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Initial Proposed Action - Treatment of Invasive Species
Boise and Sawtooth National Forests, June 2015
Scoping Letter Attachment 1

The Boise and Sawtooth National Forests are proposing to implement an adaptive integrated weed management (IWM) strategy to prevent the establishment of new invasive plant species populations and eradicate or control existing or newly discovered invasive plants over the next ten to fifteen years, as budgets allow. The IWM strategy is derived from the Forest Service National Strategic Framework for Invasive Species Management (2013), Forest Service National Strategy and Implementation Plan for Invasive Species Management (2004), Strategy for Noxious and Nonnative Invasive Plant Management (USDA Forest Service 1998a), and the Forest Service Invasive Species Management Manual (FSM 2900), all of which direct National Forests to implement adaptive integrated weed management programs with the following nationally established program components:

Prevention

Prevention is the "first line of defense" and is a crucial element of IWM. The goal is to prevent the introduction and establishment of new invasive plant species. External and internal education and outreach is essential for the success of this component. A variety of educational materials such as signage, exhibits, presentations, and workshops would be used by the Forests and cooperative partners to raise public awareness of invasive plants and the ecological and economic damage created by their establishment and spread. Internal training would be used to educate personnel to recognize invasive plant species, understand vectors and preventive measures, incorporate preventive measures into the project design of all projects and activities, follow procedures for reporting and mapping invasive plant infestations, and communicate with other programs and agencies. This is a non-treatment aspect of the IWM approach.

Early Detection/Rapid Response

Early Detection and Rapid Response (EDRR) is a critical component of an IWM program. As new invasive plant infestations are detected, a quick and coordinated inventory and eradication response would reduce negative environmental and economic impacts.

EDRR is intended to find new invasive plant infestations at the earliest stages of invasion resulting in decreased control costs and the need for repeated treatments. New invasive species may not be listed as noxious weeds on the statewide list however, these plants are typically identified on statewide watch or EDRR lists.

The Proposed Action includes new national direction on the control of new detections. Invasive plant sites that are discovered subsequent to the current invasive plant inventory would be evaluated to determine if eradication treatments and associated environmental impacts are consistent with those to be analyzed in the EIS.

Control and Management

The proposed IMW strategy would facilitate the use of a variety of treatment options and combinations intended to minimize the effect of invasive plants and limit their spread.

Control techniques include manual/mechanical, chemical (including aerial spray application), and biological methods. Areas infested by invasive plants on both Forests may exhibit a wide range of site conditions. Effective control relies on a clear understanding of the target species, its biology, the ecosystem it has infested, associated introduction pathways, and effective control methods. Control often requires repeat treatments and monitoring of control efficacy.

A variety of treatment options and combinations that could be applied to a wide range of site conditions are necessary so that flexibility is provided to increase effectiveness, reduce cost, and minimize potential for adverse effects from treatments. As monitoring identifies the effectiveness of treatments, specific control measures are adjusted.

The proposed action identifies the treatment of up to 20,000 acres of invasive plants annually on each Forest. This number exceeds the capacity of current budgets allocated for treatments, but is intended to be robust enough to address both known and future invasive plant infestations as well as fluctuations in budget allocations. The control and management aspect of the IWM strategy will be the focus of the analysis in the EIS.

Rehabilitation and Restoration

Ultimately, the goal for invasive plant management efforts is to restore and maintain healthy native or desired plant communities that are resistant to invasive plant establishment, recover quickly from disturbances, and provide ecosystem functionality. Many invasive plant-infested plant communities are able to successfully re-establish without intervention after control efforts. However, sites that are severely damaged or, at which few desirable species remain, may not be able to recover without help. Rehabilitation and restoration are vital components of an adaptive IWM program. Rehabilitation is defined as short-term mitigation to ensure minimum site stability and functionality. This may include site preparation and seeding of desirable vegetation. Restoration is a long-term objective and involves returning sites to natural functions and native species.

Monitoring

Monitoring is a necessary part of implementing an adaptive IWM program. Monitoring provides the data for adaptive management. Information collected from monitoring may be used by managers to evaluate the efficacy of prevention, EDRR, treatment, and rehabilitation and restoration actions. There are two basic types of monitoring essential to an adaptive integrated weed management plan: implementation monitoring and effectiveness monitoring. Implementation monitoring answers the question - “Did we do what we said we would do?”. Effectiveness monitoring answers the questions - “Were prevention, treatment and restoration actions effective?” and “Were intended goals accomplished?”.

Managers may use monitoring data from one site or set of sites to predict the effects of similar actions on other parts of the project area. This information can be used to promote the use of the most effective techniques for prevention, detection, treatment, and restoration, and avoid the use of ineffective methods.

Sawtooth Wilderness

Within the Sawtooth Wilderness, four primary strategies would be used to achieve the overall purpose of this project: prevention, adaptive management, IWM, and minimum tool requirements necessary for the administration of the Wilderness. The Proposed Action inside of the Sawtooth Wilderness would continue the use of manual (e.g., hand pulling), cultural (planting native species to prevent invasive species), herbicide, and bio-control treatment methods that are ground based and selective to control and reduce weeds. As such, other methods, such as aerial spray application would <u>not</u> be considered. Use of each treatment type would focus on locations near trails, trailheads, and campsites.

Manual treatments, such as hand pulling and grubbing, would occur on sensitive areas or in very small infestations. Cultural treatments would enhance desirable vegetation. Chemical treatments would consist of ground-applied herbicides and supplemental compounds. Non-motorized equipment, such as horse and backpack sprayers, would be used inside the Wilderness. Biological controls, primarily insects, would continue to be introduced, where appropriate, and newly approved agents would be considered for use where environmental conditions would support their use.

