

Wildfire Risk Assessment and Planning in the Northeast-Midwest U.S.

Summary written by Katy Thostenson, a social scientist with the Wisconsin Department of Natural Resources Division of Forestry, in partnership with the Northeast-Midwest Regional Strategy Committee.

In April 2019, we sent out an online questionnaire to improve our understanding of wildfire risk assessments in the 20 Northeast-Midwest states and explore the planning needs in the region. This survey is a Northeast-Midwest regional project of the National Cohesive Wildland Fire Management Strategy, a collaborative effort to manage growing wildland fire challenges across all lands, regardless of ownership.

Our goal for this work is to improve the quality of the data that is available to calculate wildfire risk and to better support the community and landscape planning work in the region. Land managers, planners, wildfire response and outreach professionals, emergency managers, and others were invited to complete the survey.

Respondents

The data in this summary only includes the **152 respondents** who work within the Northeast-Midwest region. 68% work in state or federal government.

- 718 people were emailed an invite to the survey from our existing listservs.
- 187 people completed the survey. (Our response rate was 26%)
- Data cleaning of incomplete and duplicate surveys led to 165 responses. 13 more respondents were removed (from this summary) who work outside the NE-Midwest region.

Affiliation	Number of respondents	Percentage of respondents
State government	75	45%
Federal government	38	23%
Private firm	14	8%
Other affiliation (please specify)	13	8%
Non-profit organization	11	7%
Local or municipal government	7	4%
Academic institution	5	3%
County government	2	1%
Total	165	100%

All Northeast-Midwest region states were represented in the survey by professionals of different affiliations (e.g. not all states are represented by a state government employee). Respondents represented a broad number of companies and organizations, listed here.

Federal government

Brookhaven National Laboratory
Bureau of Indian Affairs
Bureau of Indian Affairs: Eastern Region
Bureau of Indian Affairs: Midwest Region
Cape Cod National Seashore
Department of Interior
Eastern Area Coordination Center
FEMA (incl. Region 3)
National Park Service
National Weather Service
U.S. Fish and Wildlife Service
U.S. Forest Service (incl. Northern Research Station & Santa Barbara Ranger District)

State government

Connecticut Division of Forestry
Delaware Dept of Agriculture - Forest Service
Indiana DNR Forestry
Iowa Dept of Natural Resources - Forestry
Maine Army National Guard
Maine Emergency Management Agency
Maine Forest Service
Maryland Forest Service
Massachusetts Bureau of Forestry and Fire Control
Massachusetts Dept of Conservation and Recreation
Massachusetts Dept of Environmental Protection
Massachusetts Emergency Management Agency
Massachusetts National Guard
Minnesota DNR Forestry
Missouri Dept of Conservation
New Hampshire Adjutant General's Dept
New Hampshire Fish and Game Dept
New Jersey Division of Fish and Wildlife
New Jersey Forest Fire Service
New York Albany Pine Bush Preserve Commission
New York Central Pine Barrens JP&P Commission
New York Dept of Environmental Conservation
Northeastern Interagency Coordination Center
Pennsylvania Bureau of Forestry
Pennsylvania Dept of Cons. & Natural Resources
Pennsylvania Game Commission
Rhode Island Dept of Environmental Management
Rhode Island Emergency Management Agency
State of Vermont
Vermont Dept. of Forests, Parks and Recreation

West Virginia Division of Forestry
Wisconsin DNR

County government

Braxton County Office of Emergency Services, WV
Lake County, MN

Local or municipal government

East Hampton Planning Department, NY
New York Fire Department, NY
Roscommon Township Fire Department, MI
Town of Shirley / Conservation Commission, MA

Private firm

Burning Alternatives Prescribed Fire Services, LLC
Cotton-Hanlon, Inc.
Geltech Solutions
JM Forestry
Michael S. Batchner Consulting
Nationwide Insurance
Northeast Forest and Fire Management, LLC
Pine Creek Forestry LLC
Simmons Stewardship and Conservation Ecology
Sustainable Solutions, LLC
Timmons Group
Total Resource Management, LLC

Academic institution

Temple University
University of Maine
University of Wisconsin-Madison
Wesleyan University

Non-profit organization

Longwood Gardens
Nantucket Conservation Foundation
National Fire Protection Association
New Jersey Audubon
The Nature Conservancy

Other affiliation

Brookhaven Science Associates
Lake States Fire Science Consortium
Narragansett Bay National Estuarine Research Reserve
North Atlantic Fire Science Exchange
The Irland Group

Respondents work across all landscape scales, from the property level to the national level. (Note: They could check as many landscape scales as applied to their work.)

Scale of work	Number of respondents
Property-level	44
Municipal or community-level	43
County	37
In-state region	51
Statewide	68
Multi-state region	52
National	28

Area of focus for their work in wildland fire

Respondents work across all three areas of focus of the National Cohesive Strategy.

Respondents were asked to describe the work they do using the three areas of focus of the U.S. National Cohesive Wildland Fire Management Strategy. (Note: They could check as many areas of focus as applied to their work).

Area of focus for their work	Number of respondents
Restoring and maintaining resilient landscapes (e.g. prescribed burning, ecosystem management)	130
Improving fire response (e.g. suppression, protection)	103
Creating fire-adapted communities (e.g. community and land use planning, homeowner outreach)	91

