Effective and Efficient Invasive Species Management; Courage and Commitment

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Chairman Barrasso, Ranking Member Wyden, and Honorable Members, my name is Dr. George Beck. I am a professor of weed science at Colorado State University where I have worked on the management of invasive weed species for over 30 years. Today I represent the Healthy Habitats Coalition, a 501(c)3 entity, which is a diverse coalition of state and county land managers, conservation organizations, private companies, industry and academics such as myself. We have focused on improving invasive species management in our country since a nine state invasive weed summit in 2008.

Invasive species is an insidious issue. These harmful organisms cause numerous detrimental environmental effects and cost Americans over $120 billion annually (Pimentel et al., 2005). Damage worldwide caused by invasive species is valued at $1.4 trillion each year, about 5% of the global economy (Pimentel et al., 2001). The interactions of invasive and imperiled species are of particular concern because invasive species populations expand exponentially and disrupt evolved ecological relationships. For example, cheatgrass (*Bromus tectorum*) and other invasive annual grasses that are native to the Mediterranean region and Asia have invaded the western U.S. and dramatically altered ecosystems. Cheatgrass increases fuel loads on invaded rangeland, which in turn alters wildfire characteristics such as frequency and intensity. These effects are especially damaging when disturbance regimes exceed the variation to which native communities are adapted thus causing plant and animal community changes and ecosystem-level transformations. Such alterations are the hallmarks of invasive species and why they are considered insidious and must be managed.

Cheatgrass' propensity to alter fire regimes poses a major threat to sage-grouse habitat in the western U.S (Crawford et al, 2004). Cheatgrass fueled fires destroys sage-grouse habitat and impacts the survivability of sage-grouse broods (Rhodes et al, 2010) and the link between cheatgrass and other annual grasses and decline of sage-grouse habitat is very clear. As an example, Colorado State University researchers recently completed a comprehensive study to recover cheatgrass infested rangeland for wildlife habitat (Beck 2014; Appendix Tables 1-3). We possess the knowledge and ability to recover these infested areas for sage-grouse habitats if we take the initiative. We also are evaluating a new herbicide, Esplanade, that will allow us to target and eliminate the soil seed reserve of invasive annual grasses, which will provide the greatest opportunity to recover native habitat (Sebastian et al, *in press*)

## The Invasive Species Conundrum

The U.S. is vexed with numerous invasive species – Asian carp and zebra mussels in the Great Lakes, cheatgrass, knapweeds and tamarisk in the west, Burmese pythons, melaleuca, and hydrilla in Florida, Emerald ash borers in the Northeast and Midwest … the list is daunting and

continuously getting worse. Invasive species occur in every state and are transported or move across all borders. We must take immediate action to avoid their draconian and magnificent ecological and economic impacts.

The chronic poor performance by Federal land management agencies with regard to managing invasive species prompted the formation of the Healthy Habitats Coalition to develop a national solution for the harm caused by invasive species in our country. Four GAO or OIG reports clearly indict the poor Federal land management performance for invasive species. Federal lands are breeding grounds for invasive species because of inconsistencies for invasive species budgeting; lack of collaboration, on the ground effort, and prioritization with states and local governments; using NEPA as an excuse for inaction or as justification to postpone making management decisions in a timely manner; a general failure to grasp the magnitude of the invasive species problem; and poor Administrative leadership around developing appropriate invasive species public policy, management and budgetary action.

Invasive species lack the biological and ecological relationships that regulate the populations of native species such that the latter rarely are problematic natural resource issues. Personnel in Federal agencies are polarized about managing invasive species, which creates the conundrum where a portion of the workforce is committed to solving this problem while a seemingly much larger portion believes it to be a waste of time, which is ludicrous given the tremendous economic and severe natural resource impacts that these species cause in our country annually! An example of this poor attitude was captured by the Hawai'i Free Press on June 19, 2015 when Ken Werner, PPQ, APHIS Pacific States and Territories was quoted "the truth is, we just don't care that much about invasive species." This attitude is totally unacceptable given the annual $120 billion price tag that American taxpayers absorb much less the $1.4 trillion international problem that equates to 5% of the global economy!