Treatment Methods

The proposed adaptive IWM program would utilize a variety of tools, used alone or in combination, to treat invasive plants on both Forests. Proposed treatment methods include the following:

- Biological control through the use of predators, parasites, and pathogens.
- Herbicide control using ground-based application methods.
- Herbicide control using helicopter aerial application methods.
- Herbicide control using aquatic application methods.
- Manual and mechanical methods, such as hand pulling, mowing, cutting, or torching.
- Rehabilitation and restoration methods such as seeding sites to improve competition or prevent establishment of non-native invasive plant species

Table 1: Maximum Acres to be Treated Annually by Treatment Method

	Biological Control	Mechanical Control	Herbicide Control		
			Ground Application	Aerial Application	Aquatic Application
Sawtooth N.F.	2,000 acres	2,000 acres	8,000 acres	8,000 acres	Unknown*
Boise N.F.	2,000 acres	2,000 acres	8,000 acres	8,000 acres	Unknown*

* Unknown as there are no infestations at present

The treatments would abide by design criteria, the purpose of which is to reduce or eliminate the potential adverse impacts of the invasive plant treatments. Design criteria are a set of required implementation features applied to projects to ensure that the project is conducted according to environmental standards and that adverse effects are within the scope of those to be disclosed during this analysis. Implementation of the design criteria is mandatory.

Rehabilitation and Restoration

Sites that have been severely impacted by weeds can be devoid of desirable plant species or consist of only scattered individual relict plants. Soil erosion may have taken place. Ecosystem structure and function may no longer be in place (e.g. mycorrhizal relationships between plants and soil fungi). Natural revegetation can often be slow, but in cases where there are few or no desirable plant species to take the place of invasive plants, natural recovery may not take place at all. In such cases, management activities may be required to assist vegetation recovery and prevent soil erosion. In turn, the revegetation measures would impede the re-establishment of invasive plants on the site. The objective is to re-establish a desired plant community and a return to conditions that foster the recovery of natural ecosystem processes. Equipment that could be used during reseeding activities includes, but is not limited to, hand tools such as rakes or larger equipment such OHV-drawn harrows and aerial delivery. The utilization of rehabilitation and restoration actions is common to all action alternatives.

Rehabilitation and Restoration Design Criteria

- Natural revegetation is the preferred option whenever possible. Assess invasive plant-infested sites or areas of disturbance (e.g. wildfire) to determine if the area is capable of natural recovery after weed control treatments. Determine what mix of desirable or native grass and forb plants still occur on the site and if they are numerous and vigorous enough to be capable of spreading vegetatively or via seed production.

- Assess erosion processes that may be affecting the site and the degree of severity of any soil erosion.
- Consider the most effective, practical and suitable means of providing rehabilitative or restorative measures, whether eliminating sources of disturbance other than invasive plants, or taking actions such as seeding and/or mulching.
- Consider the need to control invasive annual grasses, such as cheatgrass, and forbs, such as annual mustards, that are known to compete aggressively with perennial seedlings trying to establish.
- Determine whether additional assistive measures may be required, such as cover crops, hydraulic mulches, and mycorrhizal inoculums.
- Follow the guidance for revegetation in FSM 2070 - Vegetation Ecology
- Use native plants in rehabilitation and restoration where practicable.
- If it is determined that non-native species are the best choice for interim or permanent revegetation, be sure to select species that do not behave invasively under conditions similar to those at the site to be revegetated.
- Purchase only certified invasive plant-seed free seed. Consider the use of site-adapted seed, if available and practicable.
- When seeding, determine the need for site preparation and protective measures that may need to be taken to allow the seeding to establish successfully.
- Plan revegetation activities for the optimal season and site conditions for successful establishment.
- Design seed mixes, whether native or desirable species, that are adapted to site conditions (including soil type, precipitation patterns, plant hardiness zones, etc.).
- Sites where restoration and rehabilitation treatments have been applied may need to be protected from grazing use through temporary fencing, livestock exclusion or other method appropriate to the sites to allow seeded plant establishment.
- Following establishment, continue to practice proper vegetation management to maintain a healthy, functioning plant community that is resilient to disturbance and resistant to invasive plant re-invasion.
- Use only invasive plant seed-free mulches and other products for uses such as erosion control and improved seed germination.
- Ensure that treatment tools and other equipment are free of invasive plant seed before moving to or using on the project site.
- Minimize ground-disturbing activities to the extent possible during reseeding efforts.
- Conduct rehabilitation and restoration activities only in areas with slope gradients less than 45%.
- Conduct rehabilitation and restoration activities only in areas with low or moderate landtype erosion hazard ratings.
- Consult an archaeologist prior to initiation of work to determine if an archaeological survey is needed.

Biological Control

Biological control is the use of plant predators or pathogens that attack and weaken targeted invasive plant species and reduce their ability to compete or reproduce in order to reduce or eliminate invasive plant infestations. Biological controls would be used when the target species occupies extensive portions of the landscape, other methods of control are prohibitive based on cost and location, and an effective biological control regime exists. Biological control activities typically include the release of parasitic and “host specific" insects, mites, nematodes, and pathogens. Biological treatments do not eradicate the target species, but rather reduce target plant densities to the point where competition with desired plant species for space, water, and nutrients keep populations in check. Biological control treatments are not consistent with an eradication objective, but are an integral part of an integrated weed management approach. Animal and Plant Health Inspection Service (APHIS) and the State of Idaho have approved invertebrate plant feeders and plant pathogens that are proven natural control agents that suppress, inhibit, or control specific target invasive plant species. Biological control activities include collection of invertebrate plant feeders and pathogens, development of insectaries for collection, transportation and transplantation of parasitic invertebrate plant feeders and pathogens, and supplemental stocking of populations. Biological control agents are transported in containers that safely enclose the agent until release. Releases can be ground-based or aerial. Each release is equivalent to treating approximately five acres.

