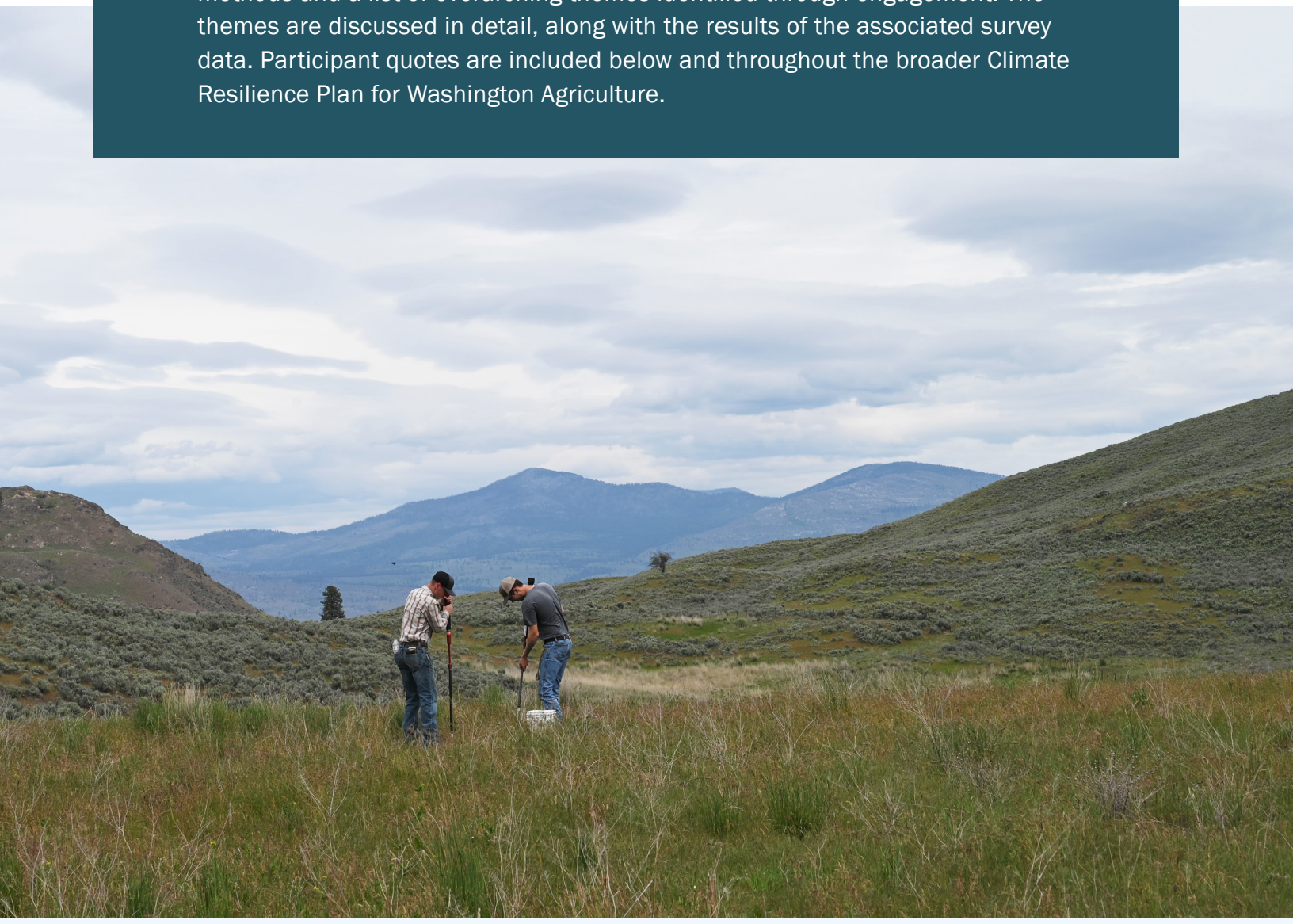
# Appendix C

# Engagement summary: Impacts of climate change on producers and other agricultural stakeholders

This report details the results of statewide engagement for the Climate Resilience Plan for Washington Agriculture. The content below outlines the engagement methods and a list of overarching themes identified through engagement. The themes are discussed in detail, along with the results of the associated survey data. Participant quotes are included below and throughout the broader Climate Resilience Plan for Washington Agriculture.



# Methods

## Listening sessions

Triangle and WSDA staff conducted 6 listening sessions between January and March of 2024 by attending existing meetings of the following Washington agricultural associations: Washington Grain Commission, Washington State Dairy Federation, Washington State Wine Commission, Washington State Potato Commission, Washington Tree Fruit Research Commission, and Washington Cattlemen's Association. These meetings comprised small groups of individuals representing their respective commodity groups and, in many cases, producers themselves. The purpose of these listening sessions was to gather in-depth information in a small group setting, forge relationships between WSDA staff and partners, and distribute the online survey. Triangle and WSDA facilitators attended these meetings online, with the exception of an in-person session with the Washington Wine Commission. **An estimated 120 agricultural stakeholders were engaged as part of these listening sessions.** Figure 11 contains a promotional flyer and agenda for each listening session.

