



ASSOCIATION of
FISH & WILDLIFE
AGENCIES

2022 AFWA Climate Adaptation Survey Report

A Review of Activities at State, Provincial, and Territorial Fish and Wildlife Agencies

A report for the Association of Fish and Wildlife Agencies and the Climate Adaptation Committee. For inquiries and more details about survey data, contact Jacob Blandford, jblandford@fishwildlife.org.

Executive Summary

The Association of Fish and Wildlife Agencies (AFWA) conducted a survey of U.S. state and Canadian provincial and territorial fish and wildlife agencies to assess perspectives, needs, gaps, challenges, and opportunities for climate change adaptation in fish and wildlife management. This biennial survey has been conducted since 2012, yet the 2022 survey was the first time Canadian members of AFWA were included. The survey was designed to gather information that was useful and useable in helping AFWA members advance climate change adaptation.

Responses were received from thirty-five U.S. state agencies plus the District of Columbia, three Canadian provinces and one Canadian territory. The results of the survey were analyzed and summarized as a whole, on a U.S. and Canadian national level, and on a regional scale with four regions that align with the geographic boundaries of the regional associations of fish and wildlife agencies.

Results of the survey were organized into five themes:

1. Demographics of respondents
2. Observed climate changes and their effects on ecosystems
3. Efforts to address climate change
4. Capacity to address climate change
5. Climate adaptation products, information, and sources of information

The responses demonstrate that all responding agencies are taking action to address climate change. Some agencies are changing hunting, fishing, and other regulations governing outdoor recreation due to climate change, most agencies are incorporating climate change considerations into management decisions, and the large majority of agencies are incorporating climate change considerations into management plans. Still, climate adaptation planning outpaces efforts for on-the-ground implementation of climate-adaptive management. This discrepancy between planning and implementation is reflected in the top needs identified by respondents which focused on best management practices and training for implementing fish and wildlife management under future climate conditions, as well as additional funding and capacity for climate adaptation.

As demonstrated by these results and those in previous surveys- state, provincial, and territorial agencies continue to respond to climate change impacts on fish, wildlife, and natural resources, but

several barriers exist to advancing adaptation actions. Among these include lack of funding, staff capacity and expertise, and information on species and habitat specific impacts and how to best address them. The Association of Fish and Wildlife Agencies, along with partner organizations, should use these report findings to better serve agencies' needs and overcome challenges.

Introduction

Since 2012, the Association of Fish and Wildlife Agencies (AFWA) has surveyed state and territorial fish and wildlife agency members on their climate adaptation efforts. These surveys are conducted biennially and meant to assess agencies' climate adaptation planning and implementation, capacity to address climate change, scientific resources being used and existing science gaps, and the obstacles that prevent climate adaptation from advancing. These surveys also guide the efforts of the Climate Adaptation Committee and AFWA's Climate Adaptation Program. For example, the 2018 survey identified the need for more information about habitat connectivity in a changing climate which resulted in the development of the Habitat Connectivity and Climate Change Toolkit and the 2020 survey identified the need for climate adaptation guidance for State Wildlife Action Plans, resulting in the development of the 2nd editions of the *Voluntary Guidance for States to Incorporate Climate Adaptation into State Wildlife Action Plans*. Furthermore, these surveys may be used by partners, a recent publication about species range shifts from scientists at the U.S. Geological Survey's Climate Adaptation Science Centers cited AFWA's 2020 Climate Adaptation Survey as motivation for their research and publication.

Some revisions were made to the 2022 survey in order to make the data and results more actionable. The first revision was the inclusion of the Canadian provinces and territories for the first time. Climate change is affecting all fish and wildlife and therefore it is pivotal to engage provincial and territorial members to understand their perspectives, efforts, and needs with regards to climate adaptation.

The second revision focused on updating the questions and answer options to ensure the data was useful to helping members with their climate adaptation effort. In past surveys, many questions only allowed 'yes' or 'no' responses, these questions were replaced with multiple choice or open-ended answers that provided more context and detail about the agency's effort. Additional questions were included to assess where capacity exists within an agency, how time is allocated to adaptation, and what efforts are being made to increase capacity to address climate change in fish and wildlife management. While these changes will be beneficial going forward, they do prevent exact comparisons with past survey results. Still, changes were intended to allow for the identification and assessment of trends using past and future surveys.

This report presents the results of the survey but does not make recommendations for next steps or how to proceed with the data. For future surveys, a working group could be formed to administer surveys, evaluate responses, and recommend next steps for acting on the data collected.

Methods

The 2022 AFWA Climate Adaptation Survey was shared with fish and wildlife agencies from all states, the U.S. territories, and Canadian provinces and territories. The survey was conducted from October to December 2022. The online survey consisted of 36 questions including a combination of short-answer responses, multiple choice, and ranked-choice. Respondents were also able to skip questions. Agencies

were able to submit more than one response and respondents were given anonymity to encourage candid information sharing.

The results were analyzed and summarized as a whole, on a U.S. national scale, a Canadian national scale, and a regional scale. The regional boundaries aligned with the four regional associations of fish and wildlife agencies – Western Association of Fish and Wildlife Agencies (West), Midwest Association of Fish and Wildlife Agencies (Midwest), Northeast Association of Fish and Wildlife Agencies (Northeast), and Southeastern Association of Fish and Wildlife Agencies (Southeast).

Results

Results of the survey are presented in themes organized around the demographics of respondents, the climate changes and impacts observed by fish and wildlife agencies, the efforts being made to address climate change, and the resources, products, and information being used by agencies in their planning and management efforts. In general, results are presented for all responses, and it is reported when notable differences were present between U.S. and Canadian responses or when regional results varied from the total responses.

Demographics of respondents

Forty-six (46) responses were submitted representing 35 states plus the District of Columbia, three Canadian provinces and one Canadian territory (Table 1). A complete list of agencies within each geographic region is included in Appendix I.

Table 1. Response rate by region.				
	Number of states, territories, provinces*	Total agency responses	Number of agencies responding	% of agencies responding
AFWA	67	46	40	60%
USA	54	41	36	67%
Canada	14	5	4	31%
Midwest	16	6	6	38%
Northeast	21	11	11	52%
Southeast	17	9	8	47%
West	23	16	13	57%
*Some state agencies are members of multiple regional associations				

Respondents represented a broad assortment of positions within their agencies. The top respondents serve as Staff Scientists/Specialists (26.09%), Managers (23.91%) and Executive (10.87%). The Other category (21.74%) included more specific titles such as State Wildlife Action Plan Coordinator as well as titles like Director (i.e. Executive) and Wildlife Diversity Program Manager (i.e. Manager) which could be classified within the categories already included in response options (Figure 1).

Every ecosystem type was represented in responses asking about the primary focus of respondents. The top focal ecosystems are Inland Waters (55.32%), Forests (51.06%), and Wetlands (46.81%). Other

ecosystem focuses include tundra, meadows, taiga, alpine, and freshwater estuarine habitats (Figure 2). Future surveys could ask if respondents focus on habitat management or species management and ask for further specificity within these categories (e.g. game or non-game species).

Figure 1. What role do you fill in your agency?

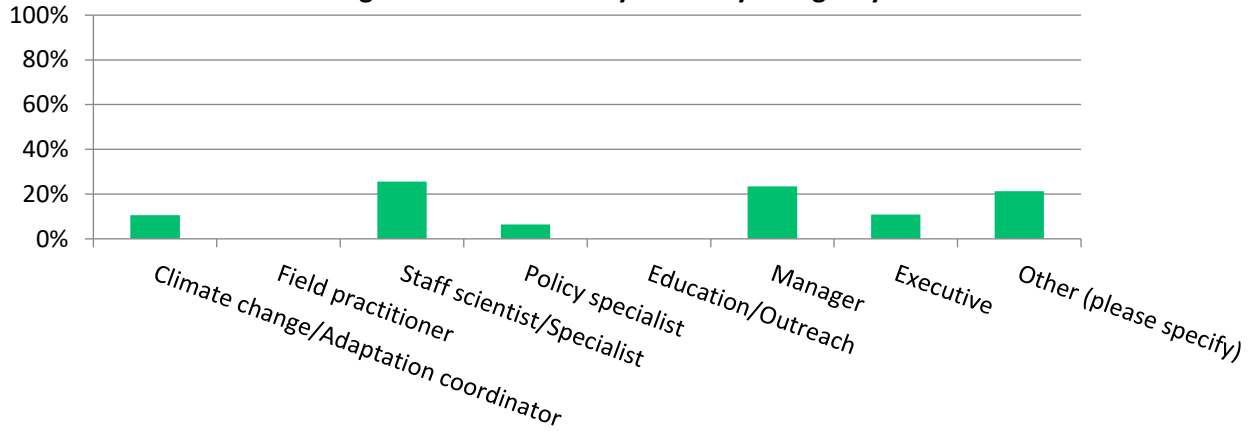
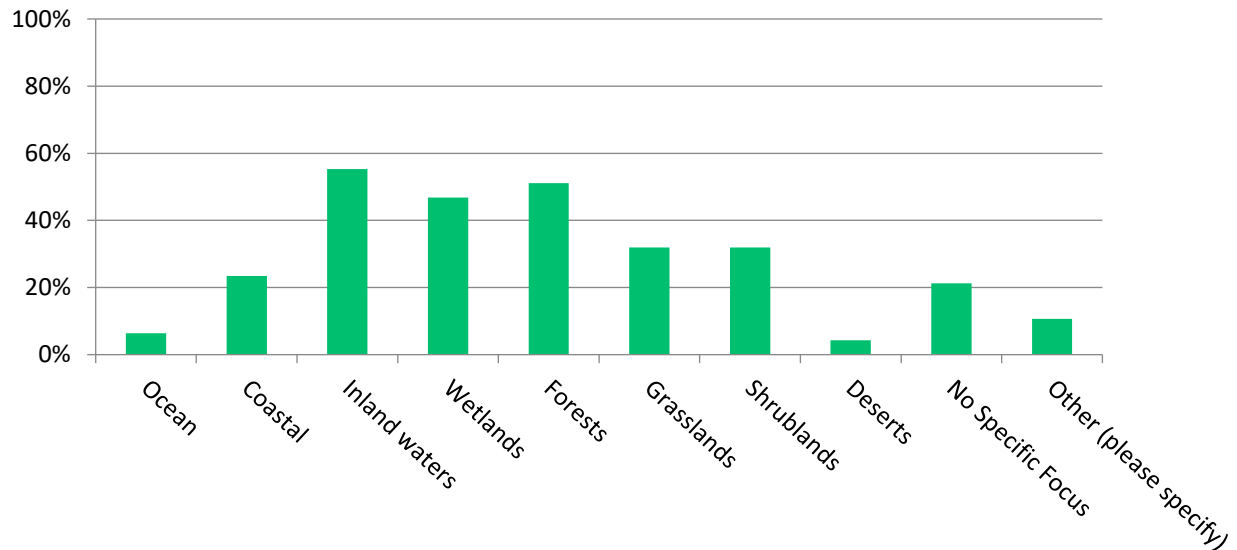


Figure 2. What ecosystem(s) are you most familiar with or do you primarily focus on?



Observed Climate Changes and Their Effects on Ecosystems

The top concerns regarding climate-related changes in environmental condition identified by respondents included increasing temperatures (78%) and changing amount and timing of precipitation (74%) (Figure 3). Other top concerns varied by region (Table 2). In addition to rising temperatures and changing precipitation, the Midwest identified increased weather variability (81%) and changing phenology (81%) as top concerns, the Northeast is concerned about too much water (flooding) (73%), the Southeast is concerned about sea level rise (67%), and the West is concerned about drought (81%) and wildfires (81%).

Figure 3. What are your agency's top concerns regarding climate-related changes in environmental conditions?

