



Biosecurity and Invasive Species Initiative Appendix

In July 2018, the Western Governors' Association (WGA) launched the Western Governors' Biosecurity and Invasive Species Initiative, the central policy initiative of WGA Chair, Hawaii Governor David Ige. The Chairman's Initiative focused on the impacts that nuisance species, pests and pathogens have on ecosystems, forests, rangelands, watersheds and infrastructure in the West, and examined the role that biosecurity plays in addressing these risks.

The initiative included a series of four workshops held across the West in the fall of 2018. Workshops were held in Stateline, NV, Cheyenne, WY, Helena, MT, and Waimea, HI. WGA also hosted a series of five webinars that examined discrete invasive species management and policy issues. Surveys completed by regional invasive species experts provided further information about challenges related to biosecurity and invasive species risks in the West.

WGA compiled an appendix to organize paraphrased viewpoints from surveys, workshops and webinars. These statements have been categorized into themes and organized in a way that clearly describes the challenges and opportunities for improvement with invasive species management. Certain species with significant impacts and large ranges, such as cheatgrass and quagga and zebra mussels, were mentioned throughout the workshops and across topic areas. Instead of devoting a particular section to these species, statements related to their effects and management are interspersed throughout the appendix.

The appendix is organized into the following topic areas:

Invasive Species Effects

- Ecological
- Economic
- Cultural

Management Challenges

- Funding & Capacity
- Coordination & Ownership Boundaries
- Regulatory Factors
- Vectors
- Data Privacy
- Geography & Climate

Management Opportunities

- Prevention
- Early Detection & Rapid Response
- Technological Improvements
- Strategic Tools
 - Partnerships
 - Integrated Pest Management
 - Biocontrols
 - Adaptive Management
 - Restoration
 - Monitoring

Collaboration & Coordination

- Coordinated Action
- Cross-boundary Management
- Innovative Funding
- Tribal Engagement
- Seed Strategy

Biosecurity: Risks and Management Tools

- Wildlife Diseases & Pathogens

Communication

- Public Awareness & Engagement
- Science to Policy Exchange

Invasive Species Effects

Ecological

Invasive species are among the most persistent and challenging issues in the West. Their impacts are staggering. According to The Nature Conservancy, invasive species impact over 100 million acres nationwide and cost \$120 billion to manage every year. (NV Governor Sandoval)

Invasive species have contributed to the decline of 42% of all threatened and endangered species. (NV Governor Sandoval)

A million acres have burned in NV alone this year. Invasive species contributed greatly to this. Fires are fueled by invasive cheatgrass, and then invasive species flourish in the burned areas, creating a system that impacts the fabric of the West (NV Governor Sandoval)

Invasive species issues sometimes fall behind other natural resources crises but are every bit as dire. The impacts to ecosystem and economies are often devastating. (Federal Agency)

Cheatgrass is the dominant invader in NV. It's a perfect invasive plant; it lives for three months, seeds and dies. Cheatgrass fires burn hot and big. If there isn't a perennial plant community to respond after a fire, the landscape can become cheat grass-dominated. (Academic Sector)

Cheatgrass can grow all over the U.S., but it's only a huge problem in arid areas of Western states. It was in the east in 1859. By 1900, it was in the West and spreading was starting to occur. By the 1940s, cheatgrass had invaded the West. (Academic Sector)

1/3 of the Great Basin has cheatgrass coverage. The presence of cheat grass more than doubles the risk of fire. Even a 1% cover of cheatgrass heavily increases fire risk. (Academic Sector)

Cheatgrass takes the same sun, same soil and same water that other species depend on. It also creates huge amounts of biomass and lays deep roots. (Academic Sector)

Cheatgrass leads to fuel loading and a quadrupling fire danger in rangelands. (Federal Agency)

Snowpack, winter moisture and spring rain drive cheatgrass growth. When there is less snowpack, there are fewer acres burned. (Federal Agency)

Cheatgrass fires can burn 90,000 acres in a day and have been increasing in size recently. (Academic Sector)

Cheatgrass creates a continuous fuel bed while native perennials have most of their fuel load underground in roots. This is characteristic of invaders. They take resources quickly, seed and die. Dropping all that biomass on the ground leads to fuel situation. (Academic Sector)

Cheatgrass has extended even into sagebrush ecosystems. That changes the fire cycle in 3-5 years. After a second cheatgrass establishment, the sagebrush is usually gone. (Conservation Sector)

Four invasive rodent species impact 88% of critically endangered vertebrates on islands. (Conservation Sector)

Variable weather events – typhons, etc. – are a major problem when it comes to invasive species. Coconut trees hold erosion. If there are large gaps, shores are eroded away. It's important to prevent degradation from that perspective as well. Islands also evolve under particular circumstances. The minute an organism enters, it can devastate flora and fauna. (Academic Sector)

Cheatgrass increases fire danger across the West. The Roosevelt fire is an example of the damage done. Erosion can also do significant damage after the fire has been put out. (WY Governor Mead)

Everyone in the West knows about cheatgrass and the problems it creates; low nutrients and increased fire risk and impacts. The after-effects are also severe. Erosion and invasive species are at the heart of that. (WY Governor Mead)

I see the issue of invasive species in the sage brush ecosystem as the most critical issue to our conservation efforts for sensitive species and working lands. (Federal Agency)

What other new invasives are in danger of invading sagebrush? Universities and The Nature Conservancy are evaluating levels of cheatgrass invasions and helping identify priorities for treatment. They are developing monitoring tools to evaluate impacts on birds from various control tools. (Federal Agency)

Many of our efforts deal with cheat grass. We work particularly in core habitat areas for greater sage grouse. We have been partnering with other agencies and groups on cheatgrass research efforts for years. (State Agency)

We're getting these dense monocultures of annual winter grasses. This is decreasing ecosystem diversity and productivity while increasing fire risk. We're having a regionwide transition from annual to perennial grasses. (Chemicals Sector)

New invaders are even more destructive than cheatgrass. The high silica content means they have low forage value. These new invasives are starting to spread into the West. (Chemicals Sector)

We are in a new era of mega-fires in the Great Basin. This is threatening anything that depends on native plant communities in that area. (Federal Agency)

This conversation should not be confined to non-natives. There are plenty of species that are out of balance that become ecosystem drivers. They are also not always annual grasses; perennials can also be an issue. (Independent State Agency)

Cheatgrass landscapes burn nearly four times more frequently than native vegetation landscapes. In many parts of the Great Basin and other parts of the West, fire is a much more frequent visitor than it was historically. This leads to a huge taxpayer burden in terms of suppression costs, lost recreation opportunities, and repeated restoration efforts. (Federal Agency)

The amount of sediment that came down from the upper watershed after the Las Conchas fire was incredible. Debris filled in most of the ponds along the Santa Clara creek and presented a huge restoration challenge. (Tribal Representative)

All four major invasive species are winter annual grasses. In the fall, their seeds germinate and emerge. When spring starts, they are growing already. By late spring blooming and midsummer, they are seeding. They take advantage of the moisture cycle and out-complete native grasses. (Academic Sector)

Invasive species and their associated impacts present one of the great threats to West. They impact all aspects of our economies and landscapes whether you're a rancher trying to control invasive grasses or a firefighter trying to battle fire or a boater stopping at an inspection station. (MT Governor Bullock)

Feral swine herds pose a big problem. Mothers average six babies per litter and it is common to have multiple litters per year. Feral swine move a lot and will eat anything. (Academic Sector)

Feral swine have been described as the worst invasive species. They impact agriculture, livestock, natural resources, compete with wildlife, serve as vectors for disease, pose dangers to public, and damage property. (Federal Agency)

Every state in the West is impacted by fire, drought, and challenges to food production. The West depends on natural resources and natural environment for our survival. As I thought about these issues, it occurred to me that there is one issue that is entwined with all these: invasive species. (HI Governor Ige)

Ohia is the dominant forest species in HI. We are very concerned about impacts to ecologically dependent species. The multi-layered forest creates water by capturing rainfall, mist and cloud cover. Native plant protection also protects watersheds. Invasive forests do not absorb water to same degree as native forests. (State Agency)

90% of native HI species are found only in HI. 70% of extinctions nationwide have happened in the state. (State Agency)

Fire threats in Hawaii are similar to threats across the West. Wildfires are increased by invasive grasses. Fountain grass is an increasing problem. Drought and climate change also lead to increases in invasive species. (State Agency)

Invasive species play a very critical role in extinction patterns. Invasive species have had a contributing role in more than 80% of island extinctions. (Conservation Sector)

Rapid Ohia Death has an average annual mortality rate of 10%. (Federal Agency)

Grazing animals in Hawaii are not native. Any grazing presence degrades habitat. Fencing is the baseline to limit disturbances in the first place. We are starting to see additional benefits of fencing in preventing disease spread. (State Agency)

The inability to manage invasive species could be the show-stopper for Governor Ige's efforts to regain food stability in HI. (Agricultural Sector)

Invasive Northern Pike are a problem, not an opportunity. (Tribal Representative)
People should be very concerned if invasive species become established and they take hold, because you can see wholesale changes in fisheries communities. (Tribal Representative)

In South-Central AK there are over 100 water bodies with invasive pike, and we don't even know the full distribution of pike because there are just so many remote areas that we haven't gotten a chance to sample. (State Agency)

We have evidence that pike specifically target salmon. When pike are introduced to a new area that also have salmon, often they will target salmonids, and when those populations become depleted or extirpated *then* they'll shift their diet over to other species of fish... finally they'll move on to invertebrates because that is all that is left. (State Agency)

When we go to an area and see primarily invertebrates in the pike stomachs, we know they've been there for a while and they've already depleted all the other fish resources there. (State Agency)

About an 80% reduction in the salmon population in Alexander Creek in AK can be contributed to the northern pike being there. (State Agency)

There are a lot of factors that can affect salmon runs, but pike predation could be that straw that breaks the camel's back and we need to highlight what that could potentially do. (State Agency)

After a massive pasture grass dieback, the NRCS introduced glycine to the islands of HI. It adapted well and initially there were no problems. Today, it is out of control with vines climbing trees and fences. (Conservation District)

Introduced pigs and deer are desirable for hunting, but their impacts on watersheds and adjacent agricultural operations are severe. (Conservation District)

Garlic mustard was first introduced from Europe in the 1800's and has since taken over large areas of the northeast, east coast, and mid-west, where it has degraded woodlands and forests. There are lots of examples where garlic mustard is the predominant ground cover. (Conservation District)

Garlic mustard is considered an ecosystem modifier. Where it becomes established, it has been documented to cause ecological imbalance. It is a highly elastic plant that adapts easily to different growing conditions and climate. (Conservation District)

Garlic mustard can become essentially a monoculture in the forest understory. Any invasive species is capable of becoming this successful on the landscape is definitely a cause for alarm. Raising the level of concern in this case is garlic mustard's ability to invade relatively undisturbed habitats. (Conservation District)

Our top three tree species from 2002 are now facing annihilation from the coconut rhinoceros beetle and Asian cycad scale, two invasive species. You need to think about what losing your top three species will do to your landscape, let alone your ecosystem. (U.S. Territory)

From European colonization to 1930, over 300 years, America lost only two tree species to invasive species: the American chestnut and the American elm. Loss of the chestnut almost decimated eastern forests. This led to near extinction of the eastern black bear, turkey, and white-tailed deer. Today, 25% of all trees greater than 1-inch in diameter have a great chance of expiring by 2027 due to invasive species. This means that over the next 50 years we are expected to lose over 20 tree species. (Conservation Sector)

Invasive species pose a significant threat to private and public lands, including natural resources, cultural resources, and facilities within the National Parks Service. (Federal Agency)

Economic

Invasive species are among the most persistent and challenging issues in the West. The impacts of invasive species are staggering. According to The Nature Conservancy invasive species impact over 100 million acres nationwide and cost \$120 billion nationally to manage every year. (NV Governor Sandoval)

Agricultural pests and other nonnative species impact nearly every sector depending on western working lands. (NV Governor Sandoval)

Recreation draws people to the Tahoe Basin. \$3.2 -5 billion in tourism spending is due to recreation. (Economic Development Sector)

We conducted an aquatic invasive species management plan in 2009 that included economic analysis. We looked at potential impacts to various recreation activities, overall visitor days, and property value. Combined for those three factors: conservatively impact \$18 million without accounting for indirect impacts. (Economic Development Sector)

The story is clear: the health of Tahoe's economy is dependent on invasive species control. Businesses know it. The "green bucks" program is a way to contribute to the Lake. Also involved in the "Take Care" program. (Economic Development Sector)

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APHIS success story: European grape moth control in CA. Grapes are worth \$4 billion to CA's economy and \$57 billion when you add multiplier effects. (Federal Agency)

We estimate management costs and lost forage value at \$1.33/acre/year. The average size of a ranch operation in MT is 5,055 acres. That means your total cost comes in at \$150,000. (Academic Sector)

When annual invasive grasses are taken out, you can see amounts to a natural fire break develop. You also start to see the significant economic benefit that doesn't get captured in current analysis of forage costs. We are working on whole ranch impacts of invasive species treatment. (Private Landowner)

We need to focus on harmonized messaging on invasive species. We also have to elevate invasive species management at all levels. We know that invasive species cost billion dollars per year, but that has to be communicated. (State Agency)

It may be structurally different in various states, but the goal is the same: all state plant protection efforts are trying to protect agricultural economies. (State Agency)

During the 2008 budget crisis, we reduced Japanese beetle traps in half. Then in 2016, we found the largest infestation in the history of OR. We had to go to the Legislature and ask for funding. By saving 80-100,000 dollars in 2008, we are now spending several million dollars. It will cost \$5 million to get back under control. "Pay me now or pay me later." (State Agency)

USFS spends more on fire suppression each year than has been spent on invasive species in all years combined. It's a huge problem across the country. The scale is bigger than some of the natural disasters we spend money on. Time and money on prevention is worth it. (Federal Agency)

Species-level risk and site-specific risk. You can have a very important site or a rare plant area: site-driven risk assessments can help define how to attack. Species-level risk is on a huge scale, with huge impacts. Both have merit, but very different risks. That drives costs. (Federal Agency)

This work is the right thing to do. It protects our land, but also makes economic sense. In HI, a single species like little red fire ant can cause hundreds of millions of damages yearly. (HI Governor Ige)

Economic impact of invasive species is something I'm far too familiar with. Invasive species issues are magnified in HI. This has resulted in a preclearance program. USDA screens as people leave, to try to handle the spread of invasives and protect domestic agriculture. The system is set to protect mainland from invasive species in HI. (State Agency)

