Clearwater Basin Collaborative

Selway-Middle Fork CFLRA Project

Weed Management Assessment

Prepared:
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Executive Summary

In 2010, a comprehensive restoration strategy submitted by the Clearwater Basin Collaborative, the Nez Perce-Clearwater National Forest, and other partners was selected for inclusion in the Collaborative Forest Landscape Restoration Program (CFLRP). The approved restoration strategy targets the 1.4 million acres of the Selway-Middle Fork ecosystem in Idaho. As part of the CFLRP, the Selway-Middle Fork project area receives federal funding (through 2019) to conduct science-based restoration projects. In 2011, a multi-party Monitoring Advisory Committee (MAC) was established in the CFLRP project area per the requirements of the CFLRP legislation. The MAC's effectiveness monitoring priorities include a weeds assessment, or gathering of baseline information, from which they will assist stakeholders in the development of recommendations for continued weed identification, treatment and monitoring as well as overall weed management efficiency and effectiveness improvements. This report was requested by the MAC and will serve as the baseline documentation for weeds-related adaptive management within the Selway-Middle Fork CFLRP project area.

Stakeholders

Weed management in the area has been part of a collaborative effort since 1995 and continues as such today under the auspices of the Upper Clearwater Cooperative Weed Management Area and the Frank Church-River of No Return CWMA. The US Forest Service (USFS) is the largest weed management stakeholder in the CFLRP project area, managing 95% of the total land. The project area spans two National Forests, two federally designated wilderness areas and four ranger districts. Weed management differs according to these boundaries and also differs according to the four general management categories most affiliated with weed treatment and monitoring in the USFS: designated weed crews, timber harvest, road decommissioning/restoration, and fire management. Additional stakeholders include Idaho County Weed Control (ICWC), the Nez Perce Tribe (NPT), private contractors, the Back Country Horsemen of North Central Idaho (BCHI or NCI), the Montana Conservation Corps (MCC), outfitters and guides, the Selway-Bitterroot Frank Church Foundation (SBFC), and private landowners and volunteers. Despite most stakeholders being member of the two CWMAs mentioned above, the goals, activities, and accomplishments of individual stakeholders can vary tremendously from each other, as well as from those of the CWMAs in which they operate.

Inventory Efforts

Weed inventory has been conducted largely by USFS designated weed crews, ICWC employees and contractors, the NPT and SBFC. Data collection varies from electronic with GPS/GIS to simplified hard copy. Most but not all information is entered in the USFS Natural Resources Manager Threatened Endangered and Sensitive Plants-Invasive Species Integrated Application and tracked with the Forest Service ACtivity Tracking System (hereafter both applications are simplified to FACTS). From 1980-2013, 48 weed species were documented in the project area. The majority of inventory data only indicates the presence of infestations encountered; areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date. The NPT Biocontrol Center (NPBC) inventory crew is the one stakeholder which documents all locations covered during inventory efforts. It is unknown what proportion of the project area has been fully inventoried for weeds to date. Most inventory efforts target new areas rather than revisiting and documenting change in previously mapped

infestations. Consequently, existing weed inventory data is useful as baseline information but cannot be used to track either treatment efficacy or natural weed spread over time across the project area.

Treatment Efforts and Trends

Biological Control

Biological control agents have been released by USFS personnel, ICWC employees, the NPT, the MCC, and private contractors. 399 releases have been made in the CFLRP project area since 1983; 391 have targeted spotted knapweed. Limited monitoring has been conducted by the NPBC and private contractors. Ten species are established; eight attack spotted knapweed and two *Chrysolina* beetles attack St. Johnswort. *Chrysolina* spp. and their host have followed a boom/bust cycle and continue to fluctuate today, though the overall weed population is much smaller than pre-release. Redistributions of *Chrysolina* are recommended to open, sunny areas in order to maintain fluctuating control at the local scale. At one spotted knapweed monitoring site, the weed decreased from one year to the next, but this was not likely due to biocontrol as agent populations also decreased between years. At the remaining sites, spotted knapweed cover did not change between years. Many stakeholders believe biocontrol of spotted knapweed is promising, and releases of *Cyphocleonus achates* have increased dramatically since 2008. 31,095 *C. achates* have been released in the project area since 1994, while 36,460 *Larinus* spp. have been released since 1996. Despite the similar amounts and time frame, *Larinus* spp. have been recovered at 106 sites, while *C. achates* has only been recovered from 7. Many *C. achates* release locations do not exhibit characteristics favorable to the agent. Consequently, population growth at most of the unsuitable sites would not be expected to reach the high levels observed elsewhere in North America where the agent has had measurable impacts. Additional time and consistent monitoring efforts are needed to fully understand the impact of biocontrol on spotted knapweed in the CFLRP project area. Any future releases should only be made in large patches growing under conditions conducive to high agent population growth (long/hot summer temperatures, mid elevation, sandy soil).

