



# Planning for the Future

An Analysis of Trends Affecting APHIS and U.S. Agriculture Over the Next 20–30 Years

## Introduction

In 2022, we celebrated our 50th anniversary. For half a century, the Animal and Plant Health Inspection Service (APHIS) has secured the health of America's agricultural resources—protecting 900 million acres of farmland, facilitating the movement of \$177 billion worth of U.S. agricultural goods, and keeping 21.6 million Americans employed in agriculture-related industries.

Over the past 50 years, the agriculture community has faced tremendous changes—the rise of globalization, advances in technology, escalating climate change impacts, and evolving production practices. The world is constantly transforming, and we can expect to face more uncertainties as the pace of change accelerates.

To navigate this landscape, APHIS is using strategic foresight to integrate future-thinking principles into its culture and planning. Strategic foresight is a method for exploring plausible future scenarios, identifying the opportunities and challenges they present, and leveraging that information to make strategic decisions now that will better position us for the future.

We incorporated strategic foresight into our planning efforts for the 2023-2027 Strategic Plan. A team of APHIS employees conducted a detailed analysis of potential future challenges and opportunities. The results of their analysis informed the plan's goals, objectives, and tactics. They are designed to be a foundation for APHIS' future.

Using scanning, trend analysis, and scenario planning, the team identified 10 trends and key drivers of change with the potential to impact APHIS in the next 20 to 30 years. When the team looked closely at the trends, they found that APHIS will need to work in an increasingly uncertain, complex, and ambiguous environment in the future. Shifts and changes will become almost constant, and agriculture, the environment, and human health will become more interconnected.

We see a future where change is the only constant. A future where technology and science advance quickly, where stakeholder networks expand and shift, and where climate change spreads pests and diseases and causes catastrophic weather events. In the coming years, strategic foresight will support programs and teams in their long-term planning and help them solve current and emerging problems.

Strategic foresight does not predict the future. Rather, it provides tools for detailed, databased analysis and gives us a sense of where the future is heading. With this knowledge we can identify opportunities to grow partnerships, expand services, and invest in our dynamic workforce.





### Ten trends most likely to impact the way APHIS does business:



#### Security threats

are on the rise and risk mitigation measures across all environments will increase and frequently change.



#### Climate change threats

continue to mount and expand in scope, intensity, and variety.



#### Political, geographical, and economic division

continues in the country, decreasing trust in government programs.



#### Data analytics

increasingly support decision and policy making as a result of big data availability, ongoing requirements, and expectations around accessible evidence.



#### Scientific and technological advances

provide new opportunities and challenges.



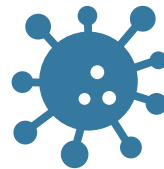
#### Stakeholder networks and cooperators

are shifting because of changing production practices and new opportunities and risks.



#### Perceptions of animal welfare and wildlife

are evolving, increasing pressure on related government activities.



#### Global health threats

are increasing, with greater and more frequent impacts, requiring coordinated response from public and private entities.



#### Globalization

is escalating demands for the enforcement of phytosanitary and zoonosanitary standards, causing unintended consequences, such as supply chain disruptions.



#### Changing workforce

needs flexible skillsets to quickly adapt; employees must continually acquire new skills throughout their career.



**Security threats** are on the rise and risk mitigation measures across all environments will increase and frequently change.

### What's Driving This Trend?



Global climate change



Ongoing polarization



Industry consolidation



Diversity of U.S. population



Rapidly evolving science



Rapidly evolving technology



Variable food security



Increased global trade

### What We Know Today

- Ecosystems are changing quickly due to extreme weather and climate conditions.
- Federal agencies are under pressure to quickly strengthen and deploy monitoring and security systems, technologies, and protocols in response to changes in domestic pest and disease occurrences.

### What We See Ahead

- Increased security risks will require APHIS and the agriculture industry to speed up the development and deployment of new technologies to better monitor and scan for emerging threats to humans, plants, and animals.
- APHIS will need to increase its human capital resources and add skillsets to support and understand new technologies and expanding systems.
- Increased security risks will present opportunities to balance risks and innovations and strengthen evidence-based decision making.



