

The IDAHO INVASIVE SPECIES STRATEGIC PLAN 2012-2016



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Executive Summary

Invasive species introduced into Idaho are affecting plant and animal communities on farms, ranches, parks, waters, forests, natural areas, and in backyards. Human activity such as trade, travel, and tourism have all increased substantially, escalating the speed and volume of species movement to unprecedented levels. That's why as Idahoans we must take care about the invasive species we allow to move into and around our state.

Invasive species, including weeds, are often unintended hitchhikers on conveyances, animals, and people. Still more nonnative species are deliberately introduced as pets, ornamental plants, crops, biofuels, food, for recreation, or other purposes. Most nonnative species brought into Idaho, including most of our sources of food and fiber, are not harmful; many are highly beneficial. However, a small percentage of introduced nonnative species do cause great harm to the environment and the economy of the state.

*Nonnative species, including their seeds, eggs, spores, larvae or other biological material capable of propagation, that cause economic or environmental harm and are capable of spreading in the state are collectively known as **invasive species** in Idaho.*

Invasive species cost the state millions in control and management each year. Science and common sense tell us it is cheaper and more effective to prevent invasive species invasions than to manage them once established. We must focus our limited resources on preventing invasions or treating to eradicate them early in the invasion cycle.

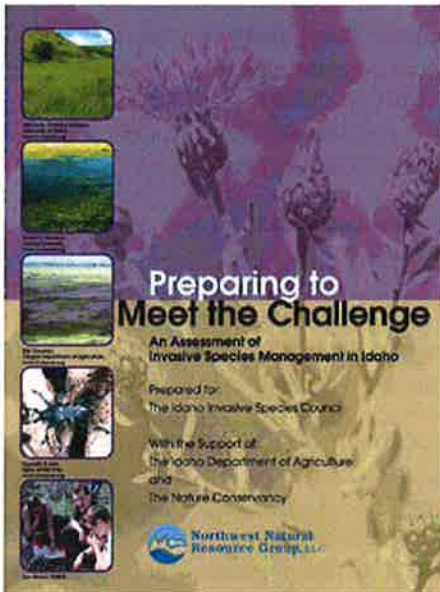
This strategic plan outlines a framework for how Idaho can continue at the forefront of state efforts to cost-effectively prevent and manage invasive species.

This strategy focuses upon three **Goals**:

1. **Prevent** the introduction of new invasive species to Idaho.
2. **Limit** the spread of existing invasive species populations in Idaho.
3. **Abate** ecological and economic impacts that result from invasive species populations in Idaho.

Invasive species include terrestrial and aquatic plants and animals.

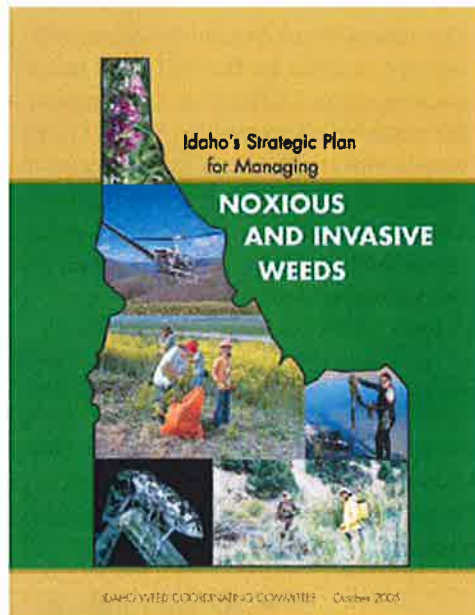
Introduction



Idaho's first *Strategic Plan for Managing Noxious Weeds* (1999) was published as a result of the Governor's Weed Summit held in 1998. This forward-thinking plan set into motion a wide variety of efforts to coordinate weed management in Idaho. This plan sparked the nationally-recognized Cooperative Weed Management Area (CWMA) concept and established the Idaho Weed Coordinating Committee (IWCC). The IWCC updated the *Strategic Plan for Managing Noxious Weeds* in 2005, and continues to strive to promote cooperation among participating agencies and entities.

In 2005, the newly-established Idaho Invasive Species Council (IISC) prepared *Idaho's Action Plan for Invasive Species* for then-Governor Kempthorne. In the past five years, the Council and partners have completed many of the tasks laid out in the Action Plan. Idaho now has a comprehensive Invasive Species Law, a dedicated Invasive Species Fund and a progressive statewide prevention program.

The 2005 weed and invasive species strategies have successfully guided the two programs for the last six years. Idaho has surpassed most of the benchmarks these plans established. In addition, Idaho's programs have become a model for many western states. This 2012 strategy aims to build off those successes and develop an "all taxa" blueprint for the next five years.



Two other related plans interconnect with this 2011 effort. Idaho's 2007 Aquatic Nuisance Species (ANS) Plan identified 21 gaps in state programs needed to effectively prevent and control aquatic nuisance species. Idaho's Strategic Plan for Biological Control of Noxious and Invasive Weeds (2008-2018) identifies five program goals developed by local, state, and federal partners.

The 2012-2016 Invasive Species Strategy (2012 Strategy) is not intended to replace the state ANS and Biological Control plans. They are referenced heavily in this document, and provided valuable technical guidance in the development of the 2012 Invasive Species Strategy. The major plan elements align well, and the plans should be considered complementary in nature.

Invasive species issues span geographic boundaries in Idaho; thus efforts to prevent and manage invasive species must be coordinated across taxa and jurisdictional boundaries. The 2012 Strategy is the first combined revision of the previous Noxious Weed and Invasive Species Plans. This document will guide efforts (including overall cross-taxa strategies and objectives) to prevent, control, and minimize invasive species and their impacts in Idaho over the next five years. The IWCC, IISC, state, federal and local agencies, nongovernmental organizations, private industry partners, industry stakeholders, and other experts have provided input in drafting this revision.

Background

Invasive species, including weeds, are often unintended hitchhikers on conveyances and people. Still more nonnative species are deliberately introduced as pets, ornamental plants, crops, biofuels, food, for recreation, or other purposes. The vast majority of nonnative species brought into Idaho, including most of our sources of food and fiber; are not harmful; many are highly beneficial. However, a small percentage of introduced nonnative species do cause great harm to the environment and the economy of the state.

Nonnative species, including their seeds, eggs, spores, larvae or other biological material capable of propagation, that cause economic or environmental harm and are capable of spreading in the state are collectively known as invasive species in Idaho.

The Idaho definition includes many types of species such as animals, plants, and microorganisms. It focuses upon invasive species which are harmful, rather than focusing on nonnative species, most of which are not harmful. It does not include crops, improved forage grasses, domestic livestock, or other beneficial nonnative organisms

Invasive species such as hydrilla and quagga mussels, may prey upon, crowd out, displace, or otherwise harm native species. Some invasive species also alter ecosystem processes, transport disease, interfere with crop production, or cause disease in animals; affecting both aquatic and terrestrial habitats. For these reasons, invasive species are of local, state, national, and global concern.

There are a number of regional and statewide organizations involved in the management of noxious weeds and invasive species across Idaho. Organizations such as the Idaho Weed Control Association (IWCA), the IWCC, the Idaho Association of Weed Control Superintendents (IAWCS), the IISC, the Columbia River Basin (CRB) Aquatic Nuisance Species team, the Western Weed Coordinating Committee (WWCC) and the Western Regional Panel (WRP) all work together to provide cohesive invasive species management. Other organizations focus their efforts on specific noxious weeds and invasive species in the state, such as the Hawkweed Action Committee, Leafy Spurge Task Force, and the Aquatic Nuisance Species Task Force.

The IWCA was formed in 1929 and promotes responsible weed management stewardship through education, communication, and public policy. The IWCA maintains an active membership and networks with appropriate organizations (state and federal agencies, county superintendents, universities, and industry) to develop professional relationships.

The IAWCS coordinates information sharing, education, and professional development among county weed control superintendents. IAWCS works closely with county government officials, state and federal agencies, and private landowners to control and eliminate noxious weeds at a local level.

The IWCC was created in 1999. Membership includes county, state, and federal agencies, IWCA, IAWCS, Nez Perce Tribe, University of Idaho, Idaho Association of Counties, and The Nature Conservancy of Idaho. The purpose of this group is to discuss and report to IWCA on issues, laws, and policies regarding noxious weeds in Idaho.

The Idaho Weed Awareness Campaign (IWAC) was created in 2001 by the IWCC. Its mission is public awareness and education to help people understand the economic and environmental impacts of noxious weeds and support integrated weed management. IWAC encourages the general public to develop and participate in invasive weed eradication and management programs, and to assist in preventing the spread of invasive weeds.

