

Arizona's Invasive Species

- unwanted plants and animals

A Report to the Governor

June 30, 2006



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Arizona's
Invasive Species
Situation

unwanted plants and animals

*Developed by the Arizona Invasive Species Advisory Council
per Executive Order 2005-09*

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Executive Summary

On April 1, 2005 Governor Napolitano established the Arizona Invasive Species Advisory Council (AISAC) by Executive Order 2005-09 and charged it with developing a consensus vision for a coordinated, multi-stakeholder approach to invasive species issues in Arizona and to make recommendations on invasive species management for the State.

The AISAC's consensus definition of invasive species for Arizona is: A species that is (1) non-native to the ecosystem under consideration and, (2) whose introduction causes or is likely to cause economic or environmental harm, or harm to human health.

The AISAC recognized that this definition is open to broad interpretation and it is not intended to be a regulatory definition. It is intended to provide counsel and guidance to State agencies and subdivisions of the State, the public, and our partners. The AISAC recognized that not all non-native species are invasive and that some native species can behave in an invasive manner.

The AISAC identified ten principals representing the consensus vision:

- o There is an immediate need for Arizona to move forward with a comprehensive statewide invasive species management plan that involves all stakeholders.
- o The threats of invasive species to Arizona are real and growing. Without concerted action, costs associated with invasive species will escalate and subsequent damage may prove irreparable.
- o Arizona should be in the vanguard of states in developing and implementing invasive species plans.
- o The AISAC should continue as a permanent body to provide advice and leadership in management of invasive species in Arizona.
- o An Arizona Center for Invasive Species should be created to facilitate information sharing and gathering, education and support. There is a pervasive need for invasive species information management and research in Arizona.
- o Staff exists in state agencies that have the authority to manage invasive species, but these positions need increased resources and additional positions may be needed.
- o Species lists and uniform definitions are essential in developing a meaningful Arizona dialogue for understanding invasive species.
- o There is a need to develop inventory and monitoring protocols to track invasive species populations in Arizona and the effectiveness of our management actions.
- o There is a need for a statewide geo-referenced database of invasive species as a cornerstone for future invasive species management and research efforts.
- o Prevention, education, and informed decision-making related to invasive species are less costly than remediation.

Executive Summary

Seven detailed recommendations are offered to the Governor as a result of the AISAC's deliberations:

1. Adopt the recommended consensus definition of an invasive species for Arizona as an advisory, non-regulatory definition.
2. Make the Arizona Invasive Species Advisory Council a permanent advisory body to coordinate, advise and work with State agencies.
3. Establish an Arizona Center for Invasive Species as a data clearinghouse, technical information repository, outreach and education outlet, and home for invasive species database and mapping functions.
4. Provide outreach and education to multiple key audiences to raise awareness of invasive species.
5. Establish an Invasive Species Database and Mapping System that is cross-jurisdictional, interactive, leveraged with other systems, and is compatible and interoperable with other database systems.
6. Strengthen existing invasive species early detection and rapid response capacities of the State.
7. Develop and implement a comprehensive statewide invasive species management plan for Arizona based upon the framework recommended by the AISAC. The framework centers around five focal strategic concepts:
 - o Leadership and Coordination
 - o Research and Information Management
 - o Anticipation and Outreach
 - o Control and Management
 - o Funding



The Assignment

Governor Janet Napolitano established the Arizona Invasive Species Advisory Council (AISAC) on April 1, 2005 through Executive Order 2005-09. The Council was established under the joint leadership of the Arizona Game and Fish Department and Arizona Department of Agriculture to develop a consensus vision for a coordinated, multi-stakeholder approach to invasive species issues in Arizona. This Governor-appointed advisory council was tasked to develop recommendations on the coordination of private, local, tribal, state, and federal entities on invasive species management efforts and issues for the State of Arizona.

The following recommendations address the organization and steps necessary to position Arizona as a leader for invasive species management.

The Problem

Invasive species in Arizona are a serious and growing problem. This invasion is affecting our economy, environment, quality of life and health, and is changing the natural uniqueness and beauty of our State. Invasive species can expand their range into Arizona from neighboring areas. They can be intentionally or accidentally introduced. Invaders can have a devastating impact on native ecosystems, out-competing native plants for space, light, water and nutrients. These invasive organisms cause a variety of environmental and financial problems, including the loss of wildlife habitat, decreased agricultural productivity, degraded watershed health, decreased land values, increased fire danger, loss of biodiversity, impeded access to recreational lands, introduction of human and agricultural diseases, and degraded urban areas and right-of-ways. While some species might be deemed undesirable, invasive species are those that are not planned for and tend towards expansion and negative impacts. These are foreign species that have not evolved to coexist with Arizona's ecosystems and for which few or no natural predators or competitors exist. Additionally, they generate harm beyond their value.

What is an Invasive Species?

A species that is (1) non-native to the ecosystem under consideration and, (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. They include plants, insects, animals, algae, fungi, viruses, and other disease-causing microorganisms.

Russian Thistle, *Salsola tragus*

Russian thistle (a.k.a. tumbleweed) is primarily a weed in sites where the soil has been disturbed, such as along highways. It is also prevalent in vacant lots, other non-crop areas, in field and vegetable crops, and in poorly tended landscapes.



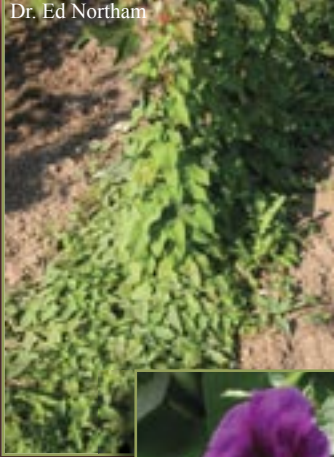
The Problem

Western states examples...

Agriculture

The annual cost of invasive species damage and control to agriculture and forestry in the United States is more than \$138 billion (Pimentel et al. 2005). Weeds can cause reductions in overall crop production, can compete with native forage plants, can be toxic to grazing animals, may produce thorns that are inedible, and can change natural area ecology. Pimentel et al. (2000) estimated losses to pasture forage at more than \$1

Dr. Ed Northam



Ornamental Morningglory Vines

Ipomoea purpurea

An example of the morningglory covering a field, which impacts harvest and crop development. This creates a significant cost to farmers.



Dr. Ed Northam

These vines have attractive flowers in home gardens, but when their seeds escape into cotton fields, non-native morningglory's produce tangled barriers that can hinder or prevent harvesting crops.

billion annually and cost to ranchers to control weeds in pastures at \$5 billion annually. The increase of invasive plants the western U.S. has led to declines in property values and reduced forage productivity for livestock.

There are few documented state-specific examples of costs agriculture. One example is Colorado, which estimated an annual economic impact of \$60 million (Colorado Department Agriculture 2001).

Biodiversity

The impact of invasive species on biodiversity is a major concern. These silent invaders constantly encroach into parks, preserves, wildlife refuges, and urban spaces. Interactions with non-native species are identified as threats to two-thirds of all federally listed threatened and endangered species (Wilcove et al. 2000). Non-native species are now considered by many experts to be the second most important threat to biodiversity, after habitat destruction (Randall 1996; Pimm and Gilpin 1989). Over the past decade, devastating impacts have been reported on every

continent except Antarctica. Invasive species can transform native ecosystems' structure and function (Richardson et al. 2001).



According to some ecologists, if biological invasions continue as they have over the past 100 or so years, ecosystems throughout the world will become homogenized and many native species will disappear altogether (Elton 1958). The long-term impact of homogenizing the Earth's biogeographical realms will be a devastating decline in biodiversity and ever-increasing threats to human food and fiber production. Habitat loss is the most important contributor to

endangerment of species federally listed as threatened or endangered. However, invasive species also contribute to the endangerment of species in Arizona that are federally listed as threatened or endangered. The effects of invasive species, including habitat degradation, competition, and predation, are identified as contributing factors to the endangerment of 20 types of fish, 4 amphibians, 1 bird, and 4 plants in Arizona (NatureServe 2006).

Biodiversity is the variety of life and its processes.

There is limited information for Arizona. According to the Office of Technology Assessment (1993), approximately 4,500 species of foreign origin have been introduced to the United States. A large portion of these have established free-living populations (Austin 1978). Currently, the Weed Science Society of America recognizes about 2,100 plant species as weeds in the United States and Canada. Approximately 1,365 of

Approximately 50,000 nonindigenous (non-native) species are estimated to have been introduced to the United States (Pimentel et al. 2000).

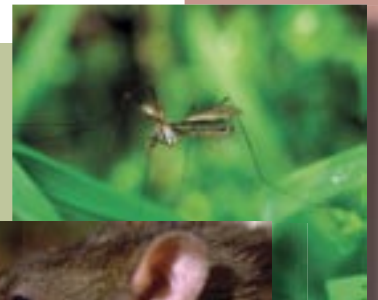
the weeds recognized by the Weed Science Society of America are of foreign origin.

Public Health

Non-native diseases have a great impact on human health and contribute substantially to health care costs. Introduced birds (e.g., pigeons from Eurasia), rodents (roof rat and Norway rat) and insects (such as mosquitoes, fleas, ticks, and lice) can serve as vectors and reservoirs of human diseases. Throughout recorded history, epidemics of human diseases such as malaria, yellow fever, typhus, and plague have been associated with these vectors (Elton 1958). A recent example of an introduced disease is the spread of the West Nile virus (via mosquitoes) across North America resulting in human deaths and in the deaths of many birds, mammals, and reptiles (Lanciotti et al. 1999). The full range of impacts of invasive species and their control goes beyond immediate effects and can have long-term public health implications. For instance, improper use of pesticides to treat a particular pest species could pollute soil and surface water.

Disease Vectors

Pest species, such as the non-native roof rat and mosquitoes, are vectors for a variety of exotic diseases and are public health threats in Arizona.



The Problem

Roads

Roadways and utility corridors are major pathways for the spread of invasive species. Roads built into and through wildlands are essential to carry people and goods, but vehicles using roads may accidentally carry invasive plants, seeds, and animals. Roadways also serve as corridors for dispersal of invasive plants through ‘natural’ expansion. In the western United States alone, 17 million acres have been taken over by invasive species mostly by “natural spread along roadways.” And, the

number of acres is growing. It is estimated that in the United States an additional 4,600 acres of public lands are taken over by noxious weeds every day (Dangerous Travelers, 2006).

The Arizona Department of Transportation (ADOT) budgets annually to control invasive plants along highways and those budgets are dependant on Legislative appropriation. Given the risk to our roadway infrastructure and the nature of roads as pathways for the expansion of invasive species, this expenditure may not be adequate to treat the invasive species problems in rights-of-way. This does not include costs associated with repairing highway damage caused by noxious weeds.

Camelthorn, *Alhagi maurorum*

Camelthorn root growth is so aggressive that it can penetrate several inches of asphalt and ruin the edges of highways.



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Tourism and Recreation

Invasive species impact recreational activities such as fishing, hunting, hiking, wildlife viewing, and water-based recreation. They negatively affect a wide array of environmental attributes that are important to support recreation, including but not limited to water quality and quantity, plant and animal diversity, and species abundance (Eiswerth 2005).

Aquatic invasive species such as hydrilla, Eurasian watermilfoil, golden algae, and giant salvinia can affect water-based recreation by impeding human access, interfering with the operation of boats and fishing lines, impairing water quality, and negatively altering aquatic ecosystems, including the abundance and diversity of fishes. For instance, hydrilla infestations have caused losses estimated at \$10 million in recreation revenues (Pimentel et al. 2005). Over the last three years, central Arizona has suffered marked losses of sport fishes from blooms of golden algae, a recent arrival in Arizona.

Unwanted and invasive aquatic animals can have significant effects upon the productivity of fisheries and the recreational and economic value of fishing to our State. The Arizona Game and Fish Department and Arizona

State University estimated that anglers contribute more than \$830 million annually to the State’s economy (Silberman 2003), a sector that could be very sensitive to introduction of aquatic invasive species such as zebra mussel, New Zealand mudsnail and whirling disease. Arizona has already inherited a population of mudsnails (Colorado River in Glen and Grand Canyons) and faces threats of unintended introductions of zebra mussel and whirling disease.