Getting avocado approved for export took a very long time. We had to establish a monitoring program to detect fruit flies. We had to change packaging to help protect against invasive species. Every step of the way, growers had additional costs. This limits the markets they can send to. (State Agency)

Fruit flies impact almost everything HI ships. This is the long-term burden HI faces. If we fail to do these controls, it would shift a lot of costs and consequences to CA, FL and the rest of the mainland. (State Agency)

We are trying to understand the value of pre-border activities and whether they can prevent costs around post-border mitigation efforts. (Academic Sector)

We try to monetize a lot of what is going on. Damages to ecosystem services have real monetary value. (Academic Sector)

We released a report in 2016 that showed that the top five invasive species in HI cost \$82.9 in ecosystem services damages over five years. (Academic Sector)

Invasive species control is a long-term investment. HI can save hundreds of millions of dollars by investing on the front-end. (Academic Sector)

Agricultural value, watershed functions, horticultural production, and tourism are all impacted by invasive species. (Academic Sector)

Invasive species are a major factor threatening HI's agricultural viability. I know a three-generation farmer who said invasive species were one of the contributing impacts that caused him to shut down his farm. (Agricultural Sector)

Agriculture must fight an array of species at the same time. You're dealing with feral animals, as well as disease and insects simultaneously. It makes it tough for farmers and ranchers to be viable. Individual producers can't afford what it takes to protect their product. (Agricultural Sector)

We lost a lot of coffee producers due to coffee berry borer. It pushed cost of production significantly

higher. Hawaiian coffee is more expensive than elsewhere. We need to produce an ultra-premium product in order to compete. Coffee berry borer has degraded the quality of the coffee. (Agricultural Sector)

Most farmers in HI operate small plots and plant a multitude of crops. Each crop has its own invasive species control strategy, which makes management very difficult. (Agricultural Sector)

Even in the HI coffee industry, we are cut up into a lot of small parcels and growers. Not all our growers manage the same way. It can be difficult to take a systems approach to controls. (Agricultural Sector)

Labor is a big problem in HI. As the agriculture sector weakens, growers can't attract the necessary workforce. A multitude of issues are impacting agriculture and dragging down growers. Invasive species, once established, are an ongoing cost the producer must incur. (Agricultural Sector)

GU's Tourism Board has plans to make Guam a first-rate destination. The beetle species alone is putting this at risk. GU has spent \$12 million in controls and Hawaii has spent \$17 million. (Academic Sector)

With invasive ecology, we have a system to analyze how to manage a new species. For something like crayfish, it becomes a cost-benefit analysis. What do you achieve by implementing various controls? It comes down to what you have available and what the impact will be. In the example of nutria, there are real benefits to just staving off the spread. (Sub-regional Planning Entity)

Predation of northern pike has really wide-reaching impacts. In the Columbia River Basin. Over \$1 billion has been invested in salmon recovery over the last two decades. This investment and the progress made towards recovery of those species are directly threatened if northern pike continue to spread downstream of the Columbia River and they begin to prey on salmon and steelhead. (State Agency)

Predation of northern pike on salmon and steelhead also threatens the investments made in fish hatcheries by tribal, federal and state governments. (State Agency)

At this point, the full economic risk of invasive pike predation is unknown, but it could certainly be in the hundreds of millions of dollars annually in WA. (State Agency)

The Historic Alexander Creek Chinook Fishery in AK originally supported 13 fishing lodges, 6 charter companies, air charters, boat rental facilities, and was a multi-million-dollar industry. Pike were introduced into Alexander Lake in the mid 1960's, and pike were discovered in the lower Alexander creek in the 1990's. Returns began declining and in 2008, the Chinook Fishery closed to harvest and has been closed ever since. As a result, that industry has collapsed. (State Agency)

If the brown tree snake got to HI, it is estimated there would be over a billion dollars in damages across the state. (State Agency)

There are millions of dollars spent every year trying to suppress the gypsy moth. The USFS has \$21 million in its budget just to help states that border areas where gypsy moth is present to keep the moth from moving any further west than it already has. (Conservation Sector)

One of the big issues currently facing the West is the APHIS proposal to deregulate the Emerald Ash Borer. What will that mean for the region? Tree removal in urban areas can cost up to \$1,000 per tree.

In 2013, surveys showed there were approximately 1.45 million ash trees in the Denver metro area alone. The costs will be enormous because the mortality rate of ash trees infested with the EAB is so high. (Conservation Sector)

With the 23 major invasive species in Washington, if we had let them expand to their potential, we would be looking at \$1.3 billion in losses per year and loss of up to 8,000 jobs. (State Agency)

Cultural

There is an attachment to the natural resources in GU. People are trying to relate back to that experience and share with their kids. Invasive species are impacting this experience. (Academic Sector)

GU is a tropical paradise. Tourists come to Guam to experience an exotic tropical destination. They also want to experience culture. Lots of new artists are coming up. Food is another draw. All of this revolves around the coconut. Now that coconut rhinoceros beetle is starting to devastate the tree populations, many of these experiences are at risk. (Academic Sector)

It is very subjective to put monetary value on cultural aspects in GU. How much is a tree that your great-grandfather planted? Can you get that monetized? It's tough, but there is real value there. (Academic Sector)

Management Challenges

Funding & Capacity

Securing funding for cross-boundary management is tough. There are different starting points on identifying and justifying funding, yet the effects on the ground are the same. Everybody is impacted by both fire and invasive species. (Federal Agency)

Invasive species are managed reactively. We are always chasing resources after emergencies. (Sub-regional Planning Entity)

For invasive species control, it becomes a cost-benefit analysis. What do you achieve by implementing controls? It comes down to what you have available and what impact you can have. Even if you can stave off spread of a species, there can be real monetary benefits. (Sub-regional Planning Entity)

It comes down to prioritization: where will dollars be most effective? Sometimes it is addressing current threats on the environment. Even straight-forward threats can be expensive to eradicate. (State Agency)

It is difficult for government to be proactive. We need to allow funding to go beyond one or more years. (Conservation Sector)

It can be hard to get more money, but some agencies can use what they have better. When USFS enters a special use permit, they should allow the utility more control over when and how to replace poles and the areas impacted. (Utility Sector)

Long-term maintenance is tough to sell on budget side, but critical. (State Agency)

Wildfires – need long-term funding as tool to address pre-fire control and post-fire restoration. (State Agency)

While there are numerous collaborative efforts to tackle the invasive grasses that are in place, long-term funding is still a challenge. A one-time effort does not work for a problem this large. We need long-term funding to address pre-fire control and post-fire restoration to assist all of these sensitive species and habitats. (State Agency)

In Western states, most local and state governments have little money available for restoration on private or state lands. (State Agency)

Chronic Wasting Disease isn't like fire; it's a slow-moving disease. We use an Incident Command System, but at a glacial speed. The funding to-date has come from state fish and wildlife from grants from AFWA. We will have to start looking for legislative funding long-term. (State Agency)

I'm amazed at the amount of progress made in short period of time. If I have concern, it would be more toward how to keep this level of activity going forward. When you have temporary funding, it's not an efficient way to deal with something that is a long-term need. (State Agency)

Invasive species are working their way up through Western delegations. The Midwest has had mussels for a while. Continuing battle to let Congressional folks know that this is a big and long-term challenge that has to be funded. (Federal Agency)

Prevention funding is tough to get. We have to keep carrying message on how much more expensive dealing with infestation is. (State Agency)

Capacity is a challenge. Risk assessment tools are out there. Staff time going through data is a challenge. (Conservation Sector)

I have tried to think about how to get emergency response funding for invasive species occurrences. It's difficult to do. The legislature is reluctant. There's also a question of who has discretion to decide when the funding is used. (State Agency)

We regulate movement the movement of goods with 85 people across the state. 85% of food is imported in HI and that doesn't count everything else. That lack of capacity is a reality. Would be great to have 200 people. There needs to be a public demand for all of this to occur. (State Agency)

Control tactics are being developed for established pests, but costs are huge and constant. (Federal Agency)

There's never enough funding. You have to prioritize based on urgency and opportunity. If you have an urgent threat at the EDRR stage, then you want to focus there if you have the resources to do so. (State Agency)

In the case of emerald ash borer, look at its distribution and extent of its impact. If you don't have the tools or capacity, it's really difficult to manage. (State Agency)

I'm disappointed by the lack of interest and funding on invasives at the policy level. How do we get decisionmakers to shift funding to it? USFS doesn't have an IS line-item. (Conservation Sector)

All you can do is try to work smarter all the time. It isn't just resources; sometimes it is capacity. On some islands, the people aren't there to do the work - more money won't solve that. (Academic Sector)

Is there enough funding going towards this issue? In short probably no, particularly when dealing with a rapid response. If pike show up in a water body in another state, do those co-managers have the money to move forward in dealing with it? (Tribal Representative)

What is being done so far is the best these managers can do right now with the time, funding and resources that they have available for this work... But there's still a lot to learn and still a lot of work to do. (Sub-regional Planning Entity)

Funding has been a challenge for northern pike monitoring and suppression efforts, and there have been many efforts around the region to identify funds to work with and to cost share. However new and updated equipment is needed regularly and right now there's not a good system in place for funds to be funneled to the people working on this. (Sub-regional Planning Entity)

I can't stress enough how important relationships are. You really must have those relationships with the upper-level management that make the decisions on the funding, and in some cases that means all the way to Washington D.C. When Administrations change, it is important to educate people about what you're doing and how well it works, so that you can keep that funding coming. (Conservation District)

The cost of shipping equipment and other resources we need for management out to the islands is very high, and sometimes we just have to work with what we have on the island. We must be innovative and think outside of the box to try and tackle some of these issues. (U.S. Territory)

Coordination & Ownership Boundaries

Conservation districts' ability to do effective invasive species management is severely hindered by lack of federal invasive species policy and interagency coordination. (Conservation District)

Lack of access to private land can prevent successful eradication. (Academic Sector)

Governors need to coordinate state fish and game departments with state departments of agriculture. Fish and game departments often have management responsibility for aquatic invasive species while departments of agriculture have authority for imports and commerce. (Federal Agency)

Mobile pests are a big challenge. You need to address where they are and also intervention at other locations. Even known threats can come from diffuse sources that are hard to identify and target. Example: mussels come from multiple points controlled by three federal agencies and private lands. (State Agency)

The entire right-of-way burned in the 2017 Thomas Fire. There's nothing more depressing than managing invasive species and to look the boundary and see them flourishing. (Utility Sector)

It's tough to know what is going on outside your agency, or above you in your own agency. All agencies have competing constraints. (Sub-regional Planning Entity)

NV is unique. Public lands make up 87% of state. BLM, USFS and DOD. DOD lands are particularly challenging. Their activities can lead to fires and invasive species establishment. Engaging those agencies on common issues is very important. (State Agency)

Jurisdictions are hard. You need to look for folks who want to have a broader focus. (State Agency)

A lot of times communication within agencies is a real challenge. It's hard to know who is where. (Federal Agency)

Many wildfires are overseen by a state forester, so that could be a broken link to appropriately focusing on rangeland fires. (Federal Agency)

A barrier for my agency is that we have to do a stronger job of educating the land managers on the use of GNA and the opportunities that exist with it. (Federal Agency)

One issue for DOI is working across jurisdictional lines and trying to fill gaps. We are trying to figure out where we can best assist other groups. (Federal Agency)

Land ownership patterns are difficult because there are all kinds of different authorities among cross-boundary landowners. The Western Regional Panel WRP is trying to get state laws and regulations tuned up. (Conservation Sector)

We have a problem on our hands when it comes to feral pigs. Canada has generally been a good neighbor on invasive species. But on feral pigs, they haven't been good partner. (Academic Sector)

We need to have some pointed questions for Canada. We need to push the unfair risk to Montana that Canadian inaction causes. Pressure needs to be brought to bear. (Academic Sector)

There's no magic solution to improving coordination. It's just is time and effort being with people. It's a challenge to have counties broken up on different islands in HI. Resource issues can interrupt relationship building. There can also be a hyper-focus on Oahu because that is where political leadership is. (State Agency)

The brown tree snake is a good example of where we need to work with the U.S. military, since a major source of movement is in household shipments. Management of threats from training activities is a responsibility of the DOD. (State Agency)

There's a disconnect between inspection and mitigation. Trade, import, and inspection-related policies and functions are run by agricultural agencies; control and mitigation is done by resource management agencies. (Academic Sector)

Working across jurisdictions allows for really wonderful things like coordination and collaboration, but it can also make reaching an agreement difficult. An invasive species in one state could be a game fish in another. (Sub-regional Planning Entity)

Regulatory Factors

A lack of coordination between state laws causes a variety of challenges with invasive species management. (State Agency)

The Department of the Interior lacks a coordinated management strategy to address invasive species challenges across its various bureaus. (Federal Agency)

NEPA timelines are often too slow to quickly respond to invasive species threats. (Conservation District)

Reauthorization of the National Invasive Species Act would provide an opportunity to update the Act with respect to scientific advances and a better understanding of the scope of invasive species problems. (Conservation Sector)

The Fish and Wildlife Service is the only federal agency with authority to designate invasives as “federally injurious,” which prohibits import and shipping, but does not prohibit state-state transport in the continental US. It also does not prohibit release of the species. (Federal Agency)

The main federal agency we work with outside the Tahoe Basin is NPS. State-federal agency coordination has challenges. Folks involved in WGA are familiar with the challenges. There would be a benefit to require mandatory boat inspections in Lake Mead, but NPS doesn’t think it has the authority to do so. (State Agency)

NEPA is a challenge. Lots of districts have specific invasive species management protocols, which can make it tough to coordinate. We need to update 1985 NEPA documents to catch up to innovations and tools. (State Agency)

We now have statutory authority requiring boat inspection in the Tahoe area. It would be good if that could be extended elsewhere in the West. The more enforcement can be consistent across different policies, the better. (State Agency)

The question is not ‘do we treat invasive species when sensitive species are present.’ It’s not a yes or no question. The question is ‘how do we treat those invasives when sensitive species are present.’ (Federal Agency)

Invasive tamarisk control can present challenges because the southwest flycatcher needs it for shelter. There is a conflict between animals, but also among human interest groups and conflicting regulatory requirements. (Conservation Sector)

When we come in as a partner to federal agencies, we look at the USFS plan, ESA implications, and NEPA requirements. We then work with the state within their Wildlife Plans. (Conservation Sector)

Critical habitat under ESA is against destroying habitat. There’s no affirmative obligation to treat invasive species on private property. FWS and other agencies would like to work with private landowners in partnership arrangement to treat that invasive species. We do that through Partners for Fish and Wildlife Program at FWS. (Federal Agency)

There’s lots of interest in managing invasive annual grasses, but not being on state weed lists can make it more challenging. (Academic Sector)