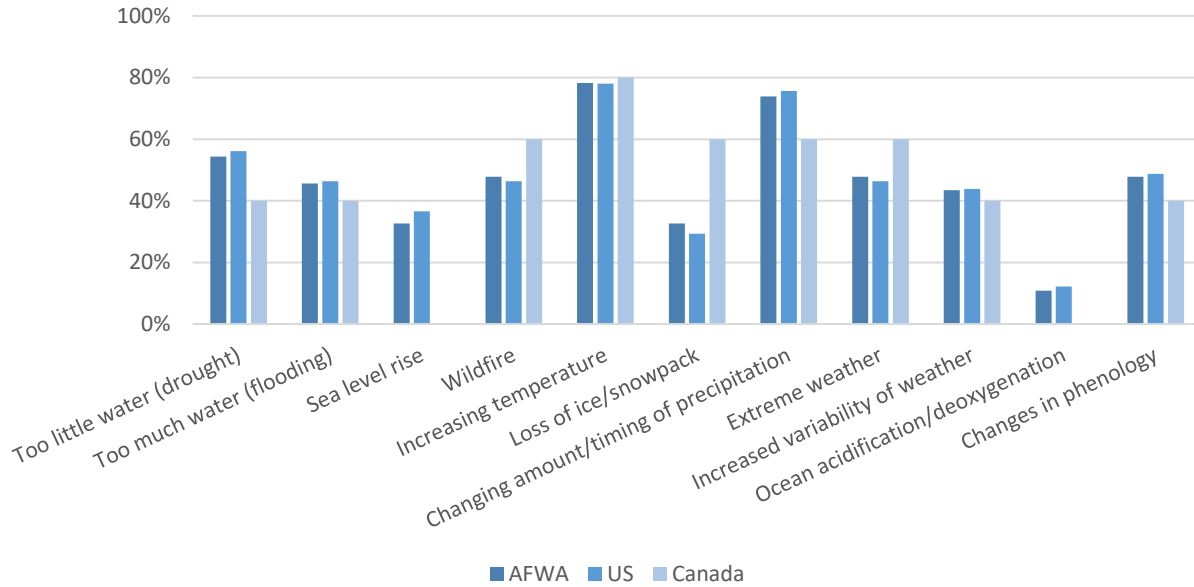
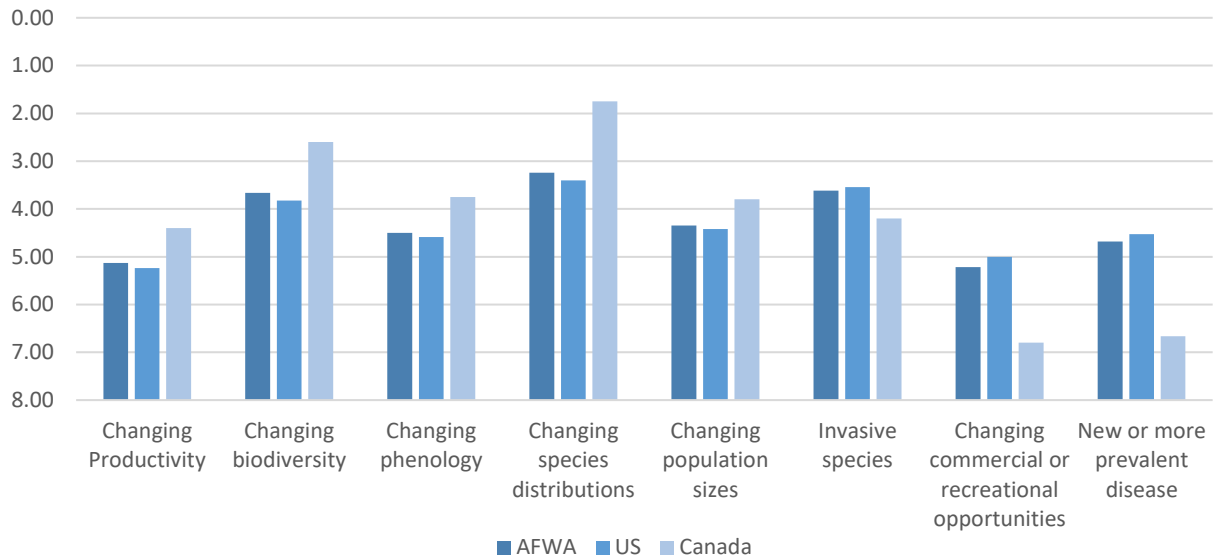


Table 2. Top three concerns regarding climate-related changes in environmental conditions by region

	#1	#2	#3
Midwest	~ Increasing temperature; ~ Changing amount/timing of precipitation; ~ Increased variability of weather; ~ Changes in phenology (81%)	-	-
Northeast	~ Increasing temperature; ~ Changing amount/timing of precipitation (91%)	Too much water (flooding) (73%)	-
Southeast	~ Sea level rise; ~ Increasing temperature; ~ Changing amount/timing of precipitation (67%)	-	-
West	~ Too little water (drought); ~ Wildfire (81%)	~ Increasing temperature (69%)	-

Respondents ranked their top concerns regarding climate-related impacts on natural resources on a scale of 1-8 with 1 equal to the most important concern. For all respondents, the top concerns are changing species distributions (3.24) and changing biodiversity (3.62). Respondents from the US also identified invasive species as a top concern (3.54) while Canadian respondents are concerned with changing phenology (3.75) (Figure 4). Regionally, many of the same concerns rise to the top although their rank varies (Table 3).

Figure 4. What are your agency's top concerns regarding climate-related impacts on natural resources?

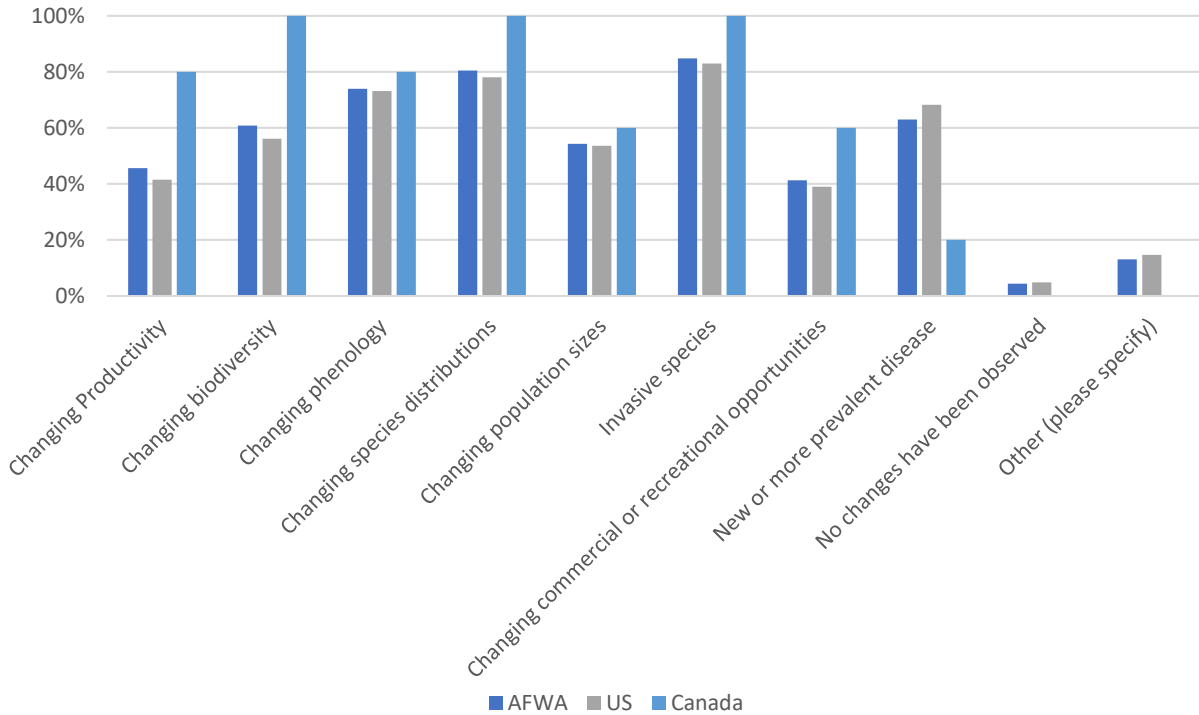


	#1	#2	#3
Midwest	Changing species distributions (2.67)	Changing phenology (2.80)	~ Invasive species; ~ New or more prevalent disease (3.6)
Northeast	Invasive species (2.73)	Changing biodiversity (3.6)	New or more prevalent disease (3.64)
Southeast	Changing biodiversity (2.71)	Changing species distributions (3.33)	Changing population sizes (4.71)
West	Changing species distributions (3.00)	Changing population sizes (3.47)	Changing biodiversity (4.23)

An interesting result of the survey is that the agencies' top concerns about climate change impacts to natural resources (Figure 4, Table 3) do not align with the impacts being observed (Figure 5). Eighty-five

percent of all respondents identified invasive species as being observed in their area. Changing species distribution (80%) and changing phenology (74%) were the other top concerns. Canadian respondents identified changing biodiversity (100%) as a top observed impact. Invasive species are the top observed impact in the Northeast, Southeast, and West but changing phenology and new or more prevalent disease were the top observed impacts in the Midwest (Table 4).

Figure 5. Have any of the following climate-related changes in environmental conditions and/or natural resources been observed in your area?



	#1	#2	#3
Midwest	~ Changing phenology; ~ Changing species distributions; ~ New or more prevalent disease (83%)	-	-
Northeast	Invasive species (91%)	~ Changing phenology; ~ Changing species distributions (73%)	-
Southeast	Invasive species (78%)	~ Changing species distributions;	-

		~ New or more prevalent disease (67%)	
West	~ Invasive species; ~ Changing species distributions (88%)	Changing phenology (81%)	-

Respondents ranked organizational changes due to climate change that are occurring in their agency on a scale of 1 – 5 with a score of one meaning no change occurred and a score of five meaning major changes have occurred. Agencies are experiencing some organizational changes due to climate impacts although few major changes were reported. For all respondents, adding capacity to address climate change scored 1.91, redirecting existing capacity and resources to address climate impacts scored 2.22, and climate change related damage to facilities scored 2.31 (Figure 6). Regional results showed the same trend, although both the Midwest and Northeast reported higher levels of damage to agency facilities (Figure 7).

Figure 6. Has your agency experienced any of the following organizational changes due to climate-related impacts?

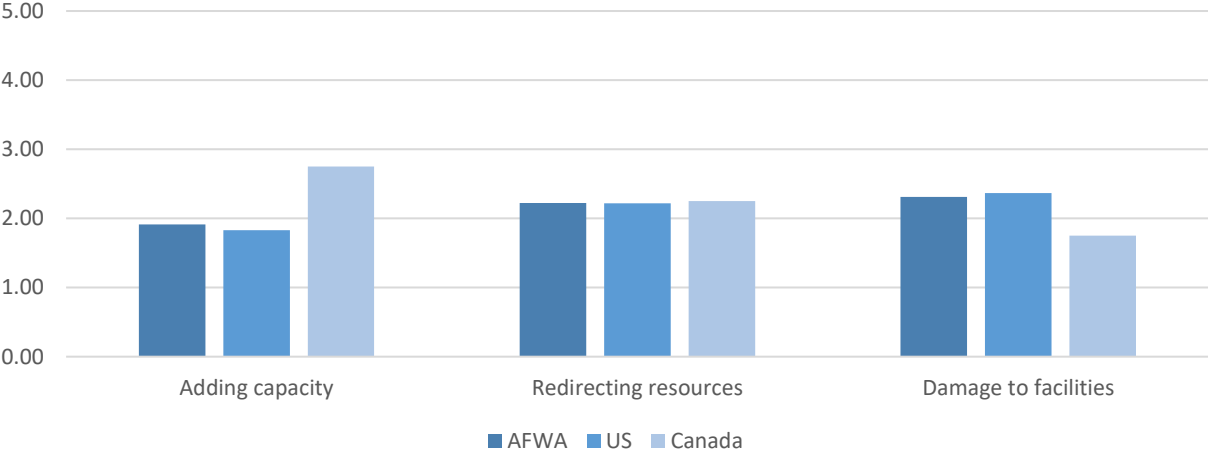
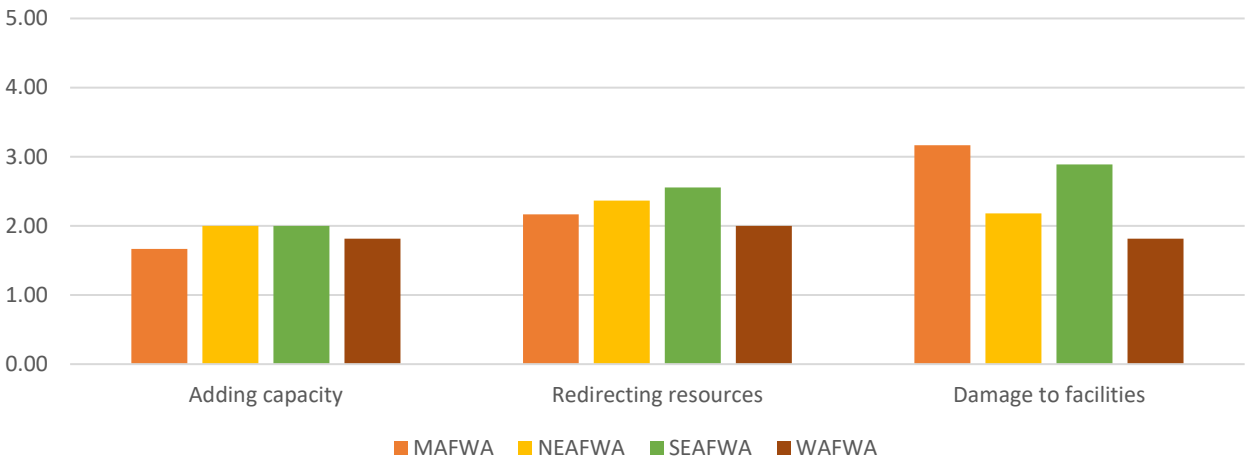


Figure 7. Has your agency experienced any of the following organizational changes due to climate-related impacts?