**Climate change threats** continue to mount and expand in scope, intensity, and variety.

### What's Driving This Trend?



Global climate change



Ongoing polarization

### What We Know Today

- Ecosystems are changing quickly due to extreme weather and climate conditions.
- Demands for environmentally friendly practices to limit ozone depletion and carbon emissions are escalating.
- Animal behaviors and habitats are evolving and shifting in response to climate change.
- APHIS personnel face threats from weather and geographic changes.
- The food supply is fragile, leading to global food insecurities.
- Plant pests are adapting, increasing range, and having more lifecycles due to climate change.
- Winds, floods, and drought exacerbated by climate change are spreading pests and diseases, affecting beneficial organisms that may aid in integrated pest management.

### What We See Ahead

- APHIS and partners will need to identify diseases that thrive in warmer climates, develop vaccines and medicines to combat them, develop strategies to tackle pests that thrive in warmer climates, and identify impacted regions.
- Habitat shifts could increase APHIS' animal removal and relocation operations, increasing scrutiny over animal welfare as the public perception of animals shifts.
- Polarization and scarcity of resources may decrease Congressional support for funding and legislative action.
- APHIS will devote more resources to an open communication strategy.
- We will strengthen partnerships with biotechnology companies and other Federal agencies, Tribal nations, and State officials.
- We will need to invest in new positions for scientists and positions related to emergency response for climate-related weather events.
- Plant pest lifecycles are increasing due to changes in temperatures, increased winds are spreading pests further, and habitat changes are expanding the range where pests can survive and spread.



**Political, geographical, and economic division** continues in the country, decreasing trust in government programs.

### What's Driving This Trend?



Rapidly evolving science



Ongoing polarization



Rapidly evolving technology



Diversity of U.S. population

### What We Know Today

- Federal policies oscillate with leadership.
- Federal workforce feels unsafe.
- The public and Congress scrutinize Agency rulemaking and mission operations.
- It's difficult to hire and retain Federal employees.
- More Americans are migrating from rural to urban regions.
- Social media algorithms filter information according to user preferences and perspectives.
- Calls to embed diversity and inclusion are louder.
- The number of Freedom of Information Act requests increases annually.

### What We See Ahead

- APHIS could face more litigation and less Congressional funding for programs that are increasingly controversial.
- With less Congressional funding, APHIS may rely more on user fees and non-Federal support and funding.
- We may need to prioritize human capital needs and limit mission area scope and operations.
- Conflict may arise because of gaps between stakeholder needs and external ideologies.
- More reporting and oversight could increase Agency responsibilities but not staffing.
- APHIS will need to devote resources to an open communications strategy to strengthen relationships with industry and the public so we can collect and consider diverse thoughts and ideas across all sectors.
- We will continue to promote segments of our work that enjoy broad support—such as trade—and spend more time explaining controversial or lesser-known operations.





**Data analytics** increasingly support decision and policy making as a result of big data availability, ongoing requirements, and expectations around accessible evidence.

### What's Driving This Trend?



Rapidly evolving science



Prioritizing trust



Rapidly evolving technology

### What We Know Today

- Use and dependence on automation is increasing.
- Need to allow space for innovation while balancing enterprise risks when considering new technologies.
- Pressure to speed procurement and deploy new technology tools is growing.
- Need more resources to identify and understand new technologies.
- Collaborations with external bodies (e.g., academia, other nations) are increasing.
- Communications burdens (e.g., translations) are increasing.
- Calls for transparency and need to defend data quality are increasing.