Federal leadership – When President Clinton penned Executive Order 13112 that created the National Invasive Species Council and raised the level of responsible leadership to the Cabinet Secretaries, most people in the invasive species community lauded the effort and thought we would finally resolve the invasive species problem because politically, it was placed at a very high level within the Federal government. We were wrong! All that was accomplished was the politicizing of a biological problem, and even that was insufficient and ineffective. It created opportunity to feign that real accomplishments were being made because meetings were continually held to celebrate meager success at best but no meaningful progress occurred. The Invasive Species Advisory Committee, which continues to meet to this very day, helped develop several national invasive species management plans that were never implemented and made numerous recommendations to Federal agencies that seemingly were always ignored.

The Department of Interior recently charged the National Invasive Species Council with the leadership to implement a national early detection and rapid response program. The concept is where a new invasive species problem that threatens the U.S. is quickly identified and rapidly eradicated from the U.S. location(s). This requires a significant amount of expertise and the courage to use the most appropriate tools to effect eradication and this could be problematic for

NISC and their staff as to my knowledge, they do not possess such expertise and their leadership capacity would then be very much in question. Additionally, NISC staff are not authorized to make decisions and direct Federal Land Management agencies to invoke any chore, much less EDRR – this has been a constant problem for agency personnel that interact with NISC. Demands by NISC staff for their projects to be implemented and completed cause agencies to be overloaded and delay progress and completion of invasive species projects already underway. Furthermore, states will not be in favor of a national EDRR program because of the propensity for most agencies to postpone decisions and a general distrust of the National Invasive Species Council and their staff. The first attempt at developing a national EDRR program was during a 3-day meeting in 2000 in Fort Collins, CO but no consensus was reached other than the federal government should not be in charge of such a program and the overwhelming majority of those in attendance were from Federal agencies!!

I served on ISAC for 6 years (from 2002 through 2008) and we even wrote and published a scientific paper carefully outlining what constitutes an invasive species and perhaps more importantly what does not constitute an invasive species. To my knowledge, this paper has not been used by Federal agencies in spite of them being the primary audience for that work conducted on their behalf by a Federal advisory committee. This wasteful use of limited funds continues to this day but NISC has done little if anything about coordinating and fostering cooperative efforts among agencies, states, and local governments as was initially thought with regard to invasive species management. NISC should be dissolved and the funds used to operate that body instead should be spent to decrease the population abundance of invasive species and recover native species habitat!

In previous hearings, the Healthy Habitats Coalition outlined the terrestrial weed problem. Using data collected from Federal land management agencies in 2009 – both acres currently infested at that time and the number of acres treated for weed control – we predicted the acres infested with invasive weeds would double in 2017 (Figures 1 and 2). In 2015, the BLM, reported more than a doubling of the 35 million acres reported in 2009 to over 77 million infested acres in 2015 … 2 years earlier than HHC predicted!

The inaction by Federal agencies is fueled by inconsistent NEPA compliance - the variable interpretation of NEPA by each agency creates a redundant and inefficient waste of public money. Categorical exclusions in S.2240/H.R.1485 will resolve this dilemma by creating a framework of measurable and tactical methods.

# Fig 1. Example: Federal Weed Issue in 2009

| AGENCY (Big 6) | Infested Acres | Treated & restored acres | Percent T&R | New Acres Annually ** | Total Net Infested Acres |
|---|---|---|---|---|---|
| BLM | 35,000,000 | 375,000 | 1.1% | 4,155,000 | 38,780,555 |
| USFS | 7,000,000 | 390,000 | 5.6% | 793,200 | 7,403,200 |
| NPS | 2,600,000 | 66,000 | 2.5% | 304,080 | 2,838,080 |
| DOD* | 2,500,000 | 200,000 | 8% | 276,000 | 2,576,000 |
| APHIS | 81,709 | 27,805 | 34% | 6,469 | 60,372 |
| FWS | 2,300,000 | 345,000 | 15% | 234,600 | 2,189,600 |
| Others | Not available | 200,000 | Not available | Not available | - |
| Totals | 49,481,709 | 1,603,805 | 3.2% | 5,769,349 | 53,847,807 |

FY09 data provided by Federal Agencies
* DOD estimated
* Annual average weed spread rate is 12%.