Use of wildfire risk assessments

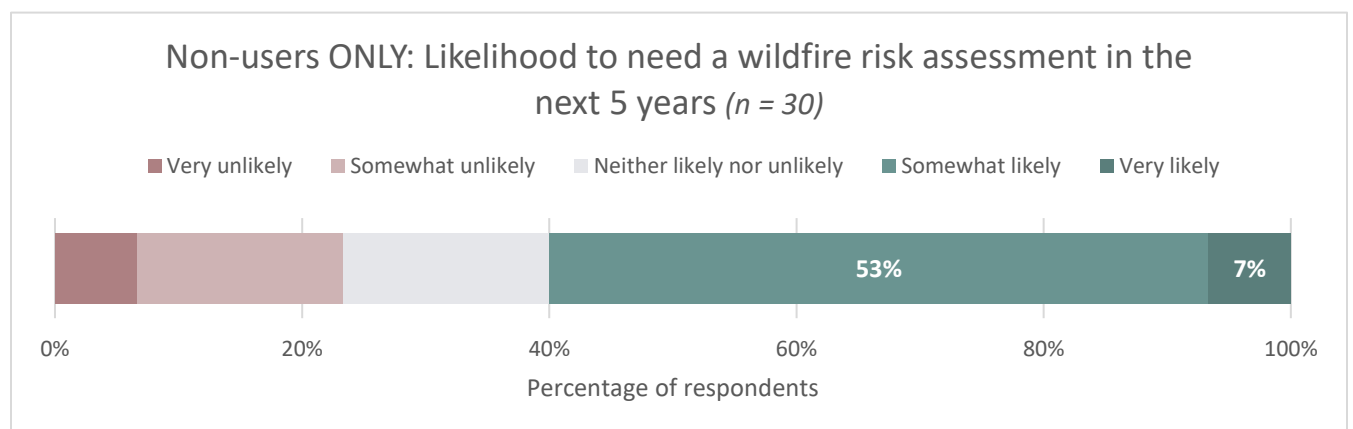
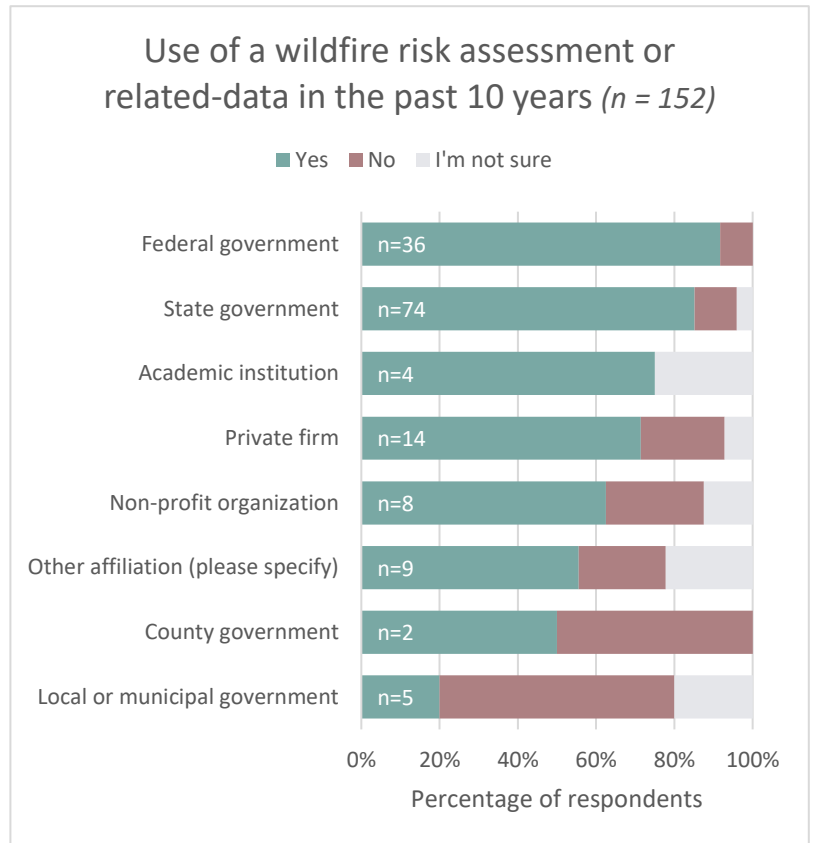
In total, 80% of respondents have used wildfire risk assessments over the last 10 years. Among the non-users, 60% said they are likely to need one in the next 5 years.

A majority (over 60%) in each group of the federal, state, academic, private and non-profit respondents have used wildfire risk assessments (WRAs) over the last 10 years (see graph at right).

A minority (20%) of local/municipal respondents have used WRAs. *Keep in mind that we received very few responses from academic, non-profit, county and local/municipal professionals to represent the entire NE-Midwest region.

Among the non-users, a majority (60%) said they are somewhat to very likely to need a WRA in the next 5 years (see graph below).

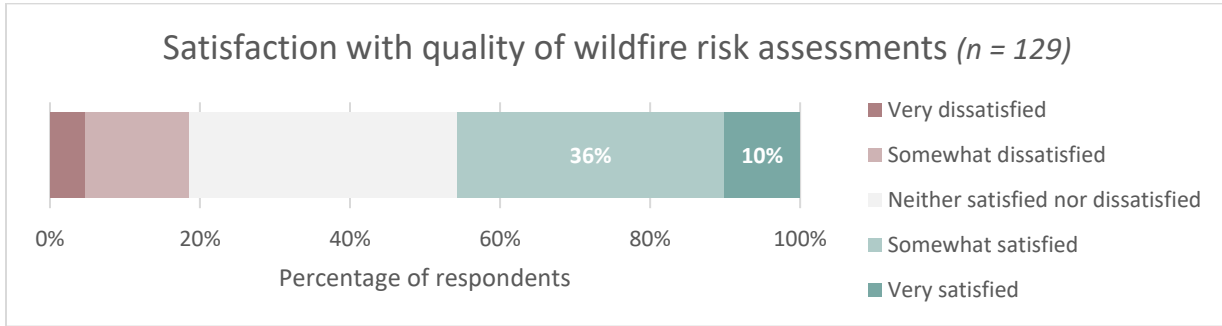
For the 18 non-users who said they were likely to need a WRA in the next 5 years: 8 worked with state government, 3 with federal government, 3 with local/municipal or county government, 2 with a non-profit, 1 with an academic institution, and 1 was “other” affiliated.