A weed designated by rule as a statewide weed must be considered noxious in every district in the state. Counties can also do their own listing. (State Agency)

We found invasive hydrilla in the Bruneau River. But not only did we find hydrilla, but also the endangered Bruno snail. This dynamic brought a negative reaction and resistance from landowners to

deal with it. We wanted to know what regulations we would be hit with and how much they cost. When we realized it wouldn't cause either of those negative impacts, landowners became cooperative. (Conservation District)

There's a question of whether Emerald Ash Borer quarantine continues to be important. 73% of the native range of ash in U.S. are currently not infested. (Conservation Sector)

State agencies often don't have the jurisdiction to regulate pathways. They are designed to regulate by pest. (State Agency)

It's really hard to figure out how to regulate ballasts and biofouling. One of the challenges is that the technology is focused on flat surfaces, but not niche areas. It helps fuel economy so that helps drive the technology's adoption. (Academic Sector)

We want to make sure that any individual involved with expanding the range of feral pigs will be prosecuted. (State Agency)

MT is smart to work to not allow feral swine to get established. In states where they get established, hunting advocates oppose eradication. MT statute takes away those counter-productive incentives. (Federal Agency)

Feral swine are considered a game animal in CA. It develops bad conflict between landowners (property damage) and hunting. (Federal Agency)

MT is mostly a private land state. Hunting incentives for swine control are not useful. Most landowners don't want hunting generally. (Federal Agency)

If you lack the ability to hunt feral swine, it reduces the incentive for illegal transport and release. In other states, there are very strict laws. You don't have much illegal transport in those states. (Federal Agency)

HI sits under quarantine on fruit fly and have protection of fruit going to the mainland. It's difficult to get reciprocal support for stuff coming into the state. HI's delegation got so frustrated that they drafted legislation. It would have allowed HI to submit an application to APHIS for an imminent pest threat. If the Secretary of Agriculture didn't act in 60 days, it would have gone into effect. (Conservation Sector)

We can get stymied by policy at the national level. The Plant Protection Act can preempt states working on invasives. It has an exemption process, but it can be tough to navigate. (State Agency)

There's a big focus on tools that allow commodities to continue. The quarantine rules are in place, but with tools to allow clean products to still move. (State Agency)

Some things that are developed in Washington, DC don't translate well to the West. The further west you go, the bigger the problem the translation becomes. We need equitable policies because we're all living in a global environment. (Academic Sector)

HI doesn't have biofouling rules yet, but they are underway. We are rolling out best management practices. (State Agency)

Customs inspects and enforces for other agencies authorities via MOA. The MOA doesn't have authority to take action if human health vector species are encountered. (Academic Sector)

Vessel biofouling is largely unregulated. VIDA changes how discharges are regulated in state waters. There's a critical four-year timeline for states to work with EPA and USCG to develop regulations. (Academic Sector)

Sometimes things can be deregulated because there's no effective control. (Academic Sector)

HI's agriculture exports have been devastated by quarantines on mainland. This has raised imports of vegetables which have brought more invasive species. This cycle has destabilized local food production. (Agricultural Sector)

When people come to Hawaii, their bags aren't screened. But when they leave, they are screened. Think about that. (Agricultural Sector)

The feds have a process for permitting biocontrol activities, but it takes 3-7 years to go through regulatory process. The most time-consuming pieces is the FWS species issues. In HI, we integrate what the state does into the federal process and timeline. (State Agency)

What is needed is streamlining the federal biocontrol consultation process. HI tries to make its process more efficient via a pre-consultation process with the feds. (State Agency)

In 2011 we were doing lots of outreach and education, as well as regulation changes. During that time, pike were classified as a game fish and as a prohibited species; we removed the classification of game fish at that time which helped us move forward in doing suppression efforts. (Tribal Representative)

Conservation districts are nonregulatory, which allows us to maintain good relationships with private landowners, but we do rely heavily on our state's regulatory authorities to follow up with noxious weed concerns. (Conservation District)

BLM and DOI are looking to use their Good Neighbor Authority (GNA) more. I'm not sure if it has been used a lot by conservation districts. Conservation districts will be able to use that Farm Bill authority because they are government entities. Helping some of the federal and state agencies understand that conservation districts are also government agencies is something we've got to do. There may need to be some changes too. For example, I don't think GNA agreements allow you to work with a non-profit, which our state association is. (Conservation District)

There are no local laws on invasive species in American Samoa, but it is something we should stress to our governor and work on at the state level. (U.S. Territory)

As a federal regulatory agency, our statutes define our mission and provide the authority to promulgate regulations in order to safeguard the health of agriculture and natural resources in the United States. (Federal Agency)

Our actions need to be based on risk, and we can only implement the least drastic action that is feasible and adequate to address that risk. We want to make sure we are only stepping into states' issues when there is an extraordinary emergency in front of us. (Federal Agency)

As a federal agency, we have limits to what we can do. Those limits are generally just Congressional decisions about how much or if we can spend resources on a certain pest. Sometimes budgetary items will be lined out and we will not have the ability to do something we were doing just last year. It can be very painful for us because we see the need, and we have to come up with creative solutions because we want to continue the work we have been doing previously. (Federal Agency)

APHIS regulations currently in place have not stopped emerald ash borer. Despite the quarantines that are currently in place, they just keep moving. While we are going through the rulemaking process, we are continuing our domestic regulatory activities, and, ultimately, we want to use our resources on efforts that will have the maximum response against this pest. (Federal Agency)

The preemption issue we have with the Plant Protection Act is that it requires us to act at both the state and federal level if we are actually going to protect HI from additional invasions of this pest. Both require information to demonstrate the potential damage caused by additional introductions. This is an especially difficult issue when you're trying to protect an endemic species that only exists on a remote archipelago. (State Agency)

A lot of the regulations for certain pests are detrimental to plants found around the world, so it is easy to show their damage. The Ohi'a tree is only found in HI, and we can't really say what a pest is going to do. (State Agency)

The progress of getting regulations in place is really dependent on what the workloads at agencies are and if they have the people needed to push certain regulations through. (State Agency)

Regulating Ohi'a rust is more complicated than other pests because it is regulating an entire family, which is a much heavier lift for APHIS. Because of the unique traits of this pest, and the fact that it exists in Florida but is not being regulated there, there are some difficulties. (State Agency)

One of the issues that we have with the Plant Protection Act is that there's a list of federally actionable pests. HI regulates any pest at any stage of development that is potentially detrimental. The federally actionable list creates somewhat of a problem, because there may be potential for releasing a pest in HI, it may just not be one that's actionable. (State Agency)

We regulate for pests, which we define as anything that's alive and can be detrimental to agriculture or the environment. The definition of 'pest' is one of the challenges we have with the Plant Protection Act. (State Agency)

We are preempted from inspecting foreign commerce. HI has gotten a few pests that were not invasive in their native range, but upon entering HI they became a pest. The state has the ability to regulate things that aren't necessarily a pest yet, but not necessarily through the Plant Protection Act. (State Agency)

Our challenge is not necessarily a lack of contacts, but more the process specifically and what you have to do and when and how. The cooperation is there, but is there a way to address preemption? That

would allow the states to do what they need to do based on their authority, and we wouldn't always be reliant on USDA to do the same work. (State Agency)

APHIS needs to revisit how to help coordinate states and state legislatures after the loss of a federal regulation, like the de-regulating of emerald ash borer. How are those states going to be able to write legislation that may affect interstate transport of ash products without some type of coordinating mechanism? (Conservation Sector)

Vectors

Boat inspector quote: "They are coming at us from all directions." The feeling of being under siege is real. There's a real threat to the ecosystems and economies we love and depend on in the West. (State Agency)

There are different challenges in identifying the threats. With invasive species, especially aquatic, it's tough to keep track of all the pathways. (State Agency)

One new invasive species pest moves in every 40 seconds in CA. New urban and riparian forests introduce new challenges as hosts for invasives. (Academic Sector)

Distance is dead when it comes to invasive species. Humans are the vectors moving species around the globe. What is in Guam will find its way elsewhere. (Academic Sector)

We often think of big game species, but we also need to consider smaller species that use the same resources as livestock. They can pose a risk as a disease vector as well. (Federal Researcher)

The Grotto mandates that all cavers decontaminate their gear before any caving. We also maintain a list of closed caves. (Recreational Sector)

I would like to see WGA help week coordinators get a better communication dialogue with railroad operators for invasives. (State Agency)

We have to address pathways for Asian gypsy moth and Emerald Ash Borer within the country. (Conservation Sector)

It's good to think about vectors as a supply chain model. Pallets can be a major vehicle for infestation. Firewood is also a really big vehicle for transport and very difficult to regulate. (Conservation Sector)

Ash locations are in river basins. That is why distribute educational information to boaters and recreationalists. They are the biggest movers of contaminated firewood. (Conservation Sector)

Vessel biofouling is the major vector for non-native marine species. It's even bigger than ballast water transport and is largely unregulated. (Academic Sector)

We're starting to recognize pathways more. Oftentimes, identifying one pathway can help with controlling multiple species. (Conservation Sector)

Quite a few fresh water IS come in originally from international vessels. Bio-fouling vessels would help that. (State Agency)

Recreational vehicles are tricky. There's a debate on whether to have boaters pay for inspection and decontamination since they are the ones moving species around. In Arizona, we want to support subsidizing because we have seen that boaters will try to avoid decontamination if they have to pay for it. (State Agency)

There are lots of pathways for the African swine fever to come in. We are working hard to avoid its spread. (State Agency)

HI is a state with a huge coastline, few people, and huge costs to contain invasive species movement. Little red fire ants move in stuff. The state doesn't have the authority to inspect stuff in many cases. They do lots of surveys at points of entry. (State Researcher)

There are few carriers in HI, but they are very proactive. They will be blamed if something moves. Young Bros. are hyper-diligent. They stopped moving stuff before the Rapid Ohia Death quarantines were implemented. Aloha Airlines won't ship any fruit without being inspected. There has been an 85% reduction of infection in other islands. Carriers and cargo guys are good. Ticketing agents for airlines, not so good. There's a perpetual need to do education and outreach to the industries. (State Agency)

When it comes to Rapid Ohia Death, I'm convinced the disease came in on nursery material. We're spending lots of time and effort to protect forests against something we could have kept out in the first place within the last 10 years. Creating structures to help avoid introduction would be terrific. (Federal Agency)

Fences don't stop movement of Rapid Ohia Death spores, but they help reduce wounding of trees by feral animals. (Federal Agency)

Feral hogs are very hard to control. Hunters actually are spreading them around. (State Agency)

Abandoned agricultural lands are the worst encouragement to pests. Keeping agriculture functioning is really important. (Federal Agency)

Vessel biofouling and ballast water discharge are the two top vectors for marine species. (State Agency)

A 2018 study concluded that 25% of non-native species that became established in HI were novel. That's a consequence of expanding trade networks and environmental change. (Academic Sector)

Global transportation has made the threat of invasive species spready grow dramatically. It's hard to figure out where the pests are coming from. Customers want access to produce on a year-round basis, but that helps spread. Seasonal production would help control some of this. (Agricultural Sector)

Borders are a concern. I appreciate the comments made about supporting agriculture at the state legislature level. (Agricultural Sector)

Borders represent threats and opportunities. All kinds of borders harbor pests. You have to take a systems approach and figure out what to focus to get the system back in balance. (State Agency)

Data Privacy

Most states have their own open records act, and there can be quite a bit of variability in what is exempted and what is not. They were created in order to promote transparency around government decision-making. (State Agency)

WY just successfully adopted an exemption for their open records act related to sensitive wildlife data, and I hope Colorado can figure out something similar. This will provide protections to landowners who share information about sensitive species on their property. (State Agency)

Our ability to do our job is based on the trust and credibility we have with private landowners. Conservation districts are going to protect that trust at all costs because they can't get natural resource management done without it. (State Agency)

I think it's important to come at data collection from a landowner's perspective. Most landowners want to show that they are doing the right thing and that's why they have species on their property. But you have to think about the potential impacts to their property value or their management practices. (State Agency)

Landowners do want to provide this information. They recognize the importance of helping make species management decisions with the data they provide. (Conservation Sector)

Landowners need to know how the data is going to be used. Is it just going to a state agency, or will it go up to the federal level where the transparency needs increase? (Conservation Sector)

Private landowners have come forward in northern Wyoming to open their lands for invasive species surveys. Without the cooperation from those landowners, it would be impossible for entities in northern Wyoming to reach their management goals. (Conservation Sector)

We limit how much data goes out and what it is used for. We want certain levels of data – county and watershed data – fully out to the public. We can make more specific data a bit fuzzier to protect landowner's' privacy. (Nonprofit)

Geography & Climate

Lake Tahoe is warming due to climate change and that is making the challenges even more difficult. Relationships with scientific community and the public are critical. (State Agency)

Climate change expands pressure on native habitats, giving opportunities to invasive species establishment and then fire. (Utility Sector)

There have been more than 1500 successful island invasive species eradications. These have protected tens of thousands of populations of rare, endangered, and endemic species. (Conservation Sector)

86% of recorded extinctions have been linked to invasive species impacts on islands. (Conservation Sector)

HI is at a crossroads for a lot of invasions. We are looking at potentially collaborating with USDA and state partners to build a biological control facility to connect with efforts in CA. (Federal Agency)

The western region is different than the east. Think what it is like to be Guam, 5000 miles further out. We have to work a lot harder to participate. It's important because we can contribute and, all together, we can craft some policies to benefit all. Changes that happen both places will impact each other positively. (Academic Sector)

We have become obsessed with stopping disturbance. Disturbance is a natural part of these systems. We need to figure out how to live with disturbance and not go totally bonkers when it happens. (Independent State Agency)

Mother Nature does not like voids. We need to be thinking about how we're going to replace those voids. Perennial grasses are the backbone of rangeland resilience. (Federal Agency)

For the first time, we have plant functional group maps of the Western US, but we don't just have the picture, we have the movie. We can tell you the continuous story of annual and perennial grasses and forbs since 1984 at the [Rangeland Analysis Platform](#). (Federal Agency)

The seasonality and periodicity of precipitation is changing in the Rocky Mountain West, particularly in the Great Basin. (Academic Sector)

All factors point to more intense and destructive wildfires in the future. So, where do we go from here? The State Wildlife Action Plans that Under Secretary Hubbard mentioned are a great way to emphasize the need for restoration and fire-adapted communities in the West. (State Agency)

In 2017, 30% more rangeland acres burned than forest acres did, but rangeland fires don't tend to receive the attention that forest fires do. (Federal Agency)

HI has 0.2% of nation's land area, but a third of the ESA listed species. (HI Governor Ige)