Hydrilla, *Hydrilla verticillata*

Hydrilla grows underwater, producing so much stem and leaf growth that it blocks sunlight to other aquatic plants, can clog water movement in irrigation canals and degrades habitat for fishes.

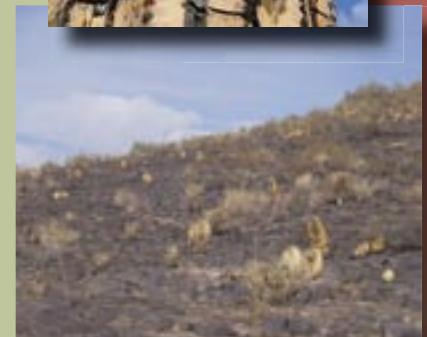
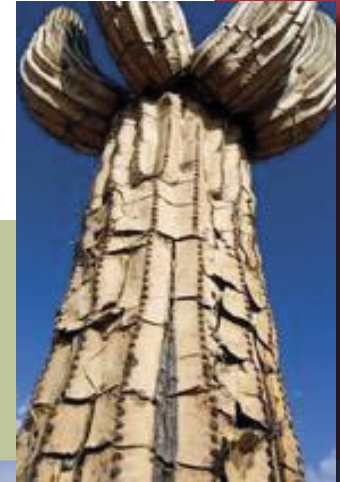
Wildland Fires

More fuel means more intense fire. The Cave Creek Complex Fire is a classic example of increased fuel load due to invasive plants in a desert habitat. These added fuels lead to a hotter, more intense fire among fire-sensitive trees, shrubs, and cacti. The occurrence of fire in ecosystems that evolved in the absence of fire often can lead to species loss and future restructuring of plant and animal interactions, favoring fire-adapted exotic species over natives (Hobbs and Huenneke 1992). Saguaro, prickly pear and cholla cactus, palo verde trees and countless other native plants are threatened with elimination by fire in parts of the desert.

Wildland fires can also create inviting habitat for a number of invasive species. For example, recent large wildfires severely burned areas in Arizona forests that are now invaded by weedy species such as Dalmatian toadflax, cheatgrass, and bull thistle. Dalmatian toadflax, an invader from the Mediterranean region, expanded in the San Francisco Peaks Wilderness Area following the 2001 Leroux Fire north of Flagstaff (Dodge 2004). Cheatgrass, one of the most invasive species in the Intermountain West, was common on severely burned areas of the 1996 Hochderffer Burn two years after the wildfire (Crawford et al. 2001) and is still common nine years later (Sabo 2006).

Wildland Fires

The damage to a desert ecosystem by fire will vary with its intensity and frequency; to what degree the ecosystem is restructured in the long-term will depend on the survival strategies of the plants that were killed and the ones that survived. While large cacti might survive a fire, smaller plants or younger individuals may suffer high mortality (McLaughlin & Bowers, 1982); some cacti may survive a burn, but be rendered vulnerable to attacks by herbivores or infection; thin-barked or juvenile trees may be killed, but herbaceous plants may be favored (Humphrey, 1974).



Dr. Carolyn Sieg



Rita Dodge

What are land managers to do?

Many of Arizona's forests have unnaturally high tree densities and increased fuel loads which make them prone to wildfires that can radically alter species composition. Unfortunately, many tools used to reduce the potential for fire spread can also enhance invasive species. Piling branches and small trees (called slash) can create scars that are readily invaded by bull thistle (Korb et al. 2004) and diffuse knapweed (Wolfson et al. 2004). But if slash is distributed under the trees and burned without piling then prescribed fires are more difficult to control. More trees can be damaged or killed and the resulting hot spots are attractive spots for future weeds.

Top - Close-up photo of Dalmatian toadflax (*Linaria dalmatica*).
Left - a large plant within the Leroux Fire burn area.

How Do They Come to Arizona?

Introductions occur in a variety of ways. Potential sources of unintentional introductions are agricultural seed, transported livestock, packing materials, commercial plants, heavy equipment, or hitchhikers on vehicles and boats. Leafy spurge and spotted knapweed are examples of accidentally introduced weeds.

Some introductions of new species are intentional and are related to the social demand for new or different species of plants and animals for recreation, landscaping, hobby purposes, education, and agriculture. Saltcedar and Dalmatian toadflax are examples of intentional introductions. Many intentional introductions have occurred when horticulturists or farmers imported plants from other countries to solve agricultural problems such as the need for rigorous and hardy pasture grasses (e.g. buffelgrass, reed canarygrass) or for use as ornamental plants (e.g. fountain grasses, Russian olive).



Hitchhiking a Ride

Recreational equipment, like boats, waders and hiking boots, can be the sources of accidental movement of plants and animals into and around Arizona.

Many of the fishes pursued by anglers in our state were intentionally introduced over the past century and provide significant value to the people and economy of our state. But careful risk-based decisions must be made about any new species introductions. New intentional introductions, and even introduced species that represent choices of the past, must be managed carefully because interactions with plants and animals outside of the area these additions were intended to serve can be negative.

What To Do

There is no simple answer. Arizona is a large, diverse state with habitats that range from alpine tundra to the Mojave Desert. The steps necessary to deal with the invasive species are complex and will require a coordinated Statewide approach.

The Arizona Invasive Species Advisory Council (AISAC) used the National Invasive Species Management Plan (Management Plan: Meeting the Invasive Species Challenge, National Invasive Species Council, January 18, 2001) as a model to develop the recommendations for this report. The AISAC divided into four working groups:

1. Leadership and Coordination
2. Control and Management
3. Research and Information Management
4. Anticipation and Outreach



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Saltcedar, *Tamarix spp.*

A native to Eurasia, saltcedar was introduced into the U.S. in the 1800's as an ornamental plant and was sold for wind breaks, to create shade, and for stabilizing eroding soils. Resulting problems associated with saltcedar in Arizona include competition with native trees for space and water, unnaturally high fuel densities and fire intensities, increases in channel roughness and associated changes in flood stage, and increases soil surface salinity (Wiesenborn 1996).

The AISAC identified several overriding principals.

The following items represent the consensus vision of the Arizona Invasive Species Advisory Council:

1. There is an immediate need for Arizona to move forward with a comprehensive statewide invasive management species plan. All stakeholders should be included in the discussion.
2. The threats of invasive species are real and growing. Arizona has already suffered environmental degradation and economic losses. In the absence of concerted action, the costs associated with invasive species will escalate and the subsequent damages may prove irreparable.
3. Other states are developing strategies to counter invasive species. By acting decisively to create an comprehensive statewide invasive species management plan and to implement those management strategies, Arizona can be in the forefront of this national effort.
4. The continuation of the AISAC will provide leadership and coordination of management efforts and create a uniform process for dealing with Arizona's invasive species.
5. The creation of an Arizona Center for Invasive Species, that allows for information sharing and gathering and could provide education support and resources, is critical for a consolidated effort to protect Arizona's, industries, and health.
6. Staff exists in agencies that have the authority to manage invasive species; however these positions need increased resources and additional positions may need to be created to address the issues.
7. Species lists and uniform definitions are essential in developing a meaningful dialogue for our understanding of invasive species.
8. There is a need to develop inventory and monitoring protocols to track the distribution, abundance, and changes in invasive species populations and the effectiveness of management actions.
9. There is a need for a statewide geo-referenced database of invasive species studies, occurrences, treatments, and additional relevant information where data can be shared and mapped. This database is the cornerstone of future management and research efforts in Arizona.
10. Prevention, education and informed decision making are less costly than remediation.

Giant salvinia, *Salvinia molesta*

Giant salvinia is a tropical floating water fern that was brought to North America as an aquarium and backyard pond species. However, when this pest is introduced into slow moving waters it quickly forms a thick mat that covers water surfaces and impedes water flow.



Recommendation 1 - Adopt an Invasive Species definition and advisory list process

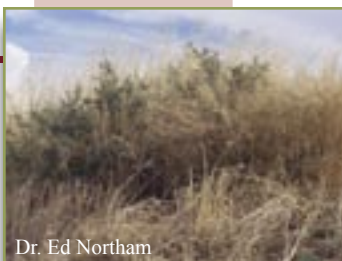
Issue

Arizona needs a consensus definition of an “Invasive Species”. Processes exist at the federal and state levels to identify species that may cause harm. For Arizona, these processes exist for both plants (Arizona Department of Agriculture) and for animals (Arizona Game and Fish Department), where the primary State regulatory authority resides. A cadre of plants, animals and pathogens are known to be invasive or deleterious pests and are listed as prohibited, restricted or regulated.

The lists of prohibited, restricted or regulated plants and animals are specific to the regulatory needs of the State. Because they are created with a specific intent in statute or by rule, they may not consider all aspects of risk to Arizona. As part of the rule making process, modification of the lists is often complex. The creation of prioritized advisory lists of invasive species, and the processes to modify them to keep them current, would assist State agencies as they move to update their State regulatory lists.

The following is a summary of existing lists:

- The Federal Noxious Weed List prohibits or restricts the import and interstate transport of specific plants.
- State noxious weed lists prohibit or restrict the weed content of planting seed and the import, possession, and use of specific plants in Arizona.
- The Federal Injurious Species List (authorized under the Federal Lacey Act) prohibits the importation of wildlife.
- State Restricted Live Wildlife rules regulate the import or possession of specific live animals (vertebrate wildlife, mollusks, and crustaceans) that meet the definition of wildlife. This listing is broad and the basis for the list is not solely invasiveness.



Dr. Ed Northam

Ladder Fuel

Non-native species coexist under native shrubs, small trees, cacti, and ocotillo in Arizona’s Sonoran desert scrub and interior chaparral plant communities. During May or early June, these plants become dry, non-native litter communities. When ignited, this litter serves as fuel for spreading wildfire from ground-levels upward into native plant canopies. This photo illustrates the fire hazard caused by Saharan mustard (*Brassica tournefortii*) and wild oat (*Avena fatua*) colonies under mesquite bushes.

Recommended Actions

The AISAC recommended definition of an invasive species for purposes of this report is:

“A species that is (1) non-native to the ecosystem under consideration and, (2) whose introduction causes or is likely to cause economic or environmental harm, or harm to human health”

- We recognize that not all non-native species are invasive.
- We recognize that some native species can behave in an invasive manner.

After much deliberation, the Council determined to focus on non-native species, which parallels the National Plan. The above definition is drawn from the National Invasive Species Advisory Committee Definitions Subcommittee in the Invasive Species Definition Clarification and Guidance white paper and Federal Executive Order 13112.

The AISAC recognizes that this definition is open to broad interpretation and is not intended by the AISAC to be a regulatory definition because of its breadth. It is intended to provide counsel and guidance to State agencies and subdivisions of the state, the public, and our partners.

There are identifiable gaps in protection using the lists of prohibited, restricted or regulated species. The AISAC recommends the development and maintenance of advisory lists for invasive plants, wildlife and pathogens.

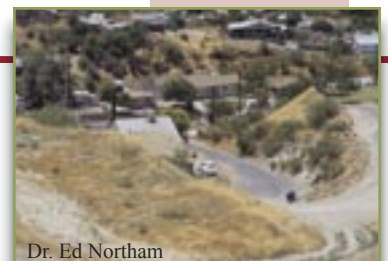
1. Develop a process for updating these lists over time.
2. Develop and regularly update an advisory list for wildlife to complement the Arizona Wildlands Invasive Plant Working Group’s list of plants (top 10). (No comparable list for animals exists other than the Arizona Game and Fish Department’s Restricted Live Wildlife List).

The AISAC adopted the current Arizona Wildlands Invasive Plant Working Group’s list of invasive, non-native plants that threaten wildlands in Arizona.

Dale Bosworth, Chief of the U.S. Forest Service, said invasive species are among the greatest threats to forests and rangeland. Invasive species claim over 133 million acres nationwide, swallowing 1.7 million acres a year.

Urban Fire Hazards

Bare soil in urban areas are prime colonizing sites for non-native plants. This photo shows Saharan mustard (*Brassica tournefortii*) and red brome (*Bromus reubens*) colonies in Globe, Arizona. Summer temperatures turn this vegetation into dense patches of flammable litter which is capable of carrying fire. Adjacent homes, businesses and human life can be destroyed when urban weed litter burns on a hot, windy, summer day.