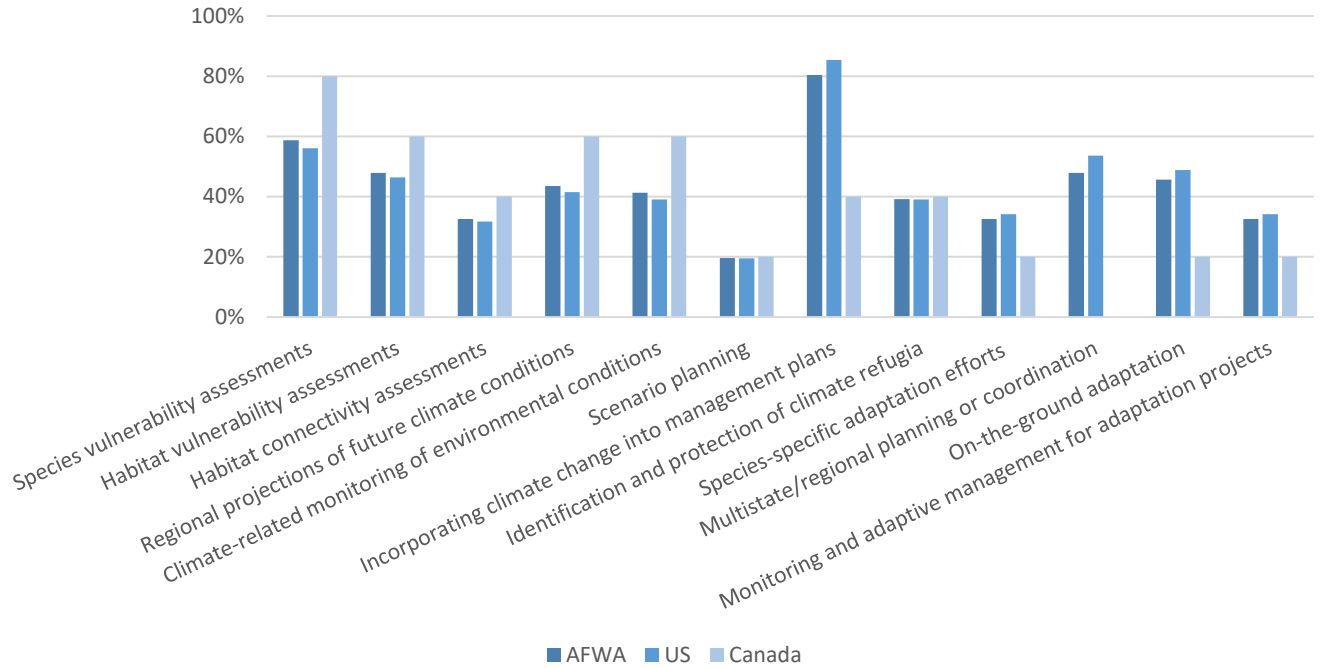


Efforts to Address Climate Change

When it comes to agency efforts to address climate change, more effort has been put into assessing climate change impacts and incorporating climate adaptation into management plans, less effort has been put into implementing on-the-ground adaptation efforts (Figure 8). Eighty percent of respondents said their agency has incorporated climate change into management plans such as their State Wildlife Action Plan and 59% of respondents said their agency has conducted species specific vulnerability assessments. Only 46% of respondents said their agency has implemented on-the-ground adaptation and only 33% of respondents are monitoring those adaptation projects.

Regional results identified similar trends with higher efforts in assessing and planning for climate change impacts (Table 5). The exception to this trend is in the Northeast, where 73% of respondents said their agencies are implementing on-the-ground adaptation projects.

Figure 8. What climate-related activities or planning processes have your agency implemented?

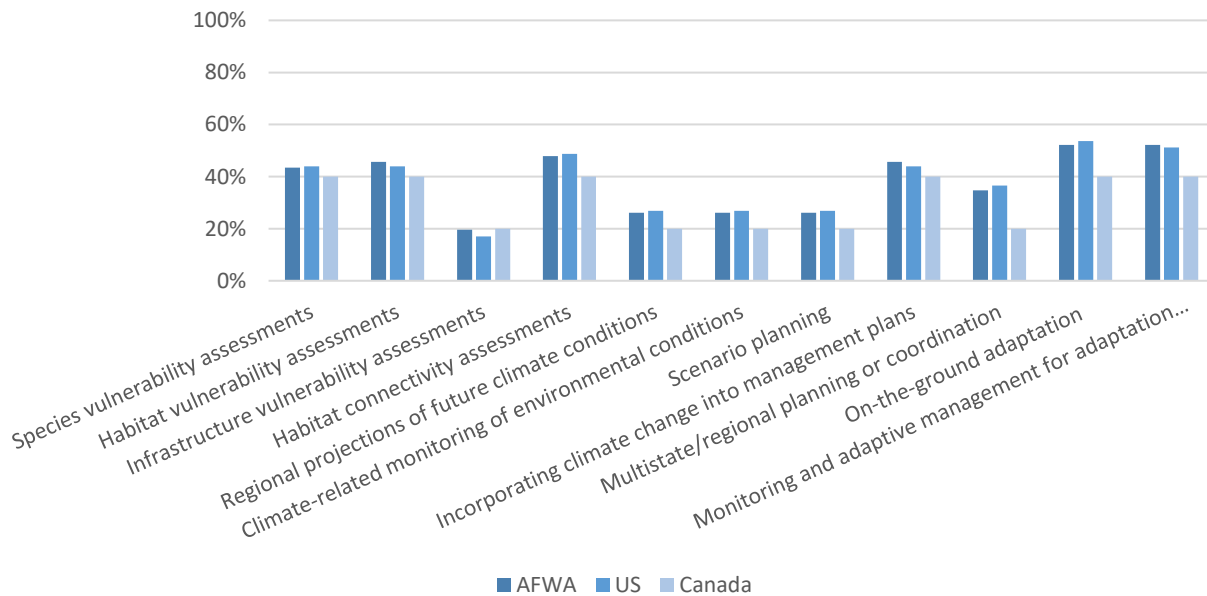


	#1	#2	#3
Midwest	Incorporating climate change into management plans (83%)	~ Species vulnerability assessments; ~ Multistate/regional planning or coordination (50%)	-
Northeast	Incorporating climate change into management plans (91%)	~ Multistate/regional planning or coordination; ~ On-the-ground adaptation (73%)	-
Southeast	Incorporating climate change into management plans (78%)	~ Species vulnerability assessments; ~ Species-specific adaptation efforts (67%)	-
West	Incorporating climate change into	Species vulnerability assessments (56%)	~ Habitat vulnerability assessments;

	management plans (81%)		<ul style="list-style-type: none"> ~ Habitat connectivity assessments; ~ Regional projections of future climate conditions; ~ Identification and protection of climate refugia; ~ On-the-ground adaptation (44%)
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Agencies that haven't already implemented climate adaptation actions are considering taking these actions. Fifty-two percent of respondents said their agency is considering on-the-ground adaptation efforts and monitoring those actions (Figure 9). No other actions are being considered by the majority of respondents although 48% of respondents stated their agency is considering conducting habitat connectivity assessments.

Figure 9. What climate related activities or planning processes is your agency considering implementing?

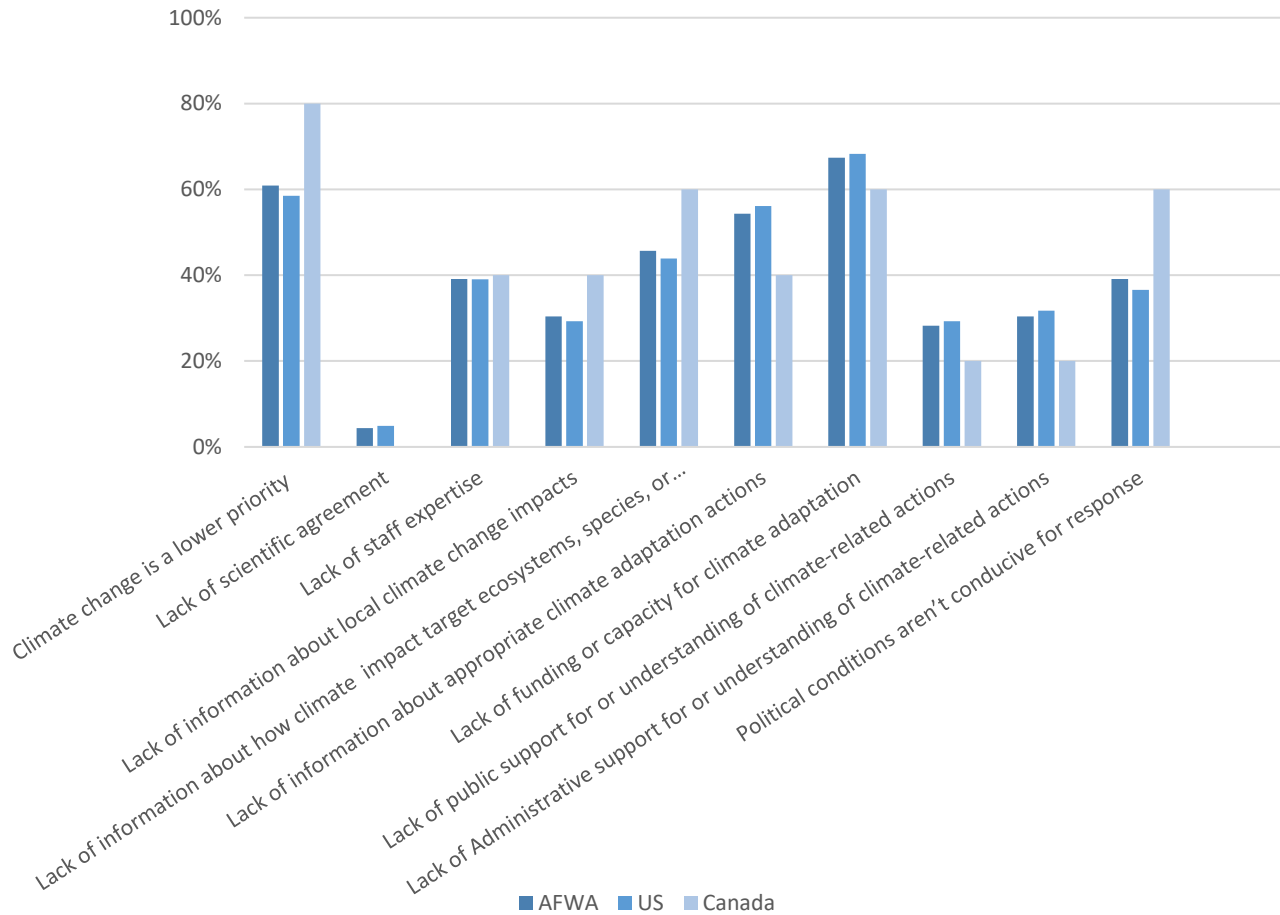


	#1	#2	#3
Midwest	<ul style="list-style-type: none"> ~ Habitat connectivity assessments; ~ On-the-ground adaptation (83%) 	<ul style="list-style-type: none"> ~ Habitat vulnerability assessments; ~ Monitoring and adaptive management for 	-

		adaptation projects (67%)	
Northeast	~ Species vulnerability assessments; ~ Incorporating climate change into management plans; ~ On-the-ground adaptation (55%)	-	-
Southeast	Multistate/regional planning or coordination (56%)	~ Habitat connectivity assessments; ~ Climate-related monitoring of environmental conditions; ~ Incorporating climate change into management plans; ~ On-the-ground adaptation; ~ Monitoring and adaptive management for adaptation projects (44%)	-
West	Monitoring and adaptive management for adaptation projects (63%)	On-the-ground adaptation (50%)	~ Species vulnerability assessments; ~ Habitat connectivity assessments (44%)

Much effort is being made to plan for and address climate change in fish and wildlife management, still there are barriers inhibiting development and implementation of climate adaptive management (Figure 10). The top barrier, selected by 67% of all respondents, was the lack of funding or capacity for addressing climate change. Other barriers that were identified by the majority of respondents were that climate change is a lower management priority for agencies (61%), likely due to a lack of funding or capacity, and a lack of information about appropriate climate adaptation actions (54%). Canadian respondents also identified a lack of information about climate change impacts to target species, ecosystems, or resources (60%) and political conditions that are not conducive to responding to climate change (60%). The regional responses followed a similar trend with a few differences among the regions (Table 7). The Midwest identified a lack of information about climate change impacts to target species, ecosystems, or resources (67%) and the Midwest along with the Northeast identified a lack of staff expertise (67% and 55% respectively). One other difference for the Southeast was the lack of political conditions conducive to responding to climate change (56%).