Island management concepts are translatable to continental areas. It's helpful to think of containable areas in land masses. Working on invasive species is different where border control occurs. It's fundamental to the development of unique species and also affects rate of introduction. Ages ago, introduction took thousands of years. Now, there are average introductions of one new species per day. (State Agency)

Islands represent a lot of biodiversity, but they are also where lots of extinctions occur. (Conservation Sector)

When it comes to the islands, they are evolving ecosystems. Established organisms aren't very good at competing with new organisms. (Academic Sector)

Invasive species management on islands vs. mainland has many similarities. The difference is related to scale and the amount of time it takes for invasions to materialize. (Federal Agency)

Climate change is changing bird habitats in Hawaii and exposing them to malaria more frequently. (Federal Agency)

Island management principles go beyond islands. On the mainland, you can look at contained environments (lakes, for example) and used island principles there. (Conservation Sector)

Islands are good laboratories for management controls that can be scaled up elsewhere. (Conservation Sector)

10-20% of species introduced outside their native range become invasive. (Academic Sector)

Something to consider with technological solutions is that there have to be selective barriers as there are other fish to consider, and a lot of the places where pike are, are just way too remote that you can't even drive to let alone set up that equipment. (State Agency)

What is normal in one state may be harmful in another. There are unique environments and we need to be aware of that. (Conservation District)

After doing a distribution and dispersal analysis, we found that outside the Clackamas River Basin only 23% of garlic mustard patches were within a floodplain, but within the Clackamas River Basin, 82% of garlic mustard patches were in a floodplain. Part of that reason is that garlic mustard prefers disturbance, and wet seeds can stick to dirt and leaves allowing them to spread around more easily in a river setting. This has allowed us to really focus our attention on the floodplain. (Conservation District)

Many people think HI is very similar to the western Pacific Islands, but that's not the case. Every place is unique, and we need to be mindful of that. There's a lot of military influence that can impact our natural resources capability in these areas. There are tribal governments we must be aware and respectful of, and we must be aware that climate change is affecting these areas much quicker than other areas of the world. (Federal Agency)

Because of the isolation of the islands, some of the species are highly endemic and they've lost their ability to compete with invasive species. At the get-go these systems are more vulnerable to invasion. Once you get an invasive species in the system, it can create cascading effects. (Federal Agency)

When evaluating a pest, we look at how it presents in each ecosystem type, region, and geographical area in order to evaluate the best response in that landscape. It is very case-specific. (Federal Agency)

APHIS has struggled with the same conundrum as the states. When we see something come in and it wasn't expected to be a pest, or climate change has allowed something that wasn't a pest to become a pest, it causes a lot of challenges. (Federal Agency)

In developing the Early Detection and Rapid Response tool with NPS and what needs it might address, we have been thinking about regional risk assessments because you might not know the full set of species in a region. It will develop watch lists of species that need to be focused on, and it can also be useful in identifying potential habitat for an invasive species across a large region that may be missed when only focusing on a small area. (Federal Agency)

We also make sure to map out areas of higher uncertainty, those areas with environmental conditions uncharacteristic to the model, because we don't have the proper data for those areas and we don't want to try to make predictions there. (Federal Agency)

With climate change comes new species moving into a lot of new areas, but despite that uncertainty, managers still have to make decisions to try and meet their goals as best they can. How can we know what to do in those situations? This is where scenario planning becomes highly appropriate. (Federal Agency)

Management Opportunities

Prevention

Prevention efforts have become more effective in recent years, but despite our best efforts, 100% containment of mussels on the Colorado River and associated reservoirs isn't realistic. You have to understand that means to have to an interception and intervention outside the Colorado River basin. Highway stations are present in NV and CA to intercept transported watercraft. The Lake Tahoe program and border programs in Idaho have been effective. The overlapping network of contacts with boaters is our best hope of containing the spread of mussels. (State Agency)

Our continued goals are to reduce the number of quagga-fouled watercraft through free-of-charge services and entrance inspections on high-risk vessels. We also want to eliminate the number of AIS infested vessels sold by dealers and auction houses. (State Agency)

Every boat must be inspected before entering Lake Tahoe. Capturing boats before they get to the ramps is the goal. The system is set up to handle high capacity. Once a boat is inspected, it gets a seal. We've had no new species since this program began. (Conservation District)

Lake Tahoe has boats from everywhere, including close, alpine lakes. Prevention protocols have helped eliminate risk. If a boat finds water, it will have been decontaminated before it got there. That helps mitigate problem of not all lakes having inspection facilities. (Conservation District)

If mussels become established there, they would quickly come downstream. It is of great concern to the tribe to avoid establishment. Prevention is the most elegant and cost-effective approach. (Tribal Representative)

In 2010, USFS Region 2 closed all caves to recreational cavers in order to prevent the spread of white nose syndrome. (Recreational Sector)

I'm glad we don't have feral swine in MT. We've been working hard to avoid them. We provide funding to states to deal with human-wildlife conflicts. In some states, these pigs are considered game species, which can put strange incentives in place on eradication. (Federal Agency)

The key is to not allow feral swine to become established. Once established, they very hard to eradicate. Public education is very important. (Federal Agency)

It's more efficient to prevent species than try to eradicate them. Enhanced biosecurity is a key protection for the landscape. (HI Governor Ige)

Canines are effective at detecting all three species - brown tree snake, little red fire ant and coconut rhinoceros beetle. We need to cross- train canines to do better inspection at ports. This will benefit not just GU, but the region and the mainland. (Academic Sector)

Fencing is the first line of defense to slow the spread of Rapid Ohia Death. (State Agency)
It's like a car accident you are waiting to see happen. Do something now rather than as a species takes hold, because there's lots and lots and lots of data out there that you better do something before it's too late. (Tribal Representative)

Managers local to the Columbia River Basin need to be concerned about what they're going to do. It's better to do something now than to do something later because the costs associated will be significantly less. (Tribal Representative)

We regulate everything from an amoeba to a zebra. As an island we're very isolated and have unique resources and a very diverse ecosystem. Our department spends a lot of time to protect those resources. 80% of our time is spent on inspections for importation. (State Agency)

Quarantines really do help – pests don't respect boundaries and they move faster than Congress. (Conservation Sector)

Early Detection & Rapid Response

Many pests may reproduce for many generations before it is noticed. This is known as the "Lag Phenomenon." (Academic Sector)

We need to develop early detection tools through advanced technology. This will help with our rapid disease response options. New molecular tools have the ability to predict disease outbreaks in certain ecosystems before they happen. (Federal Agency)

Groups, when not an emergency response, are working on their own planning processes. When there's a new infestation, they shift to rapid response. The partnership groups have ability to staff up and down to meet emergencies quickly. Regulatory agencies are hamstrung to develop new capacity to deal with new detections. (State Agency)

We need to increase resources at the regulatory agencies so that we can guide actions and run ICS processes for rapid response. We will still continue to depend on partnerships for flexible and rapid response though. Providing programmatic certainty will help strengthen their response. (State Agency)

Little red fire ant is an example where ICS wasn't used well. Since then, we have used ICS to try to contain infestation among other Hawaiian Islands. It was a good lesson on using ICS for containment, even if we can't eradicate the species completely. (State Agency)

ICS is very flexible and can be used on any level. APHIS has always used this sort of approach, but ICS has structured it. (Federal Agency)

ICS results in a common set of communications, so everybody is speaking the same language. It creates order where there was chaos. Helps build partnerships. ICS allows to pull together and work in one structure. (Federal Agency)

In 2016, we didn't know we had infestations. We then found *Venttenata* in June and *Medusahead* right after. In three months, we went from having no knowledge of the infestation to beginning to respond. (Academic Sector)

The biggest challenge we face is knowing when to pull trigger on EDRR. If something new comes up, we don't have time to do a big, long study. How do you make good decisions quickly? You need technical experts to help states make decisions early. (State Agency)

If you don't control them, invasive grasses start dictating the pasture cycle. Once they are removed, it can open opportunities you haven't had before. (Private Landowner)

We established a state Invasive Species Council in 2014. Since then, we have put a more directed focus on EDRR, especially on aquatic mussels. (MT Governor Bullock)

While prevention is always the first line of defense, it can't be the only defense. EDRR must be as thought out as prevention. I hope what is learned in Montana can be useful to other states. (MT Governor Bullock)

We need to change the perception on EDRR. Like any kind of emergency, it needs to have a structured response. We need to treat it the same way as fire. The West should immediately evaluate what resources are available and where they are. (State Agency)

Little things can get out of control easily. We should put as much effort into EDRR as on prevention. Prevent where you can, and then be ready to respond when something inevitably gets through the cracks. (Federal Agency)

When we find a new area of Rapid Ohia Death, we use a rapid response to handle it. We try to reduce the threat by felling trees or covering the infected trees with tarps. We're also investigating pesticides and starting to do follow-up inspections using drones. (State Agency)

The risk tolerance for impacting critical habitat species for FWS is very low. We have to put the emphasis on biosecurity efforts and EDRR. (Federal Agency)

In the agricultural sector, there is an understanding of the benefits of suppression. In natural resources management, people have embraced EDRR, but have been slower to embrace suppression. We don't want to cut off programs just because we can't completely eradicate invasive species. (Local Invasive Species Committee)

Coffee berry borer was discovered in Hawaii in 2010. The industry reacted quickly and established quarantine rules in Kona, but it still spread throughout the Big Island, Oahu and Maui. (Agricultural Sector)

After three years of suppression we were a little concerned, thinking, 'can we even be effective in doing this?' There were a lot of people throughout the Columbia Basin saying there was no way you could do it. But we've been able to reduce the population of Pike, and I think the takeaway is having at least three consecutive years of doing suppression efforts. We've removed roughly 17,500 pike from Box Canyon. We've demonstrated that we've been able to reduce the population by about 98%, and it's feasible to do it on a large-scale program. (Tribal Representative)

We began a suppression project in Alexander Creek in AK in 2011. We've removed around 20,000 pike since then. (State Agency)

What appears okay today may not be okay tomorrow. It is important to have boots on the ground who are aware of the risk and what can happen so when the circumstances change, you can take immediate action. (Conservation District)

Quarantine is a basic but effective tool. Early detection and rapid response are great ways to take care of these kinds of pest problems. A lot of times a pest is moved more by humans than by nature itself. (Conservation Sector)

Once you have a model, you can zoom in and start looking at individual areas. We did this to show the importance of early detection and rapid response when looking at knotweed infestations on the Toutle River Watershed. We found knotweed through the model and treated it at a cost of \$3,400. We then looked to see what would have happened if we did nothing and let it expand to where the model showed it would expand to. If we allowed that to happen, the control cost would have been \$150,000 as opposed to \$3,400. (State Agency)

Technological Improvements

Gene drives could be applied in mosquitoes to suppress, control, or even one day eradicate the plasmodium responsible for avian malaria and carried by mosquito vectors. (Conservation Sector)

People have been controlling weeds for a long time. So, what's new under the sun? There continue to be improvements in the ways we control weeds, from better herbicide selectivity to better biocontrol host-specificity testing for biological control agents. There have also been advances in using light and heat in innovative ways to kill weeds. (Conservation Sector)

Deciding which plants make the most sense to control in a particular region requires having good data. Data on where each plant is – and isn't – currently growing, data on where the plant is spreading or stable, and where it's already being controlled. Data on which areas are suitable for that plant to grow and thus vulnerable to spread. And ideally, we know how that suitable range shifts with our changing climate. Cal-IPC built an online tool, CalWeedMapper, to hold all these types of data, and State Parks and other partners contributed GIS datasets and expert knowledge data. Now the tool is used by regional partnerships as a foundation for setting landscape-level strategies. (State Agency)

We're trying to figure out how to do gene drive safely and connect to the unique characteristic of a population on an island, so if gets off the island, it won't spread. Various investigations are going on to figure out the best way to control this spread. Islands are helpful for this research because they have biosecurity safeguards that can control a field study that goes awry. (Conservation Sector)

We need a mechanism to bring innovator together. Inventors need to be brought to the table to help solve these problems. (Planning Agency) We used satellite image analysis to locate affected areas and then applied herbicide with high accuracy helicopter and GPS technology. (Private Landowner)

The more accurate we are with treatment the more money can save. Helicopter application is expensive, but the accuracy can help pay for using it. (Private Landowner)

DNA now is being used for "environmental DNA." You can take a water sample and use DNA to look for other species. (State Agency)

If we can get clear on what the eDNA indicates and what is triggered by a positive response, then it becomes useful. (State Agency)

We've been leading group of scientists on tools for early detection of aquatic invasive species. Most work is at the molecular level. We take things developed in medical field and apply them to an environmental context. Environmental DNA is one of those tools. (Federal Agency)

We've begun to standardize what eDNA results mean. "Positive detection" is a loaded term. To a geneticist that means one thing; to a natural resource manager, means something else entirely. Communication has to happen up front. (Federal Agency)

In 2014, CO discontinued eDNA for mussels. We acknowledge that progress has been made, but we don't think it is a tool ready for managers' use right now. (State Agency)

The Western Regional Panel created an eDNA Committee. It clearly has lots of interest, but there are lots of knowledge gaps. We're hoping to help create a framework to make use of the tool in monitoring and have confidence in what it means and how to communicate that. (State Agency)

CSI did geneticists no favor. Just because there is DNA doesn't mean you created the crime. DNA just means you were present at some point. (Federal Agency)

eDNA technology has come a long way. Using additional markers is really important to validate hits. You need solid controls and be able to demonstrate them. You have to walk managers through what constitutes a positive response. (Federal Agency)

eDNA was first used in a soils context 30 years ago. Water and air samples are the new frontier. (Federal Agency)

The new technology for in-water hull cleaning is really the way to get the cost down. We need some standards to govern it, so that is the next step. (Academic Sector)

We still lack tools to detect Rapid Ohia Death before the tree is symptomatic. We can only currently detect when the tree is dying. (State Agency)

DoD has been responsible for lots of technology transfer. DoD has also identified protection of biodiversity as a national security issue. They've launched genes-drive research and create space for catapult innovation. (Federal Agency)

I'm seeing mosquito management committees starting to employ some of these technology applications. (State Agency)

BISON (Biodiversity Information Serving Our Nation) is the place to go for a geographically and taxonomically comprehensive overview. That's why the data management piece is important to us; we're trying to do national-scale views of where the deepest problems are in invasive species. (Federal Agency)

We try to provide the national view of aquatic species: where they are, where they have been, and where they're moving. We also keep track of pathway information. We are trying to serve land managers with this information. (Federal Agency)

In building this integrated system, we're thinking about data standards not only for moving data back and forth but moving data in a way that doesn't end up ballooning on itself. (Conservation Sector)