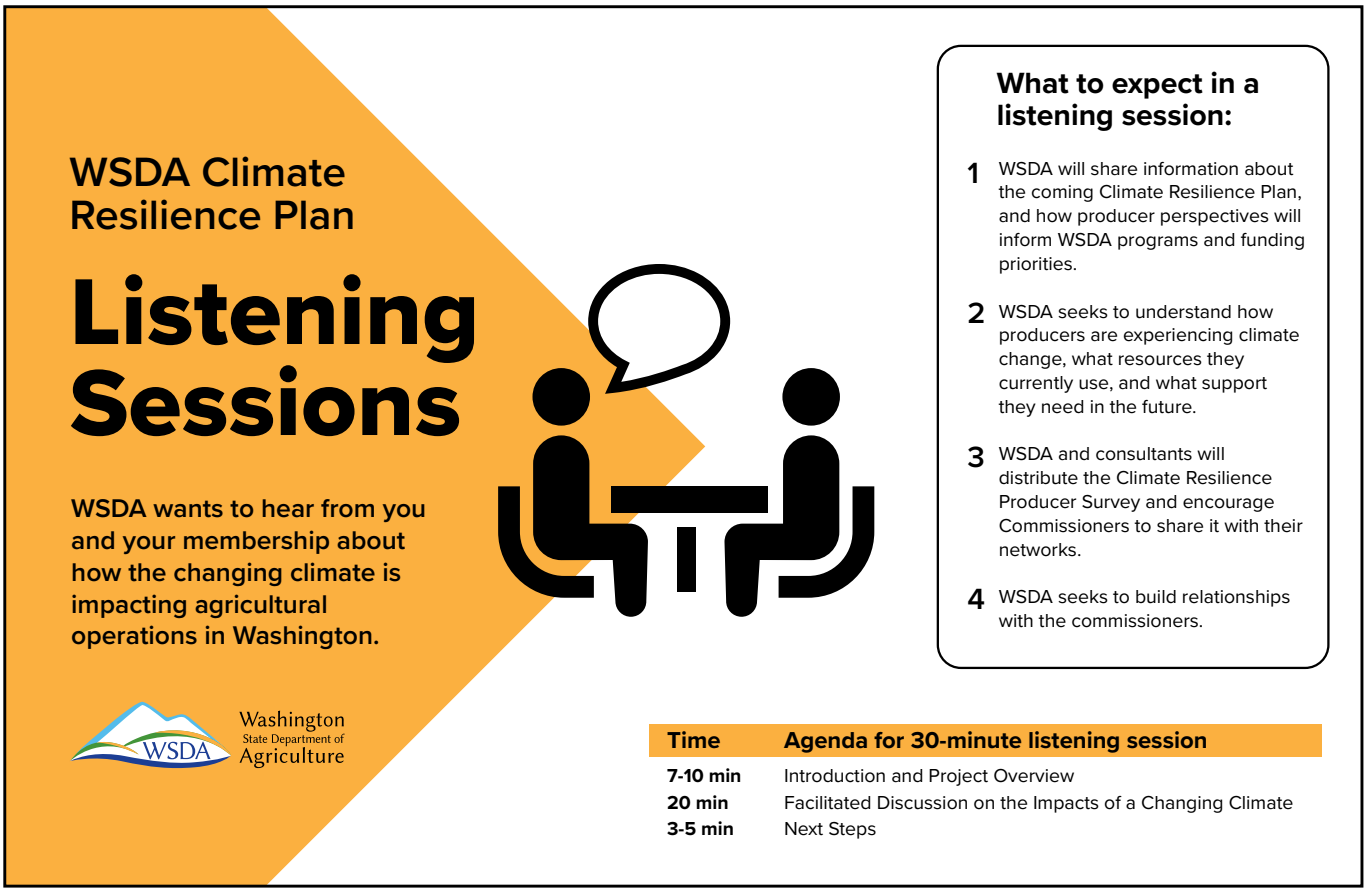



Figure 11. Listening session agenda and promotional materials.

## Producer survey approach

Triangle worked with WSDA, Washington State University (WSU), and ECOnorthwest to develop an online survey to solicit feedback from agricultural stakeholders, including farm owners, operators, employees, industry representatives, and farm advisors. The survey included questions on the impacts of climate change on agriculture and asked about current and future resources that would support producers. The survey's purpose was to hear from a broader cross-section of agricultural stakeholders and supplement the in-depth information captured during listening sessions. Triangle and WSDA launched the online survey on January 8th in English and Spanish. The survey was widely promoted to WSDA's stakeholders through newsletters, listservs, social media, and in-person events. **The survey was completed by 292 individuals.** Figure 12 provides an overview of the geographic distribution of survey respondents per county. See the *Demographics of Survey Respondents* section below for detailed demographic information.