Figure 10. What barriers have inhibited development or implementation of agency efforts to adapt to climate-related changes?

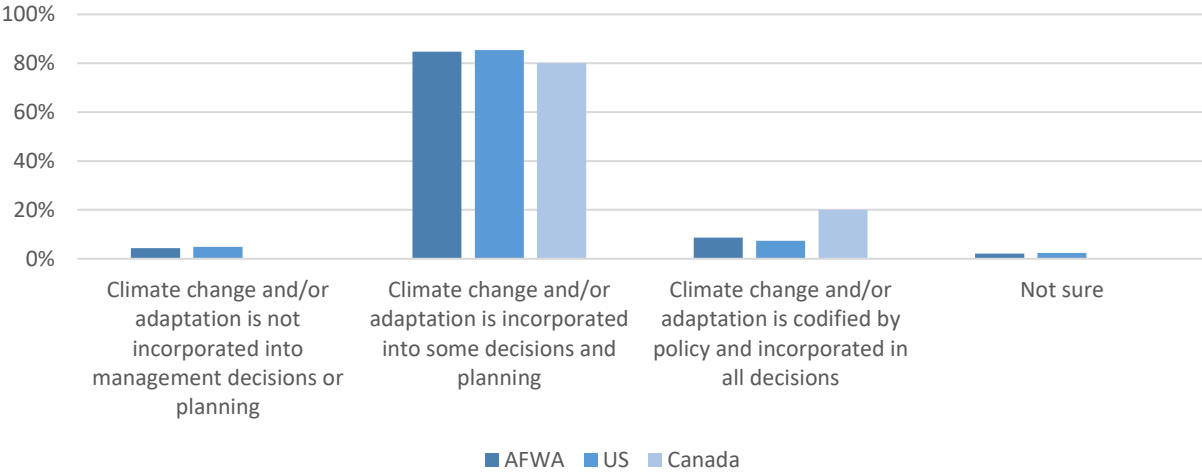


	#1	#2	#3
Midwest	~ Lack of staff expertise; ~ Lack of information about how climate impact target ecosystems, species, or resources (67%)	~ Lack of funding or capacity for climate adaptation; ~ Lack of public support for or understanding of climate-related actions (50%)	-
Northeast	Lack of funding or capacity for climate adaptation (82%)	Climate change is a lower priority (64%)	Lack of staff expertise (55%)

Southeast	~ Lack of information about appropriate climate adaptation actions; ~ Lack of funding or capacity for climate adaptation (67%)	Political conditions aren't conducive for response (56%)	-
West	Climate change is a lower priority (75%)	Lack of funding or capacity for climate adaptation (69%)	Lack of information about appropriate climate adaptation actions (63%)

Survey results show that state, provincial, and territorial fish and wildlife agencies are incorporating climate change considerations into some management planning and decisions but have not incorporated it comprehensively across all planning and decision making. Eighty-five percent of respondents said climate change and/or adaptation are incorporated into some decisions and planning processes. A larger percentage of respondents stated that climate change and/or adaptation are not considered in any management plans or decisions (9%) than said climate change and/or adaptation are incorporated into all decisions (4%) (Figure 11). These same trends apply when separating responses by country, and separating responses by region. The two (2) respondents who said climate change and/or adaptation are incorporated into all management decisions and planning are both located in the Northeast.

Figure 11. To what extent is your agency integrating climate change into management decisions or planning processes?



Some agencies are adjusting hunting, fishing, and other regulations due to the impacts of climate change on the environment or natural resources. Thirty-five percent of respondents (32% of US respondents and 60% of Canadian respondents) said their agency is adjusting regulations (Figure 12). The West was the only region where a majority of respondents (56%) said their agency is adjusting regulations and

there were no respondents from the Midwest stating that climate change has caused agencies to adjust hunting, fishing, or other regulations (Figure 13).

Figure 12. Has your agency adjusted hunting, fishing, or other regulations in response to climate-related changes in environmental conditions or natural resources?

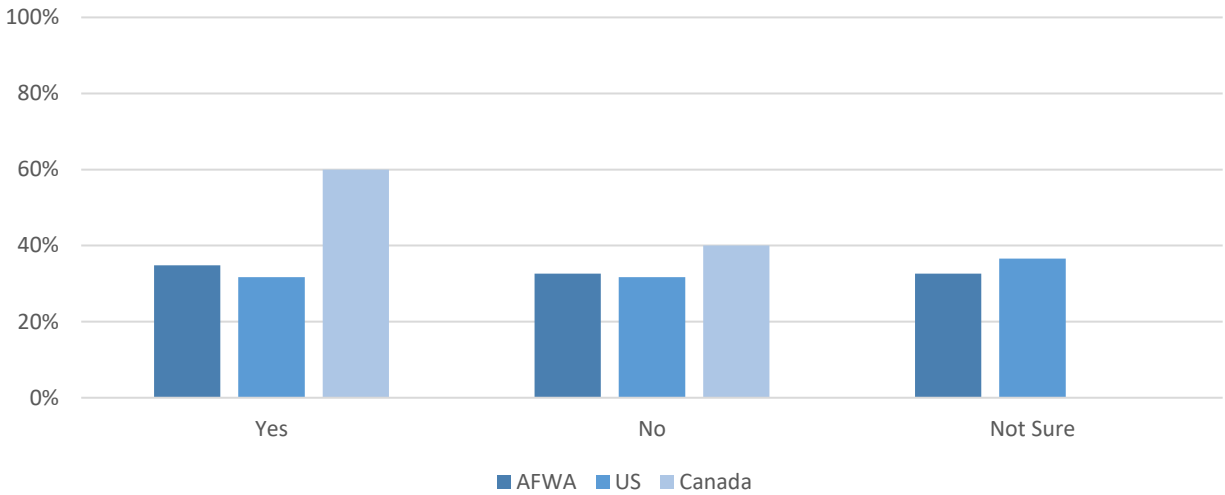
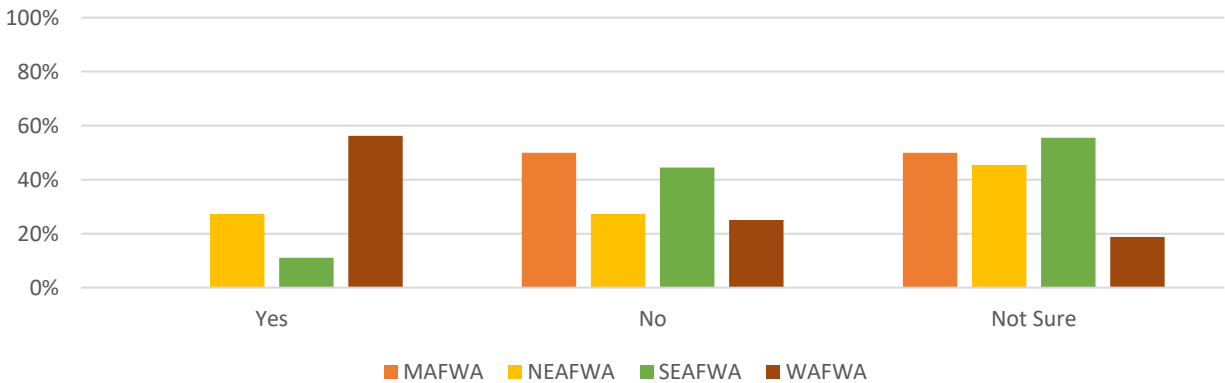


Figure 13. Has your agency adjusted hunting, fishing, or other regulations in response to climate-related changes in environmental conditions or natural resources?



While agencies are taking action to address climate change (Figure 8) and some are adjusting regulations (Figure 12), fewer agencies are doing outreach to hunters, fishers, other recreational users, and the general public about the impacts of climate change on natural resources (Figure 14). Across all respondents, 33% said they are doing outreach to increase awareness of climate change impacts while 57% said they are not doing such outreach. This trend is consistent when viewing responses by country and by region, except in the Northeast, where 55% of respondents said their agency is doing climate change-related outreach (Figure 15).

Figure 14. Is your agency doing outreach to hunters and fishers, recreational users, or the general public to increase awareness of climate change impacts on natural resources?

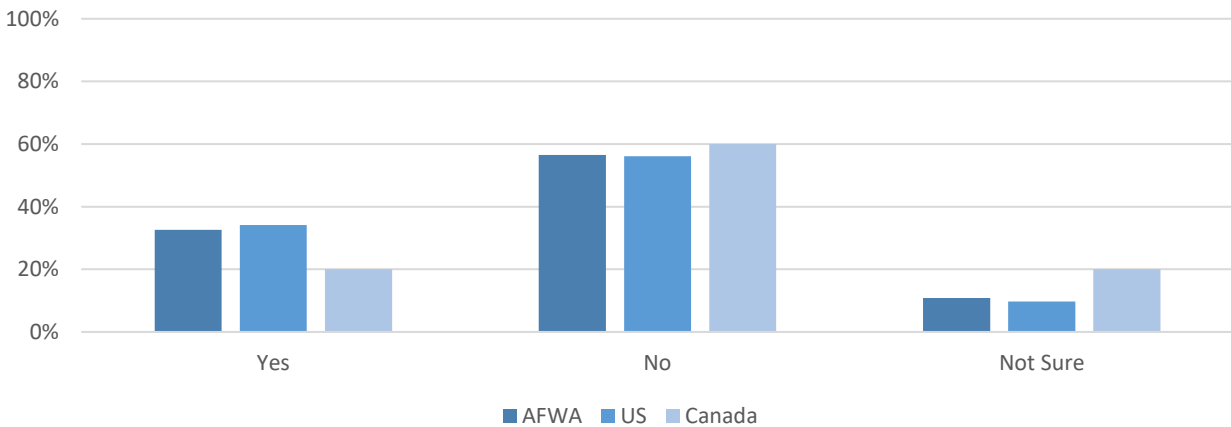
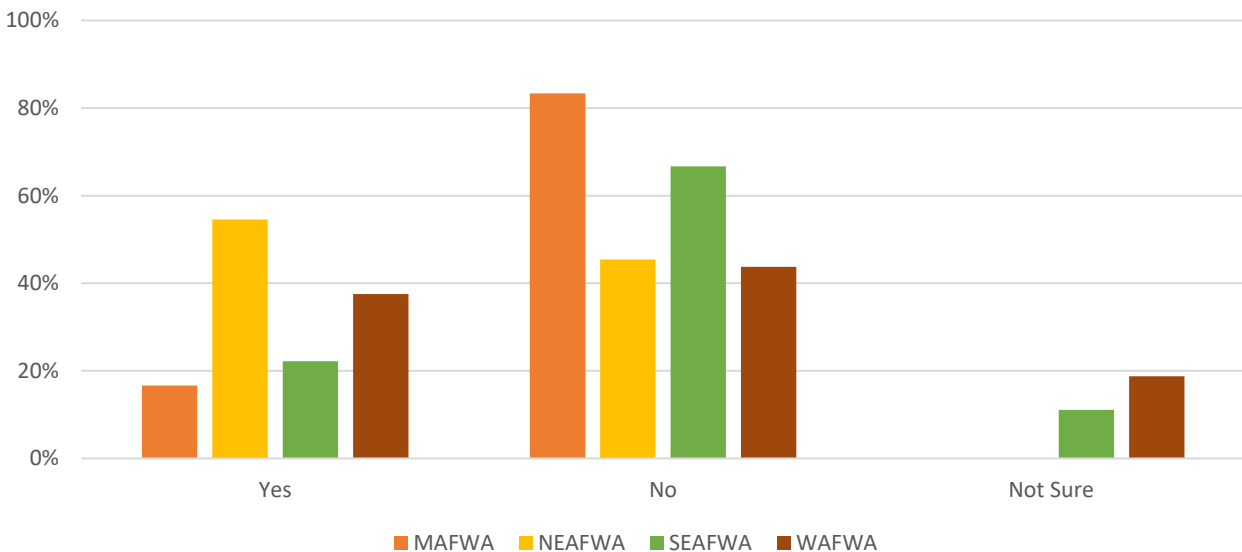


Figure 15. Is your agency doing outreach to hunters and fishers, recreational users, or the general public to increase awareness of climate change impacts on natural resources?