Satisfaction with the quality of wildfire risk assessments

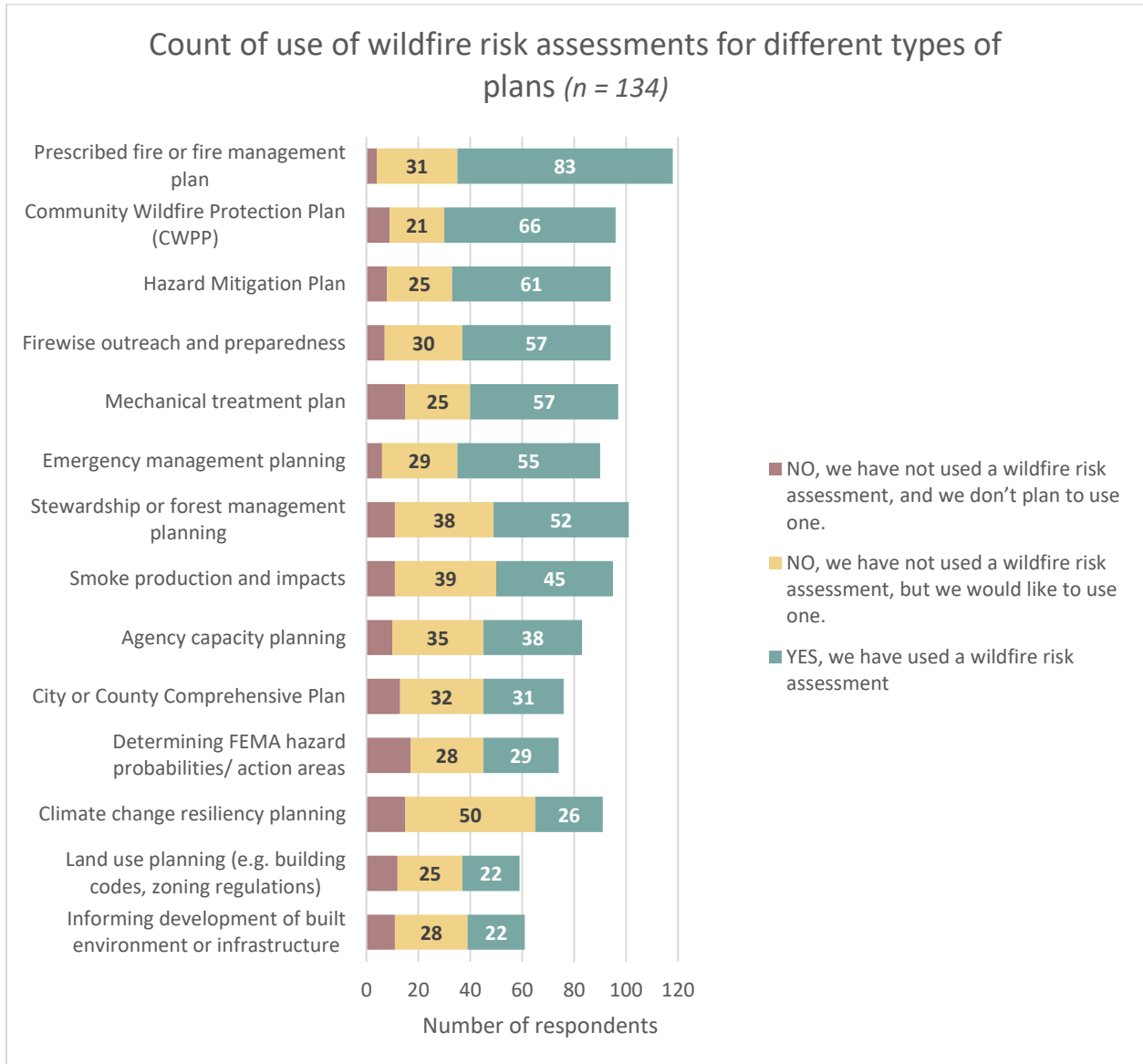
Nearly half of respondents (46%) are satisfied with the quality of wildfire risk assessments.

Overall, the majority of respondents see opportunity to improve the quality of wildfire risk assessments. Only 10% were very satisfied with what is available to them. Due to the small sample size from local-level professionals, it's not clear if satisfaction varies based on the user's affiliation.



Uses of wildfire risk assessments in the past 10 years

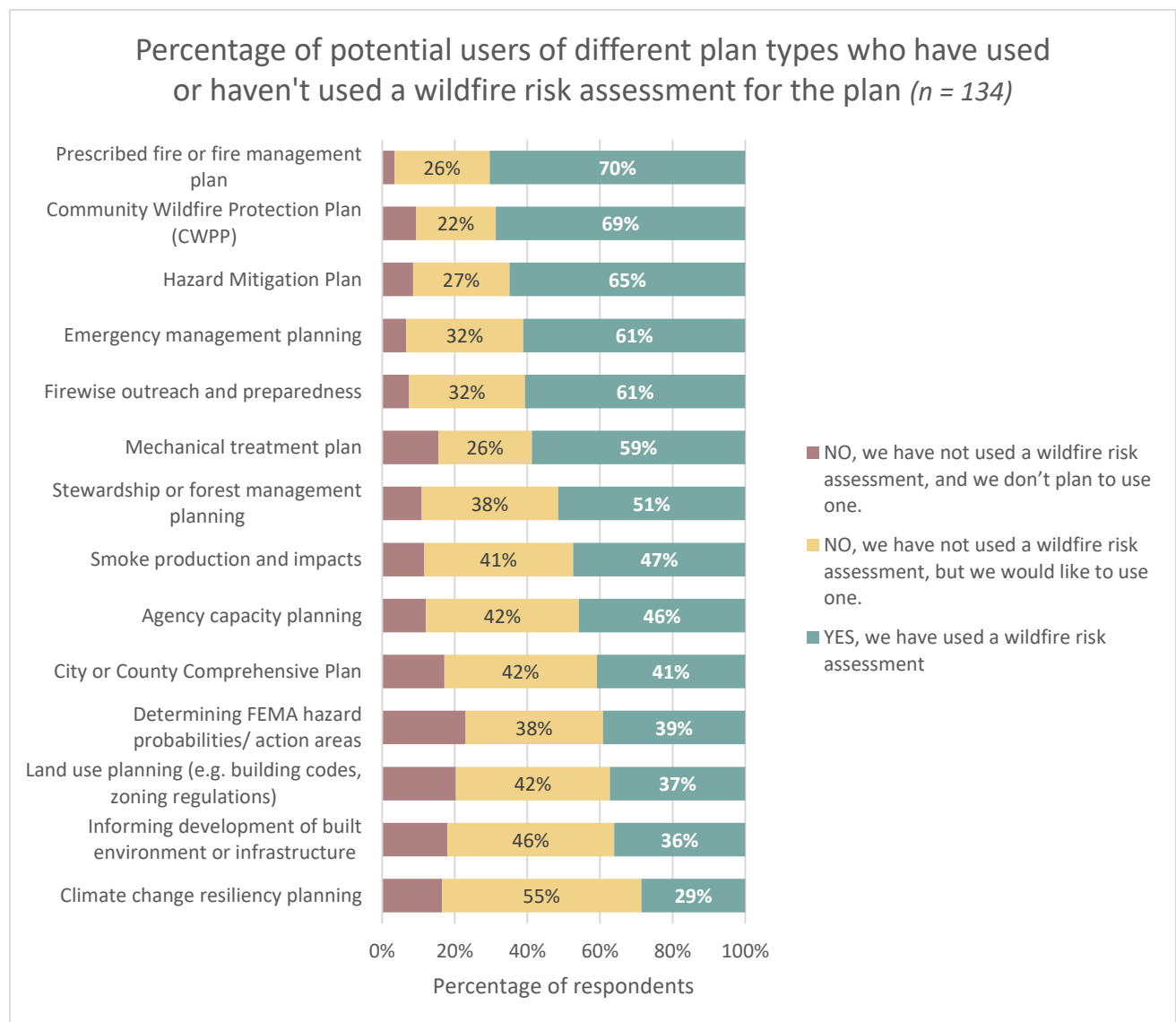
The top three uses of WRAs were for prescribed fire/fire management plans, CWPPs, and Hazard Mitigation Plans. Of note, climate change resiliency planning was the plan type that the largest number of respondents (50) say they don't currently use but would like to use a WRA to develop.