Idaho's first Strategic Plan for Managing Noxious Weeds (1999) was published as a result of the Governor's Weed Summit held in 1998. This forward-thinking plan set into motion a wide variety of efforts to coordinate weed management in Idaho. This plan sparked the nationally-recognized CWMA concept and established the IWCC

Cooperative Weed Management Areas

CWMAs form the basic local unit for cooperation in invasive weed management in the state of Idaho. CWMAs are organizations that integrate noxious weed management goals and resources across jurisdictional boundaries in order to benefit entire communities. CWMAs provide a framework that allows federal, state, and local agencies and other landowners to set common goals and priorities for the prevention and management of invasive weeds and pool resources for their accomplishment.

The primary concept behind creating a CWMA is to share resources ranging from simple hand tools to years of experience and knowledge gained by a variety of partners. Once these “resources” are combined, they create a unique synergy that allows the group to develop common goals and focus on how projects over a landscape comprised of multiple ownerships can be implemented utilizing the tools and resources available from all of the CWMA participants.

One of the most prominent benefits of a CWMA is the success that these groups have in removing communication barriers between the federal, state, county, city, and private sectors. Nearly 90% of the land area of the state falls within Idaho’s 33 established CWMA’s.

While every CWMA is structured differently to suit local needs, there are some basic components that each group shares. CWMA’s are based on the development of a common agreement that defines:

- Land area covered by the CWMA
- Partners or membership
- Legal authorities of agencies and landowners for management of invasive weeds
- Steering committee and leadership
- A strategic plan with goals, objectives, and priorities
- Annual operating plans describing activities, responsibilities, and reporting

This agreement is usually formalized through a Memorandum of Understanding or similar agreement signed by the CWMA participants. Management of the organization is carried out by a chairperson and steering committee of key individuals who represent the CWMA partners. The steering committee ensures that all parties have a venue for input and that annual activities focus on priorities laid out in the strategic plan.

The CWMA provides a mechanism for the group to augment funding through cooperative agreements, grants, and other avenues. The financial management of a CWMA may be operated through a county with a revolving weed trust fund, through a Resource Conservation and Development Program, through a nonprofit corporation, or similar institutions.

CWMA’s have been widely recognized nationally as a model for organizing effective weed management programs at the local level. They bring together all interested and concerned parties in a geographic area for the purpose of combining expertise, energy, and resources to deal with common problems.

Invasive Species Program

The Idaho Invasive Species Program was initiated in 2005 to improve the coordination of activities within the state. The Idaho Invasive Species Council was established by Executive Order (E.O. 2001-11). The Director of the Idaho State Department of

Agriculture (ISDA) chairs the Council, per this Executive Order (continued as E.O. 2006-28). Membership includes a representative from the Office of the Governor and the directors (or their designee) of the Idaho Department of Environmental Quality, the Idaho Department of Parks and Recreation, the Idaho Department of Fish and Game, the Idaho Department of Lands, the Idaho Department of Water Resources, the Idaho Department of Commerce & Labor, the Idaho Department of Health and Welfare, and the Idaho Transportation Department. Representatives and members of federal

Photo by Nez Perce Tribe Bio-Control Center.



CWMA’s are an effective way to organize at the local level.

entities, local government organizations, tribal governments, Idaho universities, and private and not-for-profit organizations with an interest in invasive species also participate.

The Invasive Species Program coordinates efforts throughout Idaho by working with state agencies, federal agencies, local governments, tribes, and nongovernmental organizations to address the state recommendation to “ensure that a comprehensive invasive species program in Idaho is not diluted by competing efforts among various agencies.” In order to carry this out, a full-time “Invasive Species Coordinator” was budgeted within the ISDA.

In 2005, the newly-established IISC prepared Idaho’s Action Plan for Invasive Species for then-Governor Kempthorne. In the past five years, many of the tasks laid out in the Action Plan have been completed. Idaho now has a comprehensive Invasive Species Law, a dedicated Invasive Species Fund and a progressive statewide prevention program.

The Idaho Invasive Species Law (Title 22 Chapter 19 Idaho Code) was enacted by the Legislature in 2008. The intent of this law is to address the increasing threat of invasive species in Idaho by providing policy direction, planning, and authority to combat invasive species and to prevent the

introduction of new invasive species to the state. This law establishes the duties of the ISDA and its Director, authorizes the ISDA Director to promulgate rules, and gives authority to conduct inspections as necessary. It also establishes the Idaho Invasive Species Fund (IISF).

The Invasive Species Prevention Sticker Rules (IDAPA 26.01.34) were enacted by the Legislature in 2009. They require motorized and non-motorized boats to have an Invasive Species Sticker to launch and operate on Idaho’s waters. The sticker program is administered by the Idaho Department of Parks and Recreation. Revenue generated by this program is deposited in the IISF. The IISF is administered by the ISDA. While the sticker program and the invasive species programs are linked through the IISF, the programs are independent in nature.

Through revenue generated by the Invasive Species Prevention Sticker Law, (and deposited in the IISF), ISDA developed a comprehensive statewide prevention program designed to educate the public about invasive species, monitor Idaho water bodies for possible introduction of those species, and inspect and decontaminate watercraft that travel to and through Idaho.



The Idaho Invasive Species Prevention Sticker revenue funds watercraft inspection stations statewide.

The 2012-2016 Strategy

This document is the first revision of the 2005 noxious weed and invasive species plans. The 2012 Strategy will direct efforts to prevent, control, and minimize invasive species and their impacts for the next five years. Agency staff, stakeholders, and other experts have provided input in drafting the 2012 revision, which replaces the 2005 Plans.

Federal, state, local, and tribal governments, as well as organizations in the private sector, have taken significant steps to meet the challenges posed by invasive species. These steps set the stage for the 2012 Strategy and provide direction and focus.

Awareness of the problems caused by invasive species has dramatically increased in the last five years as evidenced by increased activity at federal, state, and local levels. More than 30 states now have invasive species or invasive plants councils. Local governments and citizens groups of all types are active in weed and invasive species prevention and control. Despite the significant increase in activity and awareness, much remains to be done to prevent and mitigate the problems caused by invasive species.



YOU AND YOUR BOAT ARE THE SOLUTION

SAVE OUR WATERWAYS AND SAVE MONEY

One of the best things about living in Idaho is the clear, pristine water that flows from the mountains. Our beautiful lakes, rivers, and reservoirs provide the recreation we all enjoy, plus the green, low cost hydropower we depend on to fuel our lives.

Don't let a few mussels or other invasive pests devastate our waterways and raise your power bill. Show your support: Purchase and display your sticker today.

Watercraft are the primary transporters of Quagga and Zebra mussels. If you have traveled to, or recently purchased a boat outside of Idaho, please make sure you do the following before transporting the boat:

- INSPECT** all exposed surfaces. Small mussels feel like sandpaper.
- WASH** the boat thoroughly with high pressure or hot water.
- REMOVE** all plant and animal material.
- DRAIN** all water and dry all areas.
- WAIT** five days and keep your boat dry between launches.

Find out more: 1-877-336-8676 invasivespecies.idaho.gov

REMEMBER, YOU MUST BUY AND DISPLAY A ISPF STICKER TO LAUNCH IN IDAHO
invasivespecies.idaho.gov or parksandrecreation.idaho.gov



CLEAN DRAIN DRY SAVE

STOP INVASIVE SPECIES



The Structure of the 2012 Strategy



Photo by Ed Bottom

Houndstongue seeds on a vehicle

The 2012 “all taxa” Invasive Species Strategy is focused upon three strategic “Goals.”

Goals:

- **Prevent** the introduction of new invasive species to Idaho.
- **Limit** the spread of introduced invasive species in Idaho.
- **Abate** ecological and economic impacts that result from invasive species populations in Idaho.

The Strategy is structured around **Objectives** that are used to accomplish the Goals.

Each **Objective** has respective **Action Items** to describe what agencies and organizations expect to do in order to accomplish that **Objective**.

I. Goal

IA. Objective

IAa. Action Items

Note: The 2012 Strategy is not a comprehensive list of all possible invasive species actions that need to be taken in Idaho. Rather, the 2012 Strategy outlines achievable objectives and concrete action items to complete in the next five years. The 2012 Strategy was developed in conjunction with a variety of organizations and stakeholders and aims to address information voids, coordination gaps, funding issues, and technical constraints.

Goal I. Prevent the Introduction of New Invasive Species to Idaho.

Prevention is the state's first-line of defense. It is the most cost-effective approach because once a species becomes widespread; controlling it requires significant and sustained expenditures. Therefore, public investment in prevention tools, resources, and infrastructure is indispensable in protecting recreation, agriculture, and the environment.

Long-term success in prevention reduces the rate of introduction, the rate of establishment, and the damage from additional invasive species in Idaho. Measuring success requires accurate taxonomic identification, baseline data, and monitoring systems to measure long-term trends.

Objective I-A: Encourage Regional Cooperation and Coordination.

