is by truck.

In addition, NASA research and development facilities provide substantial support for remote sensing technologies, including applications for remote observation of weather and related conditions relevant to WIST user needs.

In addition to regulating nuclear energy facilities and radioactive materials in the United States, the **Nuclear Regulatory Commission** regulates the transport, storage, and disposal of nuclear materials and nuclear wastes. From a transportation perspective, the Commission is important in approving the packaging designs and quality assurance programs for transport of high activity radioactive materials and spent nuclear fuel. It coordinates and develops guidance with other U.S. government and international agencies on storage and transportation policy and safety issues.

Transportation responsibilities of the **U.S. Postal Service** range from long-haul interstate movements to local delivery. The delivery of postal services has supported development of national transportation and communication infrastructures. It has linked urban and rural economies and has led to the creation of the country's physical address system.



At the command center for the U.S. Postal Service, electronic weather displays help to keep the mail moving during the December pre-holiday surge. Copyright AP Wide World Photos.

3.2 State and Local Agencies

The next tier of organizations that validated the WIST Needs Templates, after the federal entities described above, consists of state and local government agencies. Unlike the federal agencies, whose roles are primarily regulation, policy making, and oversight, the state and local agencies are largely WIST users; they make operational decisions that are affected by weather. The chief examples are the state departments of transportation, with their road and highway operation and maintenance responsibilities. Among the WIST transportation sectors, the one with the most types of weather-impacted activities is the roadway sector. A large percentage of the specific

weather information needs in the WIST template for the roadways sector were put forward by the state transportation departments.

The interests of state departments of transportation in WIST applications have been a major driver for university research and private-sector application development. One WIST II participant estimated that the total funding support from the states specifically for WIST R&D probably exceeds that of all federal programs combined (Osborne 2002).

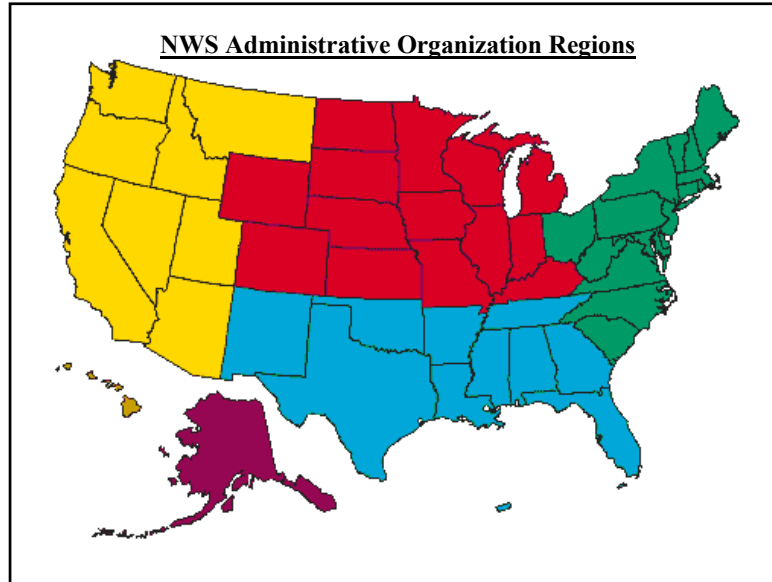


Figure 3-1 NWS regions.

For the validation of WIST user needs, the continental United States was divided into four regions, coinciding with the four geographic regions used by the NWS (see Figure 3-1). This division aligns the state and local participants in the validation process with the NWS organizations that provide them with regional weather information products and services. Within each

NWS region, a geographic distribution of participants was sought to represent major climatic variations (Figure 3-2).

In addition to the state transportation departments, this section addresses rural and urban transit authorities, public school districts, and regional airports. Figure 3-2 includes the distribution of