The majority of potential users of each plan type below have either already used a wildfire risk assessment to inform the plan OR they would like to use one in the future.

The chart below focuses ONLY on the respondents who said that a plan type was applicable to them (i.e. people who said the plan type “does not apply to their work” were removed). Shown below, it is clear that for many plan types, the majority of respondents have used a wildfire risk assessment. These include prescribed fire/fire management plans, CWPPs, Hazard Mitigation Plans, Emergency management plans, Firewise outreach and more.

Shown in yellow are future interests for using wildfire risk assessments. There are two types of plans for which a large percentage of respondents indicated they would like to use a wildfire risk assessment in the future but don't currently: *Climate change resiliency planning* (55% of potential users) and *Informing development of built infrastructure* (46% of potential users.)



Familiarity with spatial data related to wildfire or affected resources

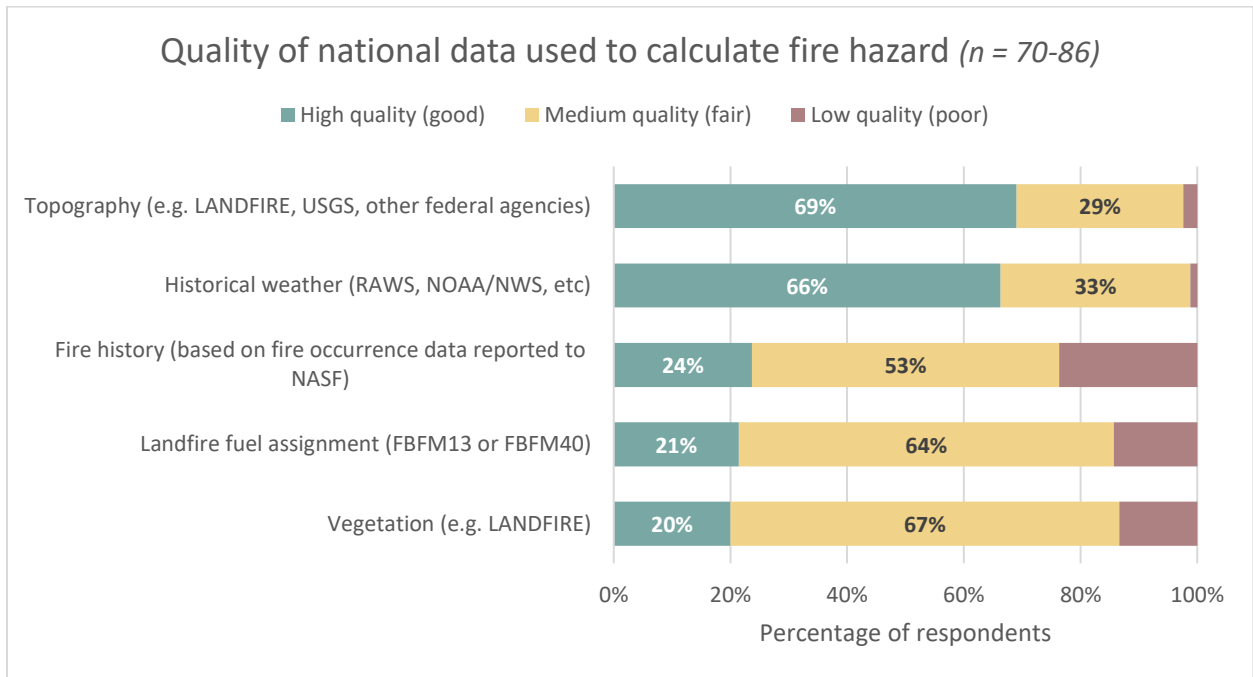
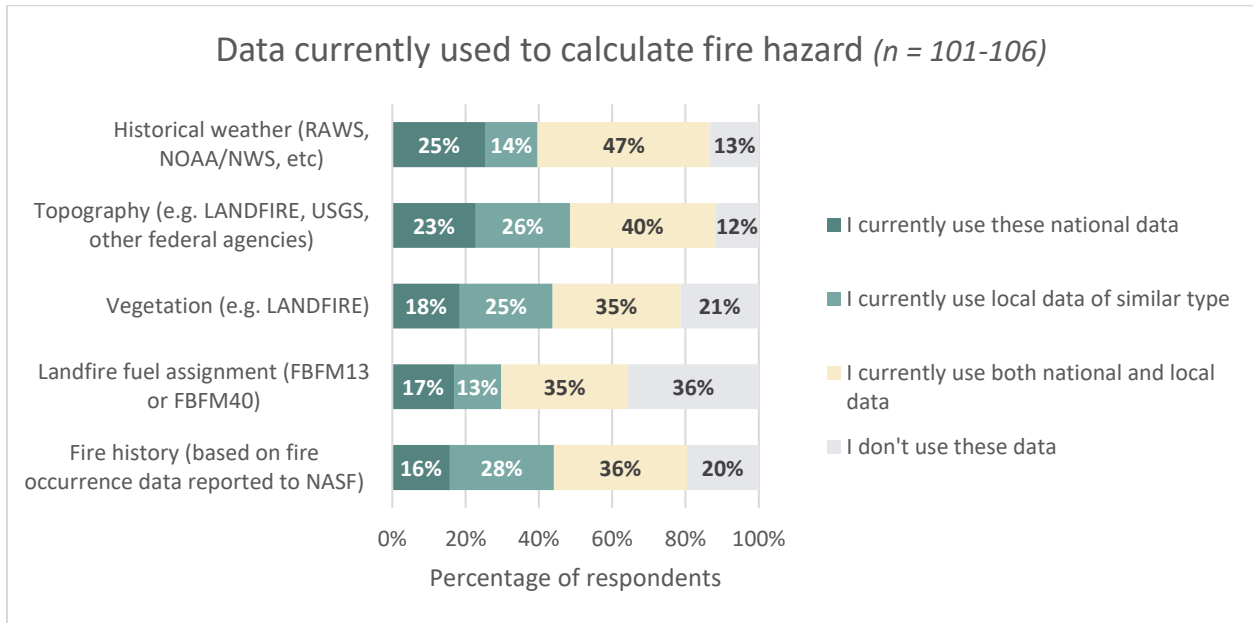
Before answering questions about spatial data, respondents were asked about their level of familiarity with spatial data. A total of 105 respondents (78%) said they were familiar with spatial data and 11 respondents (8%) said they weren't sure about their level of familiarity. These two groups were invited to answer the following questions about spatial data.