Fish and wildlife agencies are not working alone to address climate change and have engaged with cross-sector agencies on their efforts. Water resources (83%) was the top cross-sector collaborator identified by respondents and the only sector that was selected by a majority of respondents (Figure 16). A majority of Canadian respondents are working with the energy sector (60%). A similar trend is seen in the regions where water resources is the only sector that a majority of respondents are working with. Other cross-sector collaborations differ by region. In the Northeast, a majority of respondents are working with Energy (64%) and Transportation (91%); in the Southeast, a majority of respondents are

working with transportation (56%); and in the Midwest, the majority of respondents are working with agriculture and energy (Figure 17.) Other sectors that were identified by respondents include law enforcement, forestry, and health and human services.

Figure 16. What sectors are your agency working across on climate-related issues?

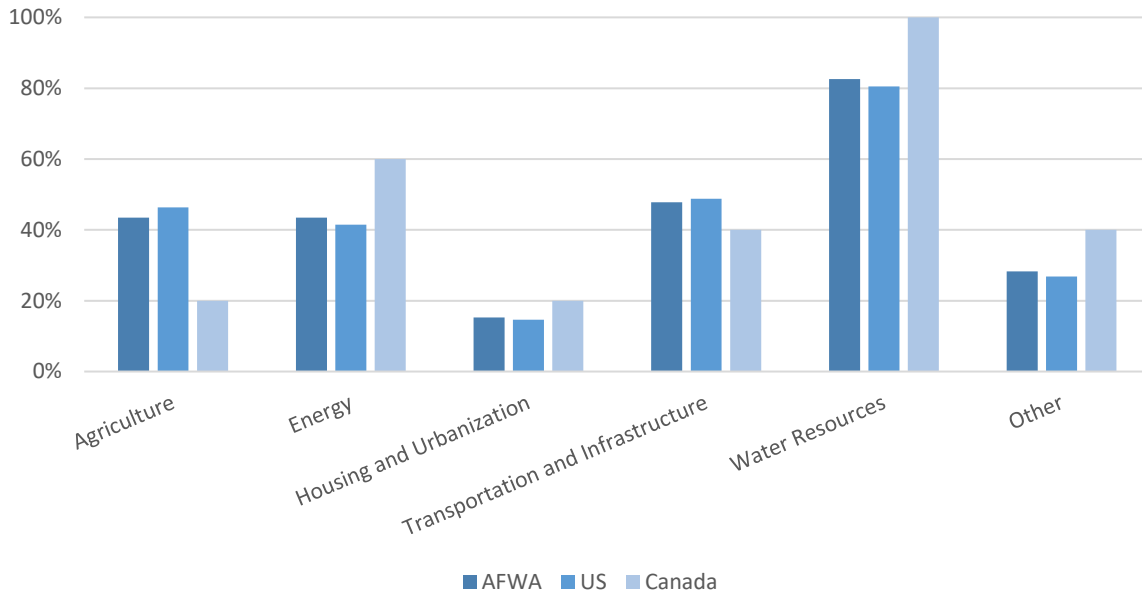
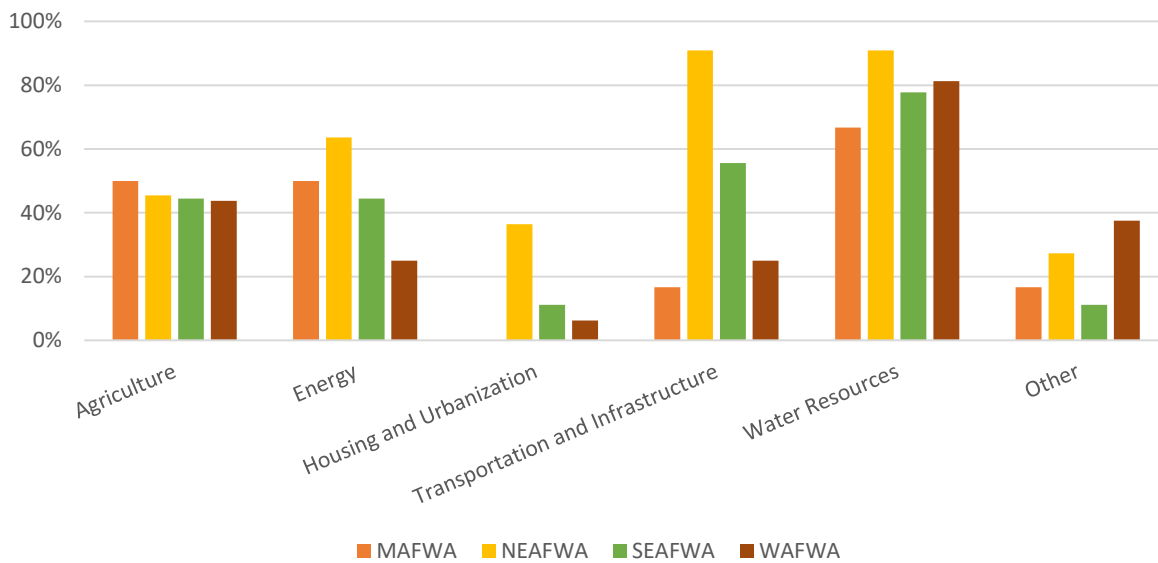


Figure 17. What sectors are your agency working across on climate-related issues?



Agency Capacity to Address Climate Change

The majority of fish and wildlife agencies expect staff to incorporate climate change into their work (54%) while a smaller percentage have a position dedicated to climate related issues (24%) and even fewer have no expectation that climate change impacts are considered in management (17%) (Figure 18). Similar trends are seen when comparing countries although Canada (40%) had more respondents with a dedicated climate position at their agency. The regions followed a similar trend (Figure 19).

Figure 18. How does your agency allocate staff capacity related to climate change and its impacts?

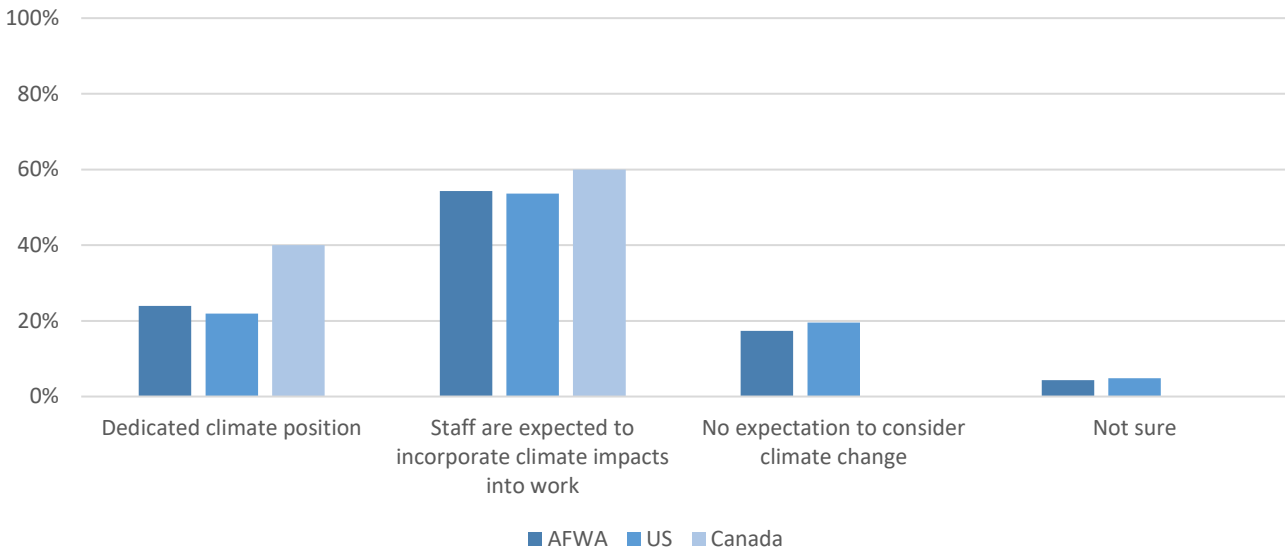
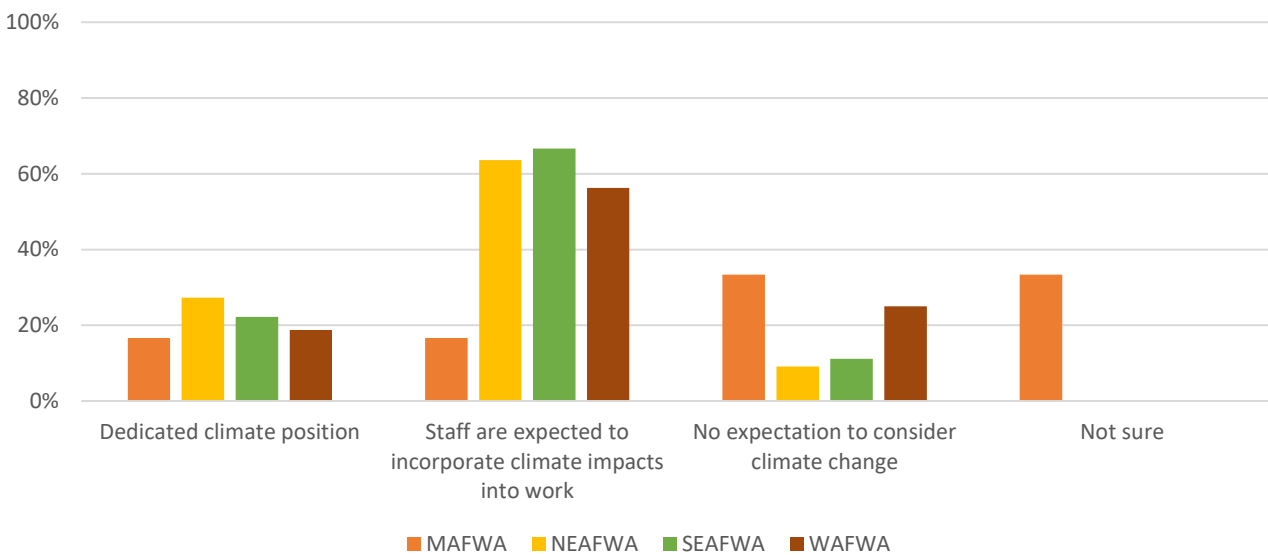


Figure 19. How does your agency allocate staff capacity related to climate change and its impacts?



The large majority of fish and wildlife agency employees have the opportunity to participate in training to increase their knowledge of climate change impacts and adaptation. Overall, 13% of respondents said

their agency has internal climate-related training and 61% are encouraged to participate in external climate related training. Still, 30% of respondents stated that climate-related training was not available to agency staff and no respondents stated climate-related training is required (Figure 20). The regional responses follow the same trend although the Northeast had a higher percentage of respondents who said staff are encouraged to take external climate-related training (82%) (Figure 21).

Figure 20. Does your agency offer the opportunity for staff to take training related to climate-related changes and/or climate-informed natural resource management?