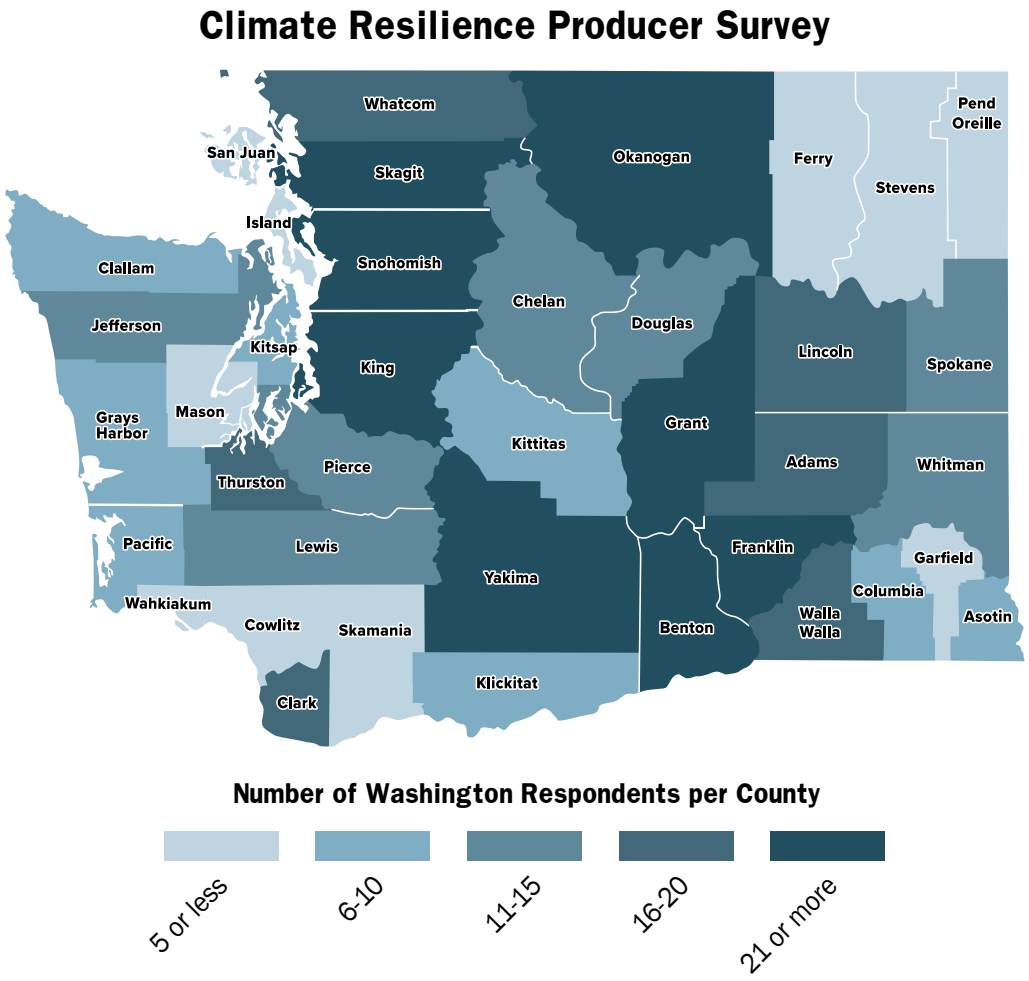



Figure 12. In seven weeks, 292 responses to the agricultural climate impacts survey were received, with at least two responses from every county in Washington.

## Overarching themes

While feedback varied by operator identity, commodity type, geography, and farm size, broad themes emerged from both the survey and listening sessions (Table 2). Of these themes, many were identified in multiple listening sessions (Table 3) as well as in the survey responses. The **consistency in responses indicates that addressing the issues outlined below would likely benefit a broad range of Washington state producers.**

Table 2. Overarching themes that emerged through the agricultural climate impacts survey and during listening sessions with agricultural associations.

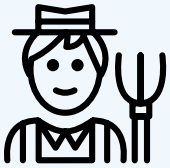
| Category | | Overarching Theme |
|---|---|---|
|  | 4. Climate-related challenges and on- farm resilience strategies | Theme 1A. Climate-related hazards have increased the unpredictability and risk of farming operations; hazards vary by cropping system and geography.<br>Theme 1B. Producers and farmworkers are taking action to mitigate climate impacts through resilience strategies, though continued support is necessary. |
|  | 2. Current and future resource needs for mitigating climate impacts | Theme 2A. Governmental agencies, universities, online platforms, and peer networks currently provide information, funding, support, and education. These resources will become more necessary in the future. |
|  | 3. Gaps in resources to mitigate climate impacts | 3A. Market volatility, high cost of production, and regulatory pressures have increased the need for flexible, responsive funding.<br>3B. A historic reduction in agricultural research and technical assistance funding and staff has limited producers' ability to respond to climate impacts.<br>3C. Regulations, taxes, difficult-to-use grant programs, and an overall disconnect between policymakers and producers have led to programs and funding that do not always meet diverse agricultural needs. |
|  | 4. Strategies to address resource gaps and increase climate resilience | Theme 4A. Increased education, research, and expertise is necessary to inform agricultural decision making in the context of a changing climate.<br>Theme 4B. Investment in public and private infrastructure and innovation is required to mitigate the impact of climate hazards. |

Table 3. Overarching themes identified during climate listening sessions, organized by commodity association.

| Listening Session | Listening Sessions: Convergence with Overarching Themes | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1A | 2A | 3A | 3B | 3C | 4A | 4B |
| Washington Grain Commission | X | | | X | X | X | X |
| Washington Wine Commission | X | | X | X | X | X | X |
| Washington Tree Fruit Commission | X | X | X | | X | X | |
| Washington Dairy Federation | X | | X | | X | X | X |
| Washington State Potato Commission | X | | X | X | X | X | |
| Washington State Cattlemen's Association | X | X | X | | X | | X |

# Discussion of overarching themes

## 1. Climate-related challenges and on-farm resilience strategies

### Theme 1a: Climate-related hazards have increased the unpredictability and risk of farming operations and vary by cropping system and geography

The most prevalent climate-related issues reported in the survey were changing weather cycles, extreme heat and drought, wildfire and/or wildfire smoke, and changing disease and pests (See Figure 4 in *Section 2: Agricultural Climate Risks and Adaptation Opportunities*). These responses mirrored those from the listening sessions, which called to attention the impact of unpredictable, extreme events such as heat, cold, flooding, and wildfire; the impacts of these events on crop quality were emphasized throughout the listening sessions.

### Theme 1b. Producers are taking action to mitigate climate impacts through resilience strategies, though continued support is necessary

To mitigate impacts, survey respondents across regions most frequently cited the use of soil health practices, experimentation with new crops or crop varieties, irrigation investments, and crop weather protection (Figure 13). These practices require continued support through the provision of funding to support research and planning resources. See Theme 3 (Gaps in Resources) for more discussion.