There are many important groups working on regional invasive species goals including the Western Weed Coordinating Committee, the Western Regional Panel on Aquatic Nuisance Species, the Pacific Northwest Economic Region and the Aquatic Nuisance Species Task Force and its Columbia River Basin Team. The Strategy's goal is to foster cooperation and coordination to protect Idaho's environment and minimize social and economic impacts caused by invasive species.

A number of groups coordinate efforts at the national level. For example, the National Plant Board, the Weeds Across Borders organization, The Federal Interagency Committee for the Management of Noxious and Exotic Weeds, the National Invasive Species Council, the Aquatic Plant Management Society, the Weed Science Society, and the North American Invasive Species network all work to foster effective, efficient, and harmonized programs; to act as an information clearinghouses; and to encourage coordination and collaboration with state, federal, and international agencies.

Because many harmful species hitchhike in packing materials and shipping containers, international coordination is also essential. The issue of invasive species is global in nature and efforts to manage our borders likely will depend on more effective global strategies to manage pathways.

Federal agencies such as the Department of Homeland Security's Customs and Border Protection and the Department of Agriculture's Animal Plant and Health Inspection Service contribute greatly, conducting inspections and risk assessment at border entries

Objective I-A Action Items:

- Build and sustain effective multi-jurisdictional partnerships and outreach programs for collaborative and coordinated management of invasive species in Idaho and surrounding jurisdictions.
- Support the use of coordination success models such as cooperative weed management areas and regional coordination entities.
- Work cooperatively with neighboring states and Canadian provinces to share information related to invasive species distributions and the invasive potential of species not yet in Idaho.
- Work cooperatively to prevent the expansion of invasive species from Idaho to neighboring states.
- Initiate reciprocity agreements for prevention programs with other western states, tribes, and Canadian provinces.
- Explore the possibility of establishing Regional Cooperative Invasive Species Management Areas (CISMAs) for the coordinated management of multiple taxa.

- Encourage regional committees and local governments to share issues and coordinate management across jurisdictional boundaries through meetings, trainings, and other forms of communication with bordering states, tribes, and Canadian provinces.
- Help secure stable, long-term funding, resources, and staffing for coordination of partnerships and outreach programs.
- Clearly define the roles and responsibilities of all relevant government and resource agencies, affiliated groups, and individuals.
- Increase public awareness of the impacts of invasive species and the importance of prevention, detection, and control.
- Promote the application of coordinated research to improve identification and control of key EDRR invasive species.
- Provide for well trained agency personnel that engage in invasive species detection and control activities.

**Objective I-B:
Determine Species that Should be Excluded from the State.**

The state needs reliable information on emerging threats and new species arriving here. Without it, intervention is not likely to be timely or successful. Early detection of new



Training to properly identify species is key to prevention.

infestations requires vigilance and regular monitoring of managed areas and surrounding ecosystems. A prompt and coordinated response to a new species can reduce environmental and economic impacts, reduce management costs, and result in less damage to the state’s resources.

Government agencies charged with protecting Idaho’s borders do an admirable job with available resources. However, the state remains vulnerable to new threats. New invaders continue to arrive in times of stagnating and fluctuating budgets. A cohesive, statewide strategy to identify new species and prevent their establishment will enhance the efforts of all groups and agencies working to maintain the biological health and richness of Idaho. Stopping an invasive species – either before it reaches the state, or shortly after it arrives – is far less expensive than trying to remove the invader once it becomes established.

In order to effectively prevent new invasive species from becoming established in Idaho, it is important to know which species have the potential to cause economic and environmental harm. Although lists of potential “bad” species become outdated as advances in science are made and unintentional introductions occur, this objective will provide guidance to resource managers as to which species should be targeted for prevention efforts.

Objective I-B Action Items:

- Evaluate and implement methods for preventing the introduction and spread of invasive species.
- Evaluate prohibited species lists of other western states.
- Utilize risk-assessment tools to develop lists of species that are invasive elsewhere and should be monitored and/or prevented from being introduced to Idaho. These lists should be reviewed annually by taxonomic experts to assure they represent the most up-to-date information.
- Review statutory authorities related to prohibited species in Idaho.

Case Study 1

The Need for Prevention – A Zebra and Quagga Mussel Case Study

Zebra and quagga mussels are native to the Black and Caspian Seas. Both species of mussel can wreak havoc when introduced to a new environment by disrupting the natural food chain and crowding out native species. They are prolific and range in size from microscopic to the size of a fingernail, attaching themselves to hard and soft surfaces. They were introduced to North America's Great Lakes in ballast water from Russia in the late 1980s.



Soon after introduction, the invasive mussels spread throughout the Great Lakes region, resulting in hundreds of millions of dollars in damage to water delivery systems in the east.

They were first detected in the western United States in January 2007 in the Lake Mead National Recreation Area. They have since spread throughout the Colorado River system and are now found in several other western states.

Although the mussels are not established in Idaho's lakes and reservoirs, most waters of the state are vulnerable to future invasion. Calcium and temperature levels are suitable for them to establish in Idaho. As these mussels are transported primarily by watercraft, state resource managers have developed programs to ensure that the invasive mussels are not introduced to Idaho's waters via mussel-fouled boats that have been in mussel-infested waters of other states. Idaho's watercraft inspection station program focuses on boats from impacted states as they cross the state line.

In addition to devastating environmental impacts, zebra and quagga mussels pose an economic threat to Idaho. The mussels can colonize on hulls, engines, and steering

components of boats, other recreational equipment, and can damage boat motors and restrict cooling. The invasive species also attach to aquatic plants and submerged sediment and surfaces such as piers, pilings, water intakes, and fish screens. The mussels frequently settle in massive colonies that can block water intake and threaten municipal water supply, agricultural irrigation, and power plant operations.

From 1993 to 1999, congressional researchers estimated that an infestation of zebra mussel in the Great Lakes cost the power industry alone \$3.1 billion with a total economic impact to industries, businesses, and communities of more than \$5 billion. Given the well-documented impacts these species have had in the Great Lakes, many western states are on high alert to contain, control, and prevent their spread. The states of Nevada, California, Arizona, Colorado, and Utah each have detected these species in critical water supply systems, and are attempting to minimize impacts. Quagga mussel veligers (the immature stage of the mussels) have been found in a Utah waterbody that is 130 miles from the Idaho state line.

Zebra and quagga mussels have not been found in Idaho waters to date. In order to understand the potential impacts of these species to

Idaho, ISDA examined existing databases and published research to generate estimates on comparable occurrences in Idaho. The results reflect an estimated cost of direct and indirect impacts on infrastructure and facilities that use surface water. Most of the published data examined does not report annual costs; however, annual maintenance costs would be expected to increase for all of the categories examined. In some cases, economic impacts could not be estimated. For example, no comparable economic data exists for mussel impacts on irrigation systems; therefore they are excluded from the potential cost estimates. These estimates are considered conservative and for the most part are reported in 1997 dollars, not adjusted for inflation.

Hydropower

These estimates were based on a Bonneville Power Administration (BPA)-commissioned study that examined the estimated hydropower maintenance costs associated with zebra mussel by examining the Bonneville Dam First Powerhouse, costs associated with Asian clam control at Bonneville, and a survey of zebra mussel mitigation costs at other hydropower generation facilities in North America. The study estimated the costs for installing sodium hypochlorite systems and applying antifouling paint to 13 federal hydroelectric projects in the Columbia River Basin. The Idaho estimate was based on the BPA average cost per project (\$1.8 million) for the 26 hydropower dams in Idaho (Phillips et al. 2005).

Other Dams

Other dams include water impoundment structures not associated with power generation. These structures will incur maintenance costs associated with mussel fouling of pipes and structures. Estimate based on figures from O'Neil (1997) for navigational lock structures (\$1,700 per structure) applied to 86 structures in the state.

Drinking Water Intakes

The drinking water facilities included in this analysis are facilities that draw surface water for municipal or public drinking water use. Mussels foul intake piping and water processing infrastructure, increasing maintenance costs and degrading water flavor due to mussel

waste and decomposition in water lines. Private single family home water intakes for drinking and irrigation are not included in this estimate. Estimates based on O'Neill (1997) figures from water treatment facilities (\$42,000 per facility) applied to 100 facilities in Idaho.

Golf Courses

Golf courses are at risk for additional maintenance costs for irrigation systems. Fouling of pipes and pumps and clogged sprinklers are projected to increase operating expenses. Estimates based on O'Neill (1997) costs from golf courses (\$150 per facility) applied to 114 Idaho courses.

Boating Facilities

Boating facilities include marinas, docks, and boat launches. Increased cost estimates are based on maintenance associated with dock and boat launch fouling. Estimates based on O'Neill (1997) figures from marinas (\$750 per facility) applied to 380 Idaho facilities.

Fish Hatcheries and Aquaculture

Hatcheries and aquaculture facilities are vulnerable to zebra/quagga mussel fouling. Pipes, pumps, and raceway structures are all subject to increased operations and maintenance costs. Estimates based on O'Neill (1997) figures for hatcheries and aquaculture impacts (\$5,800 per facility) applied to 163 facilities in Idaho.