### What We See Ahead

- APHIS will need to open positions for data managers, programmers, and bio-informaticists but may struggle to compete with the tech industry to attract and hire qualified personnel.
- The demand for big data will expand APHIS' need for new systems and software and the tech support that goes with them.
- We will need to procure and deploy digital solutions/tools faster and quickly pivot and adapt to changes based on rapid data changes.
- There will be more systems or tools from which to choose, and some may be better suited to certain populations or operational needs. Expanding these systems will demonstrate inclusion and provide a high level of confidence in APHIS' decision making.
- Having more access to data and data-sharing capabilities means APHIS can rely more heavily on the incoming stream of information.



**Scientific and technological advances** provide new opportunities and challenges.

### What's Driving This Trend?



Rapidly evolving science



Variable food security



Rapidly evolving technology



Global climate change

### What We Know Today

- Monitoring and scanning for the emergence of new science is critical.
- Pressure to manage trade risks is increasing.
- Traceability is easier through eCommerce.
- More people are seeking healthier nutrient-dense products.
- Need big data to take advantage of new science tools/technologies like genetic sequencing.
- More emphasis is placed on an organization's credibility.

### What We See Ahead

- APHIS may struggle to keep up with scientific discoveries and regulate and enforce accordingly.
- More specialized skillsets will be needed to rapidly pivot and adapt to industry changes.
- APHIS' risk assessments will need to be nimble in terms of assessment endpoints.
- APHIS has an opportunity to operate proactively based on science rather than reacting to a trigger event.
- New science and technology will allow APHIS to consider alternative solutions to rulemaking and enforcement.
- Better science and data will enhance APHIS' ability to maintain transparency with its stakeholders and partners.





**Stakeholder networks and cooperators** are shifting because of changing production practices and new opportunities and risks.

### What's Driving This Trend?



Rapidly evolving science



Variable food security



Rapidly evolving technology



Global climate change



Ongoing polarization



Changing perceptions of animal welfare and wildlife

### What We Know Today

- Escalating demands for agricultural businesses to adopt environmentally friendly practices.
- Means and channels of connectivity are plentiful but sustaining connections over multiple platforms is as important as making connections.
- More people are seeking healthier nutrient-dense products.
- Increased climate effects on agriculture and refugee populations
- Increased need to monitor and scan for the emergence of new science and threats
- There are still people without technology.

### What We See Ahead

- APHIS may experience high stakeholder “turnover” rates because of rapidly shifting issues and concerns both nationally and internationally.
- We must continue to adapt to meet the needs of our traditional stakeholders.
- APHIS will have an opportunity to partner with local and urban farmers to teach them how to recognize and combat plant pests.
- APHIS will partner with citizen scientists, non-profit organizations, non-government organizations, developers of remote technology, and international stakeholders.
- New stakeholders will arise as a result of emerging issues such as supply chain shortages.
- APHIS will build relationships in the urban environment as food markets in these areas will be critical to fulfilling supply chain needs.
- APHIS will build new relationships with organizations adopting conservation and integrated pest management practices to effectively manage pests and diseases, and to manage wildlife (e.g. resource conservation districts).



**Perceptions of animal welfare and wildlife** are evolving, increasing pressure on related government activities.

### What's Driving This Trend?



Rapidly evolving science



Diversity of U.S. population

### What We Know Today

- The public scrutinizes Federal government activities that directly impact animals.
- People are more aware of APHIS' animal welfare activities but do not understand our regulatory authority.
- Artificial intelligence is replacing live animal racing.
- The public is more interested in wildlife and livestock welfare.
- APHIS is more involved in pet and animal rescues related to weather events.
- More species, including nonconventional and farm animals, are recognized as pets.
- More nonconventional animal species are being used as emotional support animals.

### What We See Ahead

- To manage wildlife humanely, APHIS will need to understand secondary ecological effects of predator and prey population dynamics and how they impact animal welfare.
- APHIS will need to explore and implement new humane ways to depopulate animals during an emergency and control wildlife populations.
- As the list of animals considered pets expands, farms may be subject to AWA regulation.
- APHIS will be challenged by the increasingly blurred line between livestock and pets.
- APHIS will be able to adopt or promote new technologies that will improve animal welfare and support ongoing integration of nonconventional pets.
- APHIS will take a more holistic approach to address the public's growing concern for the welfare of conventional and nonconventional pets.