Dr. Ed Northam

Recommendation 2 - Establish the Arizona Invasive Species Advisory Council as a Permanent Body

Issue

There is a need to enhance and facilitate communication within and among agencies and organizations involved in invasive species management. An infrastructure needs to be in place to enhance communication at local, state, regional, national and international levels.

Recommended Actions

Make permanent the Arizona Invasive Species Advisory Council. We recommend the Arizona Invasive Species Advisory Council (AISAC) be constructed with representation to mirror the Executive Order 2005-09 of April 2005 and include local entities. This advisory body should confer with other impacted entities and can assist in the coordination of invasive species issues.

Responsibilities should include:

1. Advise the State in the development of a comprehensive statewide invasive species plan.
2. Advise the State in the creation of the Arizona Center for Invasive Species.
3. Develop a process to prioritize and coordinate research on invasive species across the state.
4. Support education and outreach efforts, such as workshops and seminars.
5. Support evaluation and update of the invasive species lists, such as those created by the Wildland Invasive Plant Working Group (WIPWG) Project. Use comparable list for animals, including wildlife to be developed by the Arizona Game and Fish Department.
6. Review status and make recommendations to regulatory agencies on invasive species.
7. Encourage coordination among counties, municipalities, tribes, federal agencies, private entities and the State to implement polices for the control of invasive species.
8. Encourage coordination between the State and Weed Management Areas (WMA).
9. Invite ad hoc participation from other entities.
10. Advise the Arizona Center for Invasive Species (See Recommendation 3) in a detailed and systematic review of past and present management efforts and in the assembly of information in the clearinghouse.



American bullfrog, *Rana catesbiana*

Bullfrogs, native to eastern North America, were introduced intentionally, and likely accidentally, into many locations in Arizona. Bullfrogs are aggressive predators with a wide range of tastes, including other native amphibians, reptiles, fish, and even small mammals and small birds. Evidence suggests that bullfrogs displace sensitive native amphibians and perhaps other sensitive aquatic wildlife. Bullfrog tadpoles are not palatable to most fish and there are few natural controls on their populations.

Recommendation 3 – Establish the Arizona Center for Invasive Species

Issue

Arizona would benefit from an enhanced infrastructure to facilitate information sharing within and among agencies and organizations involved in invasive species management. Creation of the Arizona Center for Invasive Species (the Center), operating in conjunction with the Arizona Invasive Species Advisory Council, can fulfill the need to enhance communication and education on invasive species issues for the State of Arizona.

Recommended Actions

Create and staff the Center to serve as a data clearinghouse and repository of technical information about prevention, education, control, management, and eradication of invasive species in Arizona.

The vision of the Center is to be a resource to assist with species identification, surveys and maps, and “best-method” management practices. It will also function as the public information and education center for invasive species. In order for the Center to be successful, dedicated staff must be hired to support the center and work in conjunction with shared employees from existing State agencies and universities.

There are three main functions of the Center:

- Outreach and Education
- Repository of Technical Information
- Database and Mapping

1. Outreach and Education – (See Recommendation 4)

2. Repository of Technical Information

One of the top priorities to improve invasive species management in Arizona is to disseminate knowledge of the species that threaten our environment and our economy. The Center may be charged with developing a comprehensive description of the current state of information management relevant to Arizona, to include:

- Identification of existing information-management tools and databases;
- Responsible management agencies or organizations;
- Purposes, uses, and limitations, including considerations of spatial accuracy, quality assurance of data, extent (e.g., within-agency, public) and legal ramifications (e.g., regulatory, trade, general information);
- A directory of taxonomic expertise, resources and other technical information; and
- Funding sources.

Malta starthistle, *Centaurea melitensis*

The photo shows spines on a Malta starthistle flower receptacle. Like Russian knapweed, Malta starthistle and yellow starthistle contain a neurotoxin that causes “chewing disease”, where horse’s neck muscles become paralyzed and they are unable to drink. If enough of these plants are consumed, symptoms are irreversible and fatal.



Recommendation 3 – Arizona Center for Invasive Species

Recommended Actions

2. Repository of Technical Information (continued)

Identify information management gaps in the following areas:

- Occurrence, assessment, inventory, and monitoring information sources; and
- Funding sources—accomplished/ongoing research information sources—management, biology and control information sources.

Identify information management opportunities in the areas of:

- Securing operational funds;
- Identifying partners and participants, including entities in other states and countries;
- Evaluating existing information management systems that have the potential to meet Arizona information needs; and
- Designing and initiating an Arizona information system that includes needs of all partners and participants, including entities in other states and countries where feasible.

3. Database and Mapping (see Recommendation 5)

Recommendation 4 - Provide Outreach and Education

Issue

Outreach and educational programs are a cornerstone of an effective, long term plan for invasive species management. The levels of education and awareness among landowners, policy-makers, and the general public are not commensurate with the degree of the problem. Land managers can benefit from a better understanding of their obligations to control weeds and the costs associated with failure to manage them. Well informed leaders can help to ensure adequate funding, appropriate legal authorities, and accountability from the agencies. The general public needs to understand invasive species so they become mindful of actions they can take and help build broad public and political support for adequate programs. It is important to create a climate in which people understand the risks of invasive species and change their behavior to help prevent invasions and assist in the current control invasive species.



Dr. Carolyn Seig

Leafy spurge, *Euphorbia esula*

Originally transported to the U.S. from its native range in Europe and Asia in the 1800s, perhaps as an impurity in seed, leafy spurge has spread widely in the West and poses a threat to Arizona. It displaces native or other desirable vegetation through shading, competition for nutrients, and secretion of plant toxins.

Recommended Actions

The AISAC envisions the Arizona Center for Invasive Species collaborating with agencies to serve as a clearinghouse, issuing press releases on compelling environmental stories (both dangers and successes), establishing a speaker's bureau, creating videos including PSAs (public service announcements) and coordinating with governmental entities as well as NGOs (non-government organizations) for outreach campaigns.

Public awareness and education are essential to successful implementation of programs to combat the spread of invasive species. By mobilizing public support, and the support of interest groups (e.g. recreational users), less public spending may be necessary.

With strong public information programs, "invasive species" could become a future familiar catchword, inspiring public involvement, guiding gardeners and boaters, scouts and school groups to refocus their energy and choices. For example the Arizona-Sonora Desert Museum trains two new groups annually as volunteers for their invasive species mapping program. Recreation clubs and scout groups routinely involve themselves in conservation projects. NRCDC-sponsored education centers are an effective conduit for invasive species education programs. The University of Arizona Cooperative Extension Service is actively involved in education programs in each county and is an appropriate cooperator for any outreach efforts.

The message should be positive and incentive based, perhaps borrowing from successful cooperative programs like Stop Aquatic Hitchhikers™, Habitattitude™ and the Idaho Weed Awareness Campaign. It is suggested that the following methods be implemented:

1. Identify key audiences - Potential interest groups include ranchers, anglers and hunters, garden centers, sporting goods retailers, off-highway vehicle operators, hiking/camping clubs, bird watchers, schools and many others.
2. Create communication tools - Appropriate tools should be created to reach targeted audiences. These include the adoption/implementation of a simple/memorable icon, public service announcements, point-of-sale material, web based reference, and mail-stuffed flyers (Salt River Project, Arizona Public Service, municipal).



Yellow starthistle, *Centaurea solstitialis*
Yellow starthistle was introduced to the western U.S. from the Mediterranean and has spread extensively through California and the Pacific Northwest. Seeds for crops and feed become contaminated. Horses eating large quantities of yellow starthistle develop "chewing disease" which paralyzes their throat.



Recommendation 5 – Establish an Invasive Species Database and Mapping System

Issue

A coordinated, up-to-date information management-sharing system is a critical component of state-level invasive species planning and information management is a universal issue that affects multiple aspects of such plans. The ability to effectively manage invasive species is constrained by the lack of information and communication about ongoing efforts and inadequate information management systems.

Recommended Actions

The AISAC recommends the development and maintenance of a cross-jurisdictional, interactive database and mapping system for invasive species occurrences and eradication projects. The AISAC enthusiastically recommends the opportunity to leverage system development with other systems such as Southwest Exotic Plant Information Clearinghouse (SWEPIC) and Arizona Fire Map and Arizona Hydrologic Information Systems (See appendix B for a list of databases). These systems should be compatible and interoperable (Arizona Fire Map is one good model). The data collected should meet the minimum standards set by the North American Weed Management Association (NAWMA). It is recommended that the resulting products and data be available to agencies, universities, regional planners and others.

Recommendation 6 – Strengthen Invasive Species Early Detection/Rapid Response

Issue

Failure to eradicate new invaders at the earliest stages may result in significant long-term costs to control or manage the new species. The least costly approach to addressing new populations of invasive species in our State is to seek their eradication through a rapid and coordinated response before they can become established. There is a choice to make, as there is a distinct possibility of negative economic impacts to come with any and all new invaders.



Zebra mussel, *Dreissina polymorpha*



Native to rivers and freshwater lakes in eastern Europe, zebra mussels came to the United States in ballast water of ships that traversed the Atlantic and discharged their ballast into the Great Lakes. They have spread quickly out of the Great Lakes and into the Mississippi River drainage. The emphasis of the **100th Meridian Initiative** is to keep zebra mussel out of the West and away from Arizona. Prevention is our best defense, but given the risk to our waterways and water resources, an early detection and rapid response strategy would serve Arizona well.

Integrated Early Detection/Rapid Response (EDRR) processes that involve trained personnel at the state, federal, tribal, and county levels, working with the academic and conservation community and private entities, are necessary. There is a lack of trained personnel and set protocols that would allow for a rapid, coordinated response to early detections of new invasive species.

Funding is a critical component to respond in a coordinated fashion to prevent the establishment of new populations of invasive species in Arizona. There are few programs in the State that are solely focused on the early detection of new invasive species and those programs have little in the way of dedicated resources to respond to these newly identified invaders. For instance, inadequate funding prevents Arizona from utilizing the existing port of entry stations, interior inspections and current survey/detection operations to their full potential.

An Arizona Center for Invasive Species could be utilized to create mechanisms to quickly share information and strategies for Early Detection and Rapid Response. The Center could also identify resources that could be coordinated and employed in response to a newly identified invasive species.

Recommended Actions

1. Further develop capacity and coordination for EDRR within and among state agencies that have invasive species management or land management responsibilities. This should involve federal, tribal, county and local governments as well as the academic community, regional organizations and local groups, such as invasive species management area groups.

Elements needed to strengthen the EDRR processes and networks include:

- Access to up-to-date reliable scientific and management information;
- Mechanisms for reporting detections and information exchange;
- Rapid and accurate species identification;
- Procedures for rapid risk assessment and initial control action; and
- Access to stable funding for State agencies response effort.

2. Strengthen Border Inspection Stations. Strengthen Arizona's exclusion program at the borders of the State through full use of inspection stations' capabilities. Increase training and capabilities of agricultural inspectors and others at these ports of entry in the recognition of invasive species that are present in other states that may be transported into Arizona.

Red Brome, *Bromus rubens*

This non-native winter grass aggressively colonizes Sonoran and Mojave Desert landscapes, then provides a continuous fine fuel for desert wildfires. Desert plants such as saguaros and palo verde trees are eliminated from landscapes that frequently burn.



Recommendation 7 – Develop a Comprehensive Statewide Invasive Species Management Plan

Issue:

A comprehensive strategic plan is essential to position Arizona as a leader in invasive species management. A transparent statewide plan allows for public access and participation. The more visible the plan, the more the public will know how to participate and how the state is acting in the public interest. Strategic planning helps coordinate deployment of resources, identification of priorities and emphasis areas, and opens the door to funding via grants and other sources.

Recommended Action:

The AISAC recommends the creation of a comprehensive statewide invasive species management plan. The framework for the statewide plan would parallel the national plan, consisting of the following five areas:

- Leadership and Coordination
- Research and Information Management
- Anticipation and Outreach
- Control and Management
- Funding

Leadership and Coordination:

Continuation of the Arizona Invasive Species Advisory Council creates a permanent forum for communication among State and Federal agencies, tribal governments, local governments, private companies, non-governmental organizations, the public and international communities. The following are recommended plan components:

- A. Provide sufficient funding and staff key state agencies to support or create invasive species programs. The Arizona Game and Fish Department, Arizona Department of Agriculture, Arizona State Land Department, Arizona State Parks, and the Arizona Department of Transportation each need to maintain or establish a dedicated, full-time Invasive Species Program Manager who could constitute and organize proactive programs, as funding allows, for their agencies within their statutory authorizations.
- B. Maintain and establish a consistent working relationship with neighboring states and Mexico. Broader interaction with states and countries where invasive species present a threat to Arizona is essential for anticipation, prevention and response.



