

MOYOCO Invasive Species Strike Team

Final Report 2012

Overall Summary



HIGHLIGHTS

- ☞ Conducted approximately 62 Projects on ten National Wildlife Refuges and 26 Waterfowl Production Areas within four Wetland Management Districts for more than 30 invasive plant species

Project Location	Total Survey Acres ¹	Survey Acres Infested ²	Acres Treated ³
Benton Lake NWR	1.70	1.56	1.56
Benton Lake WMD	1,824.54	264.81	62.72
Pumphouse Unit	97.77	4.62	4.65
Bowdoin NWR	680.28	3.22	2.91
Bowdoin WMD	999.30	65.62	4.78
Community Projects	1688.89		618.95
Charles M. Russell NWR	1,970.00		320.00
Lee Metcalf NWR	772.52	11.88	11.90
Lost Trail NWR	138.92	39.48	39.61
Medicine Lake NWR	1,377.20	45.87	47.39
National Bison Range NWR	715.21	38.02	1.02
National Elk Refuge	4573.00		91.77
NE Montana WMD	738.46	5.74	5.74
NW Montana WMD	1,067.45	29.80	27.59
Pablo NWR	80.73	5.01	3.08
Red Rock Lakes NWR	2018.72	7.90	0
Project Location Totals	16,774.69	523.53	923.67
¹ Area covered during the course of weed management activities regardless of presence or absence of target weed species as measured by perimeter in GIS. ² Area occupied by weed species within the survey area that does not contain the space between individuals or populations (i.e. net infestation size) as measured by GPS feature for monitoring and treatment combined, but areas in common not additive. ³ The area or subset of infested area that has received some form of treatment as measured by GPS feature.			

Coordination and Cooperation

- ☞ Close coordination with Lee Metcalf NWR and Benton Lake NWR as host-sites for strike team crews in regards to providing funding for overhead costs, safety inspections, and chemical or equipment sharing.
- ☞ Coordination with the Rocky Mountain Front Weed Round Table for project needs and community events within the Rocky Mountain Front Conservation Area.
- ☞ Coordination with National Bison Range staff to treat known populations of leafy spurge at Anderson WPA.
- ☞ Partnered with Charles M. Russell NWR for river bottom restoration by leveraging funds for chemical purchase and field prep spray effort.
- ☞ Continued cooperative agreement between National Elk Refuge and Teton County Weed and Pest to partner for weed management on the refuge and within the Jackson Hole Watershed Management area throughout the field season.

- ☞ Continued cooperative agreement with Montana Conservation Corp and FWS using Strike Team and Youth in Natural Resource Careers funding for multi-station efforts of treatment of noxious weeds, riparian restoration, and grassland restoration projects while educating youth on the importance of wildlife conservation.).
- ☞ Close coordination with Lee Metcalf NWR Project Leader prior to use of ATVs to obtain preferred method of treatment for each species in all areas treated, with special attention and consideration for areas north of Wildfowl Lane to ensure no adverse effects to ground nesting birds.
- ☞ Cooperated with MSU to evaluate effectiveness data and discuss publication opportunities.
- ☞ In coordination with National Bison Range we expanded the habitat suitability pilot project to test the model and compare results that improved the model that can be used to prioritize management efforts within their planning process..
- ☞ Coordinated with site manager Kevin Ertl for first inventory and treatment of noxious weeds at Upsata Lake WPA.
- ☞ ISST worked with Ravalli county weed district employees at Lee Metcalf NWR throughout the summer.
- ☞ Participated as FWS rep on Invasive Species Subcommittee for AGO Crown of Continent to develop comprehensive inventory of terrestrial plant species distribution and abundance and develop cooperative solutions and priorities to reduce risk and current threats to this ecosystem.
- ☞ Invited and attended Structured Decision-Making Workshop in California as EDRR technical expert with university and agency personnel to develop framework for prioritizing inventories and management at a local scale.

Prevention and Education

- ☞ Outreach and education and prevention with early detection and rapid response was again achieved by several community efforts of weed pulls and spray days.
- ☞ ISST teamed with over 300 citizens from different agencies, landowners, and volunteers through partnerships optimizing weed control efforts across the state.
- ☞ Attended 10 community events with 4weed pulls, 5 spray days and one bio-control collection day in 4 different counties of Montana
- ☞ Pulled 850 total pounds of weeds at the Zortman Weed Roundup and ISST was responsible for 282 pounds of the total weeds pulled. ISST member Levi Morgan won the “Most Pounds Pulled” award.
- ☞ Participated in the first ever Elk Creek Spray Day within the Lewis and Clark National Forest.
- ☞ Close collaboration with State Department of Agriculture and County Weed Coordinators for new invader alerts, funding collaboration, and training opportunities.