Familiarity	Number of respondents	Percentage of respondents
Yes	105	78%
No	18	13%
I'm not sure	11	8%

Use and quality of spatial data available

Data currently used to calculate **wildfire potential (fire hazard)**:

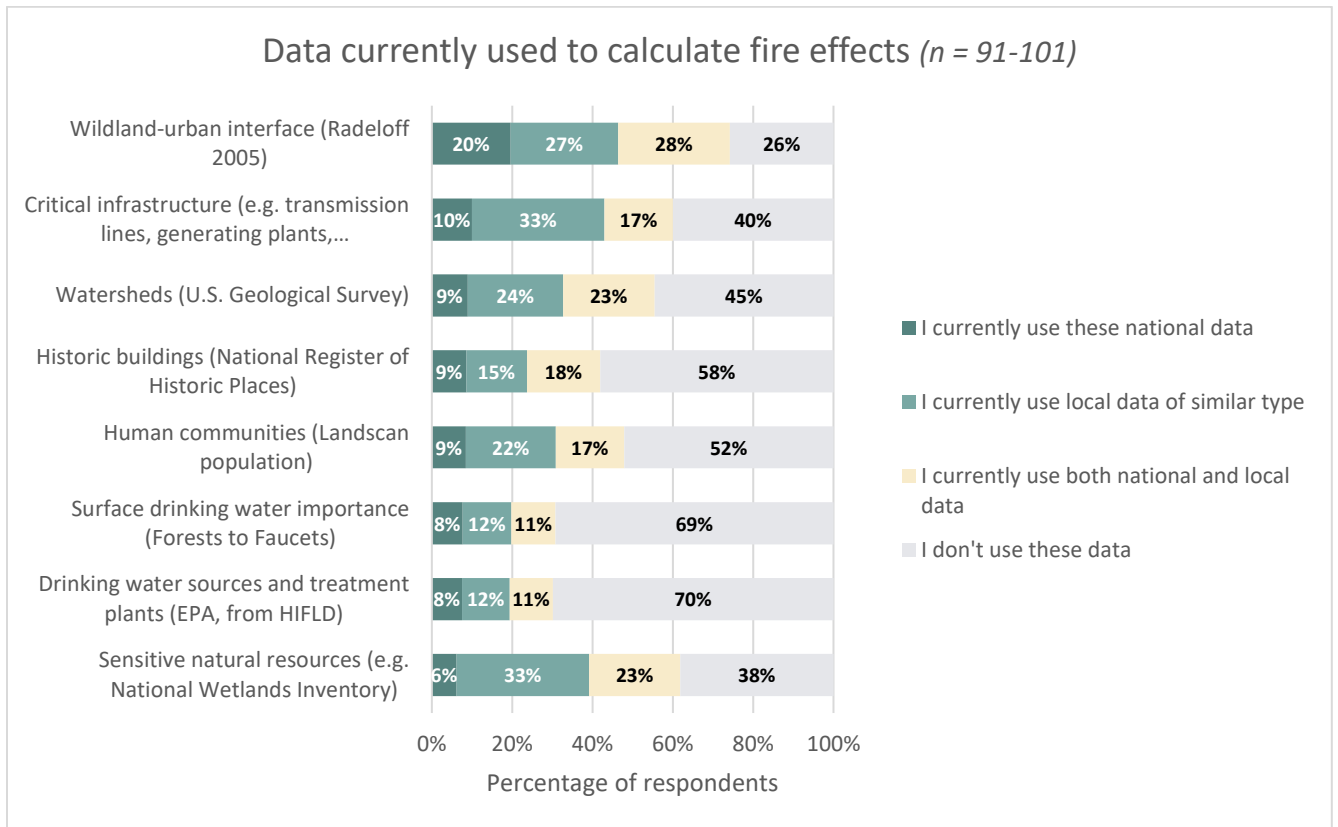
Over a third of respondents typically use a combination of both national and local data to calculate fire hazard in their area. A majority of respondents rated the national data available for topography (69%) and historical weather (66%) as *high quality (good)*, whereas a majority of respondents rated the national data available for fire history, fuel assignment and vegetation as *medium quality (fair)*.