Crayfish

Crayfish were intentionally introduced into Arizona as bait for fishing and for vegetation control in ditches. There are more than 500 species of crayfish worldwide, but none are native to Arizona. Because of emerging concerns about the impact of these species, especially in sensitive stream headwater areas, possession and transportation of live crayfish is restricted. Crayfish are omnivorous and ravenously consume submerged aquatic vegetation and compete for habitat and resources with fish, frogs, reptiles, and snails.

- C. Identify a base of invasive species expertise in all agencies, universities and private organizations. Encourage interactions among invasive species specialists at all levels.
- D. Create a statewide grid of regional consortiums for invasive species coordination. Utilize existing groups such as the Weed Management Areas (WMAs), Natural Resource Conservation Districts (NRCs), or Tribal Soil and Water Conservation Districts (CDs) to divide the state into four to eight bio-geographical regions to serve as a conduit between the State and the local communities. Combining the efforts of WMAs, NRCs, CDs and others to provide complete state-wide coverage is encouraged. An example of this conduit is the memorandum of understanding that created the Sonoran Desert Invasive Species Council (see appendix C above MOU and appendix D for the MOU of Coordinated Resource Management in Arizona).



Patti Fenner

Arizona Flycasters Club on a volunteer “bull thistle removal party” at one of their favorite fishing holes, Canyon Creek, on the Tonto National Forest. Bull thistle invaded the meadows, slopes and streambanks along Canyon Creek after the Rodeo-Chediski fire of 2002.



Patti Fenner

Members of Volunteers for Outdoor Arizona with 50 bags full of Malta starthistle they removed at Horseshoe Recreation Area on the Tonto National Forest.

Weed Management Areas

Unlike other western states that have laws establishing countywide Weed Control Districts, Arizona Weed Management Areas (WMAs) are local volunteer partner-participants that are not funded with tax dollars, are not governing entities or legislative bodies, are not tax districts or enforcement agencies and are not regulated under any state agency. Individual WMAs prioritize and set goals and choose where they want to focus their efforts. We recognize that some WMAs are well organized and hold a non-profit status, while others are loose coalitions. There are no Arizona Statutes that authorize their work and there is no consistent financial support for these activities.

Conservation Districts

Natural Resource Conservation Districts (NRCs) are political sub-divisions of the State of Arizona. They are governed by locally elected officials that serve district cooperators: a person who enters into a cooperative agreement with the District for the purpose of protecting, conserving and practicing wise use of the natural resources under their control.

NRCs may cooperate and enter into agreements with land owners and any agency or subdivision of the state or federal government to carry on programs. There are 32 NRCs in Arizona, including two tribes that opted to organize under State Law. In addition, 10 tribes have established Conservation Districts (CDs) with unique responsibilities and powers under sovereign laws. NRCs coordinate with and support ongoing voluntary weed management groups in Arizona.

Recommendations

Recommendation 7 – Develop a Comprehensive Statewide Invasive Species Management Plan (continued)

Research and Information Management:

Research is a critical component of the comprehensive statewide invasive species management plan for Arizona. Effective prevention, detection, control, eradication and restoration all require the development, testing and refining of both existing and new technologies. Research includes hypothesis testing and inventory and monitoring within an adaptive management context.

Coordination of research efforts among state and federal agencies, tribal government, neighboring states and private landowners is a critical component of ensuring an integrated response on invasive species that respect no boundaries.

Information management is a crosscutting issue that affects multiple aspects of invasive species planning. A coordinated, up-to-date information management-sharing system is an essential component of a comprehensive statewide invasive species management plan. The following are recommended plan components:

- A. Coordinate research efforts to ensure an integrated response to invasive species. Continuation of the AISAC and working with the Center, satisfies the need to support, prioritize, and coordinate invasive species research in Arizona. Strategies include creating a grant program to address high priority research needs, conducting a systematic review of past and present research efforts, and assembling information into a web-based clearinghouse to allow better collaboration and sharing of information among researchers and managers.
- B. The Center will house the Invasive Species Database and Mapping System. This offers a coordinated, up-to-date system where information can be shared and maps of invasive species studies, outbreaks, treatments and any additional information can be created.
- C. The AISAC will identify research needs in the areas of prevention, early detection and rapid response, control and management, and restoration. Addressing all four of these areas is critical to prevent the introduction of non-native pests, quickly respond to newly discovered pests, contain invasive species already established in the state, and restore lands degraded by invasive species.
- D. The Center will coordinate and oversee technology transfer. By ensuring that research results are quickly and effectively communicated to interested parties, invasive species management will be more effective.



New Zealand mudsnail, *Potamopyrgus anipodarum*

Despite their tiny size, mudsnails are impressive invaders. First detected in the 1980's in Montana, mudsnails are now found in 10 western rivers and three national parks – including the Colorado River in Grand Canyon. These snails are tiny, tough, and literally born pregnant. Populations can achieve densities of more than 100,000 snails per square meter. Their arrival in the West has generated concern about their impacts on native species, aquatic ecosystems, and fisheries.

Anticipation and Outreach:

Prevention is often the first and most effective line of defense against the damages and risks associated with invasive species. Prevention requires anticipating pathways of invasive species introductions and conveying information to those who can take action.

The following are recommended plan components:

- A. Establish evaluation mechanisms and criteria for understanding and identifying the ways an invasive species can enter our state is paramount to effective control. Creating a unified advance detection system and outreach plan for informing the public, state and federal agencies of the risks of invasive plants and animals is necessary to complete a management program.
 1. Maintain fair and feasible risk assessment processes for screening and evaluating potential introduced species not currently in or in trade in Arizona.
 2. Identify pathways for unintentional or accidental introduction of plants or animals and develop strategies to reduce risks from those pathways:
 - Develop/adopt tools that are consistent and systematic for identifying and prioritizing pathways and document preventative measures. The National Invasive Species Council is developing guidelines for identifying and ranking species that could be utilized to assist Arizona in this regard.
 - Adopt consistent “Best Management Practices” to avoid the unintentional movement of plants and animals.
 3. Identify gaps in anticipation and prevention:
 - Maintain listing processes that are risk-based, fair, and involve public;
 - Coordinate enforcement networks;
 - Cross train inspectors and enforcement personnel; and
 - Use reasonable inspection processes.

Outreach raises the awareness of Arizonans to invasive species issues and makes useful information available to help prevent the introduction of invaders.

Anticipation of how unwanted species may enter and become established in Arizona is essential to planning and evaluation of defensive mechanisms necessary to prevent the introduction of new invasive species. Identification and prioritization of pathways is an essential step to reducing the risks associated with introduction of new invasive species to Arizona.



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When you leave a body of water:

- Remove any visible mud, plants, fish or animals before transporting equipment.
- Eliminate water from equipment before transporting.
- Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, dogs, etc.).
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

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Examples of “Best Management Practices” are:

Systems such as HACCP (Hazard Analysis and Critical Control Points) can be utilized to assess activities and identify strategies to reduce the potential for unintentional movement of plants and animals (USFWS 2004).

Boating and recreational site improvements could include signage or washing capabilities to assist the public in reducing unintended movement of plants or animals. Some weed-free hay and mulch certification programs are already in place, but need to be expanded and require greater promotion to Arizona producers and consumers.

(Left - These signs have been placed at selected boat launching areas.)

Recommendation 7 – Develop a Comprehensive Statewide Invasive Species Management Plan - Outreach (continued)

- B. Outreach Tools (See Recommendation 4)
 - 1. Identify key audiences in the public and private sectors.
 - 2. Create communications tools to educate and inform key audiences and develop partnerships with those key audiences. Incorporate and adapt communications tools already in existence to accelerate Arizona’s efforts and make connections to existing national programs and efforts. Examples of some existing programs are Stop Aquatic Hitchhikers™ and Habitatitude™.
 - 3. Measure changes in practices and behaviors of intended audiences as a result of outreach efforts.

Control and Management:

It is important to understand the complexity of interspersed landownership in the State of Arizona. Multiple jurisdictional authorities and often conflicting policies and cultures create challenges to effective control and management of invasive species. The total land mass of Arizona is 72,586,000 acres or about 113,417 square miles. Land ownership can be classified in four basic categories: Privately owned lands - 12 million acres; Federal Government Lands - 31 million acres; Indian Trust Lands - 20 million acres; and State Trust Lands 9.4 million acres (source Arizona State Land Department).

When invasive species are permanently established, the most effective action may be to prevent their spread or reduce their impacts through control and management. The goals of control and management are to mitigate the undesired impacts of invasive species on agriculture productivity, biodiversity, public health, economies, infrastructure, tourism, recreation, and wildfire. The following are recommended plan components:

- A. **Reduce the number of invasive species coming into Arizona from other states and Mexico through various pathways.** Examples include:
 - 1. Early Detection and Rapid Response is essential to protecting Arizona from the spread of invasive species (see Recommendation 6).
 - 2. Support and adequately fund Arizona’s seed testing lab. The Department of Agriculture’s seed lab is an essential tool for the State to ensure purity from noxious weed seed contamination for revegetation, roadway and other restoration projects.



Buffelgrass, *Pennisetum ciliare*

Buffelgrass is a perennial bunchgrass that forms thick mats. It was widely introduced as a pasture grass, for erosion control and revegetation of arid areas. Rapid germination, high seed production, and establishment rates on poor and infertile soils made it suitable for erosion control. Its dominance and resistance to fire, drought and heavy grazing on arid soils make it a formidable invader.

3. Encourage deployment of signage and development of washing stations for equipment and boats. Remind the public that simple steps can help to reduce the potential for unintended movement of plants and animals within our state.

B. Create Uniform Processes for State Agencies

AISAC recognizes that each state agency has authorities unique to their agency and are charged with a variety of public land uses including protection and conservation of these resources. We encourage efficiency of scale and synergy where possible and where financially supported through development of consistent process, frameworks, and partnerships. Some of these activities may require additional funding to be implemented. Examples include:

1. **Establish statewide contracts for control of invasive species.** Establish contracts, through the procurement process, that are available to each land management agency. This would increase efficiency so that each agency can utilize the services of a vendor without working through the entire procurement process.
2. **Identify a pool of invasive species specialists.** Within state government, set up teams of trained and credentialed personnel from various agencies to perform invasive species control work. Review the budgeting process and create a mechanism that allows agencies to share staff time and resources.
3. **Raise the awareness of State personnel.** Create incentives to promote and encourage staff (and agency) to be trained in invasive species management.
4. **Provide training for staff on invasive species.** Train staff and volunteers to detect the arrival and dispersal of invasive species. Task appropriate State agencies to join in the collection of data, eradication and restoration projects, and mapping and database management.
5. **Develop and implement agency policy and protocols for invasive species management.** These need to be compatible with any future State plans and the resource community statewide.
6. **Develop a coordinated approach to education and outreach programs.** Create interpretation and education materials and adopt programs from existing invasive species management resources and organizations.
7. **Ensure mechanisms are in place such that all State agencies are able to lawfully apply pesticides.** These mechanisms need to be in compliance with State Rules, either directly or under the auspices of another licensed entity.

Russian knapweed, *Acroptilon repens*

Russian knapweed is a perennial invader from Eurasia. It is widely established throughout the western U.S. Russian knapweed causes chewing disease in horses. Russian knapweed can produce from 6 to 27 shoots per square foot from roots that grow to a depth of 23 feet. This growth characteristic makes Russian knapweed difficult to control.



Recommendation 7 – Develop a Comprehensive Statewide Invasive Species Management Plan - (continued)

State Agencies and University Funding:

Funding is essential for successful implementation of the comprehensive statewide invasive species management plan and to position Arizona as a leader in invasive species management. There are some dedicated resources in State government to address statutory mandates for a number of pests that are invasive. There are very limited State funds, resources and authorities for the specific functions identified in this document. Planning and funding will enable Arizona to obtain future financing from national matching grants programs.