Boater Costs

More than 90,000 motorized boats were registered in the state of Idaho in 2007. Potential increases in boater costs are based on estimates for anti-fouling paints and increased per-boat maintenance costs. Estimates based on Vilaplana et al. (1994) for increases in boater maintenance costs (\$265 per boat).

Fishing Use

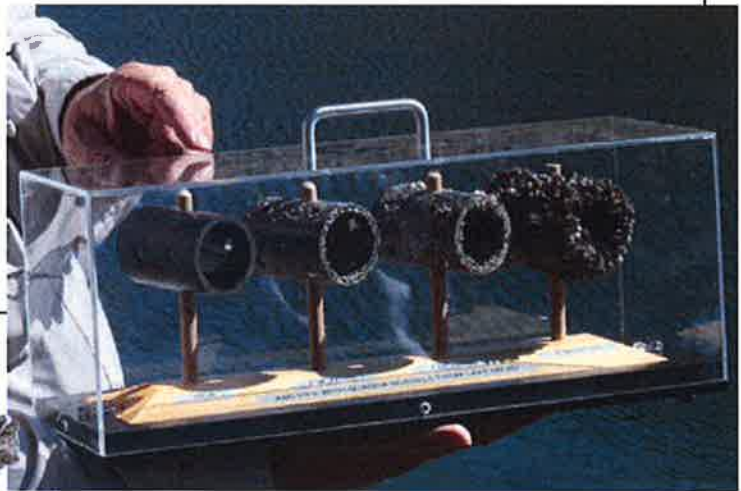
Recreational fishing is a \$430 million industry in Idaho. Research on impacts of mussels on fisheries is limited but reductions of fish numbers are likely. Vilaplana et al. (1994) found a 4% decrease

in boater recreation because of mussel introduction. Estimate based on a 4% reduction of use applied to 2,917,972 Idaho fishing trips a year averaging \$150 per trip (IDFG 2003).

Irrigation

56,175 points of diversion (POD) were identified in Idaho by the Idaho Department of Water Resources. Multiple points of use (POU) may be associated with each POD. Each **POD and POU** could be affected by the introduction of zebra or quagga mussels. These mussels can grow up to 0.5mm / day under ideal conditions and could impact water conveyances that are seasonally dry. Fouling from mussel establishment is cumulative and increased fouling and flow reduction would occur in ditches, pipes, pumps, fish screens, and diversion structures over time. Published research on mussel-related flow reduction in irrigation systems is minimal, but mussel establishment in pipes and pumps is well documented. The true impacts of zebra and quagga mussel introduction on irrigated agriculture in Idaho are uncertain, but there is a high likelihood that these mussels will increase maintenance costs for operations that rely on surface water for irrigation.

Facility	Number	Estimated Cost Per Unit	Estimated
State-Wide Cost			
Hydro Power	26	\$1,817,000	\$47,242,000
Other Dams	86	\$1,730	\$148,700
Drinking Water	100	\$42,870	\$4,287,000
Golf Courses	114	\$150	\$17,100
Boat Facilities	380	\$750	\$285,000
Hatcheries/ Aquaculture	194	\$5,860	\$1,136,800
Boat Maintenance	90,000	\$265	\$23,850,000.
Angler Days (4% reduction)	2,917,927	\$150	\$17,507,500
Irrigation POD	56,175		
TOTAL ESTIMATE			\$94,474,000



**Objective I-C:
Understand Pathways for
Species to Enter the State.**

Pathways are the means by which species are transported from one location to another. Natural pathways such as wind, currents, and other forms of dispersal are morphological and behavioral characteristics that a species has developed and used.

Man-made pathways are those pathways which are enhanced or created by human activity. These are characteristically of two types. The first type is intentional, which is the result of a deliberate action to translocate an organism. Examples of intentional introductions include the intended movement of living seeds, whole plants, or pets. The second type of a man-made pathway allows organisms to be moved unintentionally. Examples of unintentional pathways are bilge water on watercraft, soil associated with the trade of nursery stock, movement of firewood, and the movement of people.

Objective I-C Action Items:

- Conduct a gap analysis of pathways to identify those in need of greater protection. Utilize risk-assessment tools to identify areas where invasive species may first establish.
 - Determine if establishing “geographic zones” in the state would facilitate prevention efforts.
 - Work with partners to identify gaps in protection; close gaps in regulatory authority, funding, and other areas.
 - Explore the potential to establish cross-taxa invasive species inspection stations at the Idaho state line or locations likely to be initial sites of establishment.
- Develop a pathways assessment for each of the following:
 - The travelling public
 - Anglers/fishing tournaments
 - Equipment (gold dredges, construction, etc.)
 - Recreationalists (ATVs, boats, campers)
 - Pet stores
 - The pet trade
 - Aquarium stores
 - Gardening centers
 - Biomass/green industry
 - Landscape architects/city planners
 - Teachers
 - Aquaculture/fish stocking
 - Commercial haulers
 - Marinas and moorage facilities
 - Internet commerce
 - Firefighting operations
 - Gear manufacturers
 - Translocating wildlife



Potential pathways include the pet trade, moving firewood, water gardening, and unintentional movement of aquatic weeds on boats and trailers.



Case Study 2

Prevention Case Study - Operational Inspection Stations

Idaho's inspection stations are positioned on major highways at or near the Idaho state line during the summer boating season. Boats that have been in impacted states recently (within the last 30 days), watercraft coming from another state (especially commercially hauled boats), boats that show a lot of dirt, grime, or slime below the waterline or boats that have standing water on board are considered "High Risk" to the state of Idaho.

High risk invasive species inspections are thorough. They include a complete visual and tactile inspection of all portions of the boat, including compartments, bilge, trailer, and any equipment, gear, ropes, or anchors. If any biological material is found on the boat or equipment, the inspectors conduct a roadside "hotwash" of the watercraft. This is done to prevent the spread of other invasive species such as New Zealand mudsnail, Eurasian watermilfoil and hydrilla.

If the watercraft inspectors find zebra or quagga mussels on the watercraft during the course of the inspection, the boat is impounded. A more detailed decontamination and re-inspection is conducted on the watercraft before it is allowed to launch into Idaho's waters.

In 2011, ISDA operated 15 inspection stations. Many of these stations were run with the assistance of local governments and conservation districts. The data collected at the inspection stations during the previous (2009/2010) boating season allowed staff to prioritize routes into the state for the 2011 season. Some stations were moved or adjusted to maximize contact with out-of-state and high risk boats.

The State of Idaho has conducted more than 100,000 watercraft inspections since July 4th, 2009. A total of 35 fouled boats have been intercepted and decontaminated before they were allowed to launch into Idaho's waters.



Inspection stations are open throughout the boating season.

Objective I-D: Develop Targeted Education/ Outreach Messages and Tools.

Everyone living in Idaho has a stake in reducing the harmful effects of invading plants and animals. Ultimately, the success of Idaho's strategic plan to address this growing problem will hinge on the collaborative efforts of public agencies – and active participation by the public. Landowners, business owners, boaters, gardeners, consumers, travelers, and others must grasp the problem and support solutions to protect the state's valuable resources.

Objective I-D Action Items:

- Prioritize pathway audiences based on risk.
- Develop an outreach strategy for each pathway audience listed above.
- Develop partnerships that facilitate effective outreach programs within each audience (i.e., specialized messages for the pet trade, internet commerce, recreational boaters and campers).
- Review statutory authorities for measures that can be taken to address how each stakeholder group can effectively participate in preventing the spread of invasive species into the state.

Case Study 3

Noxious Weed-Free Forage and Straw Certification Program

The purpose of the ISDA Noxious Weed-Free Forage and Straw (NWFF&S) Certification Program is to limit the introduction and spread of noxious weeds through forage and straw onto United States Forest Service (USFS) and other Idaho lands. In addition, the weed-free certification program allows for the transportation and sale of certified Idaho forage and straw products into and through states and other boundaries where restrictions are placed on such commodities. An example of such restrictions include the U.S. Forest Service requirement (Weed-Free Hay Order) that forage used on USFS lands be certified as noxious weed free, and fire rehabilitation or roadside maintenance contracts require the use of noxious weed free straw or mulch. The following products meet the USFS Weed-Free Hay Order requirements: State Certified Noxious Weed-Free Hay, Cubes, and Straw. Pelletized

feed meets the USFS requirements; it is not required to be certified, because the pelletizing process (heat) destroys seed viability. ISDA recommends pre-feeding your animals State Certified Noxious Weed-Free Forage (hay or cubes) or pellets 48 hours prior to entering USFS lands. It is also suggested before leaving home, to thoroughly brush and clean hooves to remove potential seeds from your animals.