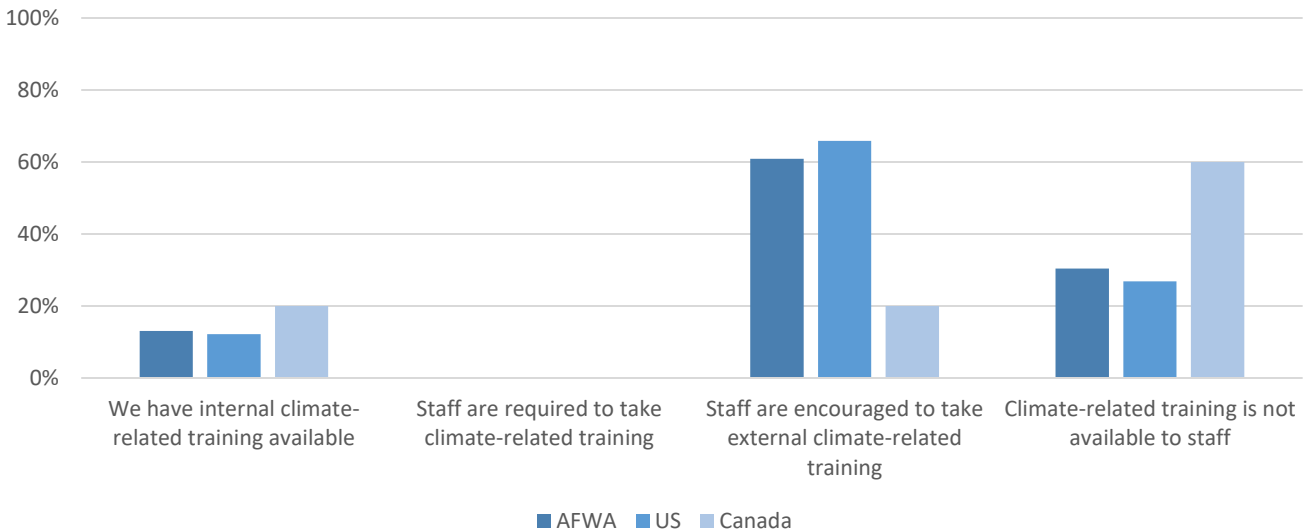
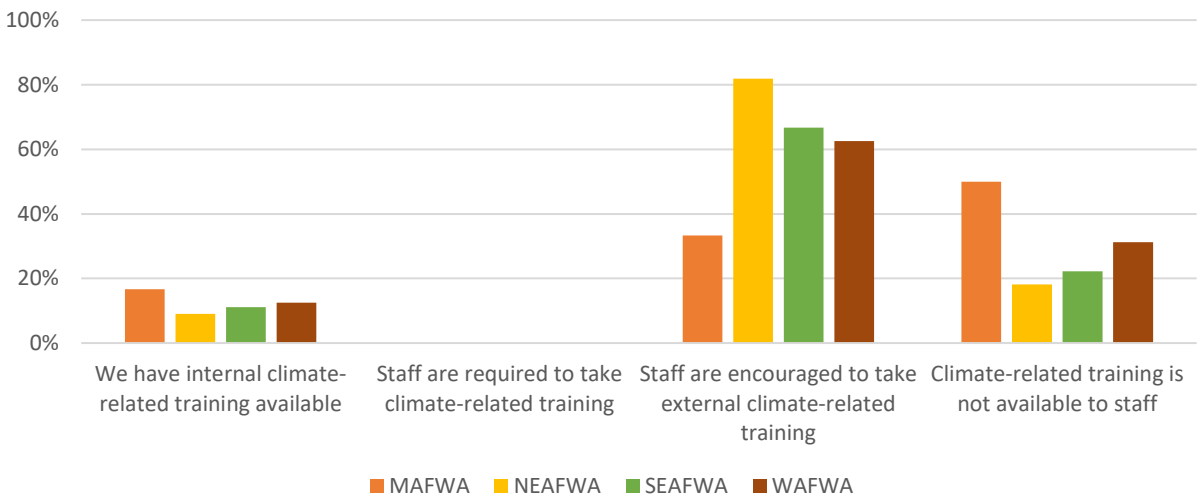


Figure 21. Does your agency offer the opportunity for staff to take training related to climate-related changes and/or climate-informed natural resource management?



Time for incorporating climate information and adaptation planning is allocated across multiple activities and efforts (Figure 22). The top three activities that respondents identified include assessing climate impacts or conducting vulnerability assessments (61%), planning and developing management responses (54%), and learning about climate change impacts (50%). Twenty-two percent of respondents

said no time is being allocated to address climate change impacts. The Southeast and Midwest regions identified these same options as the top activities for allocating time. Implementing on-the-ground actions to address climate change was a top choice in the Northeast (55%) and West (56%) (Figure 23).

Figure 22. Where has staff time been allocated for incorporating climate information and adaptation planning

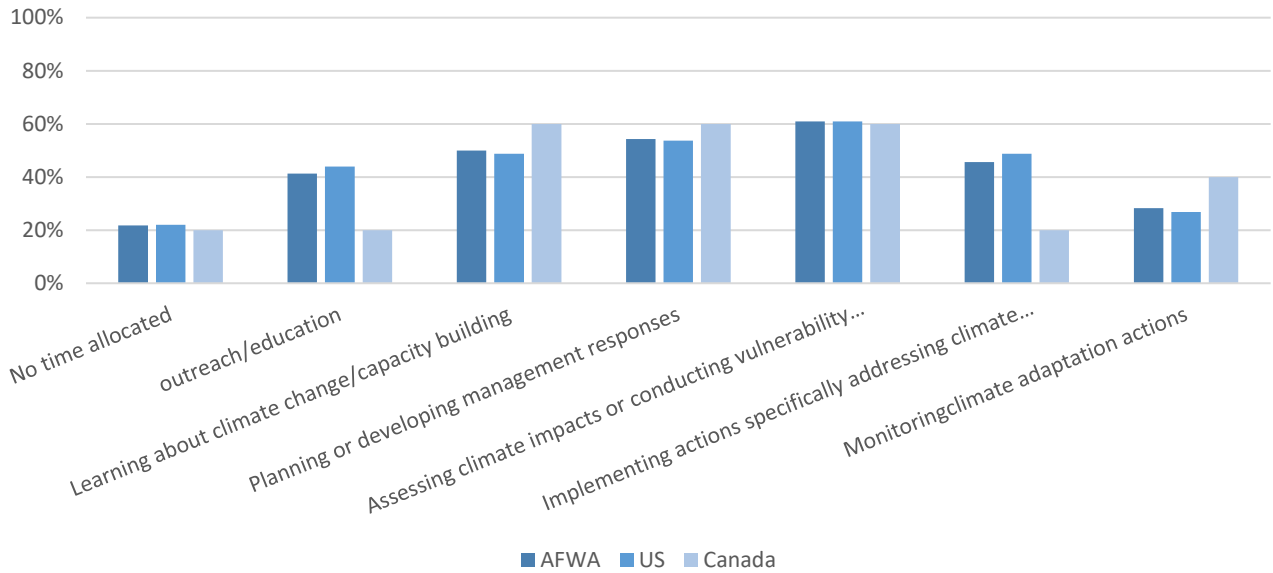
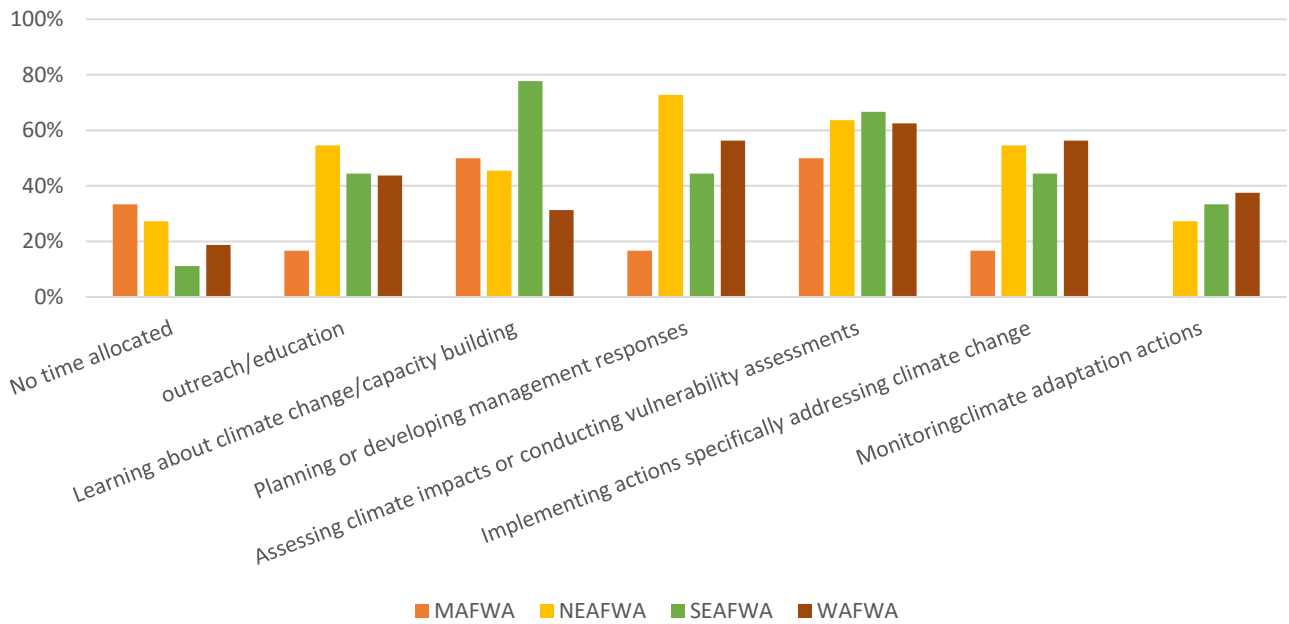


Figure 23. Where has staff time been allocated for incorporating climate information and adaptation planning



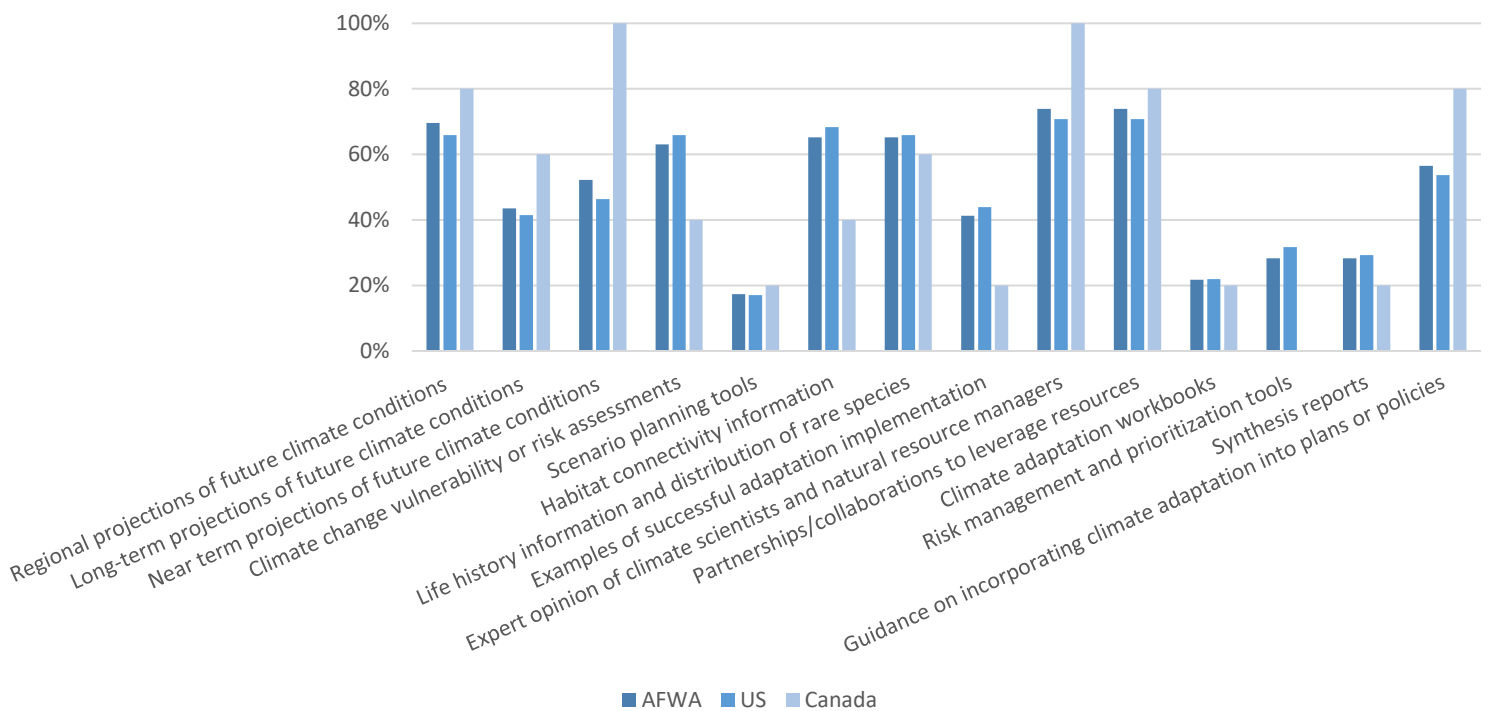
Climate adaptation products, information, and sources of information

There is a lot of information available to inform climate change adaptation and fish and wildlife agencies are using a range of resources, tools, and research (Figure 24). The products and information used by a majority of respondents include:

- 1) Expert opinions of climate scientists and natural resource managers (74%)
- 2) Partnerships/collaborations to leverage resources (74%)
- 3) Regional climate change projections (70%)
- 4) Habitat connectivity information (65%)
- 5) Life history and species distribution data (65%)
- 6) Climate change vulnerability or risk assessments (63%)
- 7) Guidance on incorporating climate change into management plans (57%)
- 8) Near-term projections of future climate conditions (52%)

The top choices by region are included in Table 7.