Chemical Control

Chemical treatments have been applied by USFS designated weed crews, ICWC employees and contractors, the NPT, private contractors, the BCHI of NCI, the MCC, and private landowners and volunteers. Application information has been recorded in FACTS since ~2006. Data collection varies from electronic with GPS/GIS to simplified hard copy. There is considerable flexibility in the interpretation of required data fields in the FACTS system such that possible data analyses differ between forests. In both the Bitterroot and Nez Perce-Clearwater National Forests, it is a requirement that 50% of acres treated be monitored in order to receive credit for treatments. This usually entails simple ocular measurements of the percent control for the treated weed (i.e. the percentage of treated plants killed). Percent control can be a very subjective measurement because it requires knowledge of the infestation prior to the original treatment. However, many individuals conducting monitoring (typically USFS designated weed crews or ICWC employees) were not present at the infestation originally.

In the UCWMA (including the Nez Perce-Clearwater National Forest), 28 weed species have been chemically treated since 2000. The number of infestations treated has increased regularly from 2000-2013, but dramatically so from 2009 onwards. The majority of infestations treated to date have been assigned a priority 3 by the UCWMA. 496, 3,355, 15,757, and 982 acres have been treated and were assigned to priority 1, 2, 3, and 5, respectively. Of the 425 unique weed infestations that have been treated chemically since 2000, 113 have been monitored at least once since 2009 (571 monitoring visits total). Despite the UCWMA strategic plan calling for the monitoring of 1 and 2 priority sites three times each year, this does not often occur. Of all high priority sites treated since 2000 (100 total), only 10 sites

received 3 or more visits during the 2013 growing season. Eight of these 10 sites occurred on non-forestland, indicating the Nez Perce-Clearwater National Forest is not actively following the strategic plan guidelines for the UCWMA. 31 and 13 sites received 1 and 2 visits, respectively. 48 high priority sites did not receive any monitoring visits in 2013. Anecdotal observations of percent control average 82%. Readings of 100% control are the only non-subjective measurements and can be used to track treatment progress at the site level. Infestations with 100% control reported for one or more monitoring visits were queried from the treatment dataset in order to track changes in chemicals applied over time. At 36 sites, chemicals applied continually decreased over time, eventually reaching zero for the most recent monitoring events. Weed infestations at these sites appear to be in control. At 21 sites, herbicides applied have fluctuated over time, but are decreasing overall compared to initial treatment records. Control appears possible at these sites. At 13 sites, applied herbicides appear to fluctuate regularly, with no obvious indication of increasing or decreasing. At a final 13 sites, most recent records indicate the chemicals needed are increasing overall. Sites with no control are typically: not visited as frequently as they should be; receive incorrect herbicides, rates, or application dates; or recent inventory efforts have increased in quality to reveal infestations were all along larger than expected and now require more herbicides.

In the Bitterroot National Forest, 16 weed species have been chemically treated since 2007. Records do not break down the acreage, priority, herbicide applied, and spatial location of individual weed species; all information is lumped by treatment location. The manner in which the Bitterroot National Forest records treatment information allows for the tabular tracking of total acres surveyed, rather than just acres actually treated with herbicides (wetted acres). Survey efforts have increased dramatically since 2010, though wetted acres have decreased since 2011, indicating that while more area is covered during weed surveys, fewer infestations are encountered and treated. 5,363 acres have been surveyed since 2007, while 727.2 acres have been wetted. Anecdotal observations of percent control average 94%. 80 out of 279 monitoring visits indicated 100% control, though some populations later recovered from the soil seedbank. Since 2010 the Bitterroot National Forest has been involved in quantitative vegetation monitoring in the CFLRP project area to determine the efficacy of past treatment efforts. Results are not currently available for analysis as this is an ongoing multi-year effort.

Physical Control

1855 acres have been treated with physical control methods since 2008, all within the UCWMA but on non-forestland. Though seven species have been physically treated, the vast majority were priority 1 infestations of garden yellowrocket (*Barbarea vulgaris*). Nine of the total 12 sites have been anecdotally monitored by ICWC employees each year since 2009. All sites on average received three visits during each growing season, in line with the UCWMA strategic plan. Four sites have maintained 100 percent control since 2010. These sites had been treated with a combination or herbicides and physical control. The remaining five sites have had fluctuating efficacy measurements since 2011, indicating additional monitoring and follow-up treatments are warranted to ensure full infestation eradication.