Early Detection and Rapid Response

- ☞ EDRR and treatment of new populations of tansy ragwort and orange hawkweed at Lost Trail NWR.
- ☞ Four common tansy populations treated in 2011 appear to be eradicated at Blackfoot WPA.
- ☞ One small population of St. Johnswort was documented during a spotted knapweed project at Blackfoot WPA.
- ☞ .009 acres of previously undocumented leafy spurge was found and treated along Hwy 204 within Korsbeck WPA.
- ☞ Strike team members mapped an additional perennial pepperweed population at Arod Lake WPA while treating Russian knapweed.
- ☞ Inventory of 4.77 acres of common reed and one small bull thistle population during an all noxious weed survey at Beaver Creek WPA.



Tansy ragwort at Lost Trail NWR. Photo by Eric Lassance

- ☞ Continued early detection of single plants or very small patches and treatment of hoary alyssum, orange hawkweed, Russian knapweed, sulfur cinquefoil, spotted knapweed, houndstongue, bull thistle, St. Johnswort, and leafy spurge at several refuges.
- ☞ Close collaboration with R6 States Department of Agriculture and County Weed Coordinators for new invader alerts, funding collaboration, and training opportunities.
- ☞ Saltcedar is an EDRR species on Copple WPA treated by the strike team starting in 2009. Populations around one of two ponds appear to be eradicated. and
- ☞ Bowdoin WMD classic example of practicing early detection/rapid response with inventories of large expanses that are protected by treating new and/or small invasions immediately.
- ☞ ISST treated 45.87 acres of leafy spurge over 1300 acres at Medicine Lake NWR. Previously treated populations had a significant decrease in population size and/or density.
- ☞ Continued treatment of baby's breath in seven WPAs within the Northeast Montana Wetland Management district.
- ☞ EDRR and treatment of one leafy spurge population within the Pumphouse Unit of Benton Lake NWR.
- ☞ Continued EDRR of meadow hawkweed, orange hawkweed, St. Johnswort, and sulfur cinquefoil at Smith Lake WPA.
- ☞ Significant decrease in density and populations size of hoary cress at Schrammeck Lake from treatments initiated in 2011.
- ☞ ISST worked on several EDRR projects at the Bison Range including white top/hoary cress, meadow hawkweed, leafy spurge, and yellow toadflax.

Inventory and Monitoring

- ☞ On several project sites significant efforts were made to inventory for the presence and absence of noxious weeds in areas never previously covered by ISST.
- ☞ Conducted extensive inventories on Red Rock Lakes NWR covering over 2,000 acres and Beaver Creek (including the Copple tract) WPA covering over 900 acres for distribution and abundance of numerous species which will help protect it from further invasion.
- ☞ Inventoried 136 acres of Spalding's catchfly habitat at Lost Trail NWR.

Management

- ☞ Projects covered over 4,629 acres across four Wetland Management Districts (27 Waterfowl Production Areas) and 9,756 acres across nine National Wildlife Refuges.
- ☞ Provided limiting analysis of effectiveness for some projects with consistent treatment data for last three years.
- ☞ Strike team strives to provide chemical for projects. Funding was provided for additional chemical needs on CMR, Bowdoin, National Bison Range and Lost Trail NWRs.
- ☞ Historical populations of whitetop at Brumwell WPA appear to be eradicated.
- ☞ Historical populations of meadow hawkweed and common tansy appear to be eradicated at Blasdel WPA.
- ☞ Historical populations of oxeye daisy and orange hawkweed at Flathead WPA also appear to be eradicated.
- ☞ Significant decrease in yellow toadflax populations and historical populations of hawkweeds appear to be eradicated at McGregor Meadows WPA.
- ☞ Continued decrease of musk thistle populations at Savik WPA
- ☞ Population of Russian knapweed at Smith Lake WPA appears to be eradicated.



Levi Morgan treating an isolated patch of salt cedar at Beaver Creek WPA (Copple Tract). Photo by Eric Lassance.