Data currently used to calculate **wildfire effects (resources and assets)**:

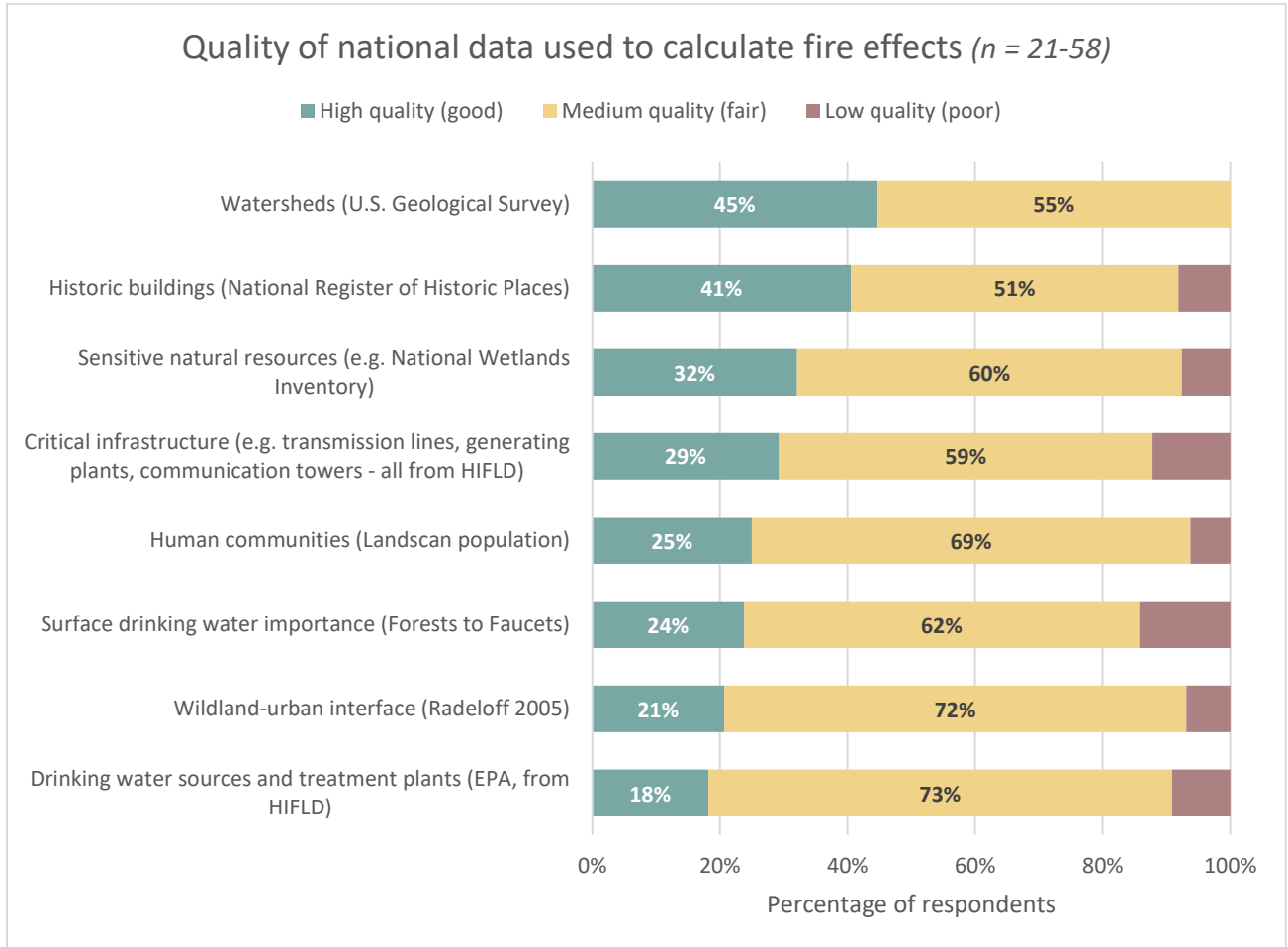
Most respondents who use these data to calculate wildfire effects say they are using either local data or a combination of national and local data to calculate fire effects. Few rely solely on national data. Taking *critical infrastructure* as an example from the chart below, only 10% of respondents solely use national data related to critical infrastructure, 17% use a mix of national and local data, 33% use locally available data, and 40% appear not to use data on critical infrastructure in their analysis at all.

When calculating wildfire effects, a majority of respondents are incorporating data on the wildland-urban interface (74% of respondents), sensitive natural resources (62%), critical infrastructure (60%), and watersheds (58%).



The majority of respondents rated the national data used to calculate fire effects as high quality (good) to medium quality (fair).

Note: the response rate for this question appears lower because respondents who answered “I don’t know” were removed from the analysis. Since fewer respondents use these data, there were fewer respondents rating the quality of the national data.



Respondents described other data they use to calculate wildfire risk or hazard:

- WFDSS, Southern Area Assessment.
- Our state-created communities at risk map and fire landscapes map.
- Locally generated data on vegetation fuel types and flammability, Compass rose wind speed directions and intensity, KBDI modelling
- State forecast, NWS
- Forest pest risk or history (e.g. southern pine beetle)
- My eyes.
- land ownership and management (PADUS, Cadastral, etc.)
- In New England Compact, state fire agencies are proactive about gathering information and assessments. Best example is Maine and MAS
- FYI - Fire history records are extremely poor for our agency, not easily accessible. No centralized data repository.
- Local vegetation maps and state GIS data
- As a meteorologist I use meteorological data to forecast weather conditions that could impact a fire or potential fire situation.
- Hazard assessments available to the insurance industry - Verisk FireLine, CoreLogic Brushfire data
- Eastern Area Modeling Consortium (EAMC), Eastern Area Coordination Center (EACC), JFSP
- IFTDSS
- Karen Shorts Fire history records and Night Lights satellite imagery to identify areas of highest population density
- Locally-generated maps of fuel loading, Landsat imagery (dNBR)
- Custom fuel mapping - fuel treatment data
- Custom fuel modeling, site specific data collected for our site, NYSDEC data on wetlands and surface waters.
- Vegetation community maps typically made by the state Division of Fisheries and Wildlife, TNC or other agency.
- USFS Superior National Forest HVRA Risk Assessment 2018
- State level data
- Analyses of individual extreme fires
- NFIRS used to define fire occurrence
- Analyzing CAL FIRE post-fire damage data
- Internal agency GIS mapping
- Site assessments
- Silvis WUI data - University of Wisconsin
- WIMS

- State planning data
- NPS Wildland Fire Risk Assessment
- Local Fire Management Plans (FMP's)

Respondents described how low-quality national data could be improved to support their work:

- Need more recent data and smaller scale events
- Much historical weather data I have found is more coarsely spread across the state than would be useful for us to develop risk models and look at risk.
- Data can be lower quality and silo-ed. Have to look in several different places to compare and contrast all of the data sets that are referenced. Need a single platform, similar to LandServer.com, with an easy UI that can return WRA data anywhere in the country.
- I don't think national datasets can capture the fine scale detail necessary to ID, much less analyze, things like critical infrastructure or forest structure...
- frequency - fire reporting frequency from municipal and volunteer fire departments is low frequency or non-existent. I also serve on a rural fire department and from experience and word of mouth, know that reporting is not a high priority. It's not tied to funding.
- increased accuracy of eastern fuel loads and more current data would be useful, although there will always be scale issues - data collected at fine scale needs to be applied to a larger area
- keep improving and ground truthing Landfire, as you did last March
- fuels via lidar
- Up to date and better resolution
- Fire history data is poor for this region for non-federal agencies. More data is needed.
- Resolution, accuracy
- higher resolution
- Poor resolution and accuracy of vegetation data.
- I would tie more funding to the local reporting of fire occurrence records to drive improvement and redesign the reporting tool (NFIRS).
- Increased accuracy
- Increased accuracy
- Better centralized national repository for all wildland fire management agencies. IRWIN? Fire EGP
- Delaware generally falls into a generic listing for fire data since we do not experience many large fires. National data historically does not work or pertain to what is going on with fire in our area
- Increased accuracy.

Other datasets respondents need to include in their wildfire risk assessments

Insect damage, drought and climate change data were the top three *additional* types of data that respondents said they need to include in their risk assessments. In this question, respondents checked any of the data types from the list below that they identified as also being important for their risk assessments.

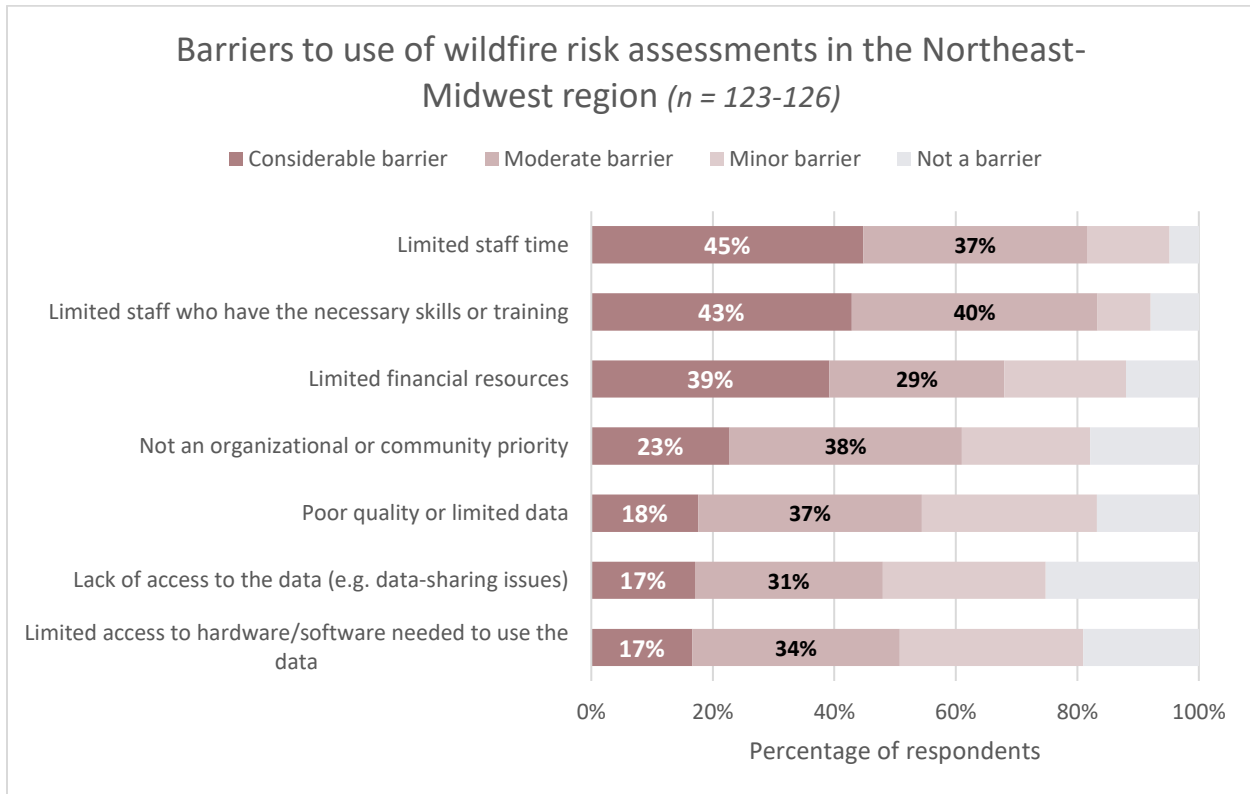
Data type	Number of respondents (n = 105)
Insect damage	55
Drought	50
Climate change	46
Capacity for wildfire response	46
Smoke impacts	45
Forest succession / growth	41
Change in development	33
Warning / response time / detection	31
Building structure information	17
There are no other datasets I need	11

Respondents were also invited to describe other data not shown on the list above that they need to use in their risk assessments:

- As of a few years ago, getting info on response capacity was next to impossible. Canadians do it better.
- Better fire meteorology, fire physics, fuel structures,
- Forest composition change i.e.: ice storms, wind events, etc.
- Fuel treatments
- I'd like to see more work done on the response side / VFA funding levels related to response and better metrics around 1st responder's
- Land ownership, structure hazard assessments
- Opportunity to utilize prescribed fire to mitigate wild fire risks
- Organic soil smoke impacts; agricultural land use conversion to grass; risk mitigation area (assessment and projects);
- Other HVRA such as timber, oil and gas, view sheds
- Prediction of canopy mortality
- Spruce budworm is a special concern in our area. More/newer WUI zoning recommendations. We use the GLIFC report from 2011
- Travel time and distance
- We need better information on long-term climate-fire relationships
- Work that the Western Climate Center does is good stuff and needs to continue. How to incorporate existing climate data for the countless weather stations out there that are not RAWS. This is the most needed: getting NFDRS calculations across multiple weather platforms. With today's data access, there is no reason why these data collected cannot be used to predict current Fire Danger and support the planning process for better assessing those bench points that trigger a safe response action.

Barriers to use of wildfire risk assessments

The top barriers to respondents' use of wildfire risk assessments in the Northeast-Midwest region are *limited staff time*, *limited staff with the necessary skills or training*, and *limited financial resources*.