To help growers meet these requirements, the ISDA has promulgated the NWFF&S Certification Rules <http://adm.idaho.gov/adminrules/rules/idapa02/0631.pdf>. Idaho's program is managed by ISDA and each county. For a field to be certified noxious weed free, it must be inspected by an ISDA certified inspector prior to, but no sooner than, ten days BEFORE harvest. There is a fee for the inspection.



Idaho's noxious weed-free hay certification program aims to limit the spread of weeds in forage and straw.

Objective I-E: Contingency Planning for “High Risk” Species.

The chance of eradicating a new population of a highly invasive species is small and depends directly on the ability to respond quickly and effectively as soon as possible. As an example, there is an urgent need to develop control technologies for species such as zebra and quagga mussels in Idaho’s systems. Water managers in impacted western states (CA, NV, AZ, and TX) have been forced to scramble to develop control technologies within water delivery infrastructure systems. This work began shortly after the discovery of the mussels in the Lake Mead National Recreation Area in 2007. Unfortunately, control options for lakes, rivers, and naturally flowing river systems are poorly-developed. To date, there are no known control technologies available for use outside of closed (infrastructure-type) systems, and Idaho would not have many options for a rapid response.

Objective I-E Action Items:

- Use a risk assessment to evaluate potential pest species and determine threats to Idaho.
- Develop contingency plans for “High Risk” species and/or pathways.



Boat decontamination at Henrys Lake, Idaho.



Quagga mussels can be introduced to Idaho on the insides of boats from infested waters such as Lake Mead.

Goal II.

Limit the Spread of Introduced Invasive Species in Idaho.

Even the best prevention efforts cannot stop all invasive species from gaining a foothold in Idaho. Early detection and rapid response (EDRR) is a critical second defense against invasive species. EDRR increases the likelihood that localized populations will be found, contained, and eradicated before they become widely established. EDRR can slow expansion of invasive species infestations and avoid the need for costly long-term control efforts.

Rapid response activities may address totally new introductions into Idaho or range expansions of previously established species. Timeliness is the key to EDRR. It is critical to quickly mobilize resources to control an infestation before it becomes more widely established

Effective EDRR depends upon the timely ability to answer critical questions such as:

- What is the species of concern, and has it been authoritatively identified?
- Where is it located and where is it likely to spread?
- What harm may the species cause?
- What actions (if any) should be taken?
- Who has the needed authorities and resources?
- How will efforts be funded?

EDRR requires collaboration among state, federal, tribal, and local governments, nongovernment organizations, and the private sector. The ability to conduct EDRR has improved, and a great deal is being accomplished in CWMAs.

Photo by Art Talsma, The Nature Conservancy



Adams CWMA field day.

In order to conduct EDRR, incipient invasive species populations must first be found. Specimens have to be authoritatively identified, and the boundaries of the infestations determined. These essential early detection efforts require resources, planning, and coordination. Invasive species are often detected by chance, but they can also be detected by trained individuals monitoring specific areas. Spatial data and other ecological information are critical to planning and response actions. However, invasive species monitoring, mapping, and taxonomic resources and capabilities are still lacking for much of Idaho (and the United States).

EDRR also includes actions necessary to determine the appropriate response. The process identifies the invasive species interdiction options, timing, and overall strategy for response. Contingency planning that anticipates invasions and coordinates efforts across jurisdictions greatly expedites response efforts.

Many rapid response efforts are led by CWMAs working with private landowners in Idaho. However, invasions can rapidly overwhelm local resources. The ability to share resources across jurisdictional boundaries, form strategic partnerships, and have “ready” access to plans, funds, and technical resources are critical components of this strategic goal.

Case Study 4

Invasive Fish

In 2003, IDFG completed construction on Deer Creek Reservoir located in the Clearwater River drainage near the town of Headquarters, Idaho. The reservoir was built to provide a local put-and-take rainbow trout fishery. In 2006, routine sampling found golden shiner (*Notemigonus crysoleucas*), which is a common bait fish in eastern and mid-western United States. Live golden shiners are used as live bait to catch various bass species and catfish in states such as Mississippi and Tennessee.

Golden shiners had not been documented in Idaho previous to being found in Deer Creek Reservoir. Most likely, local anglers purchased live golden shiners from an internet website. The use of live bait is prohibited by law in Idaho. Golden shiners are a prolific species, if established in a water body, could out-compete the native reidside shiner (*Richardsonius balteatus*), native dace species (*Rhinichthys spp*), and sport fish, for forage. The impact of golden shiners is unknown—however, a significant decline in native and desirable sport fish is a real fear.

Dworshak Reservoir is a major sport fishery, located downstream of Deer Creek Reservoir. In 2003, anglers spent an estimated \$5.99 million on fishing trips to Dworshak Reservoir. In an attempt to keep golden shiners from moving down the drainage and becoming established in Dworshak Reservoir, a rotenone project was implemented on Deer Creek Reservoir in 2006 and all fish in the reservoir and tributary streams were killed. The reservoir was re-populated with rainbow trout in 2007 and annual sampling of the fish population was implemented to verify golden shiners had been eliminated from the system.

In 2010, golden shiners were once again found in Deer Creek Reservoir. The reservoir and tributaries were treated with rotenone to kill the fish population. In addition, the reservoir was completely drained for the entire winter. Only time will tell if this treatment was 100% effective.

To date, the cost to Idaho anglers has been in excess of \$100,000 to control golden shiners in Deer Creek Reservoir.



Golden shiner - invasive species.

Objective II-A: Effective Monitoring and Surveillance.

Idaho has effective programs in place to monitor and respond to many invasive species. However, there are many others for which there is little understanding of the nature and extent of the infestations and the necessary tools to address them. Without such knowledge, it is difficult to fully define the scope of the problem and the state's capacity to respond.

There is a need to compile existing information and conduct a baseline assessment of spatial information for invasive species in Idaho. The baseline will provide an analysis of the worst invasive species in the state, the pathways and areas most affected, and resources most at risk.

Goal 2

Case Study 5

Hydrilla

Hydrilla (*Hydrilla verticillata*) is one of the most aggressive and environmentally disruptive aquatic plants in the world. Hydrilla forms dense monocultures that restrict water flow, degrade water quality, impede recreation, and out-compete native species. Introduced into North America in 1960, hydrilla now is found throughout the southern tier states in the U.S. Hydrilla has been referred to as the "perfect aquatic weed" for its ability to dominate aquatic systems. The identification of hydrilla in Idaho is of particular concern because of the potential to spread downstream into the Snake and Columbia River systems.

Hydrilla was identified in the Bruneau River near Bruneau, ID in December 2007. Surveys found an infestation that extended from Hot Creek seven miles downstream toward CJ Strike Reservoir. Dense beds of plants have been found throughout this area but primarily in areas with geothermal influence. Low densities of hydrilla plants have been found downstream of the identified geothermal area, but plants in this area were usually scattered single plants. Repeated surveys of waters downstream have found no hydrilla in CJ Strike reservoir or downstream in the Snake River. Due to the extremely aggressive and adaptable nature of this plant, ISDA is conducting an aggressive eradication program on this population.

The U.S. Geological Survey determined, through DNA analysis, that the Bruneau River hydrilla is the dioecious biotype. Dioecious hydrilla is typically found in southern tier states in the U.S., whereas the monoecious biotype has been found in colder climates, such as Washington,



Crews work to remove hydrilla in the Bruneau River.

Maine, and Wisconsin. The lower temperature limit of the dioecious biotype is not well established in scientific literature, but its distribution appears to be limited in the U.S. by cold temperatures. The distribution of dense hydrilla in the Bruneau system appears to be limited to the geothermal waters that are found throughout the seven miles of the river system below Hot Creek. Hydrilla found outside of the warm water influenced area is believed to have been deposited as tubers that were moved downstream during high spring flows.

Objective II-A Action Items:

- Compile information on species locations and programs in place.
- Conduct a gap analysis of existing surveillance efforts. Use the results from the pathway gap analysis and the state risk assessments to focus surveillance efforts.
- Establish a reporting procedure for species new to the state.
- Establish rotating all-taxa monitoring protocols for Idaho's landscapes and waters.
- Work cooperatively with neighboring states to identify and contain emerging pest problems.
- Train agency staff to identify key species.
- Engage volunteer groups, organizations, and extension programs such as garden clubs, ATV users, anglers, hikers, boaters, and other users of natural areas to detect and recognize invasive species.
- Build a database of taxonomic experts and make it available online.
- Engage a network among landowners, public land managers, conservation organizations, botanists, scientists, the academic and research community, and weed organizations to report new invasive species populations.
- Encourage research opportunities to determine or forecast conditions that make systems vulnerable to introduction or establishment of invasive species; and establish risk assessment procedures to determine invasive potential of new species to the state.
- Engage the horticultural industry and the pet trade in preventing the spread of invasive species by discouraging the sale, promotion, or transportation of invasive species and monitor direct mail marketing and internet sales of invasive species.
- Provide annual training to all relevant county, state, and federal agency personnel in invasive species, transmission pathways, and prevention and decontamination techniques.