- ☞ Chemical and funding provided to CMR for treatment of Russian knapweed along roads and in camping areas .
- ☞ Significant decrease in infestation size of Bowdoin NWR perennial pepperweed population
- ☞ Expanded Spalding’s catchfly project on Lost Trail NWR for mapping this threatened plant and treatment of invasives within its habitat.
- ☞ Responded to request by site managers for point-to-point treatment around historic locations rather than systematic, complete coverage. Although minimizes disturbance, reduces ability to detect new populations and limits scope of weed mapping data for determining effectiveness.

Community Events

The Strike Team often provides a face for the FWS efforts of invasive plant management across several landscape and watershed efforts. We work alongside neighbors participating in community events that build credibility, fosters trust, facilitates partnerships and on average, leverages funding 10:1 for all involved for more cost-effective effort. Besides providing in-kind support, often the strike team will try to provide a few prizes for raffles and weed contests. A few highlights follow:

- ☞ Participated in ten community events with approximately \$3,690 in-kind leveraged into \$36,855 of invasive species control in five counties
- ☞ Lee Metcalf NWR Weed Roundup had 32 participants that pulled 2,547 pounds of weeds, which is most ever removed during this event (over 400 pounds more than any previous year) over 4.36 acres. Strike team provided extensive support for this event.
- ☞ Zortman Weed Roundup emphasizes education and management of invasive species through collaboration and fun weed related contests. ISST was responsible for pulling 282 of the 850 total pounds pulled at this event. ISST member Levi Morgan won the “Most Pounds Pulled” Award.
- ☞ Despite a rainy day, 53 participants including ISST pulled 500 pounds of spotted knapweed at the Teton Canyon Annual Weed Pull.
- ☞ 18 total miles of roadway corridor were treated by cooperating partners along the Teton Canyon Road.
- ☞ ISST members participated in the first ever Elk Creek Spray Days along the Rocky Mountain Front.
- ☞ 80 participants using 20 boats removed blueweed along the Bitterroot River during the Ravalli county weed pull providing support Ravalli County Weed District. All known locations of blueweed in Ravalli County are located upstream from Lee Metcalf NWR.
- ☞ During the Dearborn Spray Day, two ISST members worked closely with Gary and Connor Murphy to manage weeds on their ranch.
- ☞ Approximately 20 interagency professionals and landowners worked together for a full day of noxious weed treatments within the management area owned by multiple stakeholders, commonly known as Poker Joe fishing access site. Integrated weed management techniques included hand pulling, shoveling, herbicide application, and goat grazing.
- ☞ Buzzy Breen is a Teton County biological control community event that provides a hands-on learning experience of how biological control can be used as a management tool for invasive plant management. Leafy spurge beetles are then distributed to landowners by USFWS Partners for Fish and Wildlife and Rocky Mountain Front Weed Roundtable. This year 133,000 beetles were collected and distributed from this event.



Zortman Weed Roundup. Photo by Eric Lassance.

Date	Event	County	Participants
6/2/12	Lee Metcalf Weed Roundup	Ravalli	32
6/13/2012	Elk Creek Spray Day	Lewis & Clark	12
6/14/12	Teton Spray Day	Teton	16
6/23/12	Zortman Weed Roundup	Phillips	18
6/25/12	Dearborn Spray Day	Lewis & Clark	26
6/28/2012	Sun Canyon Spray Day	Lewis & Clark	19
7/11/12	Buzzy Breen Memorial Bug Collection Day	Teton	30
7/12/2012	Poker Joe Interagency Workday	Ravalli	15-20
7/14/12	Teton Canyon Annual Weed Pull	Teton	53
7/21/12	Ravalli County Floating Weed Pull	Ravalli	80

Summary

U.S. Fish and Wildlife Service Invasive Species Strike Team

Mission: To contribute to the restoration and maintenance of native plant and wildlife communities of the National Wildlife Refuge system and their neighboring landscapes by reducing impacts from invasive species through prevention, control, restoration, monitoring, and education.

Exotic species are a major threat to native ecosystems in the United States and considered second only to habitat destruction in significance. Control of invasive species is a management priority because they have a direct negative effect on the ability of National Wildlife Refuge System (NWRS) lands to fulfill their wildlife conservation mission, including migratory waterfowl and songbird production, species recovery, biological diversity, biological integrity and ecosystem function. Because of these degrading effects, the control of exotic pests has become a priority over the past decade for land managers. It's been reported that over 2 million acres of the U.S. Fish and Wildlife Service's National Wildlife Refuge System lands are infested by invasive plants, based on Refuge Annual Performance Plan (RAPP) data.