# Fig 2. HHC Projected the Infested Acres in 2009

**Millions of Federal Acres**

| Year | Elapsed Years | Beginning Infested Acres | Acres Treated & Restored (3.2% of Begin) | Infested Acres After Treatment | 12% Annual increase | Year End Infested Acres |
|---|---|---|---|---|---|---|
| 2009 | 1 | 49.48 | - 1.60 | = 47.88 | + 5.75 | = 53.63 |
| 2010 | 2 | 53.63 | - 1.74 | = 51.89 | + 6.23 | = 58.12 |
| 2011 | 3 | 58.12 | - 1.89 | = 56.23 | + 6.75 | = 62.98 |
| 2012 | 4 | 62.98 | - 2.04 | = 60.94 | + 7.31 | = 68.25 |
| 2013 | 5 | 68.25 | - 2.21 | = 66.04 | + 7.92 | = 73.96 |
| 2014 | 6 | 73.96 | - 2.40 | = 71.56 | + 8.59 | = 80.15 |
| 2015 | 7 | 80.15 | - 2.60 | = 77.55 | + 9.31 | = 86.86 |
| 2016 | 8 | 86.86 | - 2.81 | = 84.05 | + 10.09 | = 94.14 |
| 2017 | 9 | 94.14 | - 3.05 | = 91.09 | + 10.93 | = 102.02 |
| 2018 | 10 | 102.02 | - 3.31 | = 98.71 | + 11.85 | = 110.56 |

HHC projected a 61.1 million acre increase (doubling) by 2017

# The Invasive Species Solution:

The invasive species problem in America requires a legislative repair and that solution has been outlined by Congress; S.2240 – the Federal Lands Invasive Species Control, Prevention, and Management Act was introduced in 2015 as well as a companion bill in the House, H.R.1485 . The bills focus attention on four Federal land management agencies; the Forest Service, Bureau of Land Management, Fish and Wildlife Service, and National Park Service. Categorical exclusions are a key component of the bills and not only will that help defend affected high value sites and fully support and facilitate Early Detection and Rapid Response efforts, it will end the years and years of analysis to approve use of new management tools that Federal land managers desperately need to be effective and efficient.

S.2240 and H.R.1485 also foster cooperative agreements between Federal agencies, state and local governments, and private entities to manage invasive species collaboratively. The priorities for these cooperative agreements will be determined by state Governors working with federal agencies and will engage all affected parties collectively using appropriate expertise and thus reducing redundancy and capacity barriers..

As an example S.2240 and H.R.1485 require that terrestrial weed management efforts deplete invasive species populations by a net of 5% annually, which in the case for invasive weeds means at least 15% of existing infestations must be decreased annually to stay ahead of the invasive weed expansion rates (Figures 3 and 4). This 5% annual reduction will allow us to successfully manage invasive weed problems as opposed to simply wasting funds. Biologically acceptable net decreases for other invasive taxa will have to be determined and passage of S.2240/H.R.1485 will foster acquisition of that knowledge by creating and using a required strategic plan.

**Fig 3. 2009 Solution: Treat & Restore 15% Annually**

**Millions of Federal Acres (HHC 2009 Estimate)**

| Year | Elapsed Years | Beginning Infested Acres | Acres Treated & Restored (15% of Begin) | Infested Acres after treatment | 12% Annual increase | Year End Infested Acres |
|---|---|---|---|---|---|---|
| 2009 | 1 | 49.48 | - 7.42 | = 42.06 | + 5.1 | = 47.16 |
| 2010 | 2 | 47.16 | - 7.07 | = 40.09 | + 4.81 | = 44.90 |
| 2011 | 3 | 44.90 | - 6.73 | = 38.17 | + 4.57 | = 42.74 |
| 2012 | 4 | 42.74 | - 6.40 | = 36.34 | + 4.35 | = 40.69 |
| 2013 | 5 | 40.69 | - 6.10 | = 34.59 | + 4.15 | = 38.74 |
| 2014 | 6 | 38.74 | - 5.80 | = 32.94 | + 3.95 | = 36.89 |
| 2015 | 7 | 36.89 | - 5.53 | = 31.36 | + 3.76 | = 35.12 |
| 2016 | 8 | 35.12 | - 5.26 | = 29.86 | + 3.58 | = 33.44 |
| 2017 | 9 | 33.44 | - 5.01 | = 28.42 | + 3.41 | = 31.83 |
| 2018 | 10 | 31.83 | - 4.77 | = 27.06 | + 3.25 | = 30.30 |