The treated areas would be inventoried and monitored to determine the success of the treatments and when the released bio-control agents have reached equilibrium with the target species. Repeat visits may need to be made several times a season and over a series of years to determine if additional releases are needed or if a different agent needs to be released.

The use of biological control treatment usually results in delayed effectiveness, often requiring five to ten years for successful reduction of target invasive plant infestations. However, simultaneous increase of native vegetation often eliminates the need for restoration. Biological control is the preferred method in remote areas where access is limited, on high density extensive populations where other control methods may not be appropriate, on species where biological control agents are available and proven effective, and in conjunction with other control methods to reduce density of the target species. The use of biological control is common to all action alternatives.

Biological Control Design Criteria

- Obtain Animal and Plant Health Inspection Service (APHIS) permit to Move Live Plant Pests, Noxious Weeds, or Soil for those agents when transportation across state lines is involved.
- Use only APHIS and State of Idaho approved biological control agents.
- Use Forest Service protocols for documentation of releases and monitoring and share release information with the Idaho State Department of Agriculture.
- To the extent practicable, collect biological control agents locally or from areas with similar climatic and weather conditions, land and soil types, and cover types to maximize successful establishment.
- Distribute biological control agents at the optimal season and life cycle stage to optimize the likelihood of successful establishment. Distribute quantities sufficient to optimize successful short-term establishment.
- For those agents that self-disperse poorly, actively assist the distribution throughout target infestations by redistribution (collecting and moving the agent to new locations).

<u>Manual and Mechanical Treatment Methods</u>

Mechanical and manual treatments are typically used to remove seed heads, individual plants or small infestations. They may be used in sensitive areas to avoid impacts to non-target species or water quality, or to prevent seed production, etc. Mechanical and manual approaches are slow and very labor intensive; they are effective only for small infestations.

The term “manual” defines treatments such as hand pulling or using hand tools, such as hand clippers, hoes, rakes, shovels, etc., to remove plants or cut off seed heads. Manual treatments can be effective for annual and tap-rooted invasive plant, but are ineffective against perennial invasive plants with deep underground stems or roots, or fine rhizomes that can be easily broken and left behind to re-sprout. Use of this method might need to be repeated several times throughout the growing season depending on the species. This treatment may require digging below the soil surface to remove the main root of plants. The term “mechanical” refers to the use of equipment and power tools, including actions like mowing, torching (using a propane burner to kill invasive plants with heat), and weed whipping. Choosing the appropriate power tool depends on factors such as characteristics of the target weed species (e.g. stem size or sprouting ability), the density of the target species and size of the infestation, site location and condition, and soil or topographic considerations. Mechanized treatments are typically used to remove flowering stems to prevent seed production or to reduce or remove above ground biomass. The use of manual and mechanical treatment methods is common to all action alternatives.

Manual and Mechanical Treatment Design Criteria

- Obtain necessary state and federal permits, when and where required.
- Prior to any burning invasive species using a torching device, a prescribed burn plan will be completed and compliant with Forest Service Manual 5140 and the Interagency Prescribed Fire Planning and Implementation Procedures Guide, PMS 484.
- Consult an archaeologist prior to initiation of work to determine whether an archaeological survey is needed.
- Incidental weed pulling would not trigger Section 106 review, as there is a very low probability that it would have an adverse effect on an archaeological site.
- Minimize soil disturbance as much as possible to minimize germination of invasive plant seeds and bare soil.
- Avoid non-target species damage to the extent practicable. Select mechanical methods to effectively control the target species (e.g. grubbing/hoeing is inappropriate for rhizomatous species and may increase the density of the invasive plant population as root fragments sprout and become new plants).
- Apply mechanical treatments at the proper stage of plant growth when treatment will be most effective at controlling the target invasive plant.
- Thoroughly inspect and clean all equipment and clothing to remove invasive plant seeds or vegetative propagules to prevent the movement of the invasive plant to another site.
- To the extent practicable, conduct clipping and removal of seed stalks prior to seed maturity to reduce inputs to the seed bank or when seeds are easily picked up and transported by vectors such as wind, humans or animals.
- Specific to aquatic invasive plants, hand-pulling and/or smothering may be used when an infestation is very limited in extent and occurs close to the shoreline of a water body, but has not yet infested deeper waters.

Herbicide Application

Four types of herbicide application would be used:

Spot spraying-This method targets individual plants and the immediate area around them. Most spot spraying is usually done with a backpack sprayer. However, spot spraying may also be applied using a hose from a truck-mounted or OHV-mounted tank, or tanks mounted on pack animals. This is the most common herbicide application method.

Broadcast-Herbicide is applied to cover an area of ground rather than individual plants. This method may employ a spray system mounted on a truck or OHV. Broadcast applications are used in areas where invasive plants occupy a large percentage of plant cover on the site, making spot spraying impractical.

Aquatic application-This application method would be used in response to EDRR associated with aquatic invasive plant species. This method may employ spot or broadcast spray over the surface of or into water. Application methods may be from shore using backpacks, truck-mounted or OHV-mounted tank, or from boats.

Aerial application-This method would be used in areas where physical features, such as topography, restricted access, size and/or rate of spread of infestation, personnel safety, or other factors such as prohibitive unit cost of ground application occur. Invasive plants would be treated with herbicides through the use of helicopters.

Herbicide formulations and mixtures could contain one or more of the active ingredients, displayed in Table 2, below. The range of application rates for each chemical is derived from Human Health and Ecological Risk Assessments and the herbicide label. Additional herbicides may be added in the future at either the Forest Plan or project level through appropriate risk analysis, NEPA procedures, and ESA consultation.