Rehabilitation Efforts and Trends

Restoration is not a primary objective of weed management programs in the CFLRP project area. Weed treatment is the primary avenue whereby the majority of stakeholders contribute to site rehabilitation. Weed treatment, itself, is an important component of restoration. When native or more desirable species make up more than 30% of the overall plant cover, the simple act of removing the competing weeds may be sufficient to tip the balance back in favor of the native/desirable species. Measuring native/desirable species cover is not currently a requirement in weed treatment records, so no rehabilitation data is

available for the majority of weed treatment records queried from FACTS and other sources in this assessment.

Rehabilitation is a key component to restoration activities carried out by USFS road decommissioning crews and the NPT Watershed Division. Revegetation is included in all decommissioning projects for roads not assigned to simple abandonment. Native species already growing in the project area are preferentially used in re-plantings, followed by nursery-grown stock and seed mixes containing native and desirable exotic species. Monitoring is conducted at a subset of all restoration sites to track the effectiveness of the program. For every 10 miles of road decommissioned, a ¼ mile-segment of decommissioned road is selected for monitoring vegetation and ground cover. Though not representative of the entire CFLRP project area, monitoring results indicate rehabilitation efforts are successful at *some* road decommissioning sites as the amount of overall vegetation is increasing for recent projects compared to previous efforts. This correlates to improving methods in revegetation on decommissioned roads. Weeds account for ~10% of the plant community at monitored decommissioned sites, indicating continued treatment is warranted.

Education/Prevention Efforts

ICWC, NPT Watershed Division, NPBC, and the BCHI of NCI all conduct workshops and/or give presentations to land managers, schools, and the interested public which provide training on weed identification and control methods and the importance of weeds in the environment. ICWC, NPT Watershed Division, and NPBC also distribute weed identification and control material to land managers and the public. USFS personnel, ICWC and the NPT all post signs informing the public about the importance of preventing the introduction and spread of weeds into natural areas. Signs are posted at trailheads, wilderness portals, and many campgrounds. Certified noxious weed-free hay is required throughout forestland in the project area. Maintaining signs and checking hay are not activities formally recorded in FACTS or other USFS databases, but are done regularly on an as-needed basis by USFS personnel, ICWC and volunteers with the BCHI of NCI. Consequently no data is available regarding the amount, frequency, or trends of education and prevention activities.

Recommendations

The baseline data gathered in this weeds assessment highlights the *immense* effort put into weed management by numerous stakeholders and lays the groundwork for measuring treatment efficacy in the future. The data also (along with stakeholder observations) highlights numerous gaps and limitations in current weed management activities. Because the CFLR program will continue through 2019, it is crucial that these gaps and limitations be addressed now in order to maximize the use of remaining CFLRP resources. Listed below are key recommendations for improving weed management in the project area in order to increase the efficiency and long-term efficacy of weed control programs.

Organization Structure

Re-structuring or appointing a new forest-wide leader or team is crucial for the success of weed control efforts in the project area. A strong leader or team is: accountable, persuasive, supported by Forest leadership, committed to a long-term weed control program, and highly skilled in communication, organization, technological application, and integrated weed management on a large scale.

Accountability

Once an effective leader is in place, it is necessary that leader has sufficient authority so that weed management decisions can be implemented. Accountability for implementation is necessary to ensure all essential weed control activities are completed and in the timeframe and manner determined to be most effective by the CWMA.

Funding

Invasive plants must be recognized as a significant and persistent issue in land management, and dedicated (sufficient) funding must be allocated annually and consistently in order to develop the most effective long-term weed management programs.

Inventory

Inventory efforts should be conducted throughout the entire project area, including re-visits to infestation boundaries known to be inaccurate. Inventory data collection should also be changed to require documentation of areas surveyed and found to be free of weeds. The term "weed free" should be more rigorously defined to be implemented more usefully and reliably.

Treatment Data Collection and Entry

All stakeholders collecting weed management data should record the same categories of information in the same manner and be in agreement on the interpretation of fields and values. All information should be entered into FACTS in the same manner across all forests and users. The FACTS system itself has proven cumbersome for many USFS personnel and incompatible or inaccessible for non-USFS stakeholders. If these issues cannot be addressed by FACTS developers and managers, it is recommended an alternative and simpler spatial database be developed that would allow sharing of data and seamless data entry for all stakeholders.