There's a step beyond just sharing the data. There's a necessary collaboration around the development and open access to the decision support tools that move the data in a direction needed by decision-makers, whether in policy or land management. (Invasive Species Council)

All invasive species management is local. When you start telling the story about these problems, you need to make sure that the data is available at a larger level in order to paint an accurate picture of what the problem is and what the next one might be. (Academic Sector)

Something innovative we started doing is using drone technology alongside our boots-on-the-ground that are using a chemical spray as a control for the little fire ant. This will allow the drones to spray the ants on tree canopies as well as the boot-on-the-ground spraying from below. (U.S. Territory)

New tools on mobile devices like cloud sharing and data storage hold really exciting potential. (Federal Agency)

Land managers need tools to help make strategic decisions about where to focus their limited resources to best address invasive plant control. (Federal Agency)

Local scale models can help you find and target a species you might not have known you should go out and treat. Smaller models can also help in focusing where you should search for satellite populations, and research has shown that targeting satellite populations can really help manage invasions more so than focusing on large patches that can be easier to find. (Federal Agency)

One success story we've had with modeling was that we developed a model for gypsy moth population distributions in Washington with the help of the Forest Service and APHIS. APHIS managers were able to go in and control the moths before they moved to areas where they hadn't yet established. (Federal Agency)

We used modeling to create maps where cheatgrass may actually be on the landscape. The Forest Service was then able to use the maps to first get funding, and then to guide aerial herbicide application to try to control cheatgrass in the post-burn landscape. (Federal Agency)

The INHABIT tool allows for modeling at different thresholds, more and less conservative data points, which allows people to make different decisions based on more or less certainty of an area being a suitable habitat. (Federal Agency)

We really want to engage the land management community on the tool to get feedback and make it more useful. There is also the opportunity to suggest what other species would be beneficial to add. We want to add 50 more species in the next year. (Federal Agency)

Scenario planning is a flexible framework to help support decision-making under uncertain and uncontrollable conditions. With scenario planning, we take into account all the possibilities before us rather than a single future. (Federal Agency)

With more knowledge of this tool, there is increasing interest in using scenario planning, particularly for climate adaptation, but planners and managers often need quantitative information. There are a lot of data points that need to be connected at a deeper level than the qualitative data of scenario planning. That is where our quantitative ecological modelling tools can really bring some strength. (Federal Agency)

Something we're able to find with quantitative ecological modeling is being able to identify some tradeoffs. For example, having a lower density of livestock on a landscape may provide a buffer in forage for dry years, but allows for increased growth of cool-season exotic grasses. (Federal Agency)

Strategic Tools

You can be strategic about your management when you have one annual with a predictable life cycle. Controlled grazing and herbicide application can be fine-tuned. (Academic Sector)

BLM has been doing seeding and fuel breaks after fire, but not before. They are being reactive instead of proactive. Fiscal resources come after the fire, but that is the opposite of what the science says to do. Herbicides could be used before all perennials are gone. Targeted grazing can also be used. (Academic Sector)

When evaluating the right treatment, you need to pause and figure out how to get the most change with least impact. A number of small changes may be cumulatively very impactful. (Federal Agency)

We need decision-support tools that help evaluate risk and understand when to trigger response. Time matters when you use that triggered rapid response. (State Agency)

Partnerships

There has been a huge increase in public-private partnerships responding to fire. It seems like it might be a place where we could focus on invasive species. (Utility Sector)

Part of allocating limited resources is trying to find new resources you didn't know you had. Our citizen scientists' program, "Eyes on the Lake," helps extend our capacity by engaging with marinas. (Conservation Sector)

The Tahoe Fund is the new kid on block at only eight years old. We're trying to inspire the private community to engage in environmental projects around the Lake. (Conservation Sector)

We have some of the strongest partnerships in the nation in the sagebrush ecosystem. FWS can offer assurances that if a landowner is doing the right thing, then they don't have to worry about their actions. Safe Harbor Agreements and Candidate Conservation Agreement with Assurances are the tools that help landowners to respond to changing circumstances. (Federal Agency)

Last year alone, we achieved over 150,000 acres of habitat conservation in the West, mostly with the Forest Service. We've been able to enter into stewardship contracts with every Forest Service region in the West. (Conservation Sector)

Half of the state is held by private and half by feds. Addressing invasive species requires engaging in stakeholder collaboration across multiple jurisdictions. We need to look for ways to partner. In Wyoming, we have collaborative groups like invasive species task force, they WY pest council, conservation districts, counties, federal land management agencies, WAFWA, etc. (State Agency)

WY plays a leading role in the conservation of sage grouse. It remains a high priority for us; the state supports about 43 million acres of sage grouse habitat and 37% of the population nationwide. (State Agency)

If a private landowner has partnered with FWS through a CCAA or Safe Harbor Agreement, then they will have assurances that there won't be repercussions. (Federal Agency)

The Colorado butterfly plant is on private lands in many places. Landowners have participated in the Partners for Fish and Wildlife Program. FWS trusts those landowners. There are no repercussions if they inadvertently get harmed. (Federal Agency)

After the Soda Fire, we were immediately able to partner with the NRCS and the ID Governor's Office of Species Conservation to get cedars and seeds planted. The Soda Fire burned in August 2015, and by the end of September 2016, we were doing seed plantings and cedar reestablishment on private lands. (Conservation Sector)

Collaborating with the coal mines in the Powder River Basin has been crucial. They have the funds and personnel to help us experiment with different cheatgrass management strategies or sagebrush restoration projects. (Conservation Sector)

The "shared stewardship" notion is that the Forest Service is going to sit down with states through governors' offices and see what our shared objectives are. We are never going to treat the 80 million acres that need to be treated, but we have the analytical abilities to prioritize areas and make appropriate management decisions. (Federal Agency)

APHIS has MOUs with state departments of agriculture. It allows to work under each other's authorities. It establishes what data can be shared and helps deliver a shared response. (Federal Agency)

The Montana Bat Working Group works to conserve and monitor bat populations across the state in partnership with recreational cavers who have a strong basis in conservation. (Recreational Sector)

The Hawaii Invasive Species Council, established in statute, combines authorities and expertise among state agencies. This authority helps when regulatory action is needed. There is also funding from the legislature. (State Agency)

In response to Chronic Wasting Disease, we formed partnerships with agencies, but also various NGOs like sportsmen associations. Outreach to the public was also important to make the plan understandable and the goal clear. (State Agency)

When we first found Chronic Wasting Disease, we didn't have the money to set check stations. We got on phone with Rocky Mountain Elk and the Mule Deer Associations. They cut through red tape and got us money to respond quickly. The relationship between state agencies is really important too. (State Agency)

When the first detection occurred at Tiber Reservoir, the Tribe was in a good position to react in coordination with WA state agencies. (Tribal Representative)

I won't argue there aren't enough organizations. However, we do need strategic partnerships on key elements. Watershed approaches can help a group get its best bang for the buck. (Tribal Representative)

We should develop a partnership between the US and Canada to coordinate feral swine management efforts. (Academic Sector)

The small group of transport companies are a high priority in HI. Young Bros. and Aloha Airlines both on board with taking invasive species control measures. (State Researcher)

Pacific Islands sit in the middle of all that traffic and the Pacific Islands region is larger than the United States. You have to work across jurisdictional boundaries and across international governments. The Micronesia Invasive Species Council was created to help handle this challenge. DOD also helped fund a regional biosecurity plan, which is now being updated. (Academic Sector)

GU interacts a great deal with DoD. We have seen the military step up on the brown tree snake. The US uses GU as the tip of the spear on national defense. We argue that that is also true when it comes to natural resources threats. (Academic Sector)

HI has a Christmas Tree Compliance Agreement with WA and OR. It is implemented with a limited number of growers. To get sold to Home Depot, for example, a grower has to have best management practices. (State Agency)

I learned that if I wanted to be successful with any conservation program, whether it be federal, state, or local, it needed to be done hand-in-hand with the conservation districts. (Federal Agency)

Partnerships have allowed us to expand our treatments of many weeds, including garlic mustard. The partnership allows us to be more effective for a few reasons: 1) We come together in our meetings and set priorities together; 2) We share data on the effectiveness of our treatments and the locations of new populations; and 3) We can address gaps in management. (Conservation District)

There have been multiple benefits with this big partnership. We have been able to help rangelands, streams, and water quality. (Conservation District)

Through our partnerships we have been able to keep a few species from being listed as endangered. There have been great benefits from removing the invasive species. (Conservation District)

We have been involved with a huge partnership on federal, state, and private land to remove and dispose of invasive salt cedar. (Conservation District)

By using these giant partnerships and working towards improving the larger habitat, the lesser prairie chicken and the dune sand lizard have not become listed as endangered. Getting ahead of these species being listed is more beneficial for everybody. (Conservation District)

The Secretary's authority to cooperate is very broad. Our primary cooperators are the states, usually with agriculture or natural resource forestry departments. In order to carry out an agreement, state agencies need to have the authority to do what's in that cooperative agreement. (Federal Agency)

State foresters urge cooperation. As pests become an issue, we look for ways to eradicate and mitigate those pests. All agencies involved in this need to come together under a strategy we can all agree upon. We must train personnel to work together. (Conservation Sector)

I want to look at the issue of private, state, and federal collaboration. People focus on where their mandate mission takes them, which makes a lot of sense, but one of the opportunities that WGA brings through these webinars and future work is to leverage off of the work that is being done across those various jurisdictions. (Federal Agency)

38 out of the 39 counties in Washington have noxious weed control boards. We provide hardware, software, and technical support to low capacity offices that often only have a single or part-time staff person. (State Agency)

Integrated Pest Management

Esplanade spraying can help shift rangelands back to perennial ecosystem. It allows them to re-emerge. A few years of treatment can help interrupt the invasive species seed bank. Pollinator habitat can improve as well. (Chemicals Sector)

Integrated Pest Management (IPM) tries to understand the ecology of the broader system and apply it to management decisions. (Federal Agency)

Elements of IPM include prevention, avoidance, monitoring and suppression. (Federal Agency)

IPM programs have shown to be economic for agriculture. Later studies found environmental values as well. (Local Invasive Species Committee)

In HI, area-wide fruit fly program came about in the early 2000s. This integrated effort was huge for all kinds of agriculture commodities (400 different crops). (Local Invasive Species Committee)

IPM can be used throughout the spectrum of invasive species response. It belongs in all stages. (Local Invasive Species Committee)

IPM includes the entire chain of management. When you have a pest, you have to decide what the approach will be. Most of what people do is IPM in one way or another. (State Agency)

It's easier to implement in the agriculture sector than others because you're dealing with a limited number of people and private land ownership. (Federal Agency)

Agriculture has big markets, so integrating IPM can be easier. Using it in a conservation context can be tougher. (Local Invasive Species Committee)

Biocontrols

HI is at cross-roads for a lot of invasions. We are looking at potentially collaborating with USDA and state partners to build a biological control facility to connect with efforts in CA. (State Agency)

We've been reaching out to USFS and other USDA agencies and the state of HI to think about building a facility where you can test biological control agents for different pest species. HI has an older facility and part of it is impacted by lava flow. (Federal Agency)

We are moving forward with biocontrol efforts in GU and are working on a fungus as a control method. We're spending quite a bit of money, but if we can get a control mechanism, it will help other impacted smaller nations, like the Solomon Islands. (Academic Sector)

There's a new generation of cheatgrass control with the biocontrol vs. chemical control discussion. We are testing methods right now. It's showing promise in WA. (Academic Sector)

If you can't eradicate a species, you look for management options. Biocontrol methods on noxious weeds and for invasive insects can be a good solution. (State Agency)

HI can be a leader and has led on biological control agent development. We have a proud history of success in introducing insects for safe biological control projects. (HI Governor Ige)

Biocontrols are low-risk, low-cost, long-term, landscape scale solution. (State Agency)
There's a technical advisory group that determines what species can come into the country. They have a good track record of safety. (State Agency)

We try to apply all kinds of tests to make sure biocontrols are as specific as possible to that target plant. (State Agency)

The permitting process in the Plant Protection Act only considers risks, not benefits of biocontrols. (State Agency)

Biocontrols can be a sustainable, low-risk tool with significant net benefit to stakeholders. Their use is garnering federal government support and media attention. We are regaining speed and utility with new agent approvals. (State Agency)

We are trying to find natural enemies from the native range of strawberry guava. We are approaching 200 plants targeted for biocontrols have ten as a top focus. (Federal Agency)

The failed mongoose biocontrol project had any early introduction without any science or regulatory review. That doesn't represent what we actually do in biocontrol. (Federal Agency)

Some aspects of life on islands are favorable to biocontrol project. Because various taxa may be entirely absent from the native flora and fauna, nontarget issues can be greatly simplified in some cases. (Federal Agency)

We need to collaborate and develop a better framework for biocontrol permitting. Other speakers have already talked about regulatory issues, capacity issues and money issues. All impact our ability to meet the needs for controls on a landscape basis. (State Agency)

Biocontrols are safe and economic with a good long-term return. They save a lot of money for future use. (State Agency)

Biocontrols represent opportunism that we needed to see. We need to be collaborating with other states where opportunities exist. Biocontrol is expensive and time-consuming on the front-end. The more we work collaboratively, including testing for each other, the more controls we can get out the door. (State Agency)

Communication in the states is a matter of knocking on doors and making phone calls. We've developed relationships over decades and proved value as a biocontrol program. We're just now beginning to collaborate at a more regional level. We now have calls with all the states to trade insect agents and help compensate any state's weakness alone. We need to bring Hawaii in on these conversations. (State Agency)

Can't wait to investigate biocontrol options until the invasive species is out of control. If you can get going when the species is becoming established, it can be really helpful. (State Agency)

If you went back 20 years, there would have been 12 biocontrol specialists in HI. Now, there are maybe four. We need to get up around 15 or 20. (State Agency)

We need to show the worth of biocontrols. Lots of big impacts using biocontrols were done in 1970s. With GPS, we need to now do a better job of showing impact, especially to humans. Value needs to get captured and communicated to the public. (State Agency)

Biocontrol needs to operate more openly in the public theater. We need to use modern tools to not just identify, track, etc. but also use communications tools to sell product. (State Agency)

Adaptive Management

Adaptive management is teaching how to get better at using the right techniques. It relies on solid monitoring networks. (Conservation Sector)

Cheatgrass becomes very palatable in the fall after the seed drops. Cattle prefer it over other grasses. We ran an experiment where we grazed heavily from October-mid December for three consecutive years. The next spring, there was barely any cheatgrass. This strategy works particularly well in winter-dominated precipitation zones. (Academic Sector)