Table 2. Herbicides and Application Settings Currently Used and Proposed for Use

Herbicide (Active Ingredient)	**Maximum Label Application Rate (AI[2] or AE[3]/AC[4])**	**Typical Forest Application Rate (lbs. AI or AE/AC)**	**Application Setting**			
			Upland	**Riparian**	**Aerial**	**Aquatic**
2,4-D amine	2.0 lbs ae /ac/app[5] 2 apps per year	0.5-2.0 lb./ac	X	X		
Aminopyralid	0.11 lbs ae/ac/year	0.06 – 0.11 lb./ac	X	X	X	
Chlorsulfuron	2.6 oz. product/ac/year (0.12 lbs ai/ac/year)	0.5 - 2.0 oz./ac (0.02 - 0.09 lb./ac)	X	X	X	
Clopyralid	0.5 lbs ae/ac/year	0.28 - 0.5 lb./ac	X	X	X	
Dicamba	1.0 lbs ae/ac/app 2 apps per year	0.75 - 2.0 lb./ac	X			
Glyphosate	1.7 lbs ae/ac/app ≤ 8.0 lbs ae/ac/year	0.35 -5.0 lb./ac	X	X		X
Imazapic	0.19 lbs ai/ac/year	0.1 - 0.19 lb./ac	X	X	X	
Imazapyr	1.5 lbs ae/ac/year	0.5-1.0 lb./ac	X	X		X
Imazamox	0.5 lbs ae/ac/year	0.25-0.5 lb./ac		X		X
Metsulfuron-methyl	4.0 oz. product/ac/year (0.15 lbs ai/ac/year)	1.0 - 3.0 oz./ac (0.04 - 0.11 lb./ac)	X	X	X	
Picloram	1.0 lbs ai/ac/year	0.5 - 0.75 lb./ac	X		X	
Sulfometuron methyl	8.0 oz. product/ac/year (0.37 lbs ai/ac/year)	2.0 - 6.0 oz./ac (0.09- 0.28 lb./ac)	X	X	X	
Triclopyr: triethylamine salt (TEA)	9.0 lbs ae/ac/year	4.5 - 6.0 lb./ac	X	X		X

[2]AI=Active Ingredient [3]AE=Acid Equivalent [4]AC=Acre [5]app=Application

Herbicide Design Criteria

General Herbicide Application

- Herbicide application shall comply with applicable laws (Idaho Statute Title 22, Chapter 34 and Idaho Administrative Code Rule 02.03.03), Forest Service policy and guidelines (FSH 2109 and FSM 2150), Endangered Species Act (ESA) section 7 consultation requirements, National Pollutant Discharge Elimination System (NPDES) permit requirements, and with product label directions for the herbicide being used to assure worker safety and to manage potential impacts of herbicide application.

- Always read and follow label directions, including instructions for herbicide use, application rates, equipment and techniques, personal protective equipment for applicators and mixers, and container disposal .
- Prior to implementation, program managers would ensure proper permitting is in place.
- Make sure Material Safety and Data Sheets, safety plans, spill prevention plans and cleanup kits are available to applicators and mixers, per the requirements of FSH 2109.
- Keep accurate and detailed application records, per Idaho Department of Agriculture Rules Governing Pesticide and Chemigation Use and Application and EPA requirements identified in the NPDES.
- Perform herbicide applications by or under the direct supervision of licensed Idaho professional herbicide applicators for forest and contract crews, per Idaho Department of Agriculture Rules Governing Pesticide and Chemigation Use and Application.
- Ensure that contracts and agreements include all of these design criteria as a minimum.
- Monitor wind speed and direction and equipment and spray parameters throughout an herbicide application. No herbicide shall be applied in sustained wind conditions exceeding five (5) miles per hour in riparian areas or in any wind conditions exceeding product label directions.
- Conduct equipment and personnel inspections, equipment maintenance and equipment calibration as needed to ensure proper herbicide application and to meet regulatory requirements. Regularly check equipment and components for wear. Attend to repairs and parts replacement promptly.
- Transport only the quantity of herbicide and adjuvants needed for a project. Secure containers being transported in such a way to prevent the likelihood of spills. Make periodic checks enroute to help avoid spillage. Carry herbicides and adjuvants in water-tight, floatable containers when supplies need to be carried over water by boat, raft or other watercraft.
- When out in the field, use practical measures to restrict access to herbicides and adjuvants and spray equipment by unauthorized personnel.
- Off-highway vehicles (OHVs) used to transport or spray herbicides are administratively allowed to travel off designated motorized routes. These vehicles would not be taken off designated routes if damage to soils could occur due to wet conditions. Take care to ensure that disturbance to desirable vegetation is minimized and that no visible “trail” creation occurs.
- Follow the procedures in the Spill Plan in the event of a spill. Keep the Spill Plan compliant with NPDES.
- Use indicator dye in the herbicide mix to visually assure uniform coverage and minimize overlapped or skipped areas and treatment of non-target areas.
- Within areas of special concern, such as developed recreation, trailheads, campsites and other high human areas, utilize treatments methods that minimize potential exposure to the public.
- To minimize herbicide drift during broadcast operations, use low pressure and larger droplet size to the extent possible with the equipment being used. Use nozzles designed for herbicide application.
- Equip water drafting equipment with back siphoning prevention devices.
- Wherever possible, mix and load at a distance greater than 100 feet from water and where spilled materials will not flow into groundwater, wetlands or streams.
- No broadcast application methods are used in riparian areas.
- Provide herbicide "awareness" information to forest users as opportunities arise. Treatment areas will be signed prior to herbicide applications within areas of special concern, such as trailheads, campsites, and other high use areas. Make information on where and when spraying and other treatments would occur available to the public at the local Ranger District office. Forest Service and other websites may also be used for public notification.

- Grazing permittees will be made aware of annual treatment actions at the permittee annual operating instruction meetings and/or if requested, notified in advance of spray dates.
- Follow label directions and other information sources to apply herbicides to the target species during phenological stages that optimize target control.
- To the extent practicable, apply herbicides to infestations containing biological control agents at times when the effects of herbicides to the host plants would not interfere with the agent's life cycle.
- Use a spray pattern that avoids application of herbicide to non-target species.