Monitoring

It should be a requirement of both employees and contractors that all infestations be monitored for past treatment efficacy prior to any new applications. Monitoring data collected should be altered to include less subjective measurements of control (e.g. quantitative measurements) and include native/more desirable species in order to track progress on the landscape. The same monitoring protocol and interpretation should be agreed upon and utilized by all stakeholders.

Training and Coordination

Once inventory, treatment, and monitoring data collection protocols are agreed upon by stakeholders, workshops should be held to ensure that all individuals (and interested public) are trained in: the new methodology, in weed identification (especially new invaders), and in the most effective methods/timings/rates for treating each weed species.

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Acronyms

BAER	Burned Area Emergency Response
BCHI	Back Country Horsemen of Idaho
BCHI of NCI	Back Country Horsemen of North Central Idaho
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CBC	Clearwater Basin Collaborative
CFLRP	Collaborative Forest Landscape Restoration Program
CRBWMA	Clearwater River Basin Weed Management Area
CWMA	Cooperative Weed Management Area
EIS	Environmental Impact Statements
FACTS	Forest Service ACtivity Tracking System
FCRONRW	Frank Church-River of No Return Wilderness
FCWMA	Frank Church-River of No Return Wilderness Weed Management Area
FIA	Forest Inventory and Analysis
GIS	Geographical Information System
GPS	Global Positioning System
ICWC	Idaho County Weed Control
ISST	Invasive Species Strike Team
MCC	Montana Conservation Corps
NEPA	National Environmental Policy Act
NPBC	Nez Perce Biocontrol Center
NPT	Nez Perce Tribe
NRM TESP-Invasive Species Application	Natural Resources Manager Threatened Endangered and Sensitive Plants (TESP) - Invasive Species Integrated Application
SBFC	Selway-Bitterroot Frank Church Foundation
SBW	Selway-Bitterroot Wilderness
SIMP	Standardized Impact Monitoring Protocol
UCWMA	Upper Clearwater Cooperative Weed Management Area
USFS	United States Forest Service

1. Introduction

The Clearwater Basin Collaborative (CBC) consists of numerous representatives from tribal, federal, state and local governments, private industry, conservation groups and sportsmen organized to resolve land management conflicts in the Clearwater Basin of north central Idaho. In 2010, a comprehensive restoration strategy submitted by the CBC, the Nez Perce-Clearwater National Forest, and other partners was selected for inclusion in the Collaborative Forest Landscape Restoration Program (CFLRP).

Figure 5: Selway-Middle Fork CFLRP project area in Idaho

The approved restoration strategy targets the 1.4 million acres of the Selway-Middle Fork ecosystem in Idaho (Figure 1). This project area is of significant cultural, recreational, and economic importance. It is within the traditional homeland of the Nez Perce Tribe and contains the Middle Fork of the Clearwater River, a section of waterway included in the US Wild and Scenic Rivers system. The majority of the project area is forested, with 68% federally designated as wilderness. The forest products industry, fishing, hunting and recreational opportunities within the Selway-Middle Fork CFLRP area all provide substantial income for communities in and around the region.

As part of the CFLRP, the Selway-Middle Fork project area receives federal funding to conduct science-based restoration projects. The program began in 2010 and will extend through 2019. Current and future projects target the following goals, as outlined in the CFLRP proposal:

1. Protect communities, private lands and Wild and Scenic River corridors from uncharacteristic wildland fires
2. Re-establish and perpetuate landscapes that are diverse and resilient
3. Restore forest structure, function and ecologic processes that promote aquatic health
4. Restore forest structure, function and ecologic processes that promote habitat for big game and other terrestrial species
5. Contain or eliminate noxious weeds
6. Promote landscape conditions that allow fire to function as the primary restoration agent
7. Contribute to the economy and sustainability of rural communities

The containment or elimination of non-native invasive plant species (weeds) is listed above as a stand-alone goal because it is becoming increasingly apparent that weeds influence all other restoration goals of the project.

1.1 Importance of Weed Management

The introduction of non-native species to new habitats is a growing concern for biodiversity and global environmental change (Walker and Steffen 1997, Mack et al. 2000). In the United States, weeds invade approximately 1.7 million acres of wildlife habitat per year (Babbitt 1998). Their establishment and spread severely impact agriculture and other human activities (Pimental et al. 2001, DiTomaso et al. 2007), displace native plant communities (Morse et al. 1995), and disrupt existing ecosystems (D'Antonio and Vitousek 1992, Walker and Steffen 1997).