Monitoring

Systematic monitoring is an important component of the state's Early Detection and Rapid Response (EDRR) program. For example, in the event that zebra or quagga mussels are found in the state, early detection will be important to the potential for successful eradication. Idaho's water bodies have been prioritized based upon; calcium levels, number of launches, use by recreational boaters, and threats to endangered species. The aim of the prioritization exercise is not to provide a definitive list of which water bodies are likely to be invaded in any particular order; rather it is a tool to focus the use of limited resources. Ninety "Critical" and "Very High" risk water bodies have been identified for monitoring for zebra and quagga mussels. Idaho water bodies were sampled several times throughout the year in an effort to detect spawning events and/or veliger presence.

Objective II-B: Contingency Plan Implementation.

Managers need to respond quickly and efficiently to prevent the spread of a newly-introduced invasive species. Precious time can be lost during the process of determining authority or funding, obtaining permits, and coordinating responses. In addition, managers may not have access to the tools needed to respond with the utmost effectiveness and least amount of environmental disturbance and cost. There is a need to enhance communication channels to facilitate rapid responses when needed. One barrier to action is the lack of authority for species not on a regulation list. There are species in Idaho of limited distribution and state resources cannot be used.

Objective II-B Action Items:

- Increase and enhance communication to ensure coordinated approaches are supported and tools are accessible to address an emerging pest issue.
- Ensure the federal permitting processes are understood and processes are expedited to enable quick responses for all likely control actions.
- Clarify jurisdiction and authority between federal, county, and state agencies to support coordination across boundaries.

- Bring together federal, tribal, and environmental protection entities; industry stakeholders; and state and local coordinators to develop a process for coordination.
- Enhance capacity to respond to invasive species by improving agencies' access to emergency funding and building on existing efforts to develop an interagency early detection and rapid response network.

**Objective II-C:
Close Pathways for Additional
Populations, or Spread of
Incipient Populations into Non-
impacted Parts of the State.**

Once a new invasive species arrives in Idaho, it is important to understand the pathway by which it arrived. This is important to prevent additional inoculations and to prevent the species from spreading from the point of introduction to non-impacted parts of the state. This can be seen as the in-state version of prevention.

Objective II-C Action Items:

- Identify the pathway that supported the new infestation and that will allow for expansion to additional areas.
- Identify and implement the actions needed to eliminate or manage these pathways.
- Train “non-traditional” groups and agency personnel to identify key species and prevent their spread within Idaho.
- Collect data from invasive species possession and transport permitting process to better understand actions that can be taken to minimize the movement of high-risk materials within the state.
- The following are examples of actions that might be implemented for an aquatic species pathway associated with activities in, on, or around state waters:
 - Adopt environmentally safe disinfection procedures for all activities in, on, or around state waters, including state and federal agency field personnel activities.
 - Phase out the use of felt-soled waders in state waters, where practical.
 - Encourage the use of “boot washing” stations at all public access points.



Goal III. Abate Ecological and Economic Impacts that Result from Invasive Species Populations in Idaho.

Eradication of an invasive species that is already widespread may not be feasible. Widespread invasive species are subject to control and management efforts that slow or prevent range expansion and lessen the environmental and economic impacts of invasive populations.

Invasive species can span geographic and jurisdictional boundaries. Their control and management requires communication and coordinated action across jurisdictions. Information on the distribution, abundance, rates of spread, and impacts is critical to containing invasive species.

Impacts of terrestrial invaders differ from those of aquatic species, and impacts also differ from taxon to taxon. Understanding the ecological, economic, and social impacts of invasive species is important in prioritizing control and management operations. A variety of control and management tools are needed to assess, remove, and contain invasive species populations and guide management decisions. These tools should be applied within coordinated and integrated invasive species management strategies.

Photo by Art Talsma, The Nature Conservancy



*Aerial spraying for noxious weeds on
Craig Mountain, Nez Perce County.*

Objective III-A: Effective Management

Management of invasive species focuses on reducing their impacts as cost effectively as possible using an integrated pest management (IPM) approach. Management may involve eradication of the pest species, repeated reductions of pest numbers for periods of time, lasting reductions of pest numbers, or exclusion of the species from an area. Control methods for invasive plant species include chemical, biological, manual, cultural, and physical control. Conventional techniques for control of invasive animals include chemical and physical controls, fencing, and trapping.

Objective III-A Action Items:

- Prioritize weeds and invasive species on a local basis to focus control efforts on the most urgent threats.
- Encourage cross-jurisdictional area-wide invasive species management programs.
- Secure adequate permanent funding to manage existing pest populations.
- Use IPM techniques to control established invasive species populations, when possible.

- Support research on developing effective site-specific control technologies for invasive species.
- Establish local, state, federal, and tribal partnerships to effectively manage existing populations.
- Encourage regional and local programs to share issues, ideas, control efforts, and management plans across jurisdiction boundaries through meetings, trainings, and other communications with bordering states, tribes, and Canadian provinces.
- Support foreign and domestic research on biological control agents for established invasive species.

Photo by Nez Perce Tribe Bio-Control



Weed identification training are an important activity organized by CWMA's.

Case Study 6

Biocontrol for Dalmation Toadflax

In the mountains of south-central Idaho, biocontrol insects are quietly working to control noxious weeds. Tri-County CWMA uses insects to control dalmation toadflax (*Linaria dalmatica ssp. dalmatica*) in an area where the steep terrain limits treatment options. The toadflax stem-mining weevil (*Mecinus janthinus*) has been used in the United States for the past 15 years and since the late 90's in Idaho. Adult stem-mining weevils consume toadflax leaves and stems; weakening the plant and suppressing flowering and seed production. Weevil eggs are laid within the stems of the toadflax plants. As the eggs hatch, the larvae feed on the toadflax shoot, severing the water-conducting tissues, causing wilting and desiccation of the attacked stems. In 2010, Southern Idaho Bio-Control 'Bug Crews' released the toadflax stem-mining weevil into several remote locations. There are six 'Bug Crews' in southern Idaho working in Camas, Lincoln, Gooding, Blaine, Twin Falls, and Jerome counties. The 'Bug Crews' are made up of kids 12-18 years old who are responsible for the collection, release and monitoring of the insect and weed populations. 'Bug Crews' will collect annual baseline data on plant vigor and infestation

size and examine insect establishment.

Dalmatian toadflax infestations can be found from the northern most location in Idaho throughout the southwestern and southeastern regions. The size and scope of the infestations necessitated that landowners and land managers utilize biological control to effectively combat this species. A comprehensive monitoring program was initiated in 2007 to determine the effectiveness of the weevils and the results thus far have been very encouraging.

Photo by Nez Perce Tribe Bio-Control



Dalmatian toadflax biological control agent (*Mecinus janthinus*)
Toadflax stem weevil

Objective III-B: Rehabilitation

Healthy native or other desirable plant communities are a good defense against invading weed species. Therefore, restoration or rehabilitation of weed-infested areas can minimize the need for future weed control efforts. Restoring lands with native plants or other desirable plants, whether through natural regeneration or replanting, will help prevent invading plants from re-establishing themselves. Restoration also reduces long-term control costs. Land managers must continue control measures, plant native or other desirable species, and tend new plantings long enough to give them a competitive advantage.

Objective III-B Action Items:

- Build restoration funding into agency management plans and include long-term maintenance and monitoring activities, as appropriate.
- Compile information on restoration and rehabilitation efforts and build a history of successful restoration practices.
- Partner with scientific organizations and academia to support and strengthen policies that incorporate the best available science for using native species in restoration.
- Support educational and outreach materials that encourage the use of native or other desirable species in restoration.
- Support research on native species suitable for restoration including seed harvest and propagation techniques, weed seed removal, planting maintenance, plant species resistance to disease and insects, restoration and disturbance ecology, and behavior of intact and disturbed ecosystems.
- Restore or rehabilitate disturbed areas whenever possible to minimize the threat of weed invasions.
- Work to decrease the costs of restoration efforts.
- Engage the horticulture industry, conservation agencies, and academia to develop and expand the market for native species selection and availability.
- Encourage outreach programs to educate plant consumers and stimulate local awareness of the availability of native plant choices for residential and commercial landscapes, rights-of-way, erosion control, and for habitat improvement.

Photo by Cathy Ford, Idaho Transportation Department



Rehabilitation of weedy areas along interstate right-of-way.

Partnership Case Study 7

Hells Canyon

Hells Canyon is one of the most biologically significant landscapes in the West. Measuring 7,993 feet deep from mountain peaks to the Snake River and up to 10 miles wide, Hells Canyon forms the deepest river canyon in North America. There are over 1,000 native plant species in Hells Canyon and approximately 380 wildlife species, many of them endemic to this landscape.