Figure 24. What products or information is your agency using to inform climate adaptation?



	#1	#2	#3
Midwest	Regional projections of future climate conditions (67%)	Expert opinion of climate scientists and natural resource managers (67%)	Guidance on incorporating climate adaptation into plans or policies (67%)

Northeast	Climate change vulnerability or risk assessments (91%)	Expert opinion of climate scientists and natural resource managers (91%)	Partnerships/collaborations to leverage resources (91%)
Southeast	Life history information and distribution of rare species (78%)	<ul style="list-style-type: none"> ~ Regional projections of future climate conditions; Long-term projections of future climate conditions; ~ Climate change vulnerability or risk assessments; ~ Expert opinion of climate scientists and natural resource managers; ~ Partnerships/collaborations to leverage resources; ~ Guidance on incorporating climate adaptation into plans or policies (67%) 	-
West	Habitat connectivity information (69%)	Life history information and distribution of rare species (69%)	<ul style="list-style-type: none"> ~ Expert opinion of climate scientists and natural resource managers; ~ Partnerships/collaborations to leverage resources (63%)

The products and information that are most needed by fish and wildlife agencies relate to informing on-the-ground adaptation (Figure 25) and may explain why implementing climate adaptive management lags behind adaptation planning (Figure 8). The top product and information needs identified by respondents include:

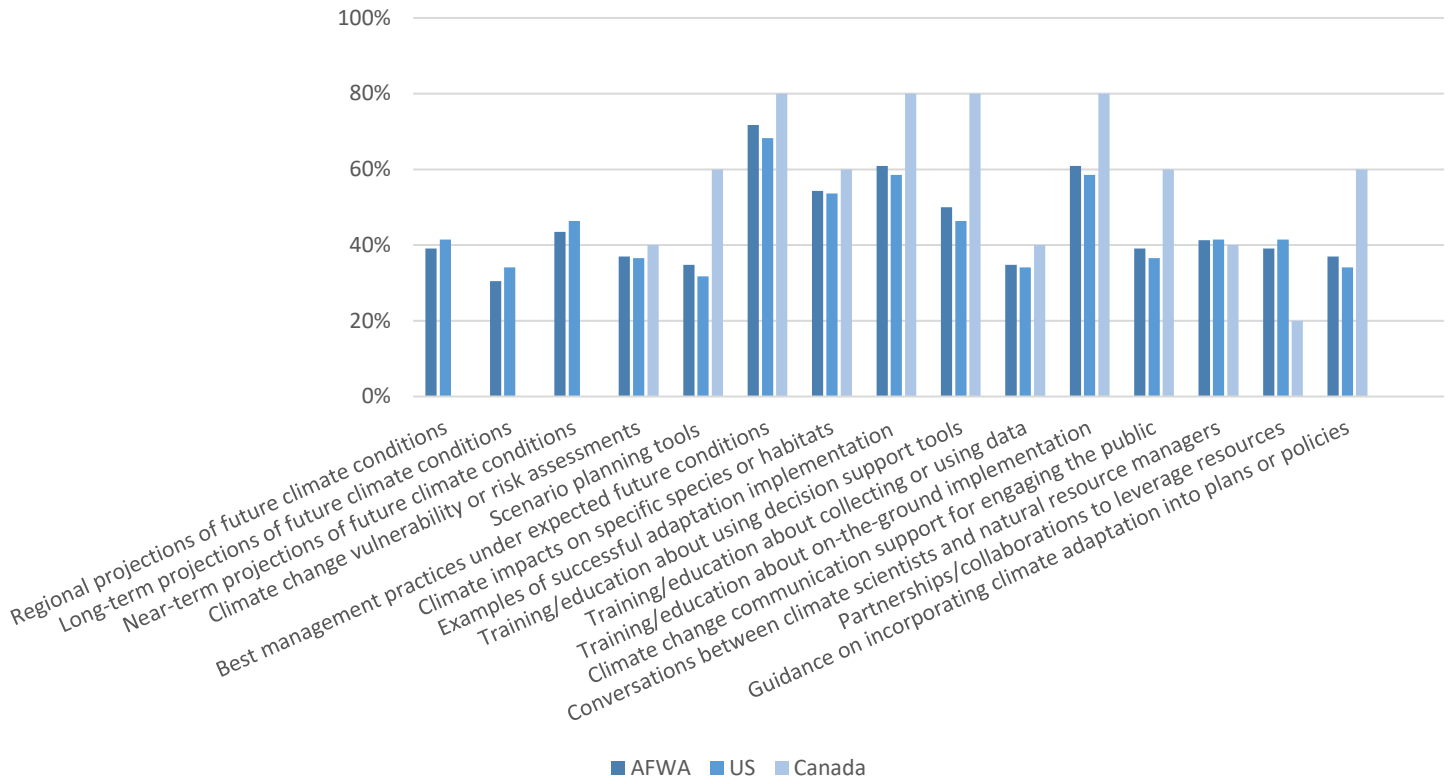
- 1) Best management practices under expected future climate conditions (72%)
- 2) Examples of successful adaptation implementation (61%)
- 3) Training/education about on-the-ground implementation (61%)

Other options that were identified by the majority of respondents include:

- 4) Climate impacts on specific species and habitats (54%)
- 5) Training/education of using decision support tools (50%)

The top choices by region are included in Table 8. Few variations exist between regions except the Southeast identified a need for partnerships to leverage resources (67%) and the Midwest identified a need for more conversations between climate scientists and natural resource managers (67%).

Figure 25. What products or information to inform climate adaptation would be most helpful to your agency?

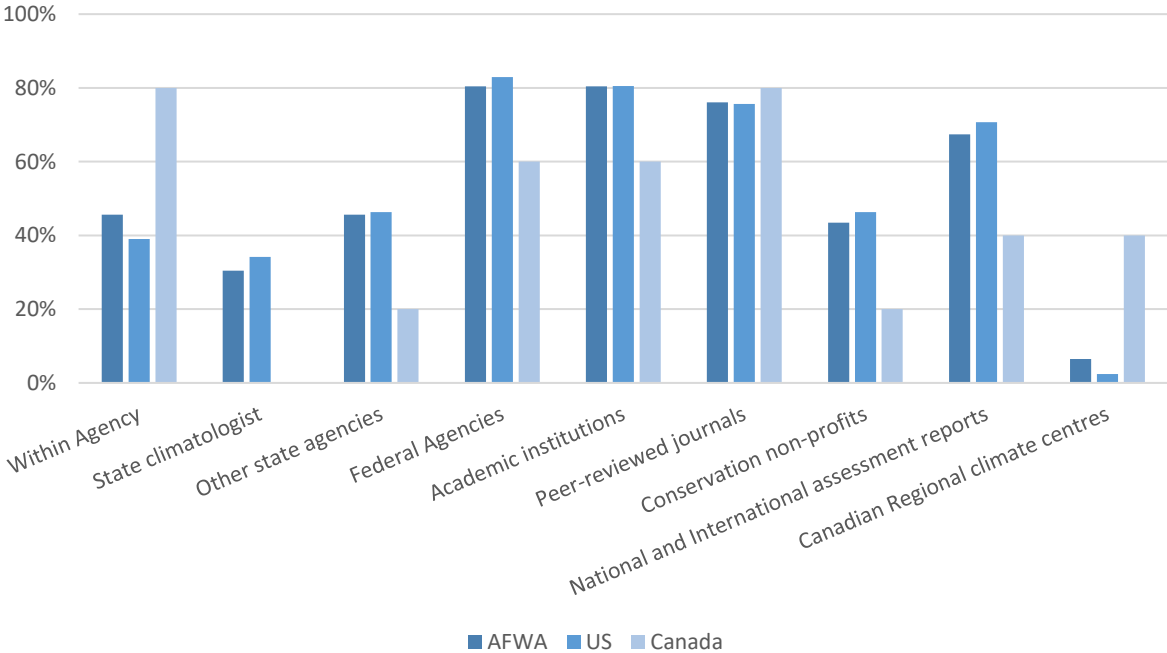


	#1	#2	#3
Midwest	Examples of successful adaptation implementation (83%)	Training/education about on-the-ground implementation (83%)	~ Best management practices under expected future conditions; ~ Conversations between climate scientists and natural resource managers (67%)
Northeast	Best management practices under expected future conditions (82%)	Climate impacts on specific species or habitats (73%)	Training/education about on-the-ground implementation (73%)
Southeast	Best management practices under expected future conditions (67%)	Examples of successful adaptation implementation (67%)	Partnerships/collaborations to leverage resources (67%)
West	Best management practices under	Examples of successful adaptation implementation (56%)	~ Climate impacts on specific species or habitats;

	expected future conditions (63%)		~ Training/education about using decision support tools (50%)
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Climate change information is sourced from a range of government agencies (including their own agency, other state agencies, and federal agencies), conservation organizations, academic institutions, and reports (Figure 26). The top sources of information, both identified by 80% of all respondents, were federal agencies and academic institutions. Peer-reviewed literature was identified as a top source by 76% of respondents and in Canada, 80% of respondents said they get their climate related information from within their agency. Top sources of information by region are listed in Table 9 and show similar results with the addition of national and international assessment reports being identified as a source of climate information by 67% of respondents in the Midwest and 78% of respondents in the Southeast.

Figure 26. Where does your agency get climate-related information?