In an open-ended question, respondents described other barriers, concerns or challenges related to wildfire risk assessments in the region:

- Accuracy of available WUI data - smaller areas with volatile fuels in Northeast U.S. often overlooked
- Accuracy of assessments without field experience verification. 2. Recognized collection methodology of data. 3. Assessments can be developed to meet individual agendas. They should be endorsed by the local wildfire agency.
- Accuracy and ground truthing aligns with perceptions
- Education of community leaders.
- Ensuring that all Federal Agencies are utilizing the same data sets. We can not come at this from a different direction to inform our state and local partners on the true risk.
- Few risk models take into account the impact of wind and embers nor of structures (homes, commercial buildings) as fuel that will help spread the fire.
- Forest health, tick population
- How to use them might be the biggest barrier.
- Lack of National Fire Leader in FS Research, no FS funding in JFSP, NFP for research, limiting FS scientists from attending research meetings to coordinate efforts and seek partnerships
- Lack of understanding of available products and the ability to market the concept to stakeholders
- Local jurisdictions don't seem to want to take enough responsibility for taking actions.
- Mainly time and money...
- Means/ability to interface CWPP, county and Firewise data to stakeholders to share in efforts to reduce wildfire risk.
- Multi-Agency planning/response General public attitude that it "won't happen to me"; especially in the East

- Our state doesn't think this type of data is important to collect, so I have a difficult time completing this kind of task.
- regional plans are pretty broad in scope.
- standardized breakpoints/thresholds for assessments (low, mod, high, etc)... fuels vs hazard vs values
- That the problem is compounding daily across the US vs our ability and timeliness to not only develop the tool that will identify the high risk areas AND implement mitigation practices on the ground. In almost all cases these practices in-themselves are risky and require a highly trained and skilled labor force that is, relative to the total effort required on the ground, in very short supply.
- The national risk assessment is too broad to cover the east, where >90% of fires are human caused. USFS R9 has just begun a regional risk assessment utilizing many data sources, including corporate data.
- These Questions asked in 18 are spot on with the real focus issue; that being not enough staff, not enough time, and not enough available funding. But hey, we live in the northeast. We don't have wildland fire issues right? Climate change experts say we're gonna be hotter and wetter. So put the resource elsewhere

... there needs to be a minimum level of organization or better interagency sharing even in low occurrence areas to properly plan and respond. Somehow the issue funding is the ultimate stumbling block, from those dollars available to ease of distribution to other agencies when needed.

- they don't assess the potential use of prescribed fire as a mitigation tool, which could pave the way for education, resource allocation, public acceptance and implementation.
- We are concerned with influences that favor one party over another
- We don't consider wildfire to be a risk currently. Imported pests are our main worry
- We have a great partnership with USFS staff to help us implement the data.
- We have almost zero understanding of long-term climate-fire relationships that can inform current risk/hazard in the GLR and NE. We also do not understand our fire ecology which is requisite to understanding risk/hazard.
- Wildfire is not a priority in the northeast for emergency responders, though it should be in many cases.

Final comments

In an open text question, respondents shared final thoughts on the topic of wildfire risk assessments in the Northeast-Midwest region, shown here:

- Useful tool to show Tribes about the need to protect values at risk.
- I have found many risk assessment maps in the Northeast Regional Cohesive Strategy report and National Cohesive Strategy report to be inaccurate for Wisconsin.
- Experience is limited but am anxious to build local capacity in Hazard Mitigation Planning
- We have used many of the spatial data sets here to create our own models of vegetation flame lengths and priority vegetation management. That has driven a lot of our on the ground shrub forest management in the last seven years and been highly effective.
- The value to Natural Resources is much higher in Indian Country than to surrounding areas due to being Trust Assets.
- This is needed and it's fantastic that you all are leading on this and see it as a very valuable service to aggregate, evaluate and synthesize the results of this survey. Please let me know how we can help
- Needs to be buy in from all agencies and participants and it needs to be reproducible so that results can be compared and analyzed.
- I participated in a review of fire behavior outputs with the contractor conducting the assessment for the eastern region of the FS, very happy to see the efforts made to involve local managers of the resources.
- I have a need for GIS based training, I feel this would improve my program greatly.
- Accurate fuels layer is the bottleneck for a worthwhile assessment of Pennsylvania
- It takes time, and funding, and people specifically assigned to get it done, meaning we tend to share too much with other agency needs. Not one standard may apply across the nation. A good example is the need for Fire Danger Operating Plans here in the east verses the west. I think people tend to get hung up on fitting everything into the same mold when maybe we can get away with something less that is just as efficient and beneficial. The retired guy has vented a bit, good survey, hope there is some value to my responses based on some obtained wisdom.
- In our state they've only been completed for high risk areas (Cape and Islands). More regions need assessment.
- It is a challenge to discuss this with communities, even rural communities. They do not see fire as a big risk, maybe because of our fast action and cooperation with fire companies but with the changing urban interface and climate change they need to understand the wildfire risk.
- Again, probably not the best person to ask. This is simply not a high priority or focus for me.
- I've participated in data collection of local risk assessments for local CWPP
- I have no experience. Would be helpful to learn more about them.
- They should have an expiration. Or ensure updates/revisions occur.
- There is a lot of useful data available and we use it frequently for wildfire risk assessments. However, the quality of data can always be improved. Thank you for your efforts.
- limited mostly the hazard mitigation planning, drought, and flooding affects
- USFS is a great partner, as are MN DNR, MNICS and GLIFC.
- I have done these for prescribed fire planning, hazard mitigation plans and community wildfire plans.
- We primarily use them to target efforts nationally and provide relative risk information for educational purposes. We promote the use of science-based home-level risk assessments to counsel residents on making changes to reduce home ignitability.
- Not always updated to reflect recent changes in the landscape for whatever reason, i.e. development, insects/diseases, fires, wind storms, floods, etc.
- In my role, I use existing NJ Fuel Hazard (in-house) mapping and risk assessments created through CWPP's and Firewise programming to development WUI mitigation plans for communities and identify opportunities for the State of NJ to reduce fuels by mechanical methods.
- The ones I have seen lack the assessment and integration of identifying potential use of prescribed fire as part of the solution, which is a missed opportunity.
- We need an online portal for state and regional.
- East Hampton has a fire climax community (Pine Barrens). Fire suppression has contributed to poor forest regeneration, increased invasive flora and ever-increasing populations of dog, black-legged and lone star ticks.