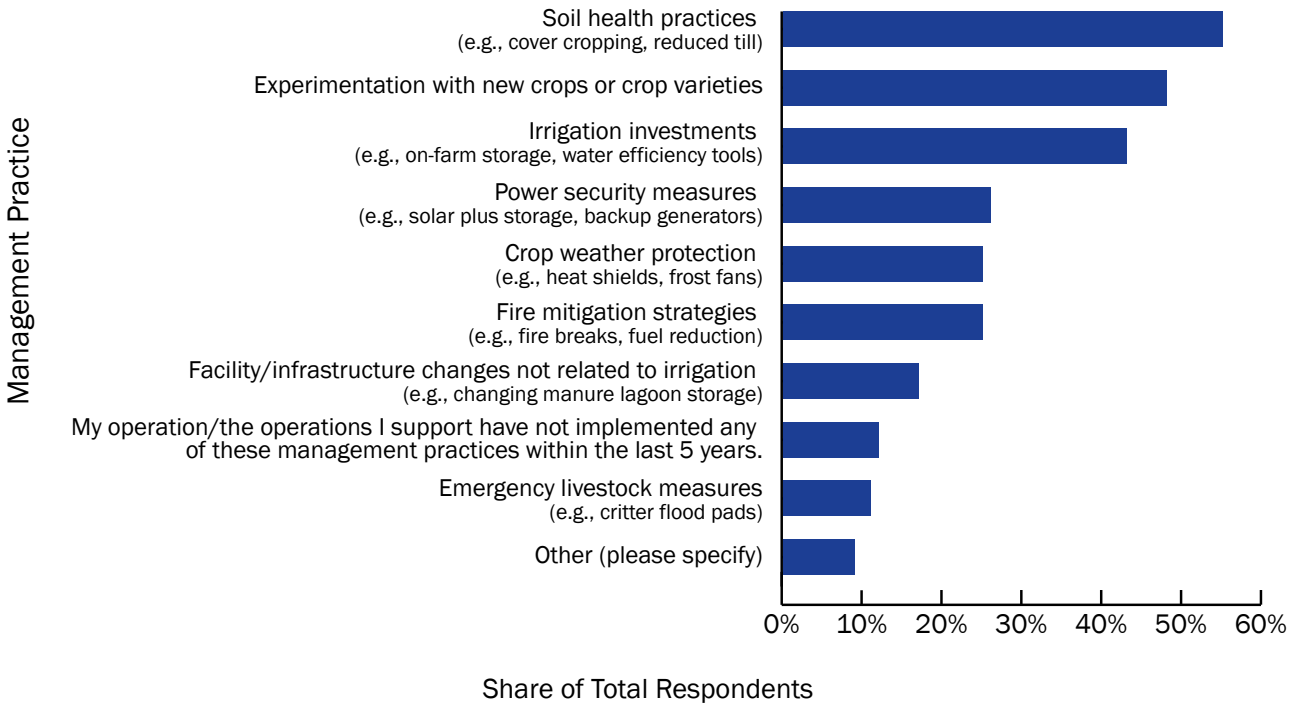



Figure 13. Responses to "Has your operation or the operations you support implemented any of the following management practices in the last five years?" during a survey of producers and other agricultural stakeholders (n=292).

## 2. Current and future resource needs for mitigating climate impacts

**Theme 2a: Governmental agencies, universities, online platforms, and peer networks currently provide information, funding, support, and education. These resources will become more necessary in the future**

In the survey and listening sessions, participants were asked to describe the existing resources they use to mitigate climate impacts, and those they anticipate needing in the future (Figures 14 and 15). Participants reported relying on governmental agencies, educational institutions, online platforms, and peer networks for information, funding, support, and education.

The top-ranked resources for addressing current and future challenges were:

1. Conservation incentive programs such as the Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP) and the State Conservation Commission's Sustainable Farms and Fields Program
2. Peer-to-peer learning

In the write-in portion of the survey, resources frequently mentioned were:

- Conservation Districts
- WSU Extension
- USDA - mentioned in various contexts, including USDA offices and USDA programs like the Organic Program
- Sustainable Agriculture Research and Education (SARE)
- YouTube - mentioned frequently as a source of information and learning
- NOAA (National Oceanic and Atmospheric Administration) - mentioned for weather forecasting and data