*19.2 million acre decrease over 10 years (39%)*

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**Fig 4. 2016 Solution: Treat & Restore 15% Annually**

**Millions of Federal Acres (HHC 2015 Estimate)**

| Year | Elapsed Years | Beginning Infested Acres | Acres Treated & Restored (15% of Begin) | Infested Acres after treatment | 12% Annual increase | Year End Infested Acres |
|---|---|---|---|---|---|---|
| 2016 | 1 | 100.0 | - 15.0 | = 85.0 | + 10.2 | = 95.2 |
| 2017 | 2 | 95.2 | - 14.2 | = 81.00 | + 9.7 | = 90.7 |
| 2018 | 3 | 90.7 | - 13.6 | = 77.1 | + 9.2 | = 86.3 |
| 2019 | 4 | 86.3 | - 12.9 | = 73.4 | + 8.8 | = 82.2 |
| 2020 | 5 | 82.2 | - 12.3 | = 69.9 | + 8.4 | = 78.3 |
| 2021 | 6 | 78.3 | - 11.7 | = 66.6 | + 8.0 | = 74.6 |
| 2022 | 7 | 74.6 | - 11.2 | = 63.4 | + 7.6 | = 71.0 |
| 2023 | 8 | 71.0 | - 10.6 | = 60.4 | +7.2 | = 67.6 |
| 2024 | 9 | 67.6 | - 10.1 | = 57.5 | + 6.9 | = 64.4 |
| 2025 | 10 | 64.4 | - 9.7 | = 54.7 | + 6.6 | = 61.3 |

*33.9 million acre decrease over 10 years (36%)*

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The bills also improve the efficient use of federally derived public monies by requiring affected Federal agencies to spend at least 75% of their invasive species funds on-the-ground to directly manage the problem while capping awareness and research at 15% of those funds and holding administrative costs to 10% or less. The efficiency and effectiveness of federal expenditures to manage invasive species will be dramatically improved and we know this can occur because of an outstanding model program recently invoked in the southwestern U.S. – Restore New Mexico – where thousands of acres have been recovered from invasive species and other expanding problems. S.2240 and H.R.1485 also will hold Federal agencies accountable for their invasive species efforts and overcome weaknesses and negative attributes identified in GAO and OIG reports.

It is up to Congress to seize control and pass a badly needed legislative repair for the invasive species issue. Simply put, we must create a paradigm shift for invasive species management with an authorization and appropriation generated from required budgets that flow from a strategic plan.

The constant procrastination we have observed for the past 30 years creates the perfect environment for invasive species success. A significant problem exists within most Federal agencies where some land management personnel simply do not care to manage invasive species regardless that such is required by law. We must stop kicking the invasive species management

can down the road. S.2240 and H.R.1485 represent the necessary staging action that will begin to resolve our nation's invasive species problems!!

## Literature Cited


Beck, K. George. 2014. Invasive species: Herbicides can facilitate a positive outcome for invasive species and endangered species interactions. Outlooks on Pest Management 25(5): 316-319.

Crawford, John A., Rich A. Olson, Neil E. West, Jeffrey C. Mosley, Michael A. Schroeder, Tom D. Whitson, Richard F. Miller, Michael A. Gregg, and Chad S. Boyd. 2004. Ecology and management of sage-grouse and sage-grouse habitat. J. Range Manage. 57:2-19.

Pimentel, D., S. McNair, J. Janecka, J. Wightman, C. Simmonds, C. O'Connell, E. Wong, L. Russel, J. Zern, T. Aquino, and T. Tsomondo. 2001. Economic and environmental threats of alien plant, animal, and microbe invasions. Agr. Ecosyst. Environ. 84:1-20.

Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecol. Econ. 52:272-288.

Rhodes, Edward C., Jonathan D. Bates, Robert N. Sharp, and Kirk W. Davies. Fire effects on cover and dietary resources of sage-grouse habitat. J. Wildlife Management 74(4): 755-764.

Sebastian, D.J., J.R. Sebastian, S.J. Nissen, P. Westra, and K.G. Beck. A new herbicide for winter annual grass control on rangeland. Rangeland Ecology and Management, *in press*.