Sensitive Species

- Evaluate sites considered for herbicide treatment for sensitive plant habitat suitability. Survey suitable habitat as necessary prior to treatment. The need for field surveys in suitable habitat is based on factors such as plant phenology at the time of treatment and species' susceptibility to the herbicide(s) being used.
- Mechanical treatment, individual plant treatment (e.g. wiping), or spot herbicide application are preferred methods when treating invasive plant infestations associated with sensitive plant populations.
- For identified sensitive plant populations, there would be a 50-foot no spray zone for all herbicides applied by broadcast-type spray equipment (e.g. vehicle or helicopter- mounted booms or boomless sprayers).
- Glyphosate would only be applied within a 50-foot buffer if the sensitive plant species is dormant. Remaining herbicides may be applied following label instructions.

Aerial Herbicide Application

- The Aerial Herbicide Application Coordination and Safety Implementation Plan would be followed.
- Provide a minimum buffer of 300 feet for aerial herbicide application around developed campgrounds and private land (unless otherwise authorized by adjacent private landowners).
- All live water (perennial streams, flowing intermittent streams, lakes, ponds, springs, and wetlands) would have a 300 foot no aerial application herbicide buffer.
- Aerial herbicide application would not occur in designated municipal watersheds. Idaho DEQ Source Protection Areas would not be included in aerial application project areas.
- Aerial herbicide applications would not occur in Research Natural Areas (RNAs) or proposed wilderness areas. No aerial application would occur within ¼ mile of Designated Wild, Scenic System River (includes Recreation classification) and rivers determined to be eligible for inclusion in the System.
- Aerial herbicide application would not occur over areas with >30% live tree canopy cover.
- Aerial herbicide application would not occur over whitebark pine stands.
- No aerial herbicide application would occur within ¼ mile of occupied pygmy rabbit habitat.
- Within known or potential sage-grouse nesting/early brood-rearing habitat, any aerial herbicide application would occur after June 30.
- Helicopters would avoid known raptor rest sites when flying to and from treatment sites and no aerial herbicide application would occur within ½ mile from known raptor nest sites during the following periods (or until young have fledged):
    - April 1 through August 31
    - bald eagles - February 1 through August 15
- Aerial herbicide application would not occur when sustained wind speeds exceed 5 mph or label recommendations, whichever is less.
- Aerial herbicide applications would not occur during inversions, or below minimum relative humidity or above maximum temperature, as stated on label.

- Herbicide applicators would obtain a weather forecast for the area prior to initiating a spraying project to ensure no extreme precipitation or wind events were predicted to occur during or immediately after spraying that could allow runoff or drift into water bodies.
- Considerations for choosing sites for aerial application would include the extent of the invasive plant infestation, the cumulative size of the infestation (many small sites in close relative proximity of each other), and the density of the invasive species.
- Aerial treatment areas could be treated recurrently on a 2 or 3-year rotation to ensure effective control. Monitoring would show which areas would need to be re-treated or if treatment areas can be reduced based on effectiveness of previous treatment.
- Public notification would be conducted through press releases in local newspapers and the use of social media and websites which that identify the potential windows of treatment for specific areas. Signing and on-site layout would be performed one to two weeks prior to actual aerial treatment.
- Temporary area, trail, and road closures would be used to ensure public safety during aerial spray operations.
- Grazing permittees would be notified that aerial application would be conducted and of the specific time frames in which treatment would occur to allow the option to remove grazing animals from the area.
- Aerial spray units (and perennial seeps, ponds, springs, and wetlands in proposed aerial units) would be identified prior to spraying to ensure only appropriate portions of the unit are aerially treated. A GPS system would be used in spray helicopters and each treatment unit mapped before the flight to ensure that only areas marked for treatment are treated. Drift monitoring cards would be placed out to 300 feet from and perpendicular to perennial streams to monitor herbicide presence.

Aquatic Herbicide Application

- Perform herbicide applications by or under the direct supervision of licensed Idaho professional herbicide applicators with Aquatic Pest Control certifications.
- Aquatic herbicide applications would not be applied aerially.
- When the product label recommends use of an adjuvant, only aquatic-approved adjuvant may be used.
- Conduct evaluation of the infested site to determine best control method, including (a) location, number and extent of infestations, (b) depth, flow, substrate, water quality and configuration of the water body involved, (c) density and diversity of native flora, and (d) direct and indirect effects to native flora and fauna and to people (e.g. domestic water use).
- Consider whether to apply herbicide to entire body of water, or to areas with highest risk as vectors, such as boat ramps.
- Use label to determine what proportion of water body may be treated at one time without causing excessive oxygen depletion from decaying plant matter.
- Do not apply to water where invasive plants are not present if herbicide is not labeled for submerged vegetation. Prefer spot-spraying techniques when applying herbicides to emergent vegetation.
- Notify the public of dates and type of treatment and duration of closure period.
- In the event of a detection of an aquatic nuisance plant species, the applicable sections of Idaho’s Aquatic Nuisance Species Plan (ID ISCTC 2007) will be followed.

Treatment Priority and Strategy

Treatment priorities are based on factors such as the current abundance and distribution of the species, type and values of the site affected, and risk for spread or infestation into other areas. Other program management considerations may affect priorities. For example, priority may be given to sites located in areas proposed for ground-disturbing management activities. In addition, opportunities for special funding or cooperative projects with other landowners, agencies, and organizations may be considered. Treatment priorities do not necessarily refer to the order in which an infestation is treated during a given fiscal year. Treatment priorities are part of an adaptive integrated weed management strategy used by managers in determining how to allocate resources.

The criteria for determining treatment priority of invasive plant infestations are in Table 3, below. Higher priority is generally given to those new invasive plant infestations where reduction or eradication of infestations is likely to be successful. For established infestations, suppression strategies play a much more important role. In general, the vast majority of currently inventoried infested acres are associated with human-caused disturbance such as travel routes. Because they are common to infestations at all potential priority levels, spread vectors such as trailheads, roadways, campgrounds, and parking areas are not explicitly considered when setting priorities.