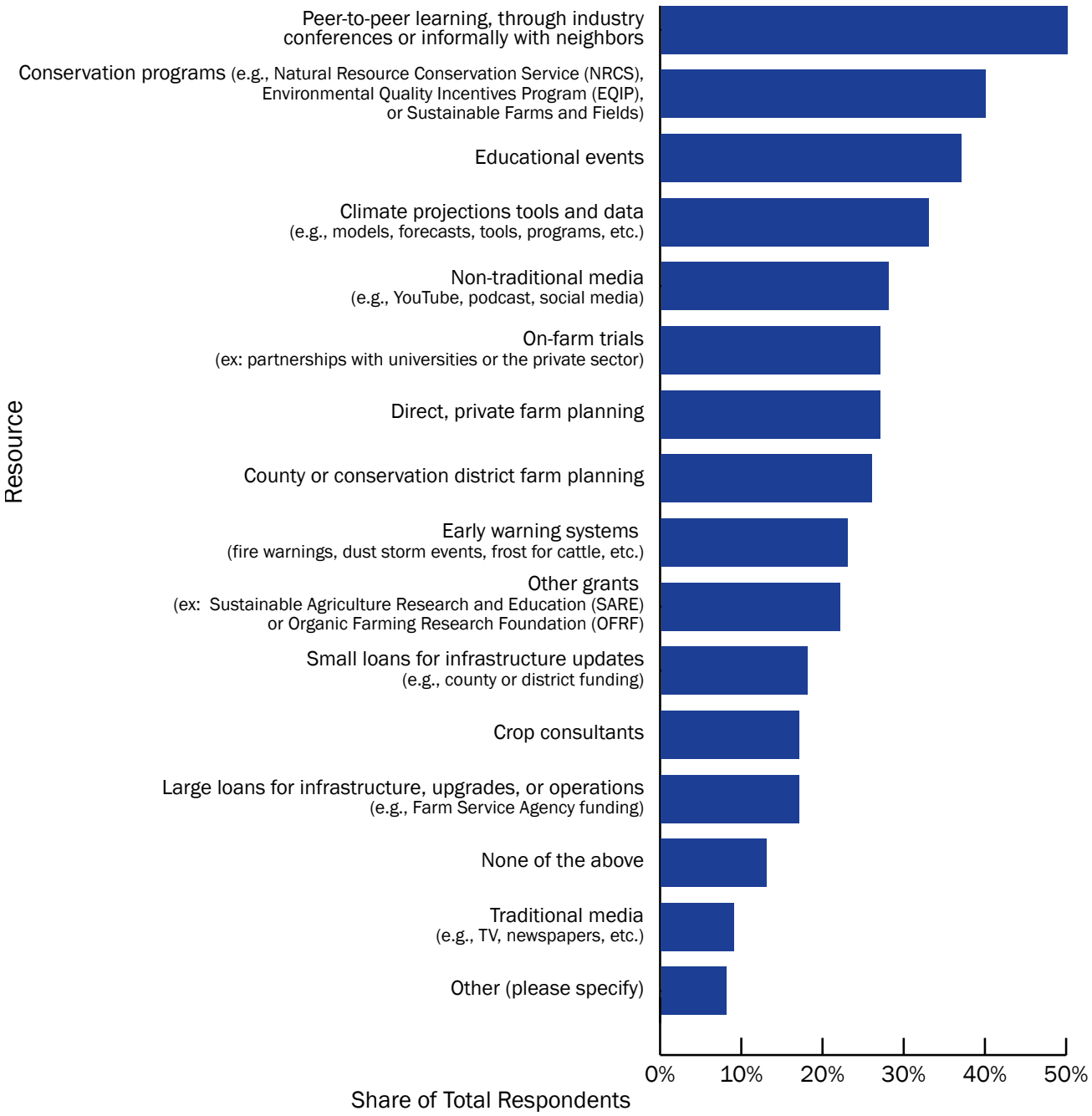



Figure 14. Responses to "What resources help you manage the impacts of a changing climate?" during a survey of producers and other agricultural stakeholders (n=292).

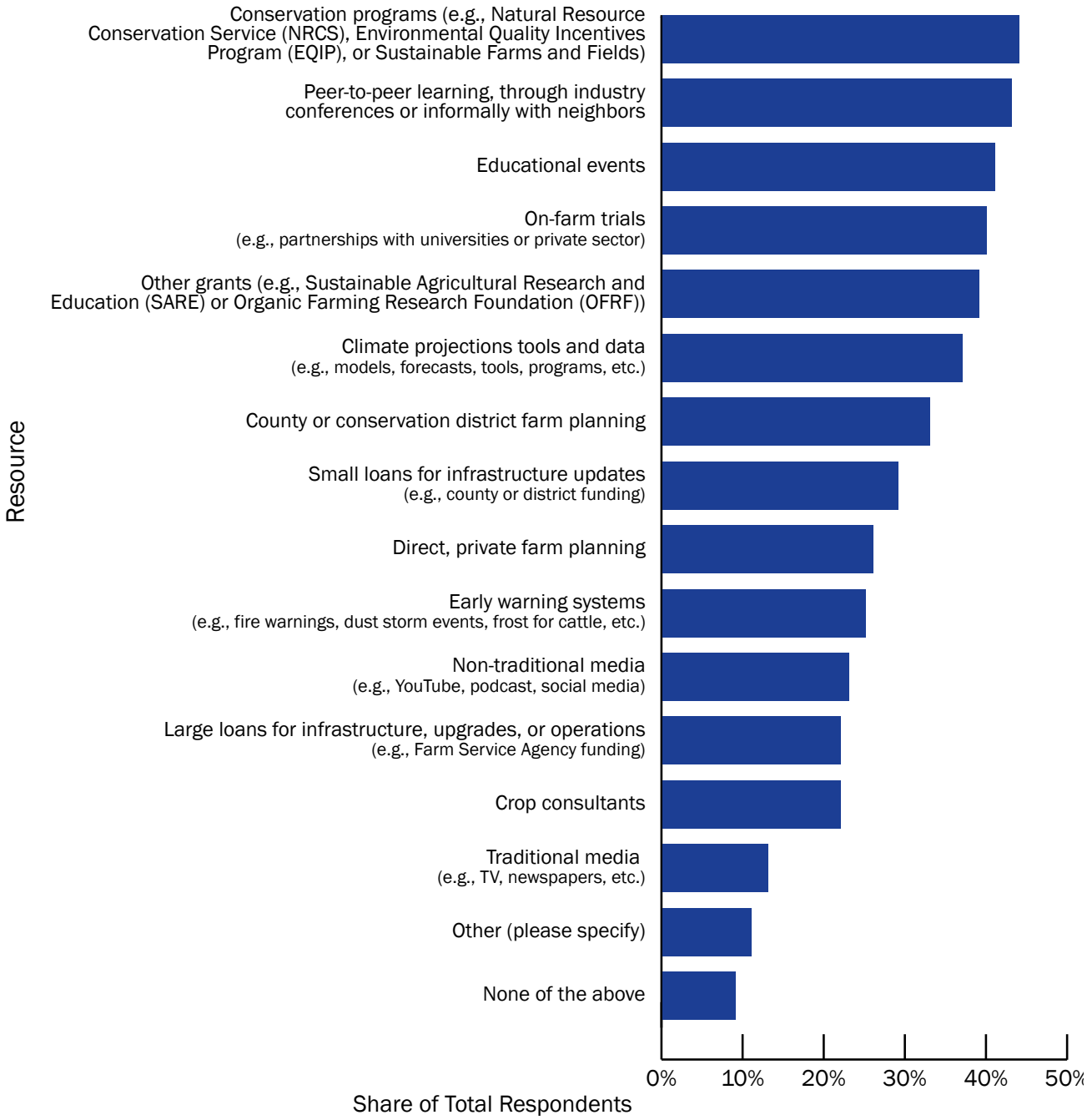



Figure 15. Responses to "What additional resources would you be most likely to use to manage the impacts of a changing climate?" during a survey of producers and other agricultural stakeholders (n=292).