**Global health threats** are increasing, with greater and more frequent impacts, requiring coordinated response from public and private entities.

### What's Driving This Trend?



Rapidly evolving science



Variable food security



Rapidly evolving technology



Global climate change



Rising focus on workforce wellness



Changing perceptions of animal welfare and wildlife

### What We Know Today

- There is an ongoing tension between safeguarding and open trade.
- There are more calls for governments to be transparent about risks.
- Cyber security is a global threat.
- The scope of risk in a globalized economy is broadening.
- The frequency of pest incursions and disease outbreaks is increasing.
- Seasonality of produce is eroding due to year-round availability.
- Dependence on automation is increasing.
- Pressure to speed procurement and deploy new technology tools is increasing.

### What We See Ahead

- Future trade agreements may negate user fee payments, making fees undependable.
- APHIS will need to consider the global impacts of pandemic and zoonotic disease risks.
- We may need to respond to more emergencies here and abroad and mitigate for commodities rather than pests or diseases.
- Business decisions may be based on a country or region's local disease profile.
- We will need to add skillsets to support new technologies and expanding systems.
- We need to balance risks and innovations and strengthen evidence-based decision making.
- We will share and acquire data from international organizations.
- We will strive to improve traceability through eCommerce.
- APHIS may have an opportunity to focus more on global standard setting activities and trade agreements, particularly in developing nations.





**Globalization** is escalating demands for the enforcement of phytosanitary and zoosanitary standards, causing unintended consequences, such as supply chain disruptions.

### What's Driving This Trend?



Rapidly evolving science



Variable food security



Rapidly evolving technology



Global climate change



Rising focus on workforce wellness



Changing perceptions of animal welfare and wildlife

### What We Know Today

- The global environment is volatile, uncertain, and complex.
- Agricultural and natural resource interests align and integrate, creating a larger canvass for response and investment of resources.
- More staff is needed for emergency response.
- Staff is burdened from increased travel and other stresses (e.g., public liaising) associated with emergencies.
- The public has more interest in disease outbreaks.

### What We See Ahead

- APHIS may have to prioritize emergencies, which could mean not responding to outbreaks previously considered mission essential.
- The Agency may face economic hardships as the frequency and intensity of outbreaks increase.
- Response plans will need to change and be developed quickly for emergencies.
- Increased incursions could mean more pest and pathogen surprises as more fly under the radar.
- APHIS will develop and refine communications plans that inform stakeholders and the public about the Agency's efforts and positive impacts.
- APHIS may need to be more involved in animal welfare emergencies and will need to add positions to respond to and scan for emergencies.



**Changing workforce** needs flexible skillsets to quickly adapt; employees must continually acquire new skills throughout their career.

### What's Driving This Trend?



Diversity of U.S. population



Rising focus on workforce wellness



Rapidly evolving science



Rapidly evolving technology



Prioritizing trust

### What We Know Today

- APHIS has an open, employee-focused communication strategy.
- The world seems smaller and more closely connected.
- APHIS' customer base is expanding.
- Workforce changes are occurring simultaneously (e.g., schedules, budget, locations, etc.).
- More telework and remote positions increase competitiveness.
- Coordinating resources across staffs and multiple platforms is necessary to satisfy demand.
- There are more training options and opportunities for all USDA employees.
- Turnover is high.
- There's an increased focus on improved employee experience.
- Calls to embed diversity and inclusion are louder.

### What We See Ahead

- Evolving technologies make multi-tasking and performing in more than one role possible, but this also reduces overall staffing levels.
- Tension may arise between the need for specialized and broad skillsets; however, redundancy in skillsets is necessary to fulfill resource needs within APHIS.
- APHIS' workforce profile will need to shift as the world's population demographics shift.
- APHIS will have the opportunity to develop a transparent hiring process that is more appealing and easier for applicants outside the Federal workforce.
- Supporting a hybrid workforce will make APHIS more competitive in the global market for new hires and will allow the Agency to broaden its applicant pool.