The steep canyon slopes of Hells Canyon support some of the best remaining bunchgrass communities in the north-western United States. However, this landscape is under threat of conversion to noxious weeds, such as yellow starthistle (*Centaurea solstitialis*) and invasive annual grasses. The ecological disturbance created by wildfires makes the threat of weed invasion even more urgent.

Traditionally, land managers spend most of their time fighting weeds with expensive herbicides and bio-controls on large noxious weed invasions. In Hells Canyon, weed managers designed an innovative cooperative leading edge approach to weed control and prevention. Ecologically Designed and Geographically Efficient (EDGE) strategies were designed to manage weed invasions in large rugged landscapes.

Digital Aerial Sketch Mapping (DASM) surveys and Strategic Weed Action Teams (SWAT) with ranchers and land managers effectively detect and eradicate weeds that are invading relatively weed free areas. This study has demonstrated the capacity to increase landowner participation and prevent weed invasions in large landscapes using these cost effective early detection and rapid response strategies.

Project partners include the Bureau of Land Management, The Nature Conservancy, Idaho Department of Fish and Game, Idaho State Department of Agriculture, Nez Perce Tribe, University of Idaho, and the USDA Forest Service.

Here partners use geographic information systems (GIS) to inventory, map, and track the effects of fire and weeds on lands in the 250,000-acre weed management area. GIS guides weed control efforts and land management planning activities such as prescribed fire and restoration efforts in grasslands and forest communities. This tool is helping partners take a proactive, landscape-scale approach to weed control and fire rehabilitation in the rugged canyons of Idaho, Oregon, and Washington.

Conservation in Practice Formula

- CWMA Coordinated Weed Management Areas with a strong multi-agency partnership working across state boundaries.
- DASM Digital Aerial Sketch Mapping as an effective remote sensing tool.
- SWAT Strategic Weed Action Teams working out in the field with landowners.

Summary

These joint activities are show promising results in long term weed control, effective communication of lessons learned in fire management, and overall improvements to the ecological integrity and wildlife diversity for the land.

Photo by Art Talsma, The Nature Conservancy



Yellow starthistle infestation in Hells Canyon, Nez Perce County

Objective III-C: Adequate Regulatory Tools

State and federal agencies administer and enforce a growing body of laws to address the problem of invasive species. These laws primarily allow for management of existing populations of invasive species or seek to prevent species introduction through known pathways. The laws also establish regulatory structures and grant programs. Several regulatory agencies in Idaho have species lists that fall under the invasive species umbrella. For example, the ISDA and IDFG each have lists of species for the purposes of management activities or for controlling and eradicating invasive species. Table 1 lists laws, statutes, agencies, and their key responsibilities, and affected industry sectors.

Objective III-C Action Items:

- Assess current invasive species laws and authorities. Recommend policies to address gaps and streamline existing statutes and regulations.
- Coordinate activities between state and federal agencies to provide appropriate enforcement of state and federal laws.
- Support and strengthen enforcement of state laws and quarantine lists.
- Strengthen current state regulations that safeguard against invasive species introductions and spread.
- Educate the public about the costs associated with invasive species and the effects on food prices, user fees, habitat quality, and demonstrate the savings associated with prevention.

Objective III-D: Adequate Funding

It takes years of diligent efforts to eliminate harmful non-native species. Additionally, invasive species management including detection, control, eradication, monitoring, and rehabilitation strategies is expensive. Control and eradication costs are rarely a one-time expense. Management costs alone sometimes exceed the total budgets of managing agencies. Hence, affected land can and does go untreated or inadequately restored. In some cases, the cost of managing infested public lands may be passed on to the public through higher fees and taxes.



Cogongrass is a federal noxious weed that is still widely used in landscaping.

Objective III-D Action Items:

- Assess cost-saving measures to make existing operations more strategic and efficient.
- Work to establish more funding sources of invasive species management.
- Identify additional funding sources available for invasive species management and position the state to take advantage of them.
- Encourage regional funding that targets specific invasive species or pathways.
- Encourage federal partners to provide cooperative funding to address the interstate movement of invasive species.
- Increase funding and protect existing funding sources to state agencies for the prevention and control of invasive species.
- Encourage federal partners to provide adequate funding to prevent and manage invasive species populations on Idaho's federally-managed lands and waters.

Case Study 8

Eurasian Watermilfoil

Eurasian watermilfoil (EWM) is one of the most problematic invasive aquatic plants in

North America. EWM out-competes native vegetation and degrades aquatic habitats by reducing biodiversity. EWM forms dense canopies of growth in the water which can make boating and fishing impossible. Dense plant growth degrades water quality and fisheries and encourages mosquito growth. An aggressive treatment program began in 2006 to prevent further spread of EWM and to eradicate the plant from treated water bodies.

2011 was the sixth year of the Eurasian watermilfoil program and treatment and prevention efforts continue throughout Idaho. Over 12,000 acres of EWM has been treated in Idaho since 2006 using herbicides, diver-assisted suction dredging, and benthic barriers. Surveys have illustrated a significant reduction in EWM populations in treated water bodies and EWM no longer interferes with recreation in treated areas. Survey has also illustrated that native plant abundance and diversity

has increased following EWM treatment providing improved habitat for invertebrates, fish, and waterfowl.

Surveys in 2010 found that eastern Idaho still has no EWM. This area represents one of the largest areas of the nation to not have EWM. Only three new populations of EWM have been identified in Idaho since 2007 including a new population identified in Bayview on the southern end of Lake Pend Oreille, in Black Lake in the Couer d'Alene River chain lake system, and in an isolated pond near Buhl. The Buhl population is 80 miles upstream of the nearest Snake River EWM population and has been aggressively treated to prevent it from being introduced into that portion of the Snake River.

The milfoil program also funds prevention projects throughout the state. To date, no EWM has been found in eastern Idaho. Five watercraft inspections stations were supported by milfoil funds in Bonner and Kootenai counties and three stations inspecting watercraft on Henrys Lake in 2010. Over 100 watercraft were found to be carrying EWM and other aquatic weeds. The watercraft were hot water washed to prevent the spread of invasive aquatic species.



Eurasian watermilfoil.



Case Study 9

Holding the Line - Protecting Yellowstone National Park and the Greater Yellowstone Ecosystem

The "Holding the Line" Project emerged out of a shared conviction that invasive plants, such as leafy spurge (*Euphorbia esula*), must be prevented from expanding their ranges in eastern Idaho and invading the unique ecosystems of Yellowstone National Park. The Project works across jurisdictional boundaries bringing together landowners, land managers, and those responsible for weed management in the Greater Yellowstone area. It began in 2009 in southeastern Idaho capitalizing on successes in treating leafy spurge populations with biological controls.

The Project is managed by High Country RC&D Area, Inc. and an interagency steering committee composed of federal, state, and local land managers; private citizens; and county weed authorities.

The Project follows an integrated pest management approach using appropriate biological, cultural, and herbicide practices with extensive releases of biocontrol insects to achieve Project objectives. In 2009 and 2010, the Project released nearly ten million insects treating approximately 9,000 acres of leafy spurge infested lands, inventoried over 20,000 acres for new infestations, and established numerous insectaries for raising and releasing biocontrol insects. The Holding the Line Project has been funded by the project participants and grants from the U.S. Forest Service State & Private Forestry – Ogden, UT, Caribou-Targhee National Forest, and the Greater Yellowstone Coordinating Committee.



Leafy spurge in the Greater Yellowstone area. It is considered a serious threat to Yellowstone National Park.

State and Federal Legal Authorities

Summary of Authorities in Invasive Species Management.