## 3. Gaps in resources to mitigate climate impacts

### Theme 3a. Market volatility, high costs of production, and regulatory pressures have increased the need for flexible, responsive funding

Respondents noted stringent regulations and high operational costs as an indirect impact of climate change. Respondents expressed the need for more flexible and supportive policies, including tax reductions, streamlined permitting processes for agricultural projects, and financial assistance to offset the costs of new equipment, infrastructure improvements, and compliance with evolving regulations.

The following feedback reflects the various challenges and limitations producers face when trying to meet funding needs:

- Access to funding for small farms: Many small-scale farmers highlighted the difficulty in accessing funding, especially when grants are tailored for larger-scale projects that may not suit their needs or project sizes.
- Grant limitations and restrictions, and slow application processes: Respondents noted prohibitions for infrastructure investments for many grants, which hinder their ability to invest in new, innovative equipment. Slow turnaround times for grant applications and decision-making processes also discourage many from applying. Many respondents cited a lack of staff at Extension offices, NRCS, and other agencies as a driver of this inefficiency. See Theme 3B for further discussion.
- Insufficient funding to support specific resilience infrastructure projects, such as:
  - Water storage and conservation: dew catchment, rainwater harvesting, efficient irrigation, etc.
  - Backup systems for power outages due to extreme weather events
  - Extreme heat/cold mitigation: Hoop houses, greenhouses, high tunnels, and shade cloth
- Producers expressed a need for additional or enhanced insurance and emergency assistance programs that mitigate the impacts of extreme weather on infrastructure, crops, and livestock.

### Theme 3b. A historic reduction in agricultural research and technical assistance funding and staff has limited producers' ability to respond to climate impacts

Respondents emphasized the need for more research staff, particularly Extension specialists, to provide direct support and updated information on climate-resilient agricultural practices.

Participants identified the following research and technical assistance needs facing their operations:

- Availability and accuracy of weather and climatic prediction systems: The importance of accurate systems was noted throughout the survey as a top concern for producers to inform decision-making.
- Identification of resilient crops and practices: Farmers called for research to identify crops, plants, and farming practices that increase resilience to multiple climatic stresses such as droughts and temperature extremes, floods, storms, and wildfires.
- Access to crop consultants and research experts: Respondents identified a growing gap in the availability of research expertise either within university Extension offices and local technical assistance providers or through private crop consultants. Respondents noted that adequate staffing is crucial for timely assistance and implementation of projects. This disparity was noted to be regionally varied, with some agricultural communities having less access to expertise than others.

### Theme 3c. Regulations, taxes, difficult-to-use grant programs, and an overall disconnect between policymakers and producers have led to programs and funding that do not always meet diverse agricultural needs

Survey respondents identified changing markets, economic pressures, and regulatory concerns as issues they anticipate being most impactful to their operations in the next 5–10 years (Figure 16). Many respondents in listening sessions and survey write-in responses criticized governmental inaction, lack of funding, and the disconnect between policymakers and producers in addressing climate change in agriculture. These frustrations were tied to the recognition among producers that environmental regulations (including but not limited to climate regulations) are not written with the practical needs of producers in mind and often have negative unintended consequences.

> *"[We should be] lobbying for cutting regulations and unnecessary fuel taxes. With more money in the bottom line, there is more flexibility and, therefore more innovation. The best innovation will always come from the farmers, not mandates." — Survey respondent*