Exotic plant species are estimated to cause more than $34 billion of damage per year to farming and ranching sectors both in yield loss and the cost of weed control (Pimental et al. 2005). Determining the economic impact of weeds on natural environments is much more difficult. In addition to the direct costs of weed treatment in wildlands, exotic plant invasions alter fire regimes (D'Antonio and Vitousek 1992), leading to increased costs in fire suppression activities. Weed invasions can increase soil erosion (Lacey et al. 1989), which in turn damages fisheries. Native plant communities are displaced by large-scale weed invasions, which decreases habitat for big game and other wildlife (D'Antonio and Vitousek 1992). Some of the displaced native species are threatened or endangered, and their extinction via weeds invasion is an increasing concern (Babbitt 1998). Many exotic plant species alter the nutrient cycling in their invaded habitat to the extent that residual effects remain even after weed removal (Pearson and Ortega 2009, DiTomaso et al. 2007). Though lost revenue and/or increased control costs related to weeds can be readily calculated, it is very difficult to apply a dollar amount to the loss of a rare plant or animal, a reduction in native animal populations, the aesthetic value of "pristine" wildlands for recreationalists, or the cultural value of maintaining ecosystem function in traditional homelands.

Despite the difficulty in assigning economic values to weeds and their impact in natural areas, the importance of weed management in these areas is well documented (Pearson and Ortega 2009 and references therein). Effective weed management programs typically consist of a five-step approach (Beck 2009):

Inventory — Documenting the weeds present in the target area to understand the scope of the problem. Inventory efforts may include tracking weed infestation locations, patch size, density, and other species present.

Treatment — Applying control measures to eliminate, reduce or contain weeds. Treatment methods typically fall within four different categories. The most appropriate method will vary depending on the target weed species, patch size and location, and overall land management goals.

- **Biological** — Introducing insects or pathogens from the weed's native range to attack the weed and reduce or help contain weed populations
- **Chemical** — Applying herbicides to eliminate or reduce weed populations
- **Cultural** — Utilizing grazing livestock, crop rotations, or specific seeding/fertilization applications to reduce or contain weed populations
- **Physical** — Hand-pulling, digging, mowing, or using prescribed fire to reduce or contain weed populations

Rehabilitation — Improving the health of invaded areas with the desire of restoring ecosystem balance among native and/or more desirable species. Rehabilitation efforts may include re-seeding with more desirable species or halting land disturbance activities.

Monitoring — Observing treated areas over time to determine if or which management efforts are effective.

Prevention/ Education — The least expensive weed to control is the one that is not present. Prevention activities include educating all land users about the importance of weeds, their accurate identification, behavioral changes to prevent their spread, and the necessity of documenting and treating weeds early in the invasion process.

1.2 Purpose of Weeds Assessment

Invasive plants have long posed a challenge for maintaining the ecological integrity of the Clearwater Basin, and weed management practices in the region have been in place for several years (USDA FS 2012, Dohmen 2006). The Clearwater Basin Weed Coordinating Committee was formed in 1995, which later evolved into the Clearwater River Basin Weed Management Area (CRBWMA). The CRBWMA is a working group comprised of private landowners, county weed control affiliates, the Nez Perce Tribe, state agencies, federal land management agencies, and interested organizations and individuals. The purpose of the CRBWMA is to bring together those responsible for weed management within the Clearwater Basin, develop common management objectives and priorities, and pool resources to help facilitate coordinated and effective weed treatment. In 2005, the CRBWMA was divided into two areas: the CRBWMA and the Upper Clearwater Cooperative Weed Management Area (UCWMA). The division was done to improve the effectiveness of accomplishing common weed management objectives across multi-jurisdictional landscapes (USDA FS 2007b). Of the two CWMAs, the Selway-Middle Fork CFLRP project area overlaps only the Upper Clearwater (Figure 2). The UCWMA is described in greater detail in section 3.1.1 (Cooperative Weed Management Areas).