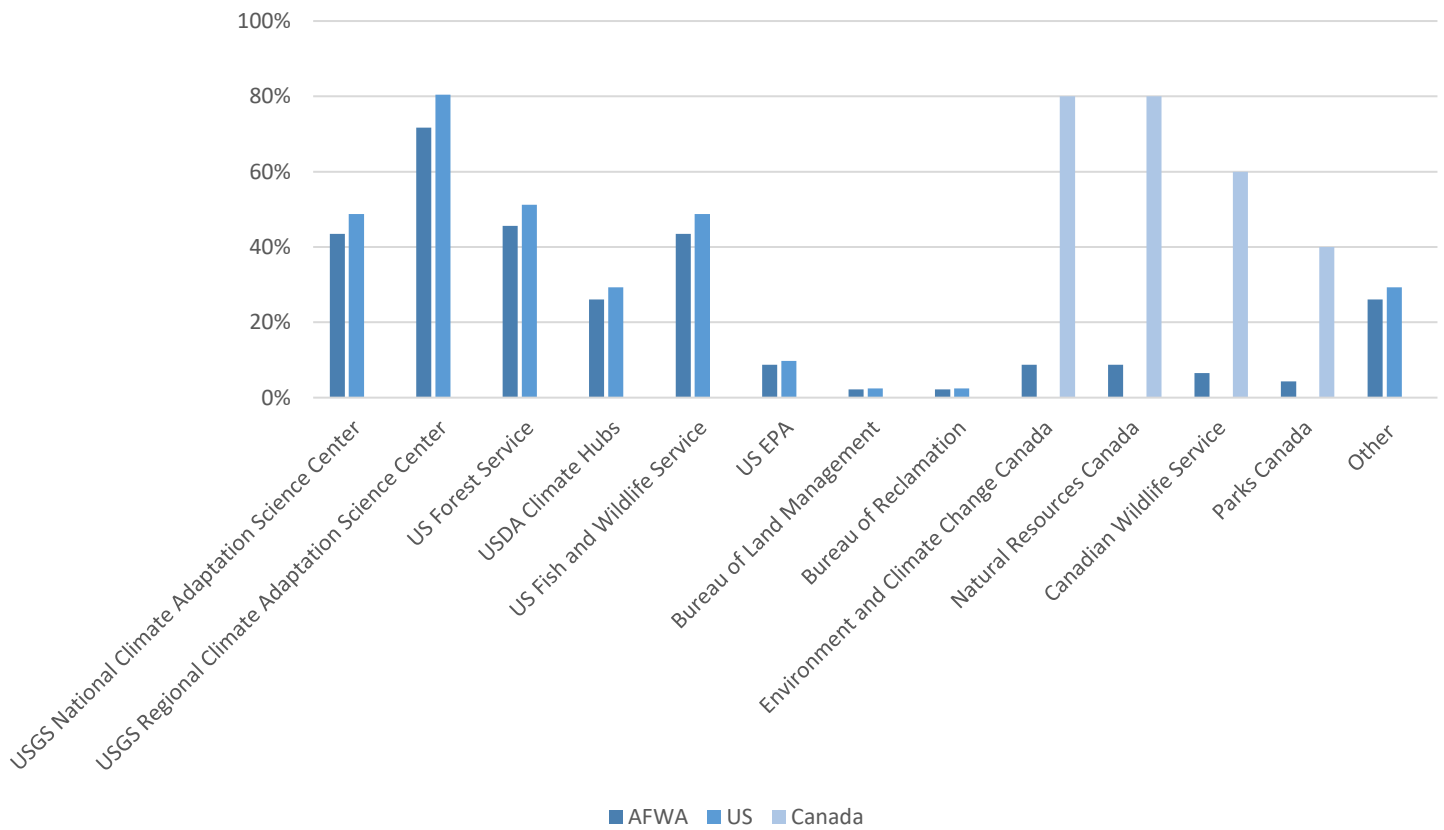
	#1	#2	#3
Midwest	Academic Institutions (83%)	~ Federal Agencies; ~ Peer-reviewed journals; ~ National and International assessment reports (67%)	-
Northeast	Federal Agencies (100%)	Academic Institutions (91%)	~ Other state agencies; ~ Peer-reviewed journals (73%)

Southeast	Federal Agencies (78%)	National and International assessment reports (78%)	Peer-reviewed journals (78%)
West	Federal Agencies (81%)	Peer-reviewed journals (81%)	Academic institutions (81%)

Federal agencies were identified as a top source of climate information by respondents and respondents were asked to identify specific federal agencies where they get their information (Figure 27). In the U.S., 80% of respondents identified the U.S. Geological Survey’s Regional Climate Adaptation Science Centers as a source for information and 51% said they get information from the U.S. Forest Service. These were the only agencies identified by a majority of U.S. respondents although the U.S. Fish and Wildlife Service and the USGS’s National Climate Adaptation Science Center were both selected by 49% of respondents. Regional selections are listed in Table 10 and follow the same trend as the U.S. choices listed above.

In Canada, the top two federal agencies were 1) Environment and Climate Change Canada and 2) Natural Resources Canada, each were identified by 80% of respondents. Sixty percent of Canadian respondents get information from Canadian Wildlife Service, the only other federal agency selected by a majority of Canadian respondents.

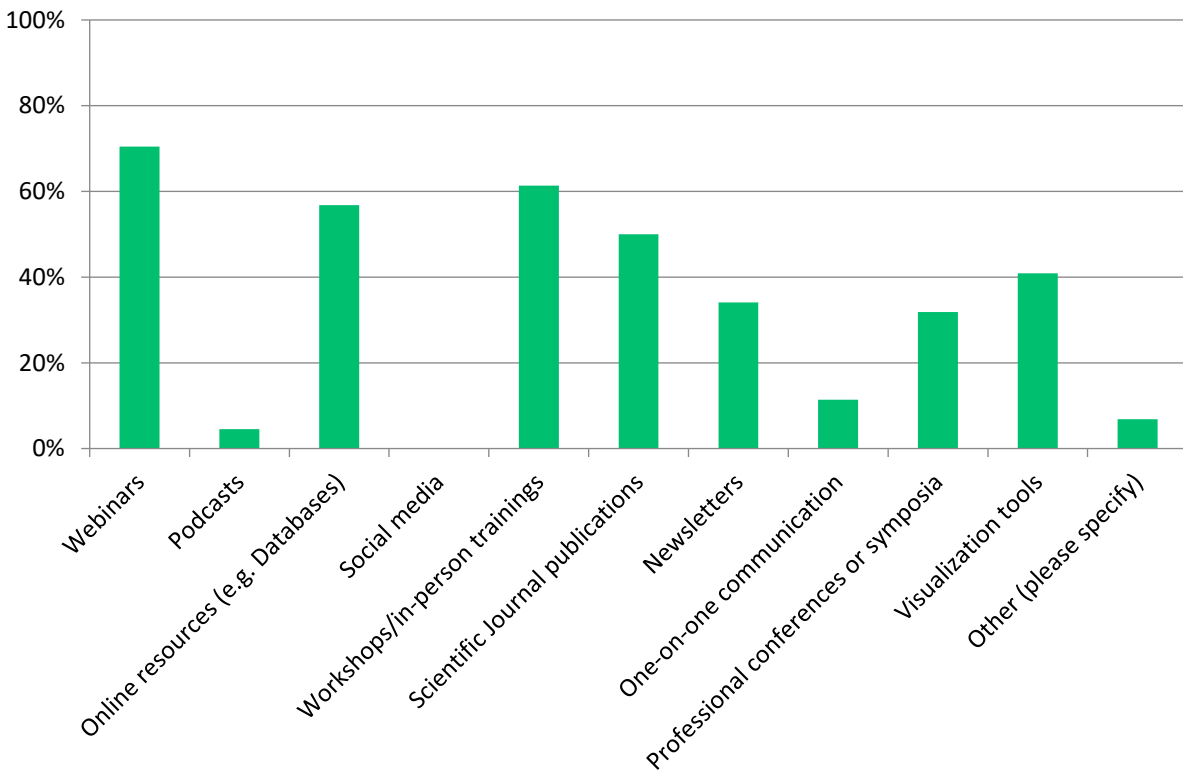
Figure 27. If you get climate related information from Federal Agencies, which agencies do you get your information from?



	#1	#2	#3
Midwest	USGS Regional Climate Adaptation Science Centers (67%)	~ USGS National Climate Adaptation Science Center; ~ US Forest Service; ~ USDA Climate Hubs (50%)	-
Northeast	USGS Regional Climate Adaptation Science Centers (91%)	US Fish and Wildlife Service (82%)	US Forest Service (73%)
Southeast	USGS Regional Climate Adaptation Science Centers (78%)	US Fish and Wildlife Service (67%)	US Forest Service (56%)
West	USGS Regional Climate Adaptation Science Centers (75%)	USGS National Climate Adaptation Science Center (44%)	~ US Forest Service; ~ USDA Climate Hubs (31%)

Finally, respondents were asked for their preferred method of accessing climate related products and information (Figure 28). Sixty-five percent of respondents get their information from webinars. Other top choices were workshops/in-person training (57%) and online resources/database (54%).

Figure 28. What are the preferred mechanisms for accessing these products or information?



Conclusion

As found in years past, fish and wildlife agencies continue to respond to climate change impacts on fish, wildlife, and natural resources. While there is growing recognition and urgency to address these changes, agencies still confront several barriers to advancing adaptation actions. Among these include lack of funding, staff capacity and expertise, information on impacts and how to best address them, and political constraints. The Association of Fish and Wildlife Agencies, and partner organizations, should use these report findings to better serve agencies' needs and help overcome challenges.

Appendix 1. Member agencies in each geographic region

All members	USA	Canada	Midwest	Northeast	Southeast	West
Alberta Environment and Parks		X				X
British Columbia Ministry of Forests, Lands & Natural Resource Operations		X				X
Canadian Wildlife Service		X				
Manitoba Wildlife Branch		X	X			
New Brunswick Department of Energy and Resource Development		X		X		
Newfoundland Department of Environment and Conservation		X		X		
Northwest Territories Department of Environment and Natural Resources		X				X
Nova Scotia Department of Natural Resources		X		X		
Nunavut Wildlife		X				
Ontario Ministry of Natural Resources and Forestry		X	X	X		
Prince Edward Island Forests, Fish and Wildlife Division		X		X		
Quebec Ministère des Forêts, de la Faune et des Parcs		X		X		
Saskatchewan Ministry of Environment		X	X			X
Yukon Department of Environment		X				X
Alabama Division of Wildlife and Freshwater Fisheries	X				X	
Alaska Department of Fish and Game	X					X
Arizona Game and Fish Department	X					X
Arkansas Game and Fish Commission	X				X	
California Department of Fish and Wildlife	X					X
Colorado Division of Parks and Wildlife	X					X
Connecticut Bureau of Natural Resources	X			X		
Delaware Division of Fish and Wildlife	X			X		
Florida Fish and Wildlife Conservation Commission	X				X	
Georgia Wildlife Resources Division	X				X	
Hawaii Department of Land and Natural Resources	X					
Idaho Department of Fish and Game	X					X
Illinois Department of Natural Resources	X		X			

<u>All members</u>	<u>USA</u>	<u>Canada</u>	<u>Midwest</u>	<u>Northeast</u>	<u>Southeast</u>	<u>West</u>
Indiana Division of Fish and Wildlife	X		X			
Iowa Department of Natural Resources	X		X			
Kansas Department of Wildlife and Parks	X		X			X
Kentucky Department of Fish and Wildlife Resources	X		X		X	
Louisiana Department of Wildlife and Fisheries	X				X	
Maine Department of Inland Fisheries & Wildlife	X			X		
Maryland Wildlife and Heritage Service	X			X		
Massachusetts Division of Fisheries & Wildlife	X			X		
Michigan Department of Natural Resources	X		X			
Minnesota Division of Fish and Wildlife	X		X			
Mississippi Department of Wildlife, Fisheries and Parks	X				X	
Missouri Department of Conservation	X		X		X	
Montana Department of Fish, Wildlife & Parks	X					X
Nebraska Game and Parks Commission	X		X			X
Nevada Department of Wildlife	X					X
New Hampshire Fish and Game Department	X			X		
New Jersey Division of Fish and Wildlife	X			X		
New Mexico Game and Fish Department	X					X
New York Division of Fish and Wildlife	X			X		
North Carolina Wildlife Resources Commission	X				X	
North Dakota Game and Fish Department	X		X			X
Ohio Division of Wildlife	X		X			
Oklahoma Department of Wildlife Conservation	X				X	X
Oregon Department of Fish and Wildlife	X					X

<u>All members</u>	<u>USA</u>	<u>Canada</u>	<u>Midwest</u>	<u>Northeast</u>	<u>Southeast</u>	<u>West</u>
Pennsylvania Fish and Boat Commission	X			X		
Pennsylvania Game Commission	X			X		
Rhode Island Department of Environmental Management	X			X		
South Carolina Department of Natural Resources	X				X	
South Dakota Game, Fish and Parks Department	X		X			X
Tennessee Wildlife Resources Agency	X				X	
Texas Parks and Wildlife Department	X				X	X
Utah Division of Wildlife Resources	X					X
Vermont Department of Fish and Wildlife	X			X		
Virginia Department of Wildlife Resources	X			X	X	
Washington, DC Fisheries/Wildlife Division	X			X		
Washington Department of Fish and Wildlife	X					X
West Virginia Division of Natural Resources	X			X	X	
Wisconsin Department of Natural Resources	X		X			
Wyoming Game and Fish Department	X					X
Puerto Rico Department of Natural and Environmental Resources	X				X	
Virgin Islands Department of Planning and Natural Resources	X				X	