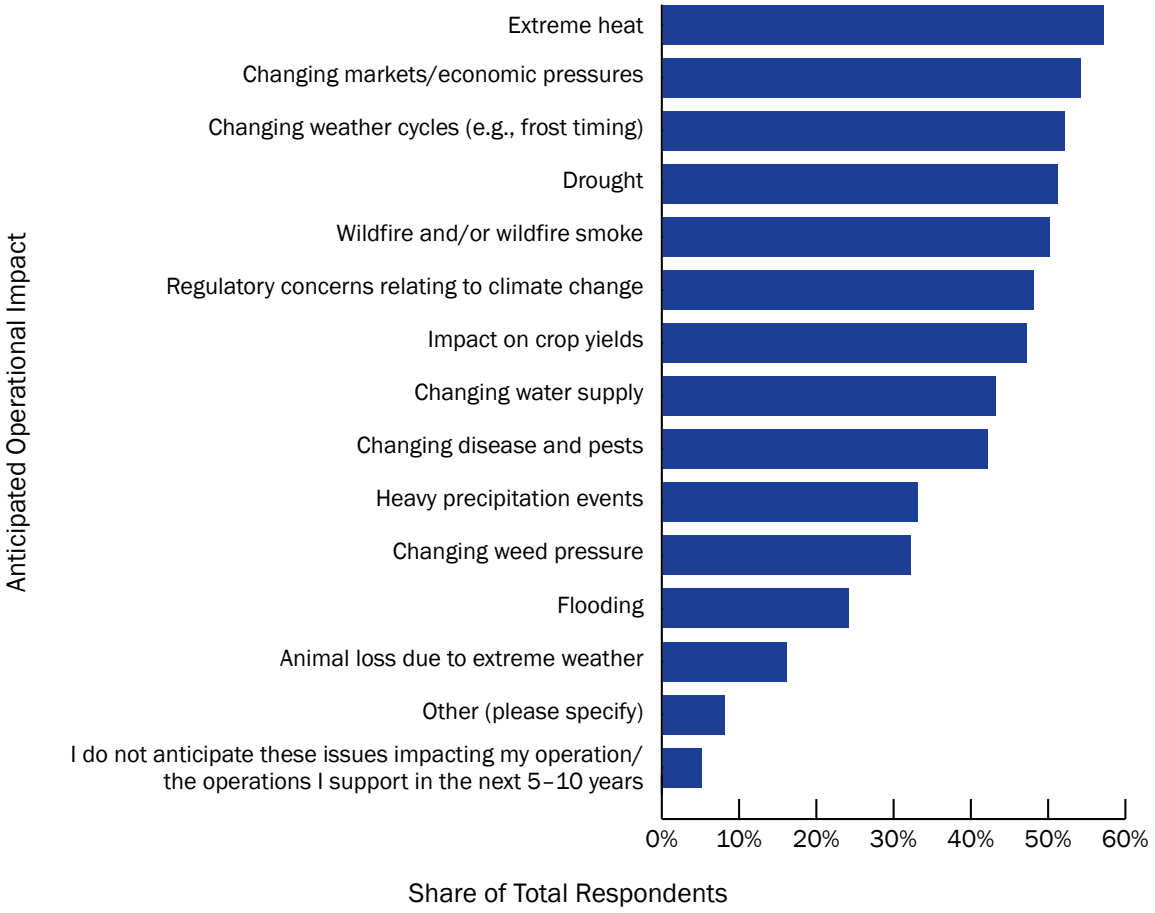



Figure 16. Responses to "Which of the following do you anticipate impacting your operation or the operation you support in the next 5 to 10 years?" during a survey of producers and other agricultural stakeholders (n=292).

## 4. Strategies to address resource gaps and increase climate resilience

### Theme 4a. Increased education, research, and expertise are needed to inform agricultural decision-making in the context of a changing climate

Survey respondents most frequently reported relying on universities (46 percent), friends, family, and neighbors (45 percent), and WSDA (43 percent) for support in managing the impacts of climate change (Figure 17). However, respondents and listening session participants expressed a desire for more: on-farm research to test and develop climate change mitigation approaches specific to their local conditions and farming practices; a need to identify resilient crops and farming practices; and accurate, timely climate data (Figures 14 and 15).

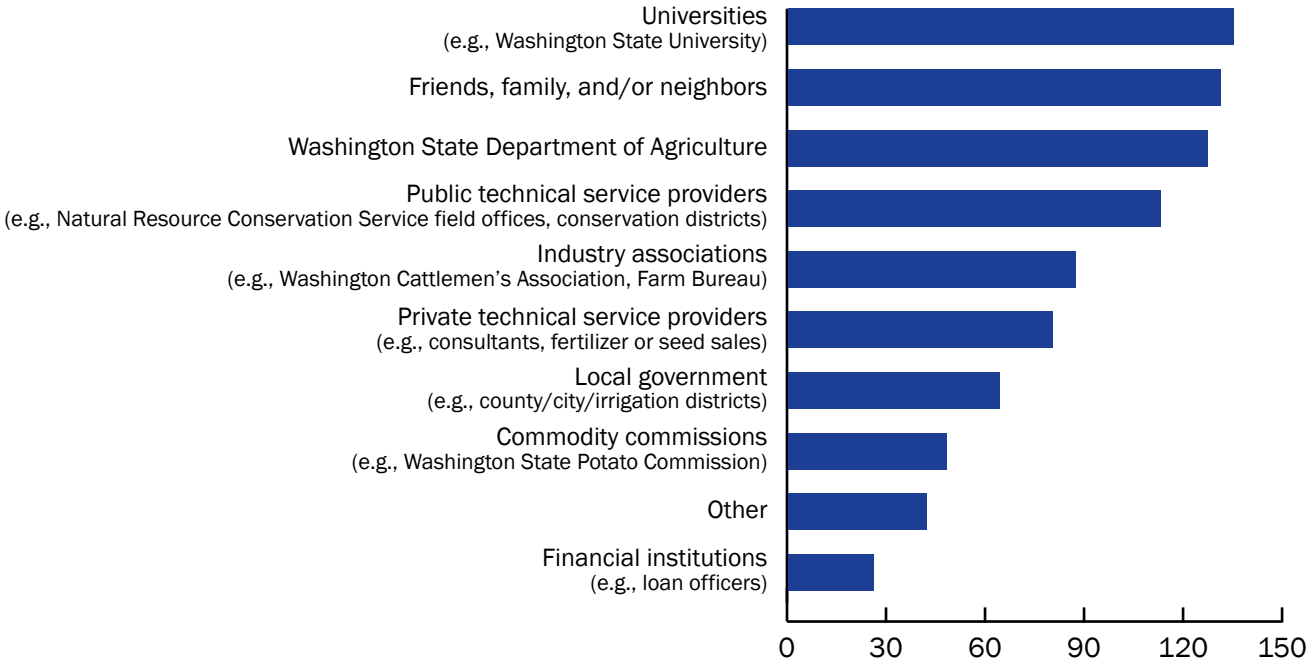



Figure 17. Responses to "From whom are you most likely to receive support to manage the impacts of a changing climate?" during a survey of producers and other agricultural stakeholders (n=292).