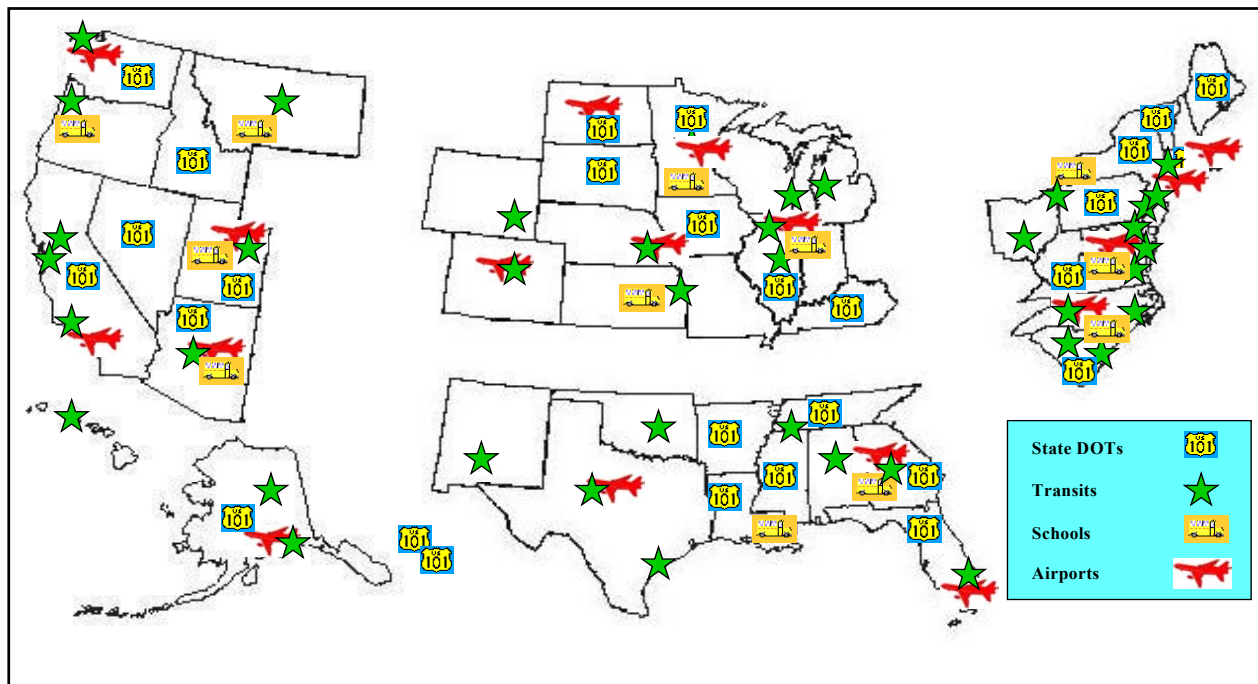


Figure 3-2 State and local entities participating in WIST needs validation.

these state and local entities that participated in validating the WIST templates. The distribution was designed to include locales that experience almost every kind of weather that occurs in the United States, as well as covering the full range of transportation environments, from the vast open spaces of the West to the densely packed urban corridor of the East Coast. (Note that the map is only a rough representation; icon placement is only approximate. Where there are multiple entities of the same type within the same geographic area, a single icon for that type of entity is shown, to reduce clutter.)

3.2.1 State Departments of Transportation

Although there are some differences among the various states, in general the core functions of the state departments of transportation are similar and can be expressed as a generic mission statement. Their mission is to provide, operate, and maintain safe, environmentally sound, and reliable transportation systems and public facilities cost-effectively. These state agencies design, construct, operate, and maintain state transportation systems, buildings, and other facilities. Their responsibilities include maintaining and operating thousands of miles of roads and thousands of bridges. They test and license millions of drivers and register thousands of motor vehicles, boats, and aircraft. They assist in developing, preserving, and improving hundreds of public airports and thousands of miles of railroads and multi-use trails. The state departments of transportation also promote river navigation, provide financial and management assistance to public transit systems, support safe transport of commodities through thousands of miles of pipeline, maintain harbor facilities and ferry systems, and regulate intrastate commercial carriers.

Participating State Departments of Transportation	
Western Region	Alaska, Arizona, California, Idaho, Nevada, Utah, Washington
Central Region	Iowa, Illinois, Kentucky, Minnesota, North Dakota, South Dakota
Southern Region	Arkansas, Louisiana, Mississippi, Tennessee
Eastern Region	Connecticut, Maryland, Maine, New Hampshire, New York, Pennsylvania, South Carolina, Virginia, Vermont

The primary interest in weather information of the state transportation departments is road and highway maintenance to ensure safe movement of traffic and roadway integrity.

Winter Road Maintenance

A brief look at several areas important to state departments of transportation underscores the imperative to move forward in meeting WIST needs. The first area is winter road maintenance; state and local agencies spend more than \$2 billion on snow and ice control operations each year (FHWA 1998, p. 16). Timely decisions on snow and ice control can prevent roads from being closed and reduce the number of accidents. Accurate decisions prevent unnecessary deployment of vehicles and material—a crucial advantage in areas where each deployment represents a sizeable portion of the local road maintenance budget.

In addition to resource costs, there is also a productivity cost to bear. In any given year, half of the U.S. population has a 5 percent or greater chance of being affected by a hurricane; 69 percent of the of the population lives in areas that normally have more than 5 inches of snowfall each

year. Seventy-four percent of the National Highway System is in the nation's snow belt. A one-day highway shutdown due to snow costs a metropolitan area between \$15 million and \$93 million in lost time wages, retail sales, and taxes (Johnson 2001).