Table 3: Treatment Priorities

Priority	Description	Treatment Objective
Highest	• Infestations of species new to the project area (EDRR).	Inventory and Eradication of new species using EDRR
Second priority	• Infestations of species that occur rarely within the project area. • Infestations of species that occur rarely within a given zone. • Infestations that pose substantial risk of infestation to priority areas currently free of the invasive species • Areas identified as having specific resource values needing protection from non-native invasive plants species such as proclaimed wilderness areas, sage grouse habitat, etc.	Control by suppression to reduce existing infestations and reduce or eliminate new infestations of uncommon noxious weeds.

Priority	Description	Treatment Objective
Third priority	• Infestations in or near areas that experience disturbance due to human activity, such as designated travel routes, recreation sites, emergency staging areas, and gravel pits. • Infestations in or near areas that experience disturbance due to natural forces, such as those recently affected by wildfire. • Infestations with the potential to spread across ownership boundaries onto lands that are not currently infested. • Infestations for which treatment has a high probability of success.	Control by direct suppression. Utilize indirect suppression where practical for achieving control.
Fourth priority	• Infestations in or near areas that contain desirable plant communities, such as intact native plant communities and sensitive, threatened, or endangered plant or animal habitat. • Infestations of established species occurring in an otherwise uninfested area.	Control by direct suppression
Fifth priority	• Infestations in habitat susceptible to invasion by and spread of invasive plants. • Infestations of established invasive plants in generally infested areas. • Large infestations of established invasive plants.	Control by direct suppression when possible. Emphasis placed on indirect suppression.

Table 4 summarizes commonly used species-specific integrated control measures that would be applied to known noxious weed species in both Forests. The table displays a range of effective treatment options. Different treatment choices may be used based on circumstances such as new Endangered Species Act (ESA) consultation requirements, information on treatment effectiveness, and availability of new products. The priority and intensity of treatment needed varies widely based on site conditions, resources at risk from invasion, and the range and aggressiveness of individual target species.

Table 4: Range of Effective Treatment Options by Target Species

Noxious Weed	Treatment Method[1]		
	Biological	**Chemical**	**Mechanical**
Russian Knapweed	*Subanguina picridis, Jaapiella ivannikovi*	triclopyr + clopyralid; picloram; clopyralid + 2,4-D; clopyralid; aminopyralid; aminopyralid + metsulfuron; aminopyralid + 2,4-D; glyphosate; 2,4-D; chlorsulfuron	Pulling and Hoeing
Hoary Alyssum	None Currently Available	metsulfuron; chlorsulfuron	Pulling
Whitetop	None Currently Available	metsulfuron; chlorsulfuron; metsulfuron + chlorsulfuron; 2,4-D	Not Effective
Musk Thistle	*Rhinocyllus conicus, Trichosirocalus horridus*	chlorsulfuron; metsulfuron; Part A[2]: metsulfuron, Part B: dicamba + 2,4-D; metsulfuron + chlorsulfuron; triclopyr + clopyralid; clopyralid; aminopyralid; aminopyralid + metsulfuron; aminopyralid + 2,4-D; picloram; clopyralid + 2,4-D; dicamba; 2,4-D; glyphosate + 2,4-D	Mowing/ Hoeing
Diffuse Knapweed	*Cyphocleonus achates, Larinus minutus, Sphenoptera jugoslavica, Urophora affinis, Urophora quadrifasciata, Bangasternus fausti, Pterolonche inspersa*	clopyralid + triclopyr; picloram; clopyralid; aminopyralid; aminopyralid + metsulfuron; aminopyralid + 2,4-D; clopyralid + 2,4-D; glyphosate; 2,4-D	Pulling and Hoeing
Spotted Knapweed	*Agapeta zoegana, Bangasternus fausti, Chaetorellia acrolophi, Cyphocleonus achates, Larinus minutus, Larinus obtusus, Metzneria paucipunctella, Sphenoptera jugoslavica, Terellia virens, Urophora affinis, Urophora quadrifasciata*	triclopyr + clopyralid; picloram; clopyralid + 2,4-D; clopyralid; aminopyralid; aminopyralid + 2,4-D; 2,4-D; glyphosate	Pulling and Hoeing
Rush Skeletonweed	*Cystiphora schmidti, Eriophyes chondrillae, Puccinia chondrillina, Bradyrrhoa gilveolella*	clopyralid; aminopyralid; aminopyralid + metsulfuron; picloram; metsulfuron + chlorsulfuron; 2,4-D	Mowing
Oxeye Daisy	None Currently Available	metsulfuron; aminopyralid; aminopyralid + metsulfuron; aminopyralid + 2,4-D; picloram; clopyralid	Pulling and Hoeing
Canada Thistle	*Rhinocyllus conicus, Urophora cardui, Hadroplontus litura*	clopyralid + triclopyr; clopyralid; aminopyralid; aminopyralid + metsulfuron; aminopyralid + 2,4-D; picloram; metsulfuron + chlorsulfuron; Part A: metsulfuron,	Not Effective