# Future Scenarios

The following scenarios consider how APHIS might operate in the future in response to the trends that are most likely to impact the way we do business.







## Shifting Vulnerabilities

Global climate change, technological and scientific advances, increasing populations, and political and geographical divisions increase security and global health threats. To sustain agriculture and natural resources and not accelerate the impacts of climate change, APHIS breaks from its traditional risk management strategies. APHIS leverages precision agriculture, wireless sensor networks, wearable health monitors, and other technologies to track and prevent the spread of pests and diseases.

The world depends on international trade for its food supply. International standard setting, certification, trade agreements and preclearance programs expand to meet these demands. APHIS is active in international organizations such as the International Plant Pest Convention and World Organisation for Animal Health to influence activities. APHIS considers food security, supply chain issues, and environmental degradation when determining how to safeguard agricultural and natural resources.

The effects of global climate change increase the severity and frequency of weather events and cause shifts in pest lifecycles and disease occurrences. More organizations are involved in emergency, necessitating greater Federal, State, and local coordination.

APHIS and the Centers for Disease Control and Prevention are equal partners in scanning for and responding to zoonotic diseases. APHIS is seen as a public health contributor and supports efforts to enhance food security. In addition, APHIS plays an important role in responding to emergencies outside its conventional agriculture role. For example, habitat shifts increase Wildlife Service's removal and relocation operations. APHIS reprioritizes emergencies and may not respond to outbreaks previously considered at the core of the Agency's mission. APHIS increases its emergency response capacity and deploys new technologies to better monitor and scan for emerging threats to humans, plants, animals, and wildlife.

As more people seek healthier, nutrient-dense products, the public and Congress press APHIS to manage and sustain new trade markets. Consumers expect to know where the agricultural products they buy come from, the treatments used in their processing, and whether they contain bioengineered ingredients. eCommerce makes traceability easier. APHIS leverages rapidly evolving science and technologies to ensure the delivery and consumption of healthy agricultural products across the globe.





## Shifting Tools and Practices

In 20 to 30 years, data analytics, advances in science and technology, and the rising focus on workforce wellness will shift the way the world operates. Processes will become more automated, jobsites will be safer since artificial intelligence can do the more dangerous tasks, and jobs will be flexible and allow people to constantly improve their skills. Changes in production practices will be widespread across the agriculture industry. New science and technology may require APHIS to consider alternative solutions to rulemaking and enforcement strategies. Additive manufacturing is efficient and readily available, leading APHIS to partner with others to develop completely new tools for risk management and mitigation, such as new packing materials for cargo instead of treatment and inspection.

Regulations may cease to be a preferred tool as more options for compliance, investigation, and guidance become available. Increased involvement of diverse private and nonprofit groups, social media, and more international level decision-making will result in the formation of new, multi-layered governing systems. These new—often informal—systems will have an increasing influence on public and private actions.

In the future, there will be a high demand and pressure for agencies to procure and deploy technology tools, systems, and software more rapidly. Multiple technical systems will be easier to integrate and require less

human oversight. Since systems will be easier to procure and support, APHIS can work faster, more efficiently, and more economically. Our technology will be more adaptable to different users, better supporting multiple languages and physical accessibility issues as well as being more user-friendly. Having greater access to data and data sharing capabilities means APHIS can make better decisions in real-time. New tools and methods for clearing cargo will be used to deal with disruptions in the supply chain. APHIS will increase its role in international standard setting, certification, trade agreements, and preclearance programs as international organizations and trade partnerships will become more influential.

As technology advances it creates an opportunity for employers like APHIS to sustain an efficient, effective, and diverse workforce. Supporting a hybrid workforce will make APHIS more competitive in the market for new hires with specialized skillsets and will allow the Agency to hire from a broader geographic area.