Snow removal is a major road maintenance cost for many states. Better WIST implementation can help reduce these costs, while improving service and safety for highway users. Copyright AP Wide World Photos.

Tropical Cyclone Evacuation

Hurricane evacuation proceeds more quickly by using both sides and all lanes of a coastal highway. Copyright AP World Wide Photos.

A second area of great concern to the state departments of transportation, as well as to FHWA and FEMA, is hurricane evacuation of coastal areas. In 1993, 35 million people lived in 22 coastal counties. By 2010, this number will increase to 76 million, and no new roads are planned. Nearly 60 percent of the deaths attributed to Hurricane Floyd were drownings involving vehicles. During this one hurricane, approximately 3 million people were evacuated from Florida, Georgia, and North and South Carolina, resulting in record congestion problems. Because emergency center managers with the South Carolina Department of Transportation and the State Highway Emergency Patrol had not agreed on a lane reversal plan prior to the hurricane, lane reversal was not employed during the evacuation. Travel times from the coastal area to inland safe havens increased by factors of two to seven times longer than



normal. The average travel time of 30 minutes from Savannah to I-95 became 3 hours, and the two-to-three hour trip from Charleston to Columbia, South Carolina, grew to between 14 and 18 hours (FHWA 2002d). These consequences, in terms of both safety and economic costs, highlight the critical importance of accurate forecasts with lead times long enough to make decisions to evacuate and then carry out the evacuation efficiently.

3.2.2 Rural and Urban Transit Authorities

Transit authorities, both urban and rural, provide a basic transportation network and commuter resource that is an alternative to the private automobile. Transit authorities build, operate, and maintain these transit systems. While buses and rail vehicles are the most common types of public transportation, other types are commuter ferryboats, trolleys, inclined railways, subways, and people movers.

In many areas, rural transit operators provide services to a diverse clientele that often is spatially dispersed and includes the elderly and the medically or physically challenged. In inclement weather, safe and reliable operation becomes even more important to these travelers. Unfavorable road conditions, vehicle delays, or failure to make pick-ups as scheduled can mean that medical appointments and other essential routines of daily life are missed. These consequences add complexity to rural operations. Timely and accurate weather data complements real-time decision-making and allows for more comprehensive transit planning, adding significant value in ensuring clients are picked-up promptly and arrive safely at their destinations.

Forty transit authorities (see text box) participated in WIST project and specified weather information needs for systems ranging from ferryboats serving Bremerton, Washington, to traditional buses in Omaha, Nebraska.

Participating Rural and Urban Transit Authorities

Western Region (including Alaska and Hawaii)

People Mover Anchorage Public Trans., AK
 Fairbanks, AK
 City of Phoenix, AZ
 METROLINK South. Calif. Regional Rail Authority, Los Angeles, CA
 Bay Area Rapid Transit, Oakland, CA
 Sacramento Regional Trans Authority, CA
 Honolulu Transit, HI
 Great Falls Transit District, MT
 Cherriots Salem Area Mass Trans, OR
 Salt Lake City Transit Authority, UT
 Kitsap Transit, Bremerton, WA

Central Region

Denver Regional Transportation District, CO
 Rockford Mass Transit District, IL
 South Central Illinois Mass Transit District, Centralia, IL
 Grand Rapids Area Transit Authority, MI
 Metro Transit (Minneapolis/St. Paul), MN
 Kansas City Area Transportation Authority, MO
 Omaha, NE
 Milwaukee County Transit System, WI
 Cheyenne Public City Bus, WY

Southern Region

Birmingham-Jefferson County Transit Authority, AL
 Palm Beach County Transit (PalmTrans), FL
 Metro Atlanta Rapid Transit Authority, GA
 Oklahoma City Metro Transit, OK
 Memphis Area Transit Authority, TN
 Corpus Christi Regional Transportation Authority, TX
 Fort Worth Transportation Authority, TX

Eastern Region

Greater Hartford Transit District, CT
 Massachusetts Bay Transportation Authority, Boston, MA
 Montgomery County Dept. of Public Works and Transportation, MD
 City of Charlotte, Dept. of Transportation, NC
 Research Triangle, NC
 New Jersey Transit, Newark, NJ
 New York City Dept. of Buses and Rails, Brooklyn, NY
 The Greater Cleveland Rapid Transit Authority, OH
 Miami Valley Regional Transportation, Dayton, OH
 Southeastern Pennsylvania Transportation Authority, Philadelphia
 Charleston Area Regional Transportation Authority, SC
 Hampton Roads Transit, VA
 Potomac & Rappahannock Transportation Community, VA

3.2.3 Public School Districts

The WIST interests of school districts are similar to transit authorities, with an added concern for young, inexperienced drivers commuting to schools as students.