We assessed a set of sagebrush obligates that helped us plan 110 conservation measures to implement across the landscape. It was a lot of work, but we all feel very comfortable moving forward with those measures. (Conservation Sector)

With regard to management, it's important to recognize that adaptive management is the process of implementing a program. It's a fundamental way of dealing with uncertainty in the decision-making. (Conservation Sector)

To make adaptive management work, we need to implement management and science together. Monitoring needs to be looked at as research. The difference is in the objectives pursued. This is a relatively slight shift in mindset in how we do management and research. (Conservation Sector)

I was talking to a friend of mine who works for the Forest Service. We were talking about how to manage wildlife in the face of climate change, and to deal with those changing conditions. His response was 'do nothing.' Essentially what he was saying is we should have in place the framework to deal with changing conditions. Doing truly science-based management will help us do that. (Conservation Sector)

We're gathering all of our state leads for GNA, and they are sharing lessons learned, and we will be

convening a workshop for information sharing about GNA. (State Agency)

If someone has capacity to do something under Good Neighbor Authority (GNA), then I don't care who does it. I'd be happy to see tribes or counties getting good work done on National Forests under GNA agreements. (State Agency)

We found out that one of the most effective things we could do in Idaho was contracting NEPA work to the state, who could do it far more expeditiously than the Forest Service could. That's an example of the beauty of the kind of innovation that can happen with GNA. (Federal Agency)

In WY, we are working with state agencies other than the department of forestry. We are working with the Department of Game and Fish to do habitat improvement projects that we have a mutual interest in. We also have a new GNA Master Agreement with the Department of Agriculture to do range enhancement work. (Federal Agency)

The joy of working with GNA is the open framework and flexibility, so that will allow us to design innovative partnerships and projects moving forward. (Federal Agency)

I think an area where BLM can expand our use of GNA is through our Rangeland Fire Protection Associations. That's an area we need to tap into a little harder. (Federal Agency)

We are now doing targeted grazing to create fire breaks. It is helping reduce fires on state lands where it is implemented. It is tough to work with federal agencies, but we are trying to break down barriers to using the same kind of tools. (Conservation District)

We utilize both spring and fall treatments. The fall treatments have been really helpful for where we have 'carpets' of seedlings, or seedlings that are intermixed with native plants, especially native annuals that go to seed by the fall. By treating garlic mustard in the fall, the native annuals are able to go to seed and regenerate. (Conservation District)

We are looking at ways to use invasive species as products. For example, using the wood from invasive trees as mulch for gardeners or for creating wood-based products. We are also looking at using bamboo for furniture and tools. (U.S. Territory)

Restoration

There is evidence that the landscape is trying to heal itself. If you are doing restoration projects, try to find populations showing characteristics to survive and use those as a seed base. (Academic Sector)

We have helped conserve 15 million acres in Wyoming, which support 80% of breeding population for sage grouse in the state. Most recently, federal land management agencies have incorporated significant portions of the state E.O. into their plans for WY. (State Agency)

It can be difficult to quantify ancillary benefits. With sage grouse, we know there are other species benefiting from our efforts, but the most efficient thing to do is focus on the primary species (greater sage grouse). (State Agency)

We want to place our sites where we have a good restoration opportunity. We look at the vegetative community and the composition of invasive species. We even try to proactively treat landscapes before we disturb them because it makes our restoration efforts easier and more effective. (Mining Sector)

Restoration is sometimes required by law when mining or drilling for oil and gas. I'm seeing lots of people becoming more interested in this. As an instructor in this area, it's exciting to see more and more students coming to learn about it. (Academic Sector)

I want to express an opinion on the importance of monitoring restoration efforts. It is critically important to keep track how we are doing because this is relatively new science. It's not just collecting data, but having agencies go through the data that is important. (Academic Sector)

Restoration happens once acre at a time with boots on the ground, but to be effective, we have to scale that up. It can be really tough to have full ecological restoration across the landscape. (Conservation Sector)

Restoration success has been very variable in the past as it relates to invasive grasses. The main challenge is depleting the invasive, annual seed bank. We are getting great results with new technologies by selectively depleting cheatgrass seeds from the bank, which allows the native perennials to pop up. (Chemicals)

New precision restoration strategies hold a lot of promise. By stitching innovations in seed enhancements with geo-spatial mapping technology, we can really improve targeted restoration efforts in these impacted grasslands. (Conservation Sector)

If you don't start at the top of the watershed with planting something after a fire to stabilize the erosion, then that erosion is going to work its way down the landscape. Something that always makes sense is to stop erosion – wind or water – and you do it right away. (Seed Industry)

We can't view it as "spraying weeds." This is ranch reinvestment and pasture restoration. I ask ranchers, "have you built new corrals?" and then if they expected to get full cost covered in year one? This is the same thing - asset improvement and capital investment. (Private Landowner)

There are signs of hope for recovery once you get rid of the threat. Native species will come back. That is encouraging. The seed bank is in the ground and regenerates and often out-competes nonnative species. (State Agency)

Our management of the brown tree snake appears to have been successful as huge bird populations have returned to Guam. We have birds returning that newer generations on Guam don't even know the names of. (U.S. Territory)

Monitoring

30 years ago, successful habitat monitoring wasn't a huge priority. Now, federal land management agencies consider monitoring as a high priority. (Conservation Sector)

Securing funding often comes with a lot of follow-up monitoring requirements. We need funding to monitor long-term management effects throughout the ecosystem. (State Agency)

Our center has been working on monitoring techniques. By taking pictures and analyzing them in the lab, we are able to stitch together many photos and understand how the site is changing. It's much cheaper and quicker, and we've been connecting with operators who want to begin using this technology. (Conservation Sector)

I can't tell you how important it is to keep track of how well we're doing with restoration. Monitoring is extremely important. Not just collecting the data but analyzing it to make sure that we're heading the right direction. (Academic Sector)

One piece of implementing these projects that we have found to be very important is to do an annual site visit. When we were writing the grant, we identified areas that we thought needed to be treated, and some of the areas we expected to be covered with cheatgrass did not have much. That validation step was very important because it allowed us to adjust our management strategy on the front end. (State Agency)

We do aerial surveys twice a year and map Rapid Ohia Death-infected trees. We then download that information to all the other state agencies. (State Agency)

Monitoring is key, even places that don't have pike, because that can lead to early detection. (State Agency)

Collaboration & Coordination

Coordinated Action

We've developed the [Hawai'i Interagency Biosecurity Plan](#) to establish a path forward to a more secure future where Hawai'i is better protected from new invasive species threats, and to better mitigate our current threats. (HI Governor Ige)

Governors should work to coordinate state agencies (wildlife, agriculture, fish and game, etc.) to address invasive species threats. (State Agency)

Governors should work with other states to regionalize management strategies and coordinate management practices and data sharing across jurisdictional boundaries. They should also consider entering into regional compacts to accomplish these goals. (State Agency)

Governors need to coordinate efforts between state agencies and be willing to declare States of Emergency in certain situations. (Academic Sector)

It's a collaborative effort of state, local, federal governments and local nonprofits and citizens who work tirelessly to protect Lake Tahoe. Collaboration is possible because the issue is truly bipartisan. Invaders ignore all boundaries, political lines and political parties. (NV Governor Sandoval)

We have invasive species managers from all over the West in the room. There is no better organization to tackle this than WGA. I can confidently say there is no more collaborative group than the WGA. Western Governors are among my closest friends. We are absolutely committed to collaboration. (NV Governor Sandoval)

I want to start by saying something that will frame up the beginning of the story. What I want to emphasize is what it takes to have 50 agencies and organizations collaborate here in Lake Tahoe.

There's a huge amount of coordination involved. It takes a superstructure that everybody has bought into. (Federal Agency)

The Tahoe Interagency Steering Committee coordinates all the various work groups active in Lake Tahoe. (Federal Agency)

These complicated problems require a complex structure for communicating. Lake Tahoe does it well. You have to buy in on the idea that you can't solve it alone and that somebody else may have a different way to tackle problems. (Federal Agency)

None of this works if you don't work effectively with partners – federal agencies, between state agencies, across states and with interest groups and the public. (State Agency)

I work in the trenches in terms of coordination in the West. The Western Regional Panel coordinates efforts between states and has helped tackle the mussels issue. (State Agency)

Invasive species are everyone's problems, but we like to think that they are someone else's responsibilities. You can slice invasive species a variety of ways: species by species or by vectors. We often look to fish and wildlife or agriculture departments as the primary managers, but responsibilities are actually shared by many agencies. There are many opportunities for agencies with different responsibilities to work together to manage invasive species. (State Agency)

Local agencies in Lake Tahoe work with the California department of agriculture to intervene on incoming mussels. We've conducted 1.4 million inspections and quarantined 1700 vessels with mussels. (State Agency)

Organizations in Lake Tahoe are working in cooperation with states and partners throughout the West to prevent the spread of invasive mussels. (Conservation Sector)

I can share lessons and failures with communities across the West. Collaboration is hard, but it is achievable with the right frame of mind. You need to get the right people to the table and communicate early and often. When things go wrong, assume a positive intention and trust each other as you work through challenges. (Conservation Sector)

We have a federally chartered advisory committee. That group also has a similar makeup of states, tribes, science community, tourism, labor, etc. It serves a federal advisory role, but also provides feedback to all levels of government. It helps figure out how to invest and balance investments among various needs. (Federal Agency)

We hosted the California Invasive Species Summit to identify new pathways and pests that don't fit our 20th century pest plan. We brought a big coalition together to work on this. The California legislature helped greatly by authorizing the Invasive Species Council of California and providing funding to address forest pests. (Academic Sector)

It is important that you open your doors and reach out. Instead of throwing up your hands, you need to try to find other people to try to engage with on shared issues. It may not result in more applications or acres treated, but as you go through natural ebbs and flows, you will have more success long-term. (State Agency)

We've been doing inspections in Lake Tahoe since 2008 through partner agencies. We started with inspections at the ramps. Now, we have moved to off-highway inspections at access locations. "Clean, drain and dry" is the mantra. (Conservation Sector)

In 2008-09 Congress asked for a Quagga Action Plan, which brought the Western Regional Panel together. We use the same language and protocols across the states. That consistency has helped engage the boating industry. (Sub-regional Planning Entity)

We passed quagga mussels legislation to try to avoid boats coming into WY are inspected. To date, it has been successful, but the danger to the West is real. We worry that it only takes one introduction to cause a big problem. We have to work in a coordinated way with other states. (WY Governor Mead)

Many times in WY, as we deal with invasives, restoration, and species conservation, we look through the lens of sagebrush and sage grouse. It's not an accident; the state plays lead role in management and conservation of the species. (State Agency)

We need a more coordinated structure at the local level with individual landowners, counties, state agencies, and federal representatives to improve invasive species management in the sagebrush ecosystem. (Federal Agency)

Greater sage grouse is an excellent example of a forcing agent to get coordination between all kinds of partners. Federal agencies have provided millions of dollars to direct efforts around cheatgrass to help protect sage grouse. (Federal Agency)

Cooperation between university, land managers and industry – hugely important. Lines of communication need to be open. (Private Industry)

One thing that was innovative in our approach was including a Conservation Agreement to address future development of the mineral estate within the designated coal development area and similar oil and gas areas. (Conservation Sector)

We've been working on invasive species management in the grassland from a collaborative standpoint over the past few years. We were able to get grant funding to target several invasive species: cheatgrass, salt cedar, thistles, and others. We also targeted impactful natives like encroaching junipers. (State Agency)

Firefighting entities have learned the hard way that working together and developing common communication system increases efficiency. The same thing happens with invasive species. We need to use incident command systems. (Federal Agency)

When the mussel detection occurred, the state recognized that it needed a coordinated voice to convey impacts to central and eastern MT, which is not a recreational area. Water use is for irrigation and rural water systems. Those impacts are not as glamorous, but there will be huge impacts on rural areas if the infestation becomes established. (State Agency)

The federal Aquatic Nuisance Species Taskforce was created in legislation in the 1990s to deal with aquatic invasive species. They have since organized six regional panels, one of which is the Western Regional Panel. (State Agency)

The Western Waters Quagga/Zebra Mussels Action Plan was created by the Western Regional Panel in 2010. It was then approved by the federal Aquatic Nuisance Species Taskforce. Funding was secured through the FWS for implementation. Implementation responsibilities reach across all levels of government. (State Agency)

There's always room to improve. In 2013, the Western Regional Panel took on "coordinating the coordination" effort. It has been a beneficial exercise to think through these questions with other regional panels and federal and local panels. I'm just glad to have as many organizations as there are now trying to help. (State Agency)

Two decades ago the tribe entered an agreement with Washington to cooperatively manage the lake and related fisheries. Tribes decided to set aside jurisdictional hurdles and shift the focus to a way that we can look at our shared resources and build cooperative management. (Tribal Representative)

The Washington State Invasive Species Council was created by state legislature in 2006. It's a 22-member organization of tribal governments, state agencies, federal agencies, regional organizations and NGOs. (State Agency)

This is a broad challenge. We are on the cusp of uniting and working across the West. We see that in things like the WGA top invasive species list. We're already beginning to have funding directed at those species identified on that list. (State Agency)

We can't do the job alone. We have to cooperate and find common language to convey the importance of controlling invasive species. (State Agency)

This meeting is one of those great collaborative efforts. On behalf of USDA, we are proud to be engaged. It is fantastic to have Governors elevating this important issue. This should not be a one-and-go exercise. USDA committed. (Federal Agency)

We have policy that guides us try to integrate invasive species into all management efforts. Rangeland and forest management incorporate key invasive species elements. Wilderness managers have to integrate invasive species prevention into management. It's the same thing on fire suppression operations. (Federal Agency)

In CO, we have a couple of different agencies doing monitoring, but they are well-coordinated. State law and regulations require that coordination. We then have MOUs on how to do the detailed protocols, so it doesn't matter who gets the detection. (State Agency)

In 2014, the U.S. supported a national plan to address feral swine, which is now directed by APHIS. The strategy is to provide resources and expertise to states and allow states to manage operational aspects of feral swine control. It's working well so far and we're seeing a reduction in swine. (Federal Agency)

MT is working hard on avoiding introduction of feral swine. New regulations on the books are helpful, and now we are working on firming up the protocols on how to deal with sightings. We need good communication flow and to identify who has authority to remove swine if sightings are confirmed. This requires coordination between all elements of the states. (State Agency)

The Sustainable Hawaii Initiative, announced in 2016, includes five goals: protection of 30% of watersheds by 2030; protection of 30% of near-shore waters by 2030; doubling local food production by 2020; 100% renewable energy by 2045; and full implementation of the Biosecurity Plan by 2027. (HI Governor Ige)