## Shifting Values

In 20 to 30 years, rising awareness of animal and wildlife welfare, increased focus on workforce wellness, and continued political, geographic, and economic polarizations will shift national and international perspectives and values. In the future, more Americans will live in urban regions. They will seek healthier nutrient-dense products, and many will agree that livestock and wildlife should be provided the same rights as domesticated pets. This will add public, and by extension Congressional, pressure on APHIS to prioritize the use of humane animal agricultural practices. As the list of animals considered to be pets expands, farms could potentially fall under regulation of the Animal Welfare Act. APHIS will also need to take a more holistic approach across program areas to address the public's growing concern for animal welfare in conventional and nonconventional pets.

The combination of changes in natural environments—including climate and environmental degradation, population demographics, ideological divides, and economic power—will necessitate that APHIS expand its stakeholder base. To increase and maintain trust, APHIS will cast a wider net to collect and consider diverse thoughts and ideas from across agriculture, environmental, and other public sectors. APHIS will experience stakeholder “turnover” as global concerns vary and move to the forefront.

The recent COVID-19 pandemic highlighted the importance of maintaining a healthy workforce. That trend will continue over the next 20 to 30 years. Public health and animal welfare concerns will also continue to merge.





## Shifting Land and Resource Use

In 20 to 30 years, risks associated with climate change, ongoing and accelerating environmental degradation, and other changes in physical or natural environments will raise questions about management of public and natural resources. Questions of ownership and expectations about the management of public resources will increase pressure to create fee-for-service programs or pay-as-you-go models to augment appropriated resources.

Private organizations' sponsorship and investment in local communities will increase. Generally, more affluent communities have more private funds. As a result, the communities where such private support doesn't exist or where there is no motivation for private investors will need more support from Agencies like APHIS. APHIS will expand its Civil Rights and Diversity and Inclusion programs to enhance monitoring around equity in program delivery.

Food security will become even more tenuous as the movement of goods and services is less predictable and the effects of climate change increase. As a result, APHIS will respond to pest and disease issues in micro-environments, such as specific growing areas rather than within the conventional county and State boundaries.

Maintaining the natural environment continues to frequently be at odds with operational practices in the agriculture sector. Misconceptions about biotechnology and interest in organic and farm-to-table products add even more chaos. APHIS will strive to be as transparent as possible in its strategic use of resources to potentially maximize partnerships and allay public concerns. APHIS personnel will be skilled at conflict management and resolution to support consensus decisions that put the health of the planet and people first.



## Looking Ahead

By exploring trends, the forces that drive them, and their implications, we can better understand issues of concern to those we serve in the years and decades ahead. This longer view helps us define the strategic context for our work and address crosscutting and interconnected challenges that require sustained collaboration and innovation.

Strategic foresight will be like a global positioning system that APHIS relies on to guide our continual and successful evolution as we achieve our changing and vital safeguarding mission, deliver new services, and identify opportunities to grow partnerships, expand services, and invest in our dynamic workforce.

It will facilitate dynamic conversations, contribute to APHIS' evaluation plans and learning agenda, and help us meet the needs of our stakeholders, our customers, our cooperators, and the American public.

We're at the beginning of our foresight journey. In the short term, this vision of the future provides a backdrop for APHIS' 2023-2027 Strategic Plan. In the long term, strategic foresight will be part of APHIS' foundation for the next 50 years.

Building strategic foresight into our culture will help us as we successfully adapt to meet the future. As we position the Agency to overcome the challenges and seize the opportunities of the future, APHIS will be agile and adaptable.

We will balance risk with innovation, invest in positions responsive to climate change, engage with new stakeholders, use emerging science and technology as an alternative to rulemaking, and support employee development and advancement in the hybrid workplace.

We will be proactive in our planning efforts, innovative in our problem-solving, and responsive to the needs of the diverse communities we serve.

APHIS will be a global leader in agricultural health, a trusted voice in the scientific community, a full partner in the Federal government's One Health initiative, and a valued collaborator to agricultural communities globally, nationally, and locally.

We've already begun.







[www.aphis.usda.gov](http://www.aphis.usda.gov)