IDAHO'S REGULATORY AUTHORITIES			
Invasive Species Function	Authorities	Agencies	Key Responsibilities
Prevention	22-1900, Invasive Species Act; Idaho Rule 02.06.09, Rules Governing Invasive Species; 22-2012, 22-2016 Plant Pest Act; 22-2409, Noxious Weed Law; 36-104, 36-106, 36-1102; 13.01.10. Fish and Game Authorities; IDAPA 13.01.03, Public Use of Land Owned or Controlled by Idaho Department of Fish and Game; 25-214, Disease Inspection and Suppression; 25-3900, Deleterious Animals; 38-602, Forest Pests	ISDA, IDFG, IDL, in cooperation with ISDA	Prohibits or restricts import, cultivation, possession, introduction or movement of invasive species and plant pests, including noxious weeds; Controls interstate movement of invasive animals and those with communicable diseases; Control weed infested seeds; Regulate the movement of injurious animals; Prevent and control noxious aquatic weeds; Authorizes cooperation with federally imposed quarantines. IDL, through the Forest Pest Act and ISDA, through the Plant Pest Act, can survey for forest pests and have broad authorities for control and prevention. Prohibits the use or transport of any hay, straw or mulch that is not weed seed free certified, on land owned or controlled by Idaho Department of Fish and Game; Prohibits the possession of wild birds; Rules governing the importation and release of wildlife.
Early Detection and Rapid Response	22-1900, Invasive Species Act; Idaho Rule 02.06.09, Rules Governing Invasive Species; 22-2009, Plant Pest Act; 22-2404, Noxious Weed Law	ISDA, Idaho counties, in cooperation with ISDA	The Noxious Weed Law and the Plant Pest Act contain specific references to the ability of any state agency to take emergency actions; Invasive Species Rules contain a Statewide EDRR AIIIS List. If any of the species listed are found to occur in Idaho, they are to be reported to ISDA immediately. Rules allow for inspections to detect the presence of EDRR AIIIS. All conveyances are subject to inspection. Requires the decontamination of any conveyance found or reasonably believed to contain EDRR AIIIS.
Control, Management and Restoration	22-2016, Plant Pest Act; 22-2409, Noxious Weed Law; 25-218, 25-219, Animal Management; 25-3900, Deleterious Animals; 36-104, 36-903, and 36-1107; Fish and Game Authorities; 38-602, Forest Pests	ISDA, IDFG, IDL, in cooperation with ISDA	Prohibits or restricts import, cultivation, possession, introduction or movement of invasive species and plant pests, including noxious weeds; Controls interstate movement of invasive animals and those with communicable diseases; Control weed infested seeds; Regulate the movement of injurious animals; Prevent and control noxious aquatic weeds; Authorizes cooperation with federally imposed quarantines. IDL, through the Forest Pest Act and ISDA, through the Plant Pest Act, can survey for forest pests and have broad authorities for control and prevention. Adopt rules pertaining to the importation, exportation, release, sale, possession or transportation into, within or from the state of Idaho of any species of live, native or exotic wildlife or any eggs thereof. Control or removal of undesirable fish; Pertains to the removal of wild animals and birds damaging property.
Research and Monitoring	22-2018, Plant Pest Act; 38-602, Forest Pests	ISDA, IDL, in cooperation with ISDA	Under the Plant Pest Act, ISDA may fund research to prevent the introduction or spread of plant pests causing, or having the potential to cause, significant damage or harm in the state, and to investigate the feasibility of their control.
Information Management			
Public Outreach and Partnership Efforts			Dissemination of public information; Cooperate with federal, state, local and tribal governments
Interagency Efforts	Various statutory authorities	Invasive Species Council	

FEDERAL ROLES			
Invasive Species Function	Authorities	Agencies	Key Responsibilities
Prevention	Plant Protection Act; Animal quarantine laws; Lacey Act; Federal Seed Act; Nonindigenous Aquatic Nuisance Prevention and Control Act; National Invasive Species Act; Noxious Weed Control and Eradication Act; Wyden Amendment; Executive Order 13112	APHIS, USFWS, NOAA, USEPA, USDA, USCG, Depts. of Defense, State and Transportation (for aquatic noxious weeds)	Prohibit or restrict imports or movements of plant pests, including noxious weeds; Control interstate movement of invasive animals and those with communicable diseases; Control weed infested seeds; Regulate the movement of injurious animals; Prevent and control noxious aquatic weeds.
Early Detection and Rapid Response	Plant Protection Act; Animal quarantine laws; USEPA; Noxious Weed Control and Eradication Act; Wyden Amendment; Executive Order 13112	Various agencies have the emergency authority to deal with incipient invasions.	Seize, hold, quarantine and treat prohibited species imported into the United States or transported between states.
Control, Management and Restoration	Such acts and NFMA, FLPMA and those that guide the management of lands or waters under various agency jurisdiction; the Nonindigenous Aquatic Nuisance Prevention and Control Act; Clean Water Act; FIFRA; USEPA; Plant Protection Act; Emergency Watershed Program; Noxious Weed Control and Eradication Act; Wyden Amendment; Executive Order 13112	Forest Service, Depts. of Defense, Interior, and Transportation, NOAA, USEPA, BOR, ACOE, NRCS, ARS, APHIS, BLM; No single agency has overall responsibility	Control and manage invasive species and restore affected areas on federal lands and waters.
Research and Monitoring	Cooperative Agriculture Pest Survey; Nonindigenous Aquatic Nuisance Prevention and Control Act; Noxious Weed Control and Eradication Act; Wyden Amendment; Executive Order 13112; and various organic acts	USDA agencies, Interior agencies, NOAA, USEPA	Develop databases on various invasives, research invasive species and micro-organisms of concern to forests, agricultural lands, rangelands and wetlands. Research risks associated with invasive species.
Information Management	International Plant Protection Convention; NAFTA; Convention on International Trade in End. Species of Wild Fauna and Flora; Convention on Biological Diversity; N. American Agreement for Environmental Cooperation	USDA agencies, Office of the U.S. Trade Representative, World Trade Organization, Depts. of Interior, Transportation, State; International Maritime Organization, USEPA, U.S. AID	Develop strategies for international control of invasive species and share information; Capacity building in other countries; treaty and trade negotiations; ballast water management.
Public Outreach and Partnership Efforts	Various statutory attributes	USDA, Dept. of Interior, Dept. of Defense; NOAA	Dissemination of public information; Cooperate with state, local and tribal governments.
Interagency Efforts	Various statutory authorities	Aquatic Nuisance Species Task Force, National Invasive Species Council, Federal Interagency Committee on the Management of Noxious and Exotic Weeds, Committee on Environment and Natural Resources of the National Science and Technology Council	Problem specific cooperative efforts and the coordination of control and research efforts.
Prevention	Plant Protection Act; Animal quarantine laws; Lacey Act; Federal Seed Act; Nonindigenous Aquatic Nuisance Prevention and Control Act; National Invasive Species Act; Noxious Weed Control and Eradication Act; Wyden Amendment; Executive Order 13112	APHIS, USFWS, NOAA, USEPA, USDA, USCG, Depts. of Defense, State and Transportation (for aquatic noxious weeds)	Prohibit or restrict imports or movements of plant pests, including noxious weeds; Control interstate movement of invasive animals and those with communicable diseases; Control weed infested seeds; Regulate the movement of injurious animals; Prevent and control noxious aquatic weeds

The Plant Protection Act of 2000 (7 U.S.C. 7701 et seq) as amended by the Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412). Among other provisions, the Plant Protection Act authorizes the Secretary of Agriculture to prohibit or restrict the importation, entry, exportation, or movement in interstate commerce of any plant, plant product, biological control organism, noxious weed, article, or means of conveyance, if the Secretary determines that the prohibition or restriction is necessary to prevent the introduction into the United States or the dissemination of a plant pest or noxious weed within the United States. The Act defines the term “Noxious Weed”.

Wyden Amendment (P.L. 109-54, Section 434) authorizes the Forest Service to enter into cooperative agreements to benefit resources within watersheds on National Forest System lands. Agreements may be with willing federal, tribal, state, and local governments, private and nongovernment entities, and landowners to conduct activities on public or private lands. Under this authority, the Forest Service may enter into agreements to support or conduct invasive species management activities on aquatic and terrestrial areas owned by local and state governments, tribes, other federal agencies, and private individuals or organizations, to benefit and protect the National Forest System and other resources within a watershed at risk from invasive species.

Executive Order 13112 issued February 3, 1999 (E.O. 13112) directs federal agencies to: (1) identify actions that may affect status of an invasive species; (2)(a) prevent introduction of such species; (b) detect and control such species; (c) monitor population of such species; (d) provide for restoration of native species; (e) conduct research on invasive species and develop technologies to prevent introduction of such species; (f) promote public education of such species; and (3) not authorize, fund or carry out actions likely to cause the introduction or spread of invasive species in the United States or elsewhere unless the benefits of the action clearly outweigh the harm and the agencies take steps to minimize the harm.

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List of Acronyms

- ANS – Aquatic Nuisance Species
- BPA – Bonneville Power Administration
- CISMA – Cooperative Invasive Species Management Areas
- CRB – Columbia River Basin
- CWMA – Cooperative Weed Management Area
- DASM – Digital Aerial Sketch Mapping
- EDRR – Early Detection Rapid Response
- EDGE – Ecological Designed and Geographically Efficient
- EWM – Eurasian Watermilfoil
- GIS – Geographic Information Systems
- IAWCS – Idaho Association of Weed Control Superintendents
- IISC – Idaho Invasive Species Council
- IISF – Idaho Invasive Species Fund
- IMP – Integrated Pest Management
- IWAC – Idaho Weed Awareness Campaign
- IWCA – Idaho Weed Control Association
- IWCC – Idaho Weed Coordinating Committee
- POD – Points of Diversion
- POU – Points of Use
- NWFFS – Noxious Weed Free Forage and Straw
- SWAT – Strategic Weed Action Teams
- USFS – United States Forest Service
- WRP – Western Regional Panel
- WWCC – Western Weed Coordinating Committee