Rapid Ohia Death response was an example of good coordination. A mixture of APHIS, USFS and researchers from University of HI were supported by response teams from state agencies. We sometimes forgot who folks worked for because we were so focused on finding a solution. (State Agency)

I've worked in a number of collaborative programs. In CA, you had lots of industry supporting you. That is very different than in Hawaii where you don't have lots of major industry partners. You have to, instead, really work with the intergovernmental relationships. The island mentality helps people work together. (Federal Agency)

Some of the early wins are not really wins of the biosecurity plan itself. There's lots of good work already being done. There are certain collaborations happening now that are supported by the plan. There are some items that state legislators are more likely to support because there is a plan in place. Funding for state biocontrol efforts and collaborative efforts has also increased. (State Agency)

Interagency collaborations are the most important. They bring research, funding, regulatory authority, and manpower. (State Researcher)

Rapid Ohia Death was a unique situation. It had economic, cultural and environmental impacts. It facilitated regulatory action in the absence of science. The department of agriculture was a regulator but also worked with interagency partners to deal with the problem. (State Agency)

When GU does invasive species management, we're not thinking about just Guam. The brown tree snake, little red fire ant and coconut rhinoceros beetle have all been established as regional priorities. (Academic Sector)

The 2016 Executive Order on invasive species management increased membership of the National Invasive Species Council to include Health and Human Services, OST and NASA. It also incorporated considerations of public health, climate change and technology innovation. (Federal Agency)

The Rapid Ohia Death Working Group is a success story for coordination between counties, states and federal agencies. (Federal Agency)

We're working on identifying pests that are going to come to our state. We now have states working together ahead of time. Most identified targets are moving west from the east coast. All Western states should be working together early. We need to hammer out all the regulatory hurdles ahead of time. We also need to embrace FWS colleagues in order to work in tandem with ESA concerns. (State Agency)

There are many benefits of collaboration: better justification of science, leveraging of resources, shared costs, and better canvassing of the world for foreign expertise. (State Agency)

As pike spreads into the Basin, people are starting to realize it takes a village to deal with something like this. You need an emergency response team to deal with it when they show up in another water body,

but the education and outreach needs the attention of the states and the governors, for them to work together, and to look at jurisdictions and think of the greater conservation outcome. Tribes, states, feds, and local folks need to work together, because everybody has something to lose if nothing is done. (Tribal Representative)

The most helpful way that Governors can take action is by raising this issue not just at a state level but at a federal level as well. This is a serious problem and a serious threat that we need to address throughout the western U.S. (Tribal Representative)

This is a regional threat, and those who have pike in their immediate area should not have to take on the burden alone. (Sub-regional Planning Entity)

One of the best things to do is to have a contingency or a response plan in place for when pike do get to the anadromous waters, and knowing what course of action will be implemented, who the responsible parties will be, what permits or authorizations will be needed, just so you can hit the ground running. (State Agency)

It's helpful to have an understanding of who the management authorities on different parts of a river are, to find partners and to determine the roles and responsibilities of each and having permits and agreements between agencies and partners and a response budget available. (State Agency)

States have to realize, and do realize, that fuel loads have increased exponentially. How do you begin to budget for these fuel loads and budget for these fires? It's not if something burns, it's when it burns. How do you plan for that? States need to be able to lean on agencies like the USFS. (Conservation Sector)

I want to look at the issue of private, state, and federal collaboration. People focus on where their mandate mission takes them, which makes a lot of sense, but one of the opportunities that WGA brings through these webinars and future work is to leverage off of the work that is being done across those various jurisdictions. (Federal Agency)

Cross-boundary Management

I'm sharing perspectives from NV. We have lead responsibility for larger invasive species management across the state. Cross-boundary issues are huge in the intermountain west, so my responsibilities involve trying to coordinate with other agencies beyond state boundaries. (State Agency)

We are one of the largest private landowners in the state. We have a big issue controlling vegetation, particularly in the context wildfires. There's inverse condemnation occurring with wildfires in CA. There's no guarantee that a utility will get recovery for damages. (Utility Sector)

We deal with cheatgrass, medusa head, and juniper invasion on private lands. We can go out and manage annually based on the natural conditions that year. We may graze the cheatgrass 2-3 times per year depending on how much rain we have. That flexibility is key to reducing the cheatgrass throughout the year. (Conservation Sector)

By managing within the natural trends of the landscape and using feedback we get on the ground, we can support different ecotones very effectively. (State Agency)

We need to expand collaboration for invasive species management. We need to look at the issue differently. We need to suspend our thinking about political boundaries and work across watersheds. (Tribal Representative)

Governor Ige focused on a challenge facing all our states in different ways. We know that invasive species management is another area where we can serve as model for cross-boundary solutions. (MT Governor Bullock)

I hope USDA and other states will join Hawaii and take a more regional, cross-boundary preventative approach to invasive species management. (HI Governor Ige)

Working at an island level often isn't enough. Transboundary work is essential. (Conservation Sector)

Weeds don't pay attention to property lines. A public land manager will often treat a weed only for it to be re-infested by a neighboring property that's privately owned. Conservation districts can then step in and work with the private landowners." (Conservation District)

The main value of conservation districts is that they're already set in place to work on the ground. They can work on all different kinds of property where most other entities don't have that ability. (Conservation District)

Innovative Funding

Governors should seek to create long-term funding solutions for state agencies and programs. By collaborating regionally, they could help to attract federal funding to relevant agencies. (State Agency)

The Tahoe Fund does fund raising. We talk to private community members and get them involved financially. (Conservation Sector)

If we can get communications dialed in and have an effective means to deliver, the private community will show up in big way financially. (Conservation Sector)

It's as important as management efforts taken by agencies, counties, states and federal land managers. We need to incentivize coordination and collaboration. It can be uncomfortable to do, but you need to try to push to get groups and private funds to the table. (State Agency)

It starts with Lake Tahoe. All local citizens care about it for various reasons. Some want to fund amenities while others are passionate about the water and ecology. We need to put science in terms that citizens can understand and experience. We need to show that there are real solutions or that they are being developed. Pilot projects are very exciting for people. (Conservation Sector)

The Lake Tahoe Restoration Act was passed in 2018 and passed money specifically through the FWS. The funding stream is great and will help invest significant resources to deal with invasive species in Lake Tahoe. (Federal Agency)

We have a mandatory, one-time boating fee of \$75.00 for the season. This is different from the state of Nevada, which has “free” inspections elsewhere. They have a good tracking system for fee program to try to make it so that boaters are paying for half the program costs. (Planning Agency)

USACE provides money to the Lake Tahoe AIS Program. (Planning Agency)

Funding has been provided (\$1 million) to control cheatgrass in three counties within core greater sage grouse areas. It’s a great start, but it won’t help if there’s a re-emergence of cheatgrass. (Federal Agency)

We’ve been hearing on all the panels about the need for funding certainty with invasive species management. I am excited to announce and initiate a new cross-boundary state program to manage invasive grasses like cheatgrass, medusa head, and ventenata. We’ll need your help to help us stand up this new initiative for Wyoming and Idaho, and we hope other states will eventually participate. (Federal Agency)

The Invasive Species Council’s funding gets used to fill the gap between funding coming from the participating agencies. (State Agency)

Non-state agency partners can have flexibility on funding state agencies don’t have. This can really extend state agencies’ capacities. (State Agency)

We have a general fund that appropriates funds for weed eradication. Our boat registration fees also pay for boat inspection activities. (Conservation District)

I’m wondering if there is a means to develop shared fiscal and capacity resources. The Washington Invasive Species Council has proposed the creation of a state emergency fund. If it was created, it would be used for initial attack on newly discovered species. (State Agency)

In OR, we got a one-time transfer from ATV registrations to help with invasive species management. Those funds were helpful but haven’t been able to make that system permanent. (State Agency)

Governor Ige commissioned a HI biosecurity plan. Emergency funding flexibility for new species detections is a key recommendation of that plan. (State Researcher)

We \$4 million a year in the department’s budget for projects that the Invasive Species Council have prioritized. The group decision on prioritization is really helpful to make sure funds are being used on something meaningful. (State Agency)

An emergency-type fund available to the Columbia Basin (or states or provinces) to tap into at a moment’s notice as well as a network of people who have dealt with the issue and could help would be met with open arms. (Tribal Representative)

In 2017 the Northwest Power & Conservation Council received emergency funding requests from the Co-Managers of the Lake Roosevelt Fisheries Evaluation Program to develop a coordinated proposal to address northern pike. In 2018, the Co-Managers came forward with a project called the Northern Pike Suppression and Monitoring Project which the Council recommended for FY 2019 BPA funding. The budget for this project was about \$900,000, and that’s what the Co-Managers felt was necessary to

suppress the population of northern pike that has already taken hold in Lake Roosevelt. (Sub-regional Planning Entity)

Much of the funding that came from the council came from what we call 'cost savings.' We are able to capture funds from projects that have closed out, and re-direct those to new projects. However, these funds were not sufficient to fund the project for this year. (Sub-regional Planning Entity)

We had to figure out how to use the Environmental Quality Incentives Program money on federal land. We partnered with BLM and USFS, and BLM came to the table saying they would match dollar for dollar, and our organization helped each landowner come up with a plan. (Conservation District)

We've found that through the partnerships between BLM, NRCS, local conservation districts, USDA, and private landowners, the more you can leverage grant funds to work together and partner, the greater success you can have. (Conservation District)

Many of the ranches we work on are checkerboard ranches of private, state and federal land. Being able to use Farm Bill money on BLM and USFS land has made a huge difference in being able to leverage funding and work with partners. (Conservation District)

Our Congress passed a 'Green Fee' which is a tax built into the ticket price to come to Palau, and it is now \$100, which goes into a protected area fund. There are marine and terrestrial funds. The funds are working really well, and now we are looking at ways to expand outside of the protected areas to stop threats from entering the protected areas. (U.S. Territory)

We started an invasive species fund, which is a fee that has been tacked onto cargo being brought into the island. The burden of the fee is on the consumer who uses the shipping companies. The fee collected feeds directly into our biosecurity division and is used to hire personnel and obtain resources and increase capacity. (U.S. Territory)

Tribal Engagement

APHIS has MOUs with tribes to facilitate coordination on various invasive species challenges. (Federal Agency)

It's a challenging time for the Tribes in the northwest. We face responsibility for keeping the Columbia River watershed free of mussels infestations. Our reservation sits at the headwaters, and we're worried that infestations would threaten native fish and wildlife species, water quality, irrigation, and tourism. Our tribe also operates a major dam. Mussels would impact conduits and other equipment. (Tribal Representative)

When the first detection occurred at the Tiber Reservoir, the Tribe was in a good position to react in coordination with Washington state agencies. (Tribal Representative)

Tribes have thousands of years of habitation on this landscape. There is such a huge responsibility in tribes to maintain experiences for the future generations. Short-term solutions will get short-term results. We need to look way ahead and plan for challenges on the front end. (Tribal Representative)

We try to inform tribes about collaboration opportunities in a respectful way. We really want to avoid sounding accusatory. (Federal Agency)

In CA, we go to “Big Days.” as a way to embrace and develop relationships with native Tribes within their social setting. (Federal Agency)

It’s sometimes important that involvement be required. There are many HI laws and regulation that require tribal participation. (Local Invasive Species Committee)

The takeaway from the Kalispel Tribe on northern pike suppression efforts is that ‘we can do this, and we know how.’ (State Agency)

Seed Strategy

Effective seeding strategies and seed availability for restoration are two challenges that we face. (Federal Agency)

The National Seed Strategy communicates the importance of having the right seed, in the right place, at the right time to promote restoration. (Federal Agency)

Seed contamination can be overblown. BLM gets weed-free seed and tests it for quality. Anything that is contaminated by a weed on a state weed list in any state gets sent back. (Federal Agency)

There are sources of weed-free seed out there. There is probably no such thing as completely weed-free seed. It’s good news that BLM is checking. (Academic Sector)

Whatever the management tool is, we need to focus on eroding the invasive species seed bank. (Chemical Sector)

Seed coating and seed pillows research is an area that the University of Wyoming is focused on. (Academic Sector)

Restoration success has been very variable in the past as it relates to invasive grasses. The main challenge is depleting the invasive, annual seed bank. We are getting great results with new technologies by selectively depleting cheatgrass seeds from the bank, which allows the native perennials to pop up. (Academic Sector)

There are three major provisional transfer zones that make up 85% of the Great Basin, and that’s where the seed is needed. (Federal Agency)

We are a land management agency, but NRCS has traditionally been the agency that has a direct relationship with farmers. That puts us at a disadvantage when we need seeds. There’s definitely potential for us to improve that relationship, potentially by using public-private partnerships. (Federal Agency)

Seed laboratories conduct the tests that show you the quality of the seeds you buy, providing information about purity, germination rate, and other data points. We act as a go-between between buyers and sellers to ensure that there’s a level playing field. (State Researcher)

Cheatgrass is a noxious weed in some states, but it is not listed as a noxious seed in any state. There’s a definite learning curve that exists for noxious weeds and seeds and how they relate to invasive species management. (State Researcher)

It's important to distinguish between purity and viability. You can have seed that is 99% pure, and it will still be 99% after a few years of storage, but only 50% might be viable and grow in the wild. (Seed Sector)

When I got into business, the amount of native seed that was sold to landowners was practically zero. There was a belief that it was too hard to establish. The NRCS has been key in changing that perception. (Seed Sector)

One of the challenges we have as seed growers is to find the acres to grow grass. It doesn't matter what species it is. It's very hard to make a business argument for farmers to switch to growing seeds that may not be in demand that year. (Seed Sector)

Biosecurity: Risks and Management Tools

Wildlife Diseases and Pathogens

80% of the diseases we're dealing with have a wildlife component. That's an elephant in the room that we need to address. (Federal Researcher)

I thought it was interesting that in Governor Mead's opening remarks that three of the five invasive risks he mentioned were diseases that affect our livestock and wildlife species. (State Agency)

There is a lot of misunderstanding about Chronic Wasting Disease. It is caused by an abnormally folded protein. It is not a bacteria or a virus. It only affects deer, moose, and elk in North America. (State Agency)

Chronic Wasting Disease (CWD) poses a growing threat to our deer and elk populations in Wyoming. It is moving from southeast WY up towards Yellowstone, which has a very large ungulate population, so that is very concerning. (State Agency)

These diseases are functionally similar to invasive plants and animals. They are inadvertently introduced species that were not part of the native ecosystem, and they have collateral impacts and are pretty intractable. (State Agency)

I want to point out the link between wildlife disease and invasive species. Invasive species themselves can play a role in spreading wildlife disease. The Asian tiger mosquito, for example, serves as a non-native disease vector. (Federal Agency)