The following tools and data were described as being especially important during emergency events such as flooding, wildfire, and during extreme cold or heat:

- Predictive, regularly available climate data (Including AgWeatherNet)
- Farm planning with Best Management Practices (BMPs) by local experts
- Data on plant health issues and recommendations of new crop varieties to support decision-making
- Support for adopting technological advancements to improve farm efficiency and productivity

> *"By learning new practices, it allows us to prepare for climate change events in the future. "*
> *— Survey respondent*

**Theme 4b. Investment in public and private infrastructure and innovation is required to mitigate the impact of climate hazards**

Respondents identified specific infrastructure needs to improve their operational resilience to climatic extremes and emergency events, underscoring the diverse challenges producers face in adapting to climate change and highlighting the importance of investing in infrastructure and technology. Respondents expressed the need for funding to support infrastructure upgrades and equipment purchases, such as installing:

- Shade cloth
- High tunnels
- Manure management systems
- Rainwater harvesting systems
- Forest resilience practices to reduce fuel loads
- Backup systems for well pumps and/or alternative water sources

> *"In 2022 our crop yield was greatly diminished due to spring rains, high temps, and early frost. Being able to receive a grant for high tunnel gives hope that yield will be better for 2024."*
> — *Survey respondent*

## Additional takeaways from listening sessions

Commodity-specific concerns that emerged during the listening sessions are included below (Table 4). These discussion points emphasize the need for a region and crop-specific examination of agricultural climate impacts and needs.

Table 4. Additional takeaways from agricultural climate impacts listening sessions, organized by commodity association.

| Listening Session | Additional Takeaways |
|---|---|
| Washington Grain Commission | • Changing weed pressure and herbicide resistance impacting crop yields<br>• Difficult to maintain crop quality in an inconsistent climate<br>• Volatile product transportation methods not controlled by farmers |
| Washington Wine Commission | • Increased severity of wildfire smoke for Eastern and Central Washington impacts product quality<br>• Lack of research on breeding for resilient varieties and rootstocks<br>• Lack of research on changes to phenology timing (bloom and ripening)<br>• Lack of support for worker safety implementation and labor needs under changing harvest conditions |
| Washington Tree Fruit Commission | • Climate-related events impacting product transportation<br>• Orchards newly located in traditionally colder regions increase challenges with cold snaps, frost, and winter kill<br>• Changes in pest management practices due to change in pest lifecycles<br>• Lack of climate change programs and incentives that benefit producers in the short-term<br>• Lack of research on how carbon sequestration may be an additional revenue source for tree fruit farmers<br>• Need for more ways to communicate industry information directly to farmers |

| | |
|---|---|
| Washington Dairy Federation | • Increased pressure to reduce carbon footprint from supply chains<br>• High input costs associated with greenhouse gas reduction technologies challenge a farm's competitiveness and viability.<br>• Increased flooding impacts lagoon storage, livestock loss, and operation income<br>• Issues with new invasive species<br>• Volatile feed supply during crises and weather events |
| Washington State Potato Commission | • Longer heat seasons increase insect and pest pressures<br>• Crops moving north from California (i.e., processing tomatoes) will introduce competition for land<br>• Limited access to affordable insurance programs due to the high value of crops<br>• A need for reliable, clean energy for storage, pumps, and nitrogen fertilizer |
| Washington State Cattlemen's Association | • Fire and smoke impacting forage crop harvest and hay storage<br>• Lack of infrastructure on public lands (decommissioned roads, inadequate watering) limits grazing and leads to a higher risk of wildfire |

## Demographics of survey respondents

Respondents were primarily farm owners and farm operators, followed by year-round employees, farm advisors, and industry representatives (Table 5). Survey respondents were well distributed across their years of experience (Table 6) and the size of their operation in gross revenue (Table 7).

Table 5. Responses to "Which of the following best identifies you?" during a survey of producers and other agricultural stakeholders (n=292). Respondents were allowed to select multiple options.

| Survey Responses: Respondent Identity | Count |
|---|---|
| Farm owner | 190 |
| Farm operator | 141 |
| Year-round farm employee | 58 |
| Farm advisor (private or public) | 38 |
| Industry representative | 23 |
| Other (please specify) | 22 |
| Seasonal farm employee | 15 |
| University researcher | 12 |

Most respondents (60 percent) worked in agriculture for more than 10 years (Table 6). Respondents primarily represented operations with an annual revenue less than $250,000 (Table 7).

Table 6. Responses to "How long have you worked in agriculture?" during a survey of producers and other agricultural stakeholders (n=292).

| Survey Responses: Years in Operation | Count |
|---|---|
| Less than one year | 11 |
| 1–5 years | 49 |
| 6–10 years | 58 |
| 11–20 years | 51 |
| 21–30 years | 34 |
| 31 or more years | 88 |

Table 7. Responses to "What was your operation's gross average revenue in 2022?" during a survey of producers and other agricultural stakeholders (n=292).

| Survey Responses: Revenue Bracket | Count |
|---|---|
| Not applicable | 49 |
| $1,000–$9,999 | 38 |
| $10,000–$99,999 | 74 |
| $100,000–$249,000 | 28 |
| $250,000–$499,000 | 29 |
| $500,000–$999,000 | 28 |
| $1,000,000 or more | 40 |

Most respondents (65 percent) selected multiple commodities when asked what they produce. The most common categories selected were vegetables and small fruits (n=129), field crops (n=103), and tree fruit and nuts (n=103) (Table 8).

Table 8. Responses to "What types of crops/livestock does your operation produce?" during a survey of producers and other agricultural stakeholders (n=292). Respondents were allowed to select multiple options.

| Survey Responses: Commodity/Crop Type | Count |
|---|---|
| Vegetables/small fruits (e.g., onion, potatoes, sweet corn, melons, blueberries, etc.) | 129 |
| Field crops (e.g., alfalfa, hay/haylage, wheat, corn/silage, cotton, etc.) | 103 |
| Tree fruit and nuts (e.g., apples, grapes, pears, cherries, citrus, etc.) | 103 |
| Livestock and poultry products (e.g., milk, eggs, manure, wool, etc.) | 70 |
| Livestock and poultry (meat) | 68 |
| Pasture | 68 |
| Seed crops | 38 |
| Other (please specify) | 36 |
| Nursery crops | 35 |
| Forest/timber products | 24 |
| Apiary products and pollination services | 23 |
| Hops | 14 |
| Aquaculture | 8 |

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