- A. Provide sufficient, stable funding for invasive species activities and necessary infrastructure. Funding must be recurring, consistent, flexible and accountable. Staff key State agencies and universities to support or create invasive species programs. Each needs to maintain or establish a dedicated, full-time invasive species specialist who could organize proactive programs for their agencies within their statutory authorizations.
- B. Create centralized emergency funding to be available for early detection, rapid response treatments. Failure to eradicate new invaders at the earliest stages may result in significant long term costs to control or manage the new invasive species. Contingency resources must be immediately available to mobilize a rapid response strike team.
- C. Provide resources for the continuation of the AISAC and creation of the Arizona Center for Invasive Species. The following tasks will facilitate efficient information sharing within and among agencies and organizations involved in invasive species management.
 - 1) Outreach and Education – raise the awareness of Arizonans about invasive species and aid in the prevention of introduction and spread.
 - 2) Repository of technical information - make useful information available for invasive species management.
 - 3) Database and mapping – provide information to detect/monitor invasive species.
- D. Create a position of grant writer to seek sources of financing and create a process for distribution to local entities (for example WMAs) in coordination with the AISAC.

Russian Olive, *Elaeagnus angustifolia*

Russian Olive is a high priority species. It is an introduced non-native plant that is colonizing stream corridors and reduces diversity of native wetland plant communities. Russian olive can outcompete native vegetation, interfere with natural plant succession and nutrient cycling, and tax water reserves.



The first premise in identifying the resources required for invasive species management is that funding must be sustainable and consistent. Current resources are insufficient. As part of a comprehensive statewide invasive species management plan, specific funding needs should be identified and paired with strategies to secure those resources.

Funding to agencies and university programs should support the necessary infrastructure for invasive species management, including staffing, training, and creation of the Center. Project specific funding may be required to implement rapid response, control and management actions. Additionally, funding for outreach and research projects should be a primary consideration of the plan.

AISAC discussed a broad palette of funding opportunities. Investment in program development now, reduces costs for control and abatement in the future and other costs that may be born by all sectors of Arizona's economy. The following alternatives should be considered to fund implementation of a multi-faceted invasive species plan.

1. State and Federal Appropriations
 - a. State appropriations will require specific legislative action
 - b. Federal appropriations for assistance to the states would require Congressional Delegation advocacy
2. Tax Incentives
3. Federal Matching Grants
 - a. Non-federal dollars must be available for match
4. User and Impact fees

There are elements of the recommendations in this document that can be implemented by the State at low or no cost. Activities such as enhanced inter-agency and inter-partner communications, streamlining of existing processes, and the networking established by the AISAC are examples.

There are a number of existing granting opportunities through the State which may enhance invasive species management. Encourage granting agencies to incorporate evaluation criteria that afford some weight to projects that include aspects that help meet invasive species management goals as outlined in the proposed comprehensive statewide invasive species management plan.

Eurasian collared dove, *Streptopelia decaocto*

Eurasian collared dove is native to the Indian subcontinent. They were imported to the Bahamas in the 1970s and made an unassisted move to Florida in the 1980s. Volunteer citizen science projects like the Christmas Bird Count and ProjectFeederWatch have documented the spread of this new species. These large doves have been spreading across North America rather rapidly and have arrived in Arizona. It is unknown if their arrival will have impacts.



Bibliography

Austin, D. F. 1978. Exotic plants and their effects in southeastern Florida. *Environmental Conservation* 5: 25-34.

Colorado Department of Agriculture. 2001. Colorado's Strategic Plan to Stop the Spread of Noxious Weeds: A Framework for Statewide Coordinated and Cost-Effective Action to Protect Agriculture and the Environment. Denver, CO:Colorado Department of Agriculture.

Crawford, J.A., C.H. Wahren, S. Kyle, W.H. Moir. 2001. Responses of exotic plant species to fires in *Pinus ponderosa* forests in northern Arizona. *Journal of Vegetation Science* 12:261-268.

Dangerous Travelers: Controlling Invasive Plants Along America's Roadways. produced by the U.S.D.A. Forest Service, Technology and Development Center, San Dimas California. To view the 26-minute program is <http://www.fs.fed.us/invasivespecies/news.shtml>

Dodge, R.S. 2004. Dalmatian toadflax (*Linaria dalmatica*) response to wildfire and native species revegetation in ponderosa pine forest. M.S. Thesis. Northern Arizona University, Flagstaff. 115 pages.

Eiswerth, M.E. 2005. Input-output modeling, outdoor recreation, and the economic impacts of weeds. *Weed Science* 53:130-137.

Elton, C.S. 1958. *The Ecology of Invasions by Animals and Plants*. University of Chicago Press, Chicago. Reprinted 2000 with a foreword by Daniel Simberloff 196pp. ISBN 0-226-20638-6.

Hobbs, R. J., L. F. Huenneke. 1992. Disturbance, Diversity, and Invasion: Implications for Conservation. *Conservation Biology* 324-337.

Humphrey, R. R. 1974. Fire in the Deserts and Desert Grassland of North America. In *Fire and Ecosystems*, edited by C. E. Ahlgren, pp.365-400. Academic Press, New York.

Korb, J.E., N.C. Johnson and W.W. Covington. 2004. Slash pile burning effects on soil biotic and chemical properties and plant establishment: recommendations for amelioration. *Restoration Ecology* 12: 52-62.

Lanciotti R.S. et al. 1999. Origin of the West Nile Virus responsible for an outbreak of encephalitis in the northeastern United States. *Science*. 1999 Dec 17; 286: 2331-3.



Northern Snakehead, *Channa argus*



A native of China, the northern snakehead has been illegally introduced into several locations in the United States. The northern snakehead often enters into the live food fish market – sometimes illegally – making its way from the restaurant or market to the water. Illegal populations of this rugged and toothy predatory discovered in ponds were removed by the Maryland Department of Natural Resources due to concerns about the effects it might have on aquatic resources if it escaped to open waters. Subsequently, populations of northern snakehead have been found in the Potomac River, with few options for its removal.

- NatureServe. 2006. NatureServe Explorer Version 4.7. Available from: <http://www.natureserve.org/explorer> (accessed June 17, 2006).
- McLaughlin, S. P. and J. E. Bowers. 1982 Effects of Wildfire on a Sonoran Desert Plant Community. *Ecology* 63 (1): 246-248.
- Pimentel D.; Lach L.; Zuniga R.; Morrison D. 2000. Environmental and Economic Costs of Nonindigenous Species in the United States. *BioScience*, Volume 50, Number 1, pp. 53-65(13).
- Pimentel, D., R. Zuniga and D., Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52:273-288.
- Pimm, S. L., and Gilpin, M. E. 1989. Theoretical issues in conservation biology. In: Roughgarden, J., R. May and S.A. Levin (Eds.). *Perspectives in Ecological Theory*. Princeton University Press, Princeton, New Jersey. pp. 287-205.
- Randall, J.M. 1996. Weed control for the preservation of biological diversity. *Weed Technology* 10:370-383.
- Richardson, C., R. Cantu, and K. Brown. 2001. Comprehensive wildlife management guidelines for the Trans-Pecos ecological region. Texas Parks and Wildlife Department, Austin, Texas.
- Ripley, S.D. 1975. Report on Endangered and Threatened Species of the United States. House Document 94-51. 200 pp. Reprinted in *Federal Register* 40(127): 27824-27924.
- Sabo, K.E. 2006. Overstory and understory production in varying stand structural types in a northern Arizona ponderosa pine forest. M.S. Thesis, Northern Arizona University, Flagstaff, AZ. 98 pages.
- Silberman, J. PhD. 2003. The Importance of Fishing and Hunting. Economic Data on Fishing and Hunting for the State of Arizona and for Each Arizona County. Prepared by Arizona State University School of Management for the Arizona Game and Fish Department.
- U.S. Congress, Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. OTA-F-565 (Washington, DC:U.S. Government Printing Office, September 1993).
- Wiesenborn, W. D. 1996. Saltcedar impacts on salinity, water, fire frequency, and flooding. Saltcedar Management Workshop 3.
- Wilcove, David S., David Rothstein, Jason Dubow, Ali Phillips, and Elizabeth Losos. 2000. Leading Threats to Biodiversity, In *Precious Heritage: The Status of Biodiversity in the United States*, edited by Bruce A. Stein, Lynn S. Kutner, and Jonathan S. Adams, pp.239-254, Oxford University Press.
- Wolfson, B.A.S., T.E. Kolb, C.H. Sieg, and K.M. Clancy. 2005. Effects of post-fire conditions on germination and seedling success of diffuse knapweed in northern Arizona. *Forest Ecology and Management* 216:342-358.

Appendix A **Arizona Wildlands Invasive Plant Working Group's** **invasive species plant list**

Appendix B **List of existing databases**

Appendix C **MOU for the Sonoran Desert Invasive Species Council**

Appendix D: **MOU for the Coordinated Resource Management in** **Arizona**



Inland Silversides, *Menidia beryllina*

A native of Eastern North America, inland silversides is a new arrival in Arizona being discovered very recently at Lake Pleasant in Central Arizona. The pathway for its trip to Arizona is unknown, but it could have been an accidental hitchhiker with bait fish. There are introduced populations of inland silversides in New Mexico and California. Its effects on other aquatic wildlife in Arizona are not known.

Appendix A: Arizona Wildlands Invasive Plant Working Group's invasive species plant list.

Categorized List

High:

These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal and establishment; and species are usually widely distributed, both among and within ecosystems /communities.

Plants Ranked High (19)

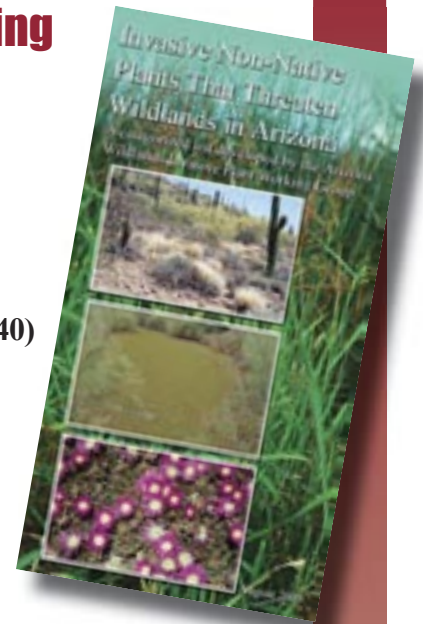
- *Acroptilon repens* (Russian knapweed)
- *Arundo donax* (Giant reed)
- *Bromus rubens* (Red brome)
- *Bromus tectorum* (Cheatgrass)
- *Centaurea solstitialis* (Yellow starthistle)
- *Eichhornia crassipes* (Water hyacinth)
- *Elaeagnus angustifolia* (Russian olive)
- *Eragrostis lehmanniana* (Lehmann lovegrass)
- *Euphorbia esula* (Leafy spurge)
- *Euryops multifidus* (Sweet resinbush)
- *Lepidium latifolium* (Perennial pepperweed)
- *Myriophyllum aquaticum* (Parrot's feather)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Pennisetum ciliare* (Buffelgrass)
- *Pennisetum setaceum* (Fountain grass)
- *Salvina molesta* (Giant salvinia)
- *Tamarix chinensis* (Fivestamen tamarisk)
- *Tamarix parviflora* (Smallflower tamarisk)
- *Tamarix ramosissima* (Saltcedar)

Medium:

These species have substantial and apparent ecological impacts on ecosystems, plant and animal communities, and vegetational structure; invasiveness attributes are conducive to moderate to high rates of dispersal, often enhanced by disturbance; and ecological amplitude (diversity of ecosystems/ communities) and distribution (within an ecosystem/community) range from limited to widespread.