Noxious Weed	Treatment Method[1]		
		Part B: dicamba + 2,4-D; chlorsulfuron; glyphosate; dicamba	
Field Bindweed	*Aceria malherbae*, *Tyta luctuosa*	dicamba; picloram; dicamba + 2,4-D; Part A: metsulfuron, Part B: dicamba + 2,4-D; metsulfuron; metsulfuron + chlorsulfuron; glyphosate; 2,4-D	Not Effective
Houndstongue	None Currently Available	metsulfuron; aminopyralid + metsulfuron; imazapic; Part A: metsulfuron, Part B: dicamba + 2,4-D; picloram	Pulling and Hoeing
Leafy Spurge	*Aphthona cyparissiae, Aphthona czwalinae, Aphthona flava, Aphthona lacertosa, Aphthona nigriscutis, Hyles euphorbiae, Oberea erythrocephala*	imazapic; picloram + 2,4-D; picloram; glyphosate; dicamba	Mowing
Black Henbane	None Currently Available	metsulfuron; picloram; dicamba; metsulfuron + chlorsulfuron; Part A: metsulfuron, Part B: dicamba + 2,4-D	Pulling, Hoeing and Mowing
Common St. John's Wort	*Agrilus hyperici, Aplocera plagiata, Chrysolina hyperici, Chrysolina quadrigemina*	2,4-D; metsulfuron; glyphosate; imazapic; picloram	
Dyer's Woad	None Currently Available	metsulfuron; chlorsulfuron; Part A: metsulfuron,; Part B: dicamba + 2,4-D; metsulfuron + chlorsulfuron	Pulling
Perennial Pepperweed	None Currently Available	chlorsulfuron; metsulfuron; aminopyralid + metsulfuron; metsulfuron + chlorsulfuron; glyphosate; 2,4-D; imazapyr; Part A: metsulfuron, Part B: dicamba + 2,4-D; metsulfuron + chlorsulfuron	Mowing
Dalmatian Toadflax	*Brachypterolus pulicarius, Mecinus janthinus, & Calophasia lunula*	chlorsulfuron; metsulfuron; picloram + chlorsulfuron; picloram; dicamba	Pulling
Yellow Toadflax	*Brachypterolus pulicarius, Calophasia lunula, Gymnetron antirrhini, Mecinus janthinus*	chlorsulfuron; picloram + chlorsulfuron; picloram + metsulfuron; picloram; dicamba	Pulling
Scotch Thistle	None Currently Available	chlorsulfuron, metsulfuron, clopyralid + 2,4-D, clopyralid, aminopyralid, picloram, dicamba, 2,4-D	Hoeing
Knotweed	None Currently Available	imazapyr, glyphosate	Cut Stem
Sulphur Cinquefoil	None Currently Available	triclopyr, 2,4-D, picloram, chlorsulfuron,	Hoeing

Noxious Weed	Treatment Method[1]		
		aminopyralid, metsulfuron	
Saltcedar	*Diorhabda carinulata*	imazapyr, glyphosate, triclopyr	Cut Stump
Puncturevine	*Microlarinus lareynii*	chlorsulfuron, 2,4-D	Pulling and Hoeing

[1] Prather et al. 2011, Prather 2012, Prather 2013, Newton et al. 2013
[2] Part A and Part B refer to tank mixes.

Adaptive Management

The proposed action, which incorporates EDRR, contains an adaptive management strategy to deal with invasive plant infestations that are constantly changing. An adaptive management strategy offers the means to describe and evaluate the consequences of changing or new invasive plant infestations and new treatment options. The adaptive management strategy consists of three principle components.

1. In order to quickly and effectively treat newly discovered invasive plant infestations while still addressing other resource concerns, a flowchart based on infestation size, location, site characteristics, and consultation with specialists would be used to select treatment methods (**Error! Reference source not found.**). All new sites would be mapped and inventoried. Appropriate design criteria must be applied to any invasive plant treatment.

2. New technology, biological controls, herbicide formulations, supplemental labels, and adjuvants are likely to be developed within the lifetime of this project. These new treatments would be considered when their use would be consistent with or less than the effects of those analyzed in this process. The Adaptive Management Strategy would allow incorporation of these new treatment methods if they meet the following criteria:

   - The herbicide must have an Environmental Protection Agency (EPA) approved herbicide label.

   - A risk assessment must be completed for the herbicide by the Natural Resources Conservation Service (NRCS), USDA Agriculture Research Station (ARS), Environmental Protection Agency (EPA), USDA Forest Service, Bureau of Land Management (BLM) or other federal land management agency.

   - New biological agents must be approved by USDA Animal, Plant Health Inspection Service (APHIS) and the State of Idaho, and the State of Utah for the Raft River Division on the Sawtooth NF prior to their introduction. This approval indicates that the agent is determined to be detrimental to the target plants while at the same time being virtually harmless to native or desirable non-native plants.

   - A FSH 1909.15, 18.4 (Section 18) review of the Boise and Sawtooth Forests Invasive Plant Treatment Final EIS (when it is completed) would be conducted to determine if the effects of the new herbicide are consistent with those identified in the Final EIS effects analysis. If the effects are not consistent, then the herbicide would not be used until a new environmental analysis was completed.

   - Endangered Species Act (ESA) section 7 consultation would be completed prior to the use of new herbicides.