The U.S. Fish and Wildlife Service Invasive Species Program was established to provide education and support to more effectively confront the threat of exotic species. One component of this program was the formation of Invasive Species Strike Teams (ISST) designed to be mobile, expert crews that travel to various sites to rapidly respond to the detection and treatment of new infestations. Strike teams were developed to provide additional management support beyond current management efforts, not as a replacement to current refuge efforts. This additional support provides critical resources that can be used for eradication of new infestations, which is critical to prevent additional spread and not increase existing management burden. Five ISST units were formed based on specific geographic regions. The Upper Missouri / Yellowstone / Upper Columbia River (MOYOCO) Strike Team was one of the first teams established in 2004, and covers NWRS lands within these watersheds within Montana and northwest portion of Wyoming.



ISST crews cover expansive landscapes in search of noxious weeds. This photo was taken at Smith Lake WPA. Photo by Eric Lassance.

Early Detection/Rapid Response Rationale

Early Detection/Rapid Response (EDRR) is a methodology to survey and identify new invaders to an area and pursue treatment as quickly as possible. The USFWS Invasive Species Strategic Plan (2003) also recommends management to focus on early detection and complete eradication of smaller satellite infestations rather than trying to control large, well established infestations. It has been shown that it is far less costly to prevent new invasions from getting established by eradicating new invasions or small patches than spending resources trying to control or eradicate an invasion once it is well-established (Chippendale 1991 in Hobbs & Humphries 1995, Leung et al. 2002, Keller et al. 2007, Frid et al. 2011). Populations of invasives often expand more rapidly and potentially cover greater area than the front of a source population (Cousens & Mortimer 1995, Moody & Mack 1988). This is similar to the fire analogy of many spot fires may occupy or “fill” that area more quickly than the advancing front of one large fire. Finally, since most invasive plants have a long lag period following introduction, but before exponential growth during colonization, they can usually be eradicated at that time if recognized. Rejmanek & Pitcairn (2004) note that early detection can make the difference between employing feasible offensive strategies versus the necessity of retreating to a defensive strategy that usually means an infinite financial commitment.

For example, treating two new small patches of a species when discovered will result most likely in successful eradication and reduce significantly the threat and risk of this species spreading and adding to the existing management burden. On the other hand, treating a large existing patch with all the available resources for years may only see a slight decrease in size or density for limited effect for the amount of resources. While, all along, the two new invasions continue to grow and spread as well, which creates an even greater need for more resources. Resources must be directed at monitoring for early invasions in cooperation with our partners and responding rapidly to new invasions when they are first detected and can be most easily and inexpensively addressed. If resources are not directed for EDRR, then invasions are given time and allowed to outpace management efforts which undermines refuge control efforts and leads to greater area invaded with greater economic costs.

Therefore, the priority of ISST is early detection and rapid response treatments to the extent feasible for all new invaders at each project site. ISST projects typically require extensive survey or inventory efforts over vast areas of rough terrain searching for small or new weed infestations. Hence, several thousand acres are covered for what looks like small amounts of treatment. However, these projects are time-consuming and labor-intensive projects that the refuges would never have the time, funding or personnel to complete under current funding levels

Yet, EDRR and prevention are only components of an integrated management strategy for new invaders or satellite infestations. Nevertheless Refuges at times have individual species of large, well established infestations that must be targeted, at least for containment, for conservation purposes. For these species, prioritization by species or area must occur first to determine when these infestations have the greatest impact on trust resources, whether infestations are in areas of high conservation value, and if treatment or restoration will be cost-effective. Infestations that must then be contained or their spread slowed will maximize limited resources for those areas prioritized for management.

2012 Field Season Overview

The MOYOCO ISST operated two crews in 2012, one expedited out of Great Falls, MT from Benton Lake NWR consisting of four members and a crew leader, with the second expedited out of Stevensville, MT from Lee Metcalf NWR consisting of three members and a crew leader. The 2012 field season was filled with constant activity which includes coordination of two ISST field crews, ongoing collaboration with partners, funding various projects, managing contractors, and participating in and providing support to community events. Carrying out the early detection and rapid response mission, the Strike Team Program covered over 16,000 acres of land while treating over 30 different species. This is despite having to deal with significant equipment maintenance issues due to an aging fleet of ATVs and sprayers. Additionally, ISST provided funding to refuges for weed control, participated in community events, hired contractors for areas that could not be worked into the ISST crews schedule and worked cooperatively with many other groups including various county weed districts, the Blackfoot Challenge, and the Rocky Mountain Weed Round Table.