## Appendix

Table 1. Cheatgrass control and cover in 2011 and 2012 at Rulison[1].

| Treatment | Rate | Cheatgrass % Control 2011 | Cheatgrass % Cover 2011 | Cheatgrass % Control 2012 | Cheatgrass % cover 2012 |
|---|---|---|---|---|---|
| Non-treated | 0 | 0 d[1] | 75 a | 0 d | 87 a |
| Journey | 1 pt/A | 87 b | 14 c | 64 b | 36 b |
| Landmark | 1 oz/A | 100 a | 0 d | 83 a | 16 c |
| Matrix | 4 oz/A | 100 a | 0 d | 90 a | 9 cd |
| Plateau | 8 fl oz/A | 33 c | 66 b | 18 c | 83 a |
| Spike | 0.38 lb/A | 100 a | 0 d | 92 a | 6 d |

[1] Data subjected to analysis of variance and means followed by the same letter are not different ($P<0.05$).

Table 2. Herbicide by grass species interaction where frequency of seeded grass species in 2012 was dependent upon herbicide treatment used to control cheatgrass in 2010 at Rulison[1].

| | | Grass Species | | | | | |
|---|---|---|---|---|---|---|---|
| | | Bluebunch wheatgrass | Indian ricegrass | Sandberg bluegrass | Sand dropseed | Squirreltail | Western wheatgrass |
| Site | Herbicide | % Frequency/plot (100 ft$^2$; 4 x 10 ft rows) | | | | | |
| Rulison | Non-treated | 7 e-i | 1.8 k-q | 2.3 j-q | 1.1 n-s | 1.4 m-s | 0.2 s |
| | Journey | 44 a | 3 i-o | 8 e-h | 2.4 i-q | 19 bcd | 10 d-h |
| | Landmark | 31 abc | 5 g-k | 5 g-l | 8 e-h | 41 ab | 11 d-g |
| | Matrix | 41 ab | 1 o-s | 7 e-i | 0.6 qrs | 15 cde | 6 f-j |
| | Plateau | 4 h-m | 0.8 p-s | 1.2 n-s | 1.5 m-s | 1.1 n-s | 0.3 rs |
| | Spike | 13 def | 0.6 qrs | 1.6 l-r | 4 h-n | 9 d-h | 3 i-p |

[1] Data subjected to a general linear models mixed procedure producing means and standard errors; means followed by the same letter are not different (P<0.05). Means in red are statistically better than means in non-treated plots within a column.

Table 3. Herbicide by forb species by year of seeding interaction where forb species frequency in 2012 was dependent upon the herbicide used to control cheatgrass in 2010 and the year of seeding[1].

| | | | Forb Species | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Gooseberry leaf globemallow | Lobeleaf groundsel | Dusty penstemon | Lewis flax | Sulphur buckwheat | Low fleabane |
| Site | Yr Sd | Herbicide | Frequency/plot (100 ft$^2$; 4 x 10 ft rows) | | | | | |
| Rulison | 2010 | Control | 0 k | 1.7 f-k | 0 k | 1.7 f-k | 0 k | 0 k |
| | 2011 | | 7 b-e | 5 c-g | 7 b-f | 4 c-h | 0 k | 0 k |
| | 2010 | Journey | 0 k | 7 b-e | 0 k | 26 a | 0 k | 2 e-j |
| | 2011 | | 0 k | 30 a | 0.1 jk | 10 a-d | 0 k | 0 k |
| | 2010 | Landmark | 0 k | 5 c-g | 0 k | 0 k | 0 k | 13 abc |
| | 2011 | | 0.4 jk | 0.7 ijk | 0 k | 1 h-k | 0 k | 0 k |
| | 2010 | Matrix | 0 k | 6 b-f | 0 k | 0 k | 0 k | 0 k |
| | 2011 | | 0 k | 1.4 g-k | 8 bcd | 17 ab | 0 k | 0 k |
| | 2010 | Plateau | 0 k | 6 b-f | 0 k | 4 c-h | 0 k | 0 k |
| | 2011 | | 19 ab | 0.6 ijk | 1.3 g-k | 1.8 e-k | 0 k | 0 k |
| | 2010 | Spike | 0 k | 0 k | 0 k | 0 k | 0 k | 0 k |
| | 2011 | | 0 k | 0 k | 0 k | 3 d-i | 0 k | 0 k |

[1] Data subjected to a general linear models mixed procedure producing means and standard errors; means followed by the same letter are not different ($P<0.05$). Means in red are statistically better than at least one of the non-treated means within a column.