Whether large or small, whether rural, suburban, or urban, the transportation interests of public school districts are generally the same: the safe and efficient transportation of their students to and from school. Most districts operate fleets of buses, similar in many respects to transit authorities. Fairfax County, Virginia, for example, currently transports more than 104,000 students every day, covering more than 5,000 routes with 1,428 school buses.

In addition, many rural and suburban school systems have another dimension to their transportation problem, which they take seriously. This aspect is the large number of inexperienced, young drivers who drive privately owned vehicles to school. As expected, school systems place the safety of their students first when considering inclement weather decisions. That policy often is reflected in decisions that serve to keep students off the roads during peak traffic periods if road conditions are unfavorable. Prime examples include delaying the opening of schools or dismissing students early, both of which limit students' exposure on the roads during the peak commuter travel times, whether the students are in buses or private autos.

“Safety is primary in all decisions.”
Greg Clemmer, Charlotte-Mecklenburg
Schools, NC

Participating Public School Districts

Western Region

Bozeman, MT
Phoenix, AZ
Salem, OR
Salt Lake City, UT

Central Region

Chicago, IL
Kansas City, MO
Minneapolis, MN

Southern Region

Atlanta, GA
Jackson, MS
New Orleans, LA

Eastern Region

Charlotte, NC
Cleveland, OH
Fairfax County, VA

3.2.4 Regional Airports—Airport Ground Operations

Discussions with airport operations personnel for the WIST study covered a wide range of weather support issues, driven largely by variations in climate associated with the geographic location of the airport. However, even with the diversity in the details received, it was possible to find ranges of values for thresholds and lead times that could be applied to the meteorological events of concern. Further, operational users of weather information were able to concur in the way their individual concerns were treated in the groupings presented in the WIST template for airport ground operations.

Early in the discussions between the OFCM staff and the airport operational personnel, agreement was reached on how to use the terms “advisory” and “warning.” An **advisory** is an alert to the possibility of a particular weather event, including its expected magnitude and duration. In general, advisories have their greatest utility when issued 12 to 24 hours before the weather event occurs. They provide time for planning and marshaling resources to deal with an impending weather event. A **warning** is issued closer to the start of an event, when the meteorological data support a more accurate analysis and forecast with regard to start time, type of event, magnitude, and duration. Warnings generally have their greatest utility when issued 3

to 6 hours in advance of an event's occurrence. Warnings typically trigger specific actions to ensure that all the right preparations have been taken by the time the weather event is likely to occur, so that the event is dealt with efficiently and effectively.

The FAA issues *advisory circulars* to provide guidance to airport owners and operators in developing procedures to deal effectively and efficiently with different situations. A number of the existing advisory circulars treat a variety of situations affected by weather elements. The FAA office responsible for issuing these circulars is FAA/AAS-100. Within the framework of guidance provided by the advisory circulars, each airport establishes policies and procedures for dealing with weather-related events. While a great deal of commonality exists, allowances are made for geographic location, climate, volume of traffic, number of runways, and other characteristics specific to a given airport. In all cases, close coordination must exist between airport operations and air traffic control, as well as between airport operations and all airport tenants.

In the area of current weather support, the WIST study found that virtually every airport operations center contacted derives its weather information from the following sources: the local weather observation taken at the airfield, a service provided by a commercial vendor, the Weather Channel, the local TV station, and to some degree, sources on the Internet. Some airport operations centers continue to work closely with the nearest NWS Weather Forecast Office, even though some of these offices have recently moved away from the airport in order to be collocated with a NEXRAD weather radar site. New technology will contribute to improved weather data displays and to increased accuracy of forecasts, nowcasts, and observations. These improvements are eagerly anticipated by airport operations personnel. They recognize that they can help their situation by a more rigorous and articulate expression of their WIST needs.

Additional opportunities to address WIST needs for airport ground operations include extending the application of existing DOT/FAA investments in weather information technologies and services. Examples include the Integrated Terminal Weather Systems and Weather Support to De-icing Decision Making, both of which are operational technologies.

List of Participating Regional Airports

Western (including Alaska and Hawaii)

Seattle-Tacoma, WA
Los Angeles, CA
Salt Lake City, UT
Phoenix, AZ
Anchorage, AK

Central

Minneapolis-St. Paul, MN
Chicago-O'Hare, IL
Denver, CO
Grand Forks, ND
Omaha, NE
Offutt AFB, NE

Southern

Dallas-Ft. Worth, TX
Atlanta, GA
Miami, FL

Eastern

John F. Kennedy, NY
Charlotte, NC
Washington-Reagan, VA
Washington-Dulles, VA
Andrews AFB, MD
Boston, MA