The strike team also had to adjust to some changes in how we conduct management and monitoring in the field. We had several requests from project leaders this season to conduct operations in a point-to-point manner instead of transecting the entire project site. Both methods have drawbacks and advantages. Point-to-point has the advantage of creating less overall disturbance to the site, and since less area is covered, it generally requires less time. The drawback is that smaller, newly established populations may not be detected as early as they would be if the whole site was transected. This means these populations may require more management effort overtime. Alternatively, transecting the entire project site gives a greater ability to detect all invasives present at the site, but it also increases the amount of disturbance and takes more time to cover a larger area.

Lindy Garner, Regional Invasive Species Program Lead; Strike Team Coordinator
 Bill Sparklin, Regional Invasive Species Biologist

Strike Team Members

Stevensville, MT Crew
 Jessica Zarate, Crew Leader
 Eric Angle
 Gina Mazza
 William Schlegel

Great Falls, MT Crew
 Eric Lassance, Crew Leader
 Chase Burns
 Michael Hader
 Levi Morgan
 Aimee Ross

The ISST crews travel throughout the growing season to various sites within the National Wildlife Refuge System specifically for the purpose of treatment, inventory, and monitoring of existing weed infestations based on project proposals submitted to the ISST Project Leader. Proposals received are prioritized and conducted as additional support of refuge invasive plant management, rather than in substitution of their efforts. Early detection and rapid response projects are critical to successful invasive plant management, and the driving force to our mission.

Project Selection

Project proposals submitted by the refuges to the ISST Coordinator are each reviewed for consideration and scheduling based on several parameters. Early detection and rapid response projects including the detection of new invaders, treatment of small and/or isolated infestations, monitoring and new inventories of areas are typically ranked the highest priority projects. However, scheduling projects is based on many variables which include, but not limited to, species and phenology expected for detection and treatment, management action requested (treatment, inventory, and/or monitoring) and available resources (chemical, lodging, teaming opportunities, etc). Extensive planning and coordination is required to successfully orchestrate the completion of multiple projects to occur within a relatively short period of time. Given the number of projects and variables that must be taken into account, the schedule has to allow for flexibility in response to weather, staff availability, and refuge access. Estimating plant phenology for rapid detection and optimal susceptibility to herbicide can be difficult given that phenology is dependent on existing climate and other environmental factors that may change from year-to-year. Timing herbicide applications appropriately with specific plant phenology is known to play an important role in the efficacy of many herbicides. Therefore, the Strike Team strategically treats specific weeds at certain times of the year. For example, the following table shows the time of year various noxious weed species are targeted for treatment and monitoring on the Lee Metcalf National Wildlife Refuge:

2012 Strike Team Noxious Weed Projects for Lee Metcalf NWR					
May	June	July	August	September	October
Houndstongue – treatment					
	Italian bugloss – treatment and inventory				
	Spotted knapweed – treatment		Spotted knapweed – treatment		
	Hoary alyssum – treatment and inventory				

	Oxeye daisy – treatment and inventory			
	St. Johnswort – treatment and inventory			
		Yellowflag iris – treatment and inventory		Yellowflag iris – inventory
		Dalmatian toadflax – inventory		Dalmatian toadflax – treatment
			Leafy spurge – treatment and inventory	
				Yellow toadflax – treatment and inventory

Budget Information

The Strike Team budget of \$481,500 is planned and distributed within the same guidelines as a refuge budget. Salaries to operating dollars are kept within the 75:25 ratio, with the Strike Team actually at 68:32 ratio. Of operating costs, 15% is used for equipment, chemical, fuel, repair, and overhead expenditures. Travel for the mobility of the crew results in 6% of the budget. Cooperative agreements (National Elk Refuge/County and MCC/ Medicine Lake/NWMT WMD) leveraged resources with other agencies or institutions consisted of 6% of the budget, while 5% was used in contract work at Charles M. Russell NWR. During the request for proposals process, refuges are provided an opportunity to request funding for chemical or equipment funding, and funding for additional partnerships. This year two refuges requested funding to purchase chemical and equipment (Lee Metcalf and National Bison Range NWRs) above and beyond chemical provided by the strike team for all refuge projects they conduct. Funding was also provided to National Bison Range for a partnership effort on Pablo NWR, and Charles M. Russell for purchase of native seed for a riparian restoration project.