We need to develop early detection tools through advanced technology. This will help with our rapid disease response options. New molecular tools have the ability to predict disease outbreaks in certain ecosystems before they happen. (Federal Agency)

I will talk about CWD, which is now present in 26 states. It's a huge concern to anyone with an interest in wildlife conservation. It can have serious effects on deer, elk and moose populations. These species are important to culture and economy of MT. (State Agency)

We're lucky that we had a good place to start from to react to CWD. MT has long had a harvest emphasis, particularly with bucks, which are more likely to be infected and spread the disease. The management of Montana wildlife over decades put us in a good place to deal with the disease. In 1999, a ballot initiative banned additional game farms. (State Agency)

MT is surrounded on three sides with states with CWD, so we knew it was coming. We put plans together to look for it and then how to deal with it when found. The plan was put together by the Dept. Fish and Wildlife staff and a 12-member citizen panel. An advisory committee came from across the state and looked for expertise on spread of disease. Both of those committees put the plan together. (State Agency)

We were able to put the plan into action the day the first disease designation was recognized. The plan was put into place in conjunction with the state's livestock industry and sportsmen groups. (State Agency)

This is a story of an unlikely partnership between federal agencies and recreational cavers. White Nose Syndrome is the crisis that brought these parties together. (Recreational Sector)

In state statute, there are transportation restrictions on what can be taken from one state to another. You often can't take contaminated body parts, like the brain, across state lines. (State Agency)

In MT, we also have restrictions within the state. from CDW-infected zones to non-contaminated areas within the state. We also have restrictions on landfills where infected parts can be disposed of. (State Agency)

Our biggest concern is transport of disease. Other impacts are important, but this might be most compelling from Governors' perspectives. (Academic Sector)

On the regulatory side of the fungus response, we established quarantine processes for products coming of the Ohia forests. We have stopped the fungus from coming of the forest, so we know the regulations are helping. (State Agency)

African swine fever is a huge concern. If it gets to Canada, it would impact the domestic hog industry significantly. (Academic Sector)

In 2010, Ohia trees started dying on the Big Island. In 2013, we conducted surveys. By 2014, we had the pathogen isolated. USDA then confirmed this was the basis for deaths and also found an additional related pathogen. (State Agency)

With Rapid Ohia Death, it is a wound pathogen. It gets in through wounds in trees. If you can control the wounding of trees, can help build resilience of forest. Fences don't stop movement of spores, but it does get to the wounding of trees by feral animals. (Federal Agency)

Ohia lives in various ecological niches and has a wealth of variation in its gene pool. This gives us hope for the development of natural resistance to the disease. (Federal Agency)

Coffee leaf rust has been through South America. If it comes to HI, it would kill the industry. (Agricultural Sector)

In the early 2000s, the semi-slug first appeared on the islands of HI. Now, many visitors and residents of Hawaii have succumbed to 'Rat Lungworm' disease, unaware of the risks posed by the slug. (Conservation District)

A snail trail on a leaf of lettuce is enough to have it removed from store shelves. Our farmers have suffered severe losses on cilantro, kale, lettuces, and other leafy vegetables because of the fear of these organisms on their crops. (Conservation District)

Ohi'a, one of Hawaii's most important trees, is a host for the pathogen known as Ohi'a rust. The tree makes up most of Hawaii's remaining native forests and is the backbone of Hawaiian ecosystems. Ohi'a houses much of the remaining biodiversity in Hawaii as well as covers the watersheds that provide people in Hawaii with their drinking water and water for agriculture. (State Agency)

Communication

Public Awareness and Engagement

The lack of public knowledge about invasive species impacts needs to be addressed. We need to create a robust, regional public education program. (Conservation Sector)

Without public support from the community, the task would be impossible. When we launched boat inspection, we went to the boating community and made the argument that we're all in it together: commercial fishermen, paddleboarders, etc. Public support helps us work through kinks in making the program work efficiently. The public also helps communicate support for funding. (State Agency)

It's great that WGA is elevating awareness about invasive species. Building awareness at all levels is needed and crucial. (State Agency)

It's easier to engage the public near Tahoe because we have common ground and one focus (the lake). Finding what people care about and focusing on that is a way to build interest. (State Agency)

You can't start from the perspective that all is hopeless. In fact, all management is helpful. Even a little help in a certain spot can make a big difference. Frame invasive species challenges as important and not insurmountable when engaging with the public. (Federal Agency)

With lots of invasive species, it is tough to figure out how to focus on what is relevant to particular audiences. (State Agency)

You need to know the terminology and figure out how to communicate it clearly. A lot of terminology is difficult to communicate across boundaries (land managers, policymakers and public.) (Academic Sector)

You need to be open to public discussion and sensitive to individuals who have to manage invasive species on their lands. You can't just focus on impacts of invasive species. (Academic Sector)

A difficulty in invasive species communications is that suppression is the reality. Invasive species communication needs to cycle through education and crisis management. (Federal Agency)

We've never moth-balled any communications plans. We need to implement communication plans within our partnerships and then to the public. You need to get a plan in place for notification of an invasive species occurrence. (Federal Agency)

Communications need to be clear and concise. When looking at issues like these, there are no real boundaries. You need messages to be understandable and communicate why the work and protocols are important. (State Agency)

We are good at fighting fire and have to work together to share money, knowledge and people. The messaging, though, is not always aligned, which leaves the public confused about the goal and what is at stake. (State Agency)

Some of these issues are very technical. It is hard to figure out how to make information understandable and sexy. (State Agency)

You need to make sure that within agencies there is a clear path of communications up and down the chain and then out to the public. (State Agency)

You also need to make sure that partnerships and their communications path are in place ahead of crisis. (State Agency)

It's critical to share data among agencies and partners and then make that available in an understandable form to the public. (State Agency)

Communicate the bar for success to the public and that eradication of invasive species often isn't possible. Where containment of the species is the goal, communicate that clearly. (State Agency)

It can be hard to make sure messaging is clear and information back is clear. A crisis often occurs because of communications breakdowns. We have really worked on this communication loop. Some science doesn't get communicated because the scientists don't know how fits into the larger picture. (State Agency)

There are opportunities to bring people together when there's a personal connection. You have to really listen to stakeholders. (State Agency)

There's generally still a lot of work to do with engaging urban populations. Lots of invasive species control groups are agricultural in nature, so they are not really engaged in urban environment. We're trying to engage urban farmers and get them to recognize noxious weeds as a challenge. We also work with counties on that front. (State Agency)

You can't engage the public with "we have a problem." You have to come with a solution as well. (Conservation Sector)

Education is huge. You have to explain why doing the actions doing. Effective communication consistently presented is a huge asset. (Sub-regional Planning Entity)

Communications is so important at all levels. Aquatic invasive species coordinators in all the states are so helpful. Communicating with the public is a key priority for the State of Nevada. Our teams went through training on how to engage with the public on our actions. (State Agency)

Prior to this beetle, the population in Guam didn't pay attention to invasive species, including brown tree snakes. We're using the coconut rhinoceros beetle as poster child for invasive species. (Academic Sector)

Public communications is usually about successes. It's important to trust each other and say what didn't work and figure out why. (Conservation Sector)

MT and USFS invited the Rocky Mountain Grotto and other cavers to a meeting. It could have been hostile but turned into a positive working relationship. Cavers started inviting biologists caving and biologists invited cavers to help with bat surveys. (Recreational Sector)

At a recent major cavers' convention, the Grotto put together a lot of clean gear for folks to use in the Montana caves while there. The next challenge is to get to cavers not involved with Grottos. It will lead to better education, but also probably put gates on more caves to control the spread of White Nose Syndrome. (Recreational Sector)

Localized teams know local champions and decisionmakers and who to engage with to be effective. We have developed education efforts targeting specific irrigation and watershed groups and come up with response activities. We want education to apply to local areas. (State Agency)

We conducted a survey with Montana ranchers on four annual invasive grasses. Most weren't familiar with Ventenata and Medusahead. Most are using grazing and herbicides, but about 30% aren't managing grasses at all. (Privat Landowner)

I'm happy with the amount of interest land managers have taken on Ventenata and Medusahead. People are excited to deal with small patches early. Having watched OR: I can say that people are prepped and ready to respond. (Academic Sector)

The "Don't Move Firewood" campaign is just one example. We work to harmonize our messaging throughout the western region, which allows the public to hear it repeatedly. That helps people to internalize the message. (Conservation Sector)

Social science says you don't just have to say repeatedly. You have to meet people in their heart. You have to do real research on what motivates folks. If you don't get that right, your messaging won't work. (Academic Sector)

The key is that the community needs to be the stakeholders. Folks need to understand the impacts to their Island. Education efforts have to tie back to land and people's attachment to it. (Academic Sector)

Usually, if you tell producers in Hawaii why you have a regulation, they are willing to participate. (State Agency)

Fruit fly management was a big success. A key part of it was education of the public. The agriculture community couldn't have controlled it on its own. (Agricultural Sector)

Scientists have communication issue about what biocontrol methods are, how they operate, why they are safe and how it translates to the public good. The example of the mongoose is known by the public. It wants to embrace that example. That example didn't follow any of the safety controls done now. It was willfully done by a few individuals and didn't take into consideration all the steps that would have eliminated mongoose. (State Agency)

We do a good job of recognizing the threats, but we aren't good at communicating when talking about the larger landscape outside Tahoe Basin. It can be hard to get to consensus on the management approach. (Academic Sector)

I have sat in meetings where a single fish is seen, and scientists often will say, "it is just one fish and not evidence of a self-sustaining population, so we don't need a communications strategy." Yet, one fish sighting can inflame the public immediately. (Federal Agency)

So much of communications is listening to the public and then adjusting your messaging to meet that. (Federal Agency)

In the lamprey example was a suppression strategy. It was important that streams got treated during the right season. Suppression activities sometimes result in fish kill, and when the fish are sport fish, it inflames the public. The public didn't understand the inconvenience versus the long-term impact of failing to manage. This disconnect can anger scientists. (Federal Agency)

We need to articulate the need for funding in a way the public can understand. We need to convince legislators and constituents by deploying the human dimension. (Conservation Sector)

There will always be limited resource scenarios when it comes to invasive species management. We have a hard time demonstrating what we have accomplished and what is at stake. The economics of "what if" can be hard to justify. If we can find specific wins and tell the story well, it can lead to support and more funding. (State Agency)

The Pacific Northwest Economic Regions (PNWER) had a meeting in July, and they had a separate forum that was specific to northern pike. The room was packed, and it's clearly an issue that people are really taking notice of. (Power & Conservation Council)

We need to make sure anglers are educated on the issue, so that when they are out on the water and they see northern pike, they can help remove them. (Power & Conservation Council)
Educating the public is a big component [of management], not just about northern pike, but about invasive species in general. (State Agency)

Conservation districts can play a valuable role in educating the community about the risks along with management of invasive species. (Conservation District)

Social media is a very powerful tool. We have to remember that fear is a very powerful motivator. If you let fear gain control, reason goes out the door. In our case with the rat lungworm, our solution would have been to manage the rats and slugs. But when social media became involved, the solution became 'stop eating leafy greens.' Social media can become a tool for miscommunication. (Conservation District)

We try to get as much community and public involvement as possible in our projects. Education is a critical component in any of our projects. (U.S. Territory)

We kept the public updated on the methods we were going to use and kept them informed during the whole roll out. We didn't hear any public outcry about the process at all. (U.S. Territory)

Science to Policy Exchange

We need to understand the pressures of time. Scientists are in a bubble trying to understand impacts but may not understand policy timelines. On the other side, scientists want to publish their science. There's an important communication link for both sides to understand others' needs. (Academic Sector)

We need to highlight knowledge gaps. There are always knowledge gaps in science. We need to make sure policymakers and the public know that all information is not final and change will be necessary over time. (Academic Sector)

We have a system of scientists and others within our cooperative extension. Their job is to do public communication with homeowners, gardeners, nurseries, arborists and the press. (Academic Sector)

Our communications system is designed to go from basic research, to developing scientific applications and then communicate those strategies effectively. (Academic Sector)

The gap begins immediately out the door from school for scientists. It used to be viewed on case-by-case basis with siloed science on species and communications on that one threat. Scientists are now starting to think at more landscape level, which is much more forward looking. In the Western U.S., there are only a couple of dozen scientists working on invasive species science. We need to bring scientists into control centers for land managers to help discuss what the emerging threats are. This will engage more scientists and give better information to land managers and policymakers. (Academic Sector)

We need to teach scientists how to get beyond the science and use fact sheets and get them distributed to the audiences. Workshops can also be very helpful. We also need to learn what to let go. Some species you just have to let go and move on. That has to be understood, believed and communicated. (Academic Sector)

In CA, we needed to move the message up to policymakers to get a response mechanism. Staff then initiated the bills based on the information they received. The bills went through legislature smoothly because communications and awareness got to the policy level. The Invasive Species Council is now a permanent, funded mechanism. The Council is in a good place to react to new challenges. (Academic Sector)

I want policymakers to appreciate the amount of solidarity among scientists about various management tools. We have quite a bit of consensus. (Conservation Sector)

There's a strong scientific foundation to underly invasive species management. We have to marshal the best scientists and capture their thoughts on how to handle various challenges. (Federal Agency)

Science helps make a credible argument for funding. Our State legislature has provided funding the last three years, which was also supported by federal agencies and non-government entities. (State Agency)

The big thing we learned during detections was the need for constant communications. Dialogue between researchers and managers must be clear and continuous. (Federal Agency)

There's a relation between academic research and applied work. They feed each other. If we don't build this relationship, we'll never get ahead. (State Researcher)

Our science team meets regularly with the management team. The science is on the ground helping set up monitoring with the management team. Everybody understands the goal is to stop the spread, not to publish research. That has helped with the collaboration. (State Agency)

It has nothing to do with getting something peer reviewed, it is about getting results as quickly as possible. Short-term solutions of what can do now is bigger than long-term solutions and fine-tuning everything. Little red fire ants are different than Rapid Ohia Death. Ants behave differently in dry beach parks versus jungles. It takes different tools to manage. (State Researcher)

Whenever someone submits concern about invasive plants in Oregon, it goes through a risk assessment to make a determination of whether the plant gets listed in the state. (State Agency)

There's been a lot of research already documenting the impact invasive pike have on certain systems, and you don't want to wait for those impacts to already be occurring before declaring an emergency. (State Agency)

We are working on a basin-wide flowering rush management plan. In order to make a management plan, we have to know what we have and where it is. The idea is to use the plan to seek implementation funding. That is why the data and modeling is so important when you go to develop these plans. (State Agency)