Plants Ranked Medium (40)

- *Alhagi maurorum* (Camelthorn)
- *Avena fatua* (Wild oat)
- *Brassica tournefortii* (Sahara mustard)
- *Bromus diandrus* (Ripgut brome)
- *Bromus inermis* (Smooth brome)
- *Cardaria chalapensis* (Lenspod whitetop)
- *Cardaria draba* (Whitetop)
- *Cardaria pubescens* (Hairy whitetop)
- *Carduus nutans* (Musk thistle)
- *Centaurea biebersteinii* (Spotted knapweed)
- *Centaurea diffusa* (Diffuse knapweed)
- *Centaurea melitensis* (Malta starthistle)
- *Chondrilla juncea* (Rush skeletonweed)
- *Cirsium arvense* (Canada thistle)
- *Conium maculatum* (Poison hemlock)
- *Convolvulus arvensis* (Field bindweed)
- *Cortaderia selloana* (Pampas grass)
- *Cynodon dactylon* (Bermudagrass)
- *Erodium cicutarium* (Redstem filaree)
- *Hordeum murinum* (Mouse barley)
- *Linaria dalmatica* (Dalmatian toadflax)
- *Linaria vulgaris* (Yellow toadflax)
- *Lolium perenne* (Perennial ryegrass)
- *Melilotus alba* (White sweetclover)
- *Melilotus officinalis* (Yellow sweetclover)
- *Mesembryanthemum nodiflorum* (Slenderleaf iceplant)
- *Rhus lancea* (African sumac)
- *Rubus armeniacus* (Himalayan blackberry)
- *Rubus discolor* (Himalayan blackberry)
- *Saccharum ravennae* (Ravennagrass)
- *Salsola collina* (Slender Russian thistle)
- *Salsola paulsenii* (Barbwire Russian thistle)
- *Salsola tragus* (Prickly Russian thistle)
- *Schismus arabicus* (Arabian schismus)
- *Schismus barbatus* (Common Mediterranean grass)
- *Sonchus asper* (Spiny sowthistle)
- *Sonchus oleraceus* (Annual sowthistle)
- *Sorghum halepense* (Johnsongrass)
- *Ulmus pumila* (Siberian elm)
- *Vinca major* (Bigleaf periwinkle)



Appendix A: Arizona Wildlands Invasive Plant Working Group's invasive species plant list

Low: These species have minor yet detectable ecological impacts; invasiveness attributes result in low to moderate rates of invasion; ecological amplitude and distribution are generally limited, but the species can be problematic locally.

Plants Ranked Low (12)

- *Aegilops cylindrica* (Jointed goatgrass)
- *Asphodelus fistulosus* (Onionweed)
- *Cirsium vulgare* (Bull thistle)
- *Cynoglossum officinale* (Houndstongue)
- *Echinochloa crus-galli* (Barnyardgrass)
- *Elymus repens* (Quackgrass)
- *Eragrostis curvula* (Weeping lovegrass)
- *Leucanthemum vulgare* (Oxeye daisy)
- *Mesembryanthemum crystallinum* (Common iceplant)
- *Onopordum acanthium* (Scotch thistle)
- *Panicum antidotale* (Blue panicum)
- *Tamarix aphylla* (Athel tamarisk)

Plants Evaluated but not listed (3)

- *Hydrilla verticillata* (Hydrilla)
- *Tribulus terrestris* (Puncturevine)
- *Verbascum thapsus* (Common mullein)

Alert: Additional designation for some species in either the high or medium category, but

whose current ecological amplitude and distribution are limited. This designation alerts site managers to species capable of invading unexploited natural communities, based on initial, localized observations or behavior in similar ecosystems/communities elsewhere.

Plants with an Alert Designation (19)

- *Bromus diandrus* (Ripgut brome)
- *Cardaria chalapensis* (Lenspod whitetop)
- *Cardaria draba* (Whitetop)
- *Cardaria pubescens* (Hairy whitetop)
- *Chondrilla juncea* (Rush skeletonweed)
- *Conium maculatum* (Poison hemlock)
- *Eichhornia crassipes* (Water hyacinth)
- *Euphorbia esula* (Leafy spurge)
- *Lepidium latifolium* (Perennial pepperweed)
- *Linaria vulgaris* (Yellow toadflax)
- *Mesembryanthemum nodiflorum* (Slenderleaf iceplant)
- *Myriophyllum aquaticum* (Parrot's feather)
- *Myriophyllum spicatum* (Eurasian watermilfoil)
- *Rhus lancea* (African sumac)
- *Rubus armeniacus* (Himalayan blackberry)
- *Rubus discolor* (Himalayan blackberry)
- *Saccharum ravennae* (Ravennagrass)
- *Salvina molesta* (Giant salvinia)
- *Vinca major* (Bigleaf periwinkle)

Appendix B: List of existing databases. Myriad state and federal agencies, non-governmental organizations, and institutions of higher education have developed databases and information-management systems. Examples include:

1. The Arizona's Heritage Data Management System (HDMS), managed by Arizona Game and Fish Department (AGFD), identifies and tracks plants and animals of concern, or those with special status at the federal, tribal, or state level. We propose the Invasive Species Advisory Council identify priority invasive species to be tracked by HDMS to provide integrated information on the status, distribution, and biology of high-priority invasive species in the state.
2. Southwest Exotic Plant Mapping Program (SWEMP; regional invasive plant database managed by USGS; available online at: <http://www.usgs.nau.edu/SWEPIC/swemp/swempa.asp>).
3. Crayfish occurrences (managed by AGFD).
4. National Agricultural Pest Information System (regulated plants, insects, diseases, bio-control agents—occurrences mostly recorded at the county level (some global positioning system-derived locality info, presence-absence data, management status, survey information).
5. Forest Service databases (forest insect and diseases). http://www.fs.fed.us/foresthealth/programs/invasive_species_mgmt.shtml; <http://www.invasive.org/insects.cfm>; <http://www.invasive.org/diseases.cfm>.
6. Arizona Department of Agriculture invasive plant database (non-public).
7. Arizona Department of Transportation (invasive plant treatment database—occurrence information provided to SWEMP).
8. Natural Resources Conservation Service, Plant Material databases (introductions, investigations, and so on).
9. SEINet (Southwest Environmental Information Network), Arizona herbaria specimen database (available online at: <http://seinet.asu.edu/collections>).
10. PLANTS database (available online at <http://plants.usda.gov>)
11. New Mexico State University website on 122 invasive species (available online at <http://weeds.nmsu.edu>)
12. INVADERS database (invasive species of the Pacific Northwest; available online at: <http://invader.dbs.umt.edu/>).

Appendix C: MOU for the Sonoran Desert Invasive Species Council

MEMORANDUM OF UNDERSTANDING BETWEEN

ARIZONA DEPARTMENT AGRICULTURE
ARIZONA DEPARTMENT OF TRANSPORTATION
ARIZONA GAME AND FISH DEPARTMENT
ARIZONA STATE LAND DEPARTMENT
BUREAU OF LAND MANAGEMENT, PHOENIX FIELD OFFICE (BLM-MOU-AZ-020-0202)
BUREAU OF LAND MANAGEMENT, YUMA FIELD OFFICE (BLM-MOU-AZ-050-0304)
CABEZA PRIETA NATIONAL WILDLIFE REFUGE
CIBOLA NATIONAL WILDLIFE REFUGE
56TH FIGHTER WING, LUKE AIR FORCE BASE, ARIZONA
IMPERIAL NATIONAL WILDLIFE REFUGE
KOFA NATIONAL WILDLIFE REFUGE
LAGUNA NATURAL RESOURCE CONSERVATION DISTRICT
MARINE CORPS AIR STATION YUMA, ARIZONA
NATURAL RESOURCES CONSERVATION SERVICE
ORGAN PIPE CACTUS NATIONAL MONUMENT
SONORAN INSTITUTE
THE NATURE CONSERVANCY
UNIVERSITY OF ARIZONA, YUMA COOPERATIVE EXTENSION
U.S. ARMY YUMA PROVING GROUND
U.S. BUREAU OF RECLAMATION, YUMA AREA OFFICE
YUMA CONSERVATION GARDEN, INC.
YUMA NATURAL RESOURCE CONSERVATION DISTRICT

AND SUBSEQUENT SIGNATORIES

CONCERNING COOPERATION AND COORDINATION IN INVASIVE SPECIES
MANAGEMENT IN SOUTHWEST ARIZONA AND THE FORMATION OF THE
SONORAN DESERT INVASIVE SPECIES COUNCIL AND ONE OR MORE ASSOCIATED
COOPERATIVE WEED MANAGEMENT AREAS

I. PREFACE

The parties to this agreement:

- either have stewardship responsibilities for natural resources mandated under federal or state statute or by policy or they have a public interest in such stewardship as identified in their organizational missions
- recognize that invasive species, not limited to those regulated as noxious weeds under state or federal law, potentially threaten the long-term persistence of individual plant and animal species and entire natural communities within Southwest Arizona

- acknowledge that independent effort, by itself, will not be able to solve an invasive species problem, as invasive species cross jurisdictional boundaries with impunity; therefore, the parties recognize that cooperation among agencies and other groups is necessary for effective management and enables them to “pool” resources to work toward common goals
- desire to use an integrated approach to invasive species management
- desire to prevent introduction and spread of invasive species into Southwest Arizona as the most cost-effective and efficient means of managing invasive species and preventing natural resource degradation
- desire to develop and implement best management practices that can mitigate the impacts of their activities on the spread of invasive species
- see value in highlighting the lack of information on control methods, vector sources and pathways, impacts to natural communities and native species, and other existing research data gaps as a means to encourage research community and funding source interests in these areas
- acknowledge benefits of developing data collection and management systems that can facilitate, among the parties, coordination, priority setting, and inventory and monitoring strategies, while enabling transfer of compatible data to regional and national databases
- seek opportunities to coordinate and combine education and outreach efforts.

II. PURPOSE

In consideration of the preceding findings, the purpose of this Memorandum of Understanding (MOU) is to enable the parties to: (1) cooperatively develop common management objectives, (2) facilitate effective response actions to control or prevent the spread of invasive species, and (3) restore natural communities within Southwest Arizona through a voluntary, but coordinated team of individuals and organizations responsible for invasive species management.

The initial focus of this agreement will be on invasive plants; however, the parties reserve the ability to address invasive animals.

III. SCOPE

To better leverage available resources and gain management effectiveness, government and non-government organizations across the United States—and in some cases across international boundaries—have been banding together to coordinate their efforts in the fight against invasive plants. At the most local level of coordination, cooperative weed management areas (CWMA; see Definitions section) are established that focus on the on-the-ground actions that need to occur to prevent or control the spread of invasive plants and to mitigate their ecological and economic impacts within a particular geographic area. Above this level of coordination, regional, state, national, and international coordinating councils of one kind or another may form to address broader programmatic invasive species issues or to provide technical, funding, and other

Appendix C: MOU for the Sonoran Desert Invasive Species Council

resource assistance to CWMAs. For example, at the national level within the United States, the National Invasive Species Council, established in accordance with 1999 Presidential Executive Order on invasive species, is meant to coordinate the efforts of federal departments and agencies in regard to national invasive species policy and management actions.

This MOU is meant to establish both the Sonoran Desert Invasive Species Council along with one or more associated CWMAs. The initial geographic scope of the council is loosely defined as encompassing the Sonoran Desert within the state of Arizona, though other portions of this ecoregion occurring within California and Sonora and Baja California Norte, Mexico can be included if this leads to better overall coordination of invasive species management activities within the region. Associated CWMAs generally should have defined boundaries or a species focus that aligns with the geographic scope of the council. As a regional council, the Sonoran Desert Invasive Species Council will provide programmatic assistance to its associated CWMAs to facilitate the effective implementation of CWMA management activities. The council also can provide an outlet for voicing CWMA needs and concerns at the state and other levels of coordination. Coordination of on-the-ground management activities within the geographic boundaries of an individual CWMA is the responsibility of the members of that CWMA, though council assistance can be requested when deemed appropriate.

IV. AUTHORITIES

Each signatory to this MOU will identify on its individual signature (execution) page the relevant authority that enables it to sign an MOU.

V. DEFINITIONS

Annual operating/management plan.—A written document that describes in detail the methods, funding, and roles and responsibilities of the participants involved in a cooperative weed management area. The plan addresses, on an annual basis, how the goals and objectives of the strategic plan will be implemented (definition modified from *Guidelines for Coordinated Management of Noxious Weeds: Development of Weed Management Areas*, a joint publication of the Bureau of Land Management, Forest Service, and National Park Service).

Cooperative weed management area (CWMA).—An area that shares common biotic characteristics, such as a common suite of invasive plants, and is identified by specific boundaries that form a logical area for the management of invasive plants. The bounded area can be based on criteria other than existing jurisdictional boundaries (definition modified from the *Guidelines* publication). Some CWMAs are not based on specific areas, but rather focus on the control of a specific invasive plant.

Control.—As appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions (Executive Order 13112).