The Strike Team strives to provide consistent and quality projects and data that support and improve our invasive plant management on refuge system lands and across the landscape in which they reside. Partnership opportunities are encouraged and welcomed to leverage all available resources into conservation actions on the ground that will enhance wildlife habitat.

Safety & Training

Safety and proper training is an essential component to ISST invasive plant management. At the start of each season every crew member attends a comprehensive, week-long orientation training where they are provided a plethora of information that is used throughout the field season. Safety meetings are held regularly in an effort to continue to educate staff members and avoid potential work hazards. Crews are required to use the proper personal protective equipment for all work and are trained thoroughly in the proper use of all equipment. A variety of environmental hazards such as lightening storms, heat exhaustion, to bear safety are addressed, and safe work habits are emphasized on a daily basis.

ISST routinely uses herbicides with a many different active ingredients that could be potentially hazardous to staff and the environment if used improperly. Because of this, formal class room and field training is performed which includes proper handling, reading and understanding the various labels, safe herbicide mixing, calibration, accidental spill procedures, etc. Proper protective equipment is supplied and required to be used for every project. Chemical labels and Material Safety Datasheets for each herbicide

used are kept on file and are on-hand at the project sites for reference as needed. Crew



ISST crew member suited in the appropriate personal protective equipment for herbicide applications. Photo by Levi Morgan.

leaders are required to attend Department of Agriculture pesticide applicator certification training and are licensed annually. Both crew leaders and members are provided opportunities to attend pesticide and noxious weed courses for additional training and to maintain certification.

The majority of weed management work is performed using All Terrain Vehicles (ATV), which allows crew members to cover more ground, carry more chemical and apply it rapidly, and facilitates faster GPS mapping. In 2010, a new policy was mandated which required the maximum fill limit of all ATV sprayers be reduced from 24 gallons to 10 gallons. This policy was implemented as a precautionary safety measure to help reduce the potential for ATV accidents resulting from excess weight of the herbicide tank on the back rack of the ATV. In 2012 with flooding conditions, each project had to be carefully reviewed for appropriateness for use of ATV to decrease degradation to the landscape. Without a doubt, the reduction in the amount of herbicide allowed to be carried, and decrease in use of ATV for walking and backpack sprayers significantly decreased treatment efficiency and increased the time and fuel required to treat large areas. A greater amount of time is spent riding to and from the staging area (where herbicide tanks are refilled), especially in heavily infested areas. Safety is of the utmost importance and ISST work requires the use of ATVs for efficiency, ISST members attend certified ATV training course each season and are adequately trained to ride safely.

Mapping Information

Weed locations were mapped at all times using *Trimble GeoXT* Global Positioning System (GPS) units. These units collect highly accurate real-time positions, generally with a precision of three meters or less. Under less than ideal conditions (i.e. mountains, heavy timber), accuracy can decline and managers may need to search a wider area if trying to locate previously mapped weed areas. Weed patches were mapped as different features if they were separated by greater than ten meters. For acreage calculations, line features were converted into polygons by buffering them with their estimated width using *ArcGIS* software. Point features were given a value of 0.005 of an acre to more accurately reflect recently established Strike Team field mapping standards. All Geographic Information System (GIS) files provided are in the GCS_North_American_1983 geographic coordinate system.

All data, be it spatial location or treatment information, is provided electronically for each project site with recommendations and interpretations. Maps and narratives will no longer be provided in paper form to reduce costs and save paper. These data are provided to refuges for use in their future management decisions. Any questions or request for further interpretation can be directed to the Strike Team Project Leader.

Long-term Trend Analysis

New for this year's final report is an analysis of multi-year population trends. This was done only for sites with species that have received consistent prioritization and treatment for at least 3 years. We report two estimates of acreages, gross acres and absolute acres. Gross acres are the acreage that includes all areas within the perimeter of the patch (both target and non-target species unless target species is 100% canopy cover). Absolute acres are just the area within patches actually occupied by the species of interest. For example, a 10 acre patch of spotted knapweed with 10% canopy cover would be reported as 10 gross acres and 1 absolute acre of spotted knapweed. With the exception of sites that receive complete surveys for a particular species, there is always some variation in total survey area. That means that these numbers should be only used to get a sense of the general trend and effectiveness at that site.

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