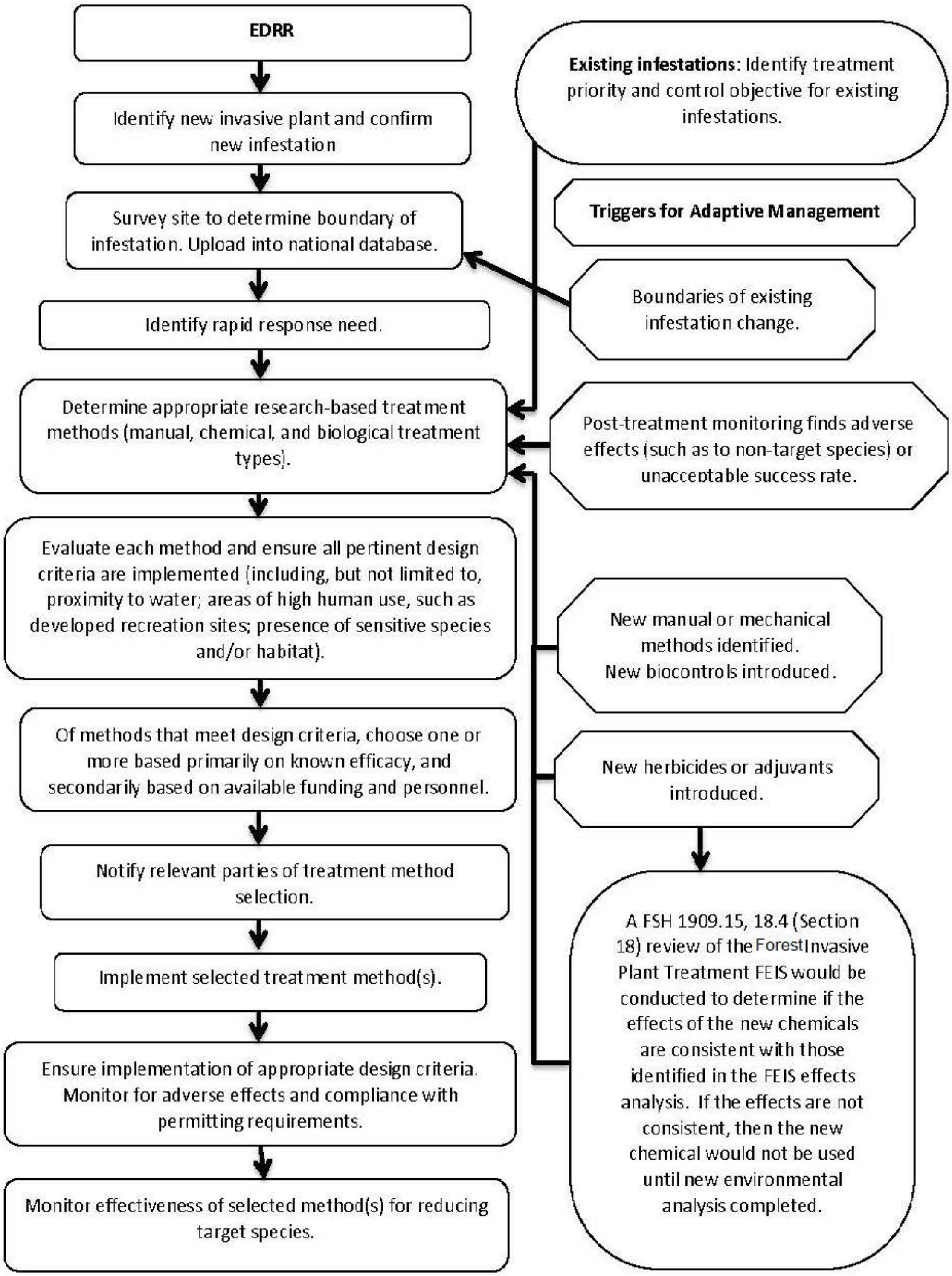

Figure 1 – Adaptive Mangement Flow Chart

Monitoring

Monitoring is an integral part of any adaptive, integrated weed management program. Monitoring addresses prevention, EDRR, treatment, and restoration efforts, and informs future decision-making and strategy. Both quantitative and qualitative monitoring efforts are included in the overall monitoring program. Post-treatment reviews of monitoring data would occur on a sample basis to determine whether treatments were effective, the type and extent of damage which may have occurred to non-target species, whether design criteria were applied correctly, and if recovery occurred as expected.

Retreatment and active rehabilitation or restoration prescriptions would be developed as needed based on post-treatment results. Changes in treatment methods would occur based on effectiveness of treating the invasive plant infestations. For example, an invasive plant population treated with a broadcast herbicide may be retreated with a spot spray or hand pulled, once the size of the infestation and density of the seed bank are reduced.

Implementation Monitoring

Program elements and site-specific projects should include the following to accomplish implementation monitoring:

- Develop a project work plan for herbicide use as described in FSH 2109.14.3. This plan would present organizational and operational details including treatment objectives, equipment, materials, and supplies needed; herbicide application method and rate; field crew organization and lines of responsibility, and a description of any interagency coordination. The plan would also include a job hazard analysis to assure applicator safety.
- Conduct site visits during work periods to monitor compliance.
- Initiate monitoring during implementation to ensure Project Design Features are implemented as planned. Document daily field conditions, activities, accomplishments and/or difficulties. Use contract administration mechanisms to correct contractor performance deficiencies.
- Document and report herbicide use, certified applicator information, invasive infestation information and inventories, and invasive treatments using the database of record to record the amount, type and location of herbicide use annually.
- For biological control releases, monitor a selection of biological control release sites annually, tracking agent establishment and target species' response, to determine the efficacy of the release.
- For aquatic herbicide applications, obtain, as required, pre- and post-treatment water quality data for water chemistry, impacts to fauna and to non-target flora and response of the aquatic invasive plant species to treatment.
- For mechanical treatments, monitor rehabilitative and restoration measures throughout the recovery process to quickly identify and correct any problems that may impede successful revegetation.

Effectiveness Monitoring

Effectiveness monitoring generates data that aids managers in assessing trends in infestation number, size, and density, the effect of noxious and invasive plant infestations on native vegetation, the effect of treatments on target and non-target species, and the effectiveness of treatments as implemented. Effectiveness monitoring must be done at multiple scales in order to provide the best insight into the effects of treatment actions. All treatment methods (manual, biological, and chemical) are subject to effectiveness monitoring.

- Monitor size, density, and other biological characteristics of invasive plant infestations.
    - Maintain noxious and invasive plant inventories in the appropriate database of record.
- Evaluate immediate and short-term impacts of treatment on target invasive plants and non-target vegetation.

    - Monitor and document observations of treated sites as practicable in accordance with established guidelines.
- Evaluate long-term effects of treatment on target invasive plants and non-target vegetation.
    - Establish permanent monitoring plots for long-term site assessment.
    - Monitor survival, distribution, and effectiveness of biological control agents.