Integrated invasive species management.—A management system that uses all suitable methods in an environmentally sound and compatible manner to reduce invasive species

Appendix C: MOU for the Sonoran Desert Invasive Species Council

populations to levels below those causing unacceptable economic or ecological consequences (definition modified from the *Guidelines* publication).

Invasive species.—An alien [non-native, exotic, introduced] species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112).

Non-native species.—With respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (Executive Order 13112 definition for alien species). A species is considered non-native when it is located outside its natural range or its natural zone of dispersal.

Noxious weed.—Those plant species designated as such by federal or state law. Noxious weeds represent a subset of those plant species that can be considered invasive plants. Noxious weeds generally will possess characteristics of aggressiveness and difficulty to manage. The definition generally applies to any living stage or viable plant part (including, but not limited to, seeds and reproductive parts) of a designated plant species; however, Arizona State law separately regulates the purity of seeds used for planting that may contain a designated noxious weed.

Prevention.—Activity (inspection, regulation, sanitation, education) that will reduce the likelihood of introduction of a targeted (or in many cases non-targeted when best management practices are followed) invasive plant into a CWMA (definition modified from the *Guidelines* publication).

Steering committee.—A group of individuals assigned, appointed, or elected to collectively complete a strategic plan for an invasive species council and/or a specific CWMA, oversee implementation of such a plan, and provide assistance to the operational needs of individual CWMA and the development of their annual operating/management plans (definition modified from the *Guidelines* publication).

Strategic plan.—A plan that documents the broad goals and coordination strategies of an invasive species council and/or its associated CWMA. Such a plan provides the long-term vision (five years or longer) for the council/CWMA, provides programmatic assistance to individual CWMA for developing their annual operating/management plans, and provides a template for the program plans of its individual participants.

Weed.—Any plant that is growing in a place where it is not wanted and interferes with management objectives for that place. The term has no scientific meaning. Weeds commonly are considered to share certain attributes: they are adept at colonizing disturbed habitats (though not all plants that are colonizers are weeds), such as plowed fields and roadsides; they are numerous and grow aggressively; and they are bothersome and generally have no economic value. A plant does not have to be non-native to be considered a weed.

VI RESPONSIBILITIES

Each of the undersigned parties mutually agree to:

Appendix C: MOU for the Sonoran Desert Invasive Species Council

A. Participate in the Sonoran Desert Invasive Species Council and, as appropriate to their geographic area of interest, in one or more of the associated CWMA's that are under the purview of the council's leadership and guidance. Membership on the steering committee is not a prerequisite to be a participant.

B. Share resources. The parties will mutually agree on the process by which resources will be shared, based on agency or organizational policy, regulations, capability, and consistency with applicable state or federal law. Sharing of federal resources or transfer of federal funds to non-federal agencies requires legal authority to do so and must be carefully examined before such transfers or sharing are accomplished. A separate agreement in the form of a cooperative agreement or contract, when otherwise deemed legal under applicable law, will be required in most cases for the transfer of funds or other resources between federal agencies or between federal agencies and non-federal agencies. In those cases in which an MOU is deemed sufficient to allow a sharing of a resource between any of the parties, this MOU will serve as the agreement to do so.

C. Provide resources of their own, to the extent each party determines it is capable of doing so, in the form of funding, manpower, equipment, supplies, or other items needed to implement invasive species management activities.

D. Share non-sensitive data and information that can facilitate the operation and management effectiveness of the council and its associated CWMA's, including, but not limited to: invasive species occurrence data, control methods, and prevention strategies. This may require execution of supplemental data share agreements. The parties will seek opportunities, when not otherwise precluded by other requirements, to make use of common data collection protocols and data management systems to facilitate coordination among themselves and compatibility with regional and national data standards and data management systems.

E. Provide a representative to the steering committee whenever a party desires to have representation on the steering committee. Parties to this MOU that do not desire to have representation on the steering committee can still participate in the activities of the council and individual CWMA's, as well as benefit from the sharing of information and best management practices that occurs within these entities; however, by not seeking membership on the steering committee they are less likely to play a role in determining council/CWMA objectives and project priorities.

F. Participate in the development and/or approval of strategic and annual/operating management plans for the council and individual CWMA, as appropriate.

VII. IMPLEMENTATION

A. **Steering Committee Establishment.** A steering committee shall be established with membership consisting of a designated representative of each initial signatory to this MOU that desires to have representation on the steering committee. Signatories will indicate their desire to have representation on the steering committee on their execution page.

B. **Changes in Steering Committee Membership.** A signatory to this MOU with representation on the steering committee may remove its designated representative at any time

Appendix C: MOU for the Sonoran Desert Invasive Species Council

and designate a replacement for any of their representatives that are so removed. Except for the removal and replacement of a designated representative, the initial members of the steering committee shall establish rules and procedures that govern any changes in membership, such as the addition of new members, beyond those specified above.

C. Steering Committee Responsibilities. The steering committee shall provide programmatic-level oversight and assistance related to the operation and function of the Sonoran Desert Invasive Species Council and its associated CWMAs. The steering committee shall:

- develop initial drafts of strategic plans and annual objectives and project priorities applicable to the council
- assist individual CWMAs with the drafting, completion, and implementation of their annual operating/management plan
- establish technical teams as necessary to address specific management issues, the composition of which can be volunteers from the signatories to this MOU or from outside groups as needed
- develop and assist in implementing best management practices and organizational invasive species management program templates
- act as an advocate for the needs of its associated CWMAs to the extent allowed by law and the restrictions imposed on any of the signatories to this MOU.

D. Relationship of Steering Committee to Participants within an Associated CWMA. Participants within a particular CWMA coordinate and accomplish the day-to-day invasive species management activities that may be undertaken in accordance with this MOU. The steering committee provides assistance on such activities to the extent that the participants within a particular CWMA desire such assistance.

E. Identification and Addition of CWMAs that are Associated with the Sonoran Desert Invasive Species Council. Signatories to this MOU are both members of the Sonoran Desert Invasive Species Council and one or more associated CWMA. The CWMAs that are associated with the Sonoran Desert Invasive Species Council are identified in the numbered attachments to this MOU. For each CWMA information is included on the geographic scope of and participants within the CWMA within the applicable attachment.

New members of the Council and existing CWMAs can be added at any time. Such additions shall be made by addition of an execution page to this MOU that also identifies the CWMA(s) the signatory is joining.

New CWMAs also are eligible to join the council. Addition is accomplished as an amendment to this MOU, which adds a new sequentially numbered attachment that identifies the new CWMA as outlined above and includes the approval of all previously existing signatories. Each new participant must sign an execution page to this MOU.

Appendix C: MOU for the Sonoran Desert Invasive Species Council

VIII. ADMINISTRATION

A. This MOU shall become effective as of 1 January 2003, providing that at least eight of the entities identified in Attachments 1 and 2 combined have signed, and shall remain in effect until modified or terminated.

B. Any signatory, including those signatories that are not members of the steering committee, may withdraw from this MOU at any time by providing 30 days written notice to all other signatories.

C. Any signatory, including those signatories that are not members of the steering committee, may propose modifications to this MOU. Modifications will be in the form of an amendment, or in the case of wholesale substantive changes in the form of a revised agreement, and may be negotiated at any time following 30 days written notice to the other signatories. Modifications shall become effective upon signature of all parties.

D. Nothing in this MOU will be construed as affecting the authority of the signatories, as a binding beyond their respective authorities, or as requiring any of the signatories to obligate or expend funds.

E. The signatories, or representatives of the parties to the agreement, shall meet on at least an annual basis to: (1) review progress on achieving mutual objectives, (2) identify cooperative work priorities for the coming year, and (3) determine whether the MOU should be maintained as is, modified, or terminated.

IX. APPROVAL

Each party to this agreement will indicate their approval by signing a separate execution page. The use of individual pages for each signatory to designate its approval enables adding signatories without having to reissue an execution page that affects other signatories.

Appendix D: MOU for the Coordinated Resource Management in Arizona

MEMORANDUM OF UNDERSTANDING FOR COORDINATED RESOURCE MANAGEMENT IN ARIZONA

AMONG

BUREAU OF LAND MANAGEMENT (BLM)
 FOREST SERVICE (USFS)
 COOPERATIVE EXTENSION (CE)
 FARM SERVICE AGENCY (FSA)
 BUREAU OF INDIAN AFFAIRS (BIA)
 NATURAL RESOURCES CONSERVATION SERVICE (NRCS)
 ENVIRONMENTAL PROTECTION AGENCY (EPA)
 FISH AND WILDLIFE SERVICE (USFWS)
 BUREAU OF RECLAMATION (BOR)
 DEPARTMENT OF DEFENSE (DOD)
 NATIONAL PARK SERVICE (NPS)
 U.S. GEOLOGICAL SURVEY (USGS)
 AGRICULTURAL RESEARCH SERVICE (ARS)
 ARIZONA STATE LAND DEPARTMENT (SLD)
 ARIZONA GAME AND FISH DEPARTMENT (AGFD)
 ARIZONA ASSOCIATION OF CONSERVATION DISTRICTS (AACD)
 ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ)
 ARIZONA DEPARTMENT OF WATER RESOURCES (ADWR)
 ARIZONA DEPARTMENT OF AGRICULTURE (ADA)
 ARIZONA STATE PARKS (ASP)

A. PURPOSE

This Arizona Memorandum of Understanding for Coordinated Resource Management provides the mechanism for private land owners, Native American Tribes, land users, Conservation Districts and state and federal resource management agencies and their cooperators, permittees and leasees to develop coordinated resource management plans for farms, ranches, wildlife habitat, watersheds, or similar resource management units. It also provides the mechanism for agencies with resource management responsibilities in Arizona to work together, share resource information, and develop complimentary policies, procedures, and methodologies where possible. It is intended to foster cooperation and coordination in development and implementation of sound resource management and conservation programs where objectives are of mutual concern.

This Memorandum of Understanding is intended to supplement existing Memorandum of Understanding between and among agencies, tribes, conservation districts, and local governments for coordination of resource management in Arizona.

This Memorandum of Understanding supersedes the February 1991 Arizona Supplemental Memorandum of Understanding for coordinated resource management between the Bureau of Land Management, US Forest Service, Arizona Cooperative Extension, Soil Conservation Service, Arizona State Land Department, Arizona Game and Fish Department, and the Arizona Association of Conservation Districts.

Appendix D: MOU for the Coordinated Resource Management in Arizona

B. ROLES AND RESPONSIBILITIES

1. The Bureau of Land Management administers public lands within a framework of numerous laws. It is the mission of the Bureau of Land Management to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations.
2. The U.S. Department of Agriculture Forest Service manages public lands in national forests and grasslands. The Forest Service also conducts forestry research, and provides technical and financial assistance to state and private forestry agencies.
3. The Cooperative Extension Service works to enhance agriculture, the environment, the natural resource base, family and youth well-being and the development of local communities. They accomplish this mission by the integration, dissemination, and application of knowledge in agricultural and life sciences.
4. The Natural Resources Conservation Service is a federal agency that works in partnership with the American people to conserve natural resources on private lands, and other non-federal lands, through scientific and technical expertise, and partnerships with Conservation Districts and others.
5. The Farm Service Agency mission is to stabilize farm income, help farmers conserve land and water resources, provide credit to new or disadvantaged farmers and ranchers, and help farm operations recover from the effects of disaster.
6. The US Fish and Wildlife Service is responsible for migratory birds, endangered species, freshwater and anadromous fish, the National Wildlife Refuge System, wetlands, conserving habitat, and environmental contaminants.
7. The Bureau of Indian Affairs has a trust responsibility emanating from treaties and other agreements with federally recognized Indian tribes to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of Indian tribes
8. The Environmental Protection Agency mission is to protect human health and to safeguard the natural environment. Their purpose is to ensure clean air, clean water, safe food, pollution prevention, and better waste management.
9. The Bureau of Reclamation manages water related resources west of the Mississippi River. Their mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.
10. The National Park Service promotes and regulates the use of the national parks, whose purpose is to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.
11. The Department of Defense mission is to support the military readiness of the United States armed forces, improve the quality of life for military personnel, and comply with environmental laws to protect human health and the environment.
12. The US Geological Survey provides the Nation with reliable, impartial information to describe and understand the earth, to minimize loss of life and property, manage water, biological, energy, and mineral resources, enhance and

Appendix D: MOU for the Coordinated Resource Management in Arizona

- protect the quality of life, and contribute to wise economic and physical development.
13. The Agricultural Research Service is the research arm of the United States Department of Agriculture. The Service provides access to agricultural information and develops new knowledge and technology needed to solve technical agricultural problems of broad scope and high national priority to ensure adequate availability of high quality, safe food, a viable and a competitive food and agricultural economy.
 14. The Arizona State Land Department is responsible for administering the use and management of Arizona's State Trust lands and for coordinating the Natural Resource Conservation District program in Arizona.
 15. The Arizona Game and Fish Department, acting pursuant to and under the authority of the Arizona game and Fish Commission, is responsible for the use and management of Arizona's wildlife resources. The mission of the AGFD is to conserve, enhance and restore Arizona's diverse wildlife resources and habitats through aggressive protection and management programs, and to provide wildlife resources and safe water craft recreation for the enjoyment, appreciation and use of present and future generations.
 16. The Arizona Association of Conservation Districts represents the Conservation Districts in Arizona, which are legal subdivisions of State or Tribal government. Conservation Districts provide locally led leadership and assist agencies in determining priorities for conservation work.
 17. The Arizona Department of Environmental Quality mission is preserving, protecting and enhancing Arizona's environment, as well as safeguarding the public health. ADEQ is responsible for air quality, water quality, and waste management in Arizona.
 18. The Arizona Department of Water Resources administers state water laws (except those related to water quality), explores methods of augmenting water supplies to meet future demands, and develops policies that promote conservation and equitable distribution of water. The Department also oversees the use of surface and groundwater resources in Arizona. Other responsibilities include management of flood plains and non-federal dams to reduce loss of life and damage to property.
 19. The Arizona Department of Agriculture is responsible for controlling dangerous plant infestations, ensuring the quality of fresh fruits and vegetables, and for protecting Arizona's native plants. The Department is also responsible for protecting the public from contagious and infectious diseases in animals. The Department enforces laws concerning the movement, sale, importation, transport, slaughter, and theft of livestock, and administers feed, fertilizer, and pesticide registration, licensing and compliance.
 20. Arizona State Parks manages and conserves Arizona's natural, cultural and recreational resources for the benefit of the people in Arizona's parks, and through cooperation with their partners.

OBJECTIVES

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1. To recognize that the lands and natural resources administered by the participants of this agreement are part of larger ecosystems that cross administrative and ownership lines.
2. To recognize that effective management of Arizona's lands, natural resources and ecosystems requires cooperation between many federal and state agencies, Conservation Districts, Native American Tribes, local governments, private land owners, and land users.
3. To acknowledge the significance of local objectives and resource concerns in the management and use of resources.
4. To promote coordinated resource management planning where land ownership, resource management responsibilities, and technical assistance responsibilities are intermingled or where coordination is essential to develop and implement a sound resource management plan.
5. To recognize that land owners, land users or agencies are entitled to request that agencies work together on resource planning and management where land ownership, resource management responsibilities, and technical assistance responsibilities overlap.
6. To encourage coordinated collection and use of resource information and monitoring data for making scientifically based resource management decisions, and to promote complimentary policies, procedures, and methodologies where possible.
7. To insure that consultation between agencies and land owners occurs before decisions are made which may affect the use and management of other lands and resources.
8. To provide for a framework for communication and scheduling of coordinated resource management planning, implementation, and monitoring activities on a case-by-case basis, and for a periodic review of planning progress and updating of coordinated resource management plans to insure goals and objectives are being met.

D. SCOPE

1. This Memorandum of Understanding provides the mechanism for agencies, landowners, and land users in Arizona to develop coordinated resource management plans. It also provides the mechanism for resource management agencies in Arizona to work together, share resource information, and develop complimentary policies, procedures, and methodologies where possible.
2. Coordinated resource management plans are developed on a case by case basis by appropriate members of local working groups, and are signed by the participants to document agreement on common goals and objectives for use and management of the resources within a management unit. Coordinated resource management plans represent agreement on a plan of action to achieve common goals and objectives for a specific management unit, and agreement on methods that will be used to evaluate progress toward the goals and objectives.
3. Coordinated resource management plans do not hinder agencies, private land owners, or land users from making necessary decisions to protect the lands or resources they own or administer or to comply with local, state, or federal laws or

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agency policy. Rather, coordinated resource management plans constitute a mutual agreement on a plan of action, and a willingness of agencies to consult, whenever possible, with all involved participants before making decisions, to insure that all resource and human concerns are adequately considered before decisions are made.

E. COORDINATED PLANNING GROUPS

The following groups are established to implement coordinated resource management in Arizona:

1. EXECUTIVE GROUP

- a. The Executive Group is made up of the state or regional executives of the participating agencies to this agreement, who are responsible for administering the resource management activities for their agency in Arizona.
- b. The Executive Group is responsible for insuring that cooperation among agencies and other groups exists for the benefit Arizona's natural resources. They are responsible for directing personnel at all levels of the organizations to be knowledgeable of, and adhere to the purpose, objectives, and scope of this agreement. They will develop, review and adopt uniform policy and procedures and supplemental agreements for coordination and cooperation in Arizona.

2. STATE TASK GROUP

- a. The State Task Group is an extension of the Executive Group. Membership of the Task Group will include state or regional level resource specialists appointed by the Executive Group. The State Task Group will meet at least annually, and other times during the year as appropriate.
- b. The purpose of the State Task Group is to assist the Executive Group in planning, implementation and monitoring coordinated resource management program in Arizona; to exchange information on policies, programs, methodologies and procedures, and issues; and to provide training, technical advice and assistance to the field groups and special working groups.
- c. This group will convey the status of statewide coordinated planning to the Executive Group. They will establish the work areas for each Field Group and maintain the current personnel lists for each Field Group. They will review local planning progress and assist in building goal oriented consensus, help establish priorities for planning, and provide assistance in conflict resolution.

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- d. The State Task Group will identify and work on opportunities, issues and problems in coordinated resource management planning and inter-agency training. They will also develop and maintain Arizona Coordinated Resource Management Handbook and Guidelines, and exchange and distribute resource data mutually beneficial to each agency.

3. FIELD GROUPS

- a. The Field Groups are made up of field staff from appropriate agencies and conservation districts within an Field Group Area designated by the State Task Group. The agencies involved in each field group will vary, depending on the land ownership and administrative responsibilities within each Field Group Work Area. The Field Groups will normally only include those agencies who will be directly involved in prioritizing, developing, implementing, and/or monitoring coordinated resource management planning activities.
- b. Field groups will formally meet at least once each year to exchange information and update, prioritize, schedule and assign agency roles for coordinated resource management activities.
- c. The State Task Group will maintain a working list of management units with planned or existing coordinated resource management activity in each Field Group Area. At the annual meeting the Field Groups will update the status of these management units, make additions or deletions to the list, and prioritize the workload as needed. Problems and areas of conflict should be brought up, discussed, and resolved by the group whenever possible. A member of the State Task Group will keep minutes of these meetings and to provide copies to Field Group participants and to the Executive Group.

4. SPECIAL WORKING GROUPS

- a. The Executive Group may establish, and appoint representatives of their respective agencies to a Special Working Group. The Executive Group may invite other agencies, local governments, universities, publics, producer groups or environmental organizations to participate in the Special Working Group as appropriate.
- b. The Special Working Group will address resource related issues and problems involving the need for a process of conflict resolution and public involvement at the field level which are beyond the traditional scope of the field groups. The Executive group may form a Special Working Group by it's own action, or at the request of anyone with valid issues or problems which are presented to the Executive Group.

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- c. The Special Working Group will define the issue or problem, establish operational guidelines, and develop a goal oriented process for addressing the issue or problem through the building of group consensus.
- d. The Special Working Group may call upon the State Task Group for assistance as necessary and will keep the Executive Group informed of progress and recommendations as they are developed.

F. MEETINGS

- 1. The State Task Group is responsible for scheduling, organizing, and facilitating the meetings of Executive Group, the State Task Group, and the Field Groups. The State Task Group will designate one person to organize the time and location for each meeting, a member to send out notification of the meeting to all participants, a member to solicit agenda items, and develop the agenda for each meeting, a member to facilitate each meeting, and a member to keep and send out minutes following each meeting. The State Task Group will call special meetings when requested by any party to this agreement with 15 days notice.

G. COORDINATED RESOURCE MANAGEMENT PLANNING PROCEDURE

- 1. A request for a coordinated resource management plan can be initiated at any time by a resource management agency, a Conservation District, a private land owner, a Native American Tribe, a land user or other appropriate party. The requests will be communicated to the appropriate members of the Field Group and arrangements will be made to hold an initial planning meeting. If a Field Group does not exist in the area, the State Task Group will establish the group.
- 2. At the initial planning meeting the involved parties will make arrangements to organize and execute the planning and implementation process. The development and implementation of a coordinated resource management Plan normally includes the following steps.
 - a. Determine the area involved, agree on the lead agency, and identify all other parties that should be invited to participate on a case-by-case basis.
 - b. Develop time schedules and responsibilities for completion of inventory, plan development, and monitoring activities.
 - c. Conduct necessary resource inventories. Inventory and monitoring methods, proposed improvements and land treatment, and responsibilities for implementation, will be agreed upon during the coordinated planning process. Coordinated resource management planning is accomplished through a team approach, involving all appropriate agency representatives, land owners, and/or the land user.
 - d. Develop the coordinated resource management plan. Record inventory data, decisions and other appropriate information on appropriate mosaics,

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maps, sketches, forms, or other documents. Responsibility for funding and the schedule of implementation, as appropriate, will be shown. It is recognized that funding as recorded indicates intent, but performance depends on yearly finances of the responsible party.

- e. All participants sign the coordinated resource management plan. Each group or agency will designate the appropriate representative who will sign coordinated resource management plans. The signed plan represents a mutual agreement on the plan of action that will be taken for the management unit. A copy of the inventory data and coordinated resource management Plan will be provided to all participants involved.
- f. Implement the coordinated resource management plan. All participants will normally agree to participate in planned monitoring to determine if the objectives of the coordinated resource management plan are being achieved. Management adjustments or changes should be based on monitoring data. Copies of all monitoring data will be provided to all participants.

H. MODIFICATIONS TO THIS AGREEMENT

1. This agreement can be modified in writing upon the consent of the parties at any time. It is re-negotiable at the discretion of any one of the parties.

I. DURATION OF THIS AGREEMENT

1. The Executive Group will formally review this agreement five years after its execution, and each two years thereafter. The continued participation of any party to this agreement is subject to cancellation at any time, upon written notification.

J. FINANCING

1. This agreement is a Memorandum of Understanding of the parties responsible. Any work under this MOU and any amendment pursuant thereof will be regulated by the laws, policies and funding provisions governing the activities of the parties.
2. Nothing herein shall be construed as obligating the parties to expend funds or be involved in any contract to other obligation for the future payment of money in excess of legal appropriations which are authorized and allocated for this planning and work.

K. GENERAL POLICIES AND REQUIREMENTS

1. Federal parties to this agreement, except those exempted agencies, are required by the policies of the National Environmental Policy Act (NEPA) to ensure that environmental impacts receive full consideration during the planning process. Procedures for environmental assessment and preparation of environmental

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documents required for compliance with NEPA, where applicable have been developed by each agency.

2. Pursuant to A.R.S. Section 35-214 all parties shall retain all books, accounts, reports, files and other records pertaining to this agreement for five (5) years after completion of a project and shall make them available to the State for inspection and audit at reasonable times.
3. This Agreement is subject to cancellation by the Governor of Arizona pursuant to A.R.S. Section 38-511, the provisions of which are incorporated herein.
4. All parties to this Agreement shall comply with State of Arizona Executive Order No. 75-5 "Prohibition of discrimination in State contracts--Nondiscrimination in employment by government contractors and subcontractors", which is made a part of this Agreement.
5. The program conducted will be in compliance with the nondiscrimination provisions as contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 CFR-15, Subparts A & B) which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity, receiving federal financial assistance from the Department of Agriculture or any agency thereof.
6. To the extent permitted by federal law, parties shall use arbitration, after exhausting applicable administrative review, to solve disputes arising out of this Agreement as required by A.R.S. Section 12-1518.