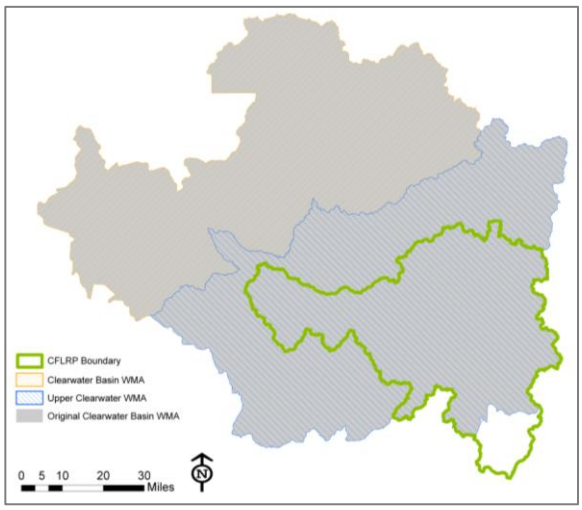


Figure 6: Selway-Middle Fork CFLRP project area in relation to Clearwater Basin CWMA and Upper Clearwater CWMA (Idaho Department of Agriculture CWMA Layer 2006)

In 2011, a multi-party Monitoring Advisory Committee (MAC) was established in the Selway-Middle Fork CFLRP project area per the requirements of the CFLRP legislation. The MAC's effectiveness monitoring priorities include a weeds assessment, or gathering of baseline information, from which they will assist stakeholders in the development of recommendations for continued weed identification, treatment and monitoring as well as overall weed management efficiency and effectiveness improvements. This report was requested by the MAC and will serve as the baseline documentation for weeds-related adaptive management within the Selway-Middle Fork CFLRP project area.

Specific objectives of this Selway-Middle Fork CFLRP weeds assessment include:

1. Identify all stakeholders in weed management
2. Determine what weed management activities have been undertaken
3. Gather baseline data for:
    a. weed species present
    b. infestation locations
    c. treatment history
    d. program expenditures
4. Determine if efforts are effective and reasons for successes/failures
5. Identify ways in which weed management programs can be improved to increase treatment efficacy and efficiency

*Taxonomic (Latin) names are frequently utilized for weeds discussed throughout this assessment. A table with their corresponding "common names" can be found in Appendix 1. It is recommended this Appendix be printed out for ease of name translation while reading this report.

2. Methods

2.1 Weed Definitions

The plant species targeted for management differ according to the group or individual applying the treatment and the management objectives under which they operate. In the simplest sense, a weed is defined as a plant growing where it is not wanted. Invasive weeds are unwanted plants that disrupt an ecosystem by dominating an area, often by choking out existing plants. Exotic weeds are unwanted plants originating from a foreign country or region.

The Federal Noxious Weed Act enacted in 1975 defines a noxious weed as "any living stage (including but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or is not widely prevalent in the United States, and can directly or indirectly injure crops or useful plants, livestock or fish and wildlife resources in the United States, or the public health" (Public Law 93-629).

The Selway-Middle Fork CFLRP project area is situated within National Forests that overlap the states of Idaho and Montana. Consequently, the weed designations of both states apply to the project area. The Idaho Noxious Weed Law defines a noxious weed as "any plant having the potential to cause injury to public health, crops, livestock, land, or other property; and which is designated as noxious by the director" of the Idaho Department of Agriculture (Idaho Code Title 22-2402). The Montana County Weed Control Act defines a noxious weed as "any exotic plant species established or that may be introduced in the state that may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities," and is further designated as either a state-wide or county-wide noxious weed (MCWCA 7-22-2101).

As indicated by the variable definitions above, "weeds" in the project area are not always exotic in origin, and their level of invasiveness is often a subjective measurement. For the purposes of this assessment, weeds are considered to be any plants targeted for management by stakeholders in the CFLRP project area. These species are described in greater detail in section 3.3.1.1 (Weed Watch Lists).

2.2 Identification of Stakeholders

The Selway-Middle Fork CFLRP project area spans 1.4 million acres. Numerous groups and individuals utilize the resources in this project area, and all are affected to some extent by weeds and their impact on the ecosystem. For the purposes of this weeds assessment, only those with historical or current involvement in weed management are considered stakeholders.

Land ownership was utilized to determine the first level of stakeholders. The United States Forest Service (USFS) manages approximately 95% of the Selway-Middle Fork CFLRP project area. Nearly 3.7% is privately owned, and 1.27% is state land. Of the remaining fraction, 1,785 acres belong to the Bureau of Indian Affairs, and 81 acres are managed by the Bureau of Land Management (BLM) (Figures 3, 4; source data BLM surface ownership layer 2009).

Though the USFS is tasked with managing the majority of land in the project area, their weed control activities span multiple forests/programs, include different private contractors and private industry

representatives, as well as multiple agreements with other agencies. Several meetings with USFS personnel were used to identify these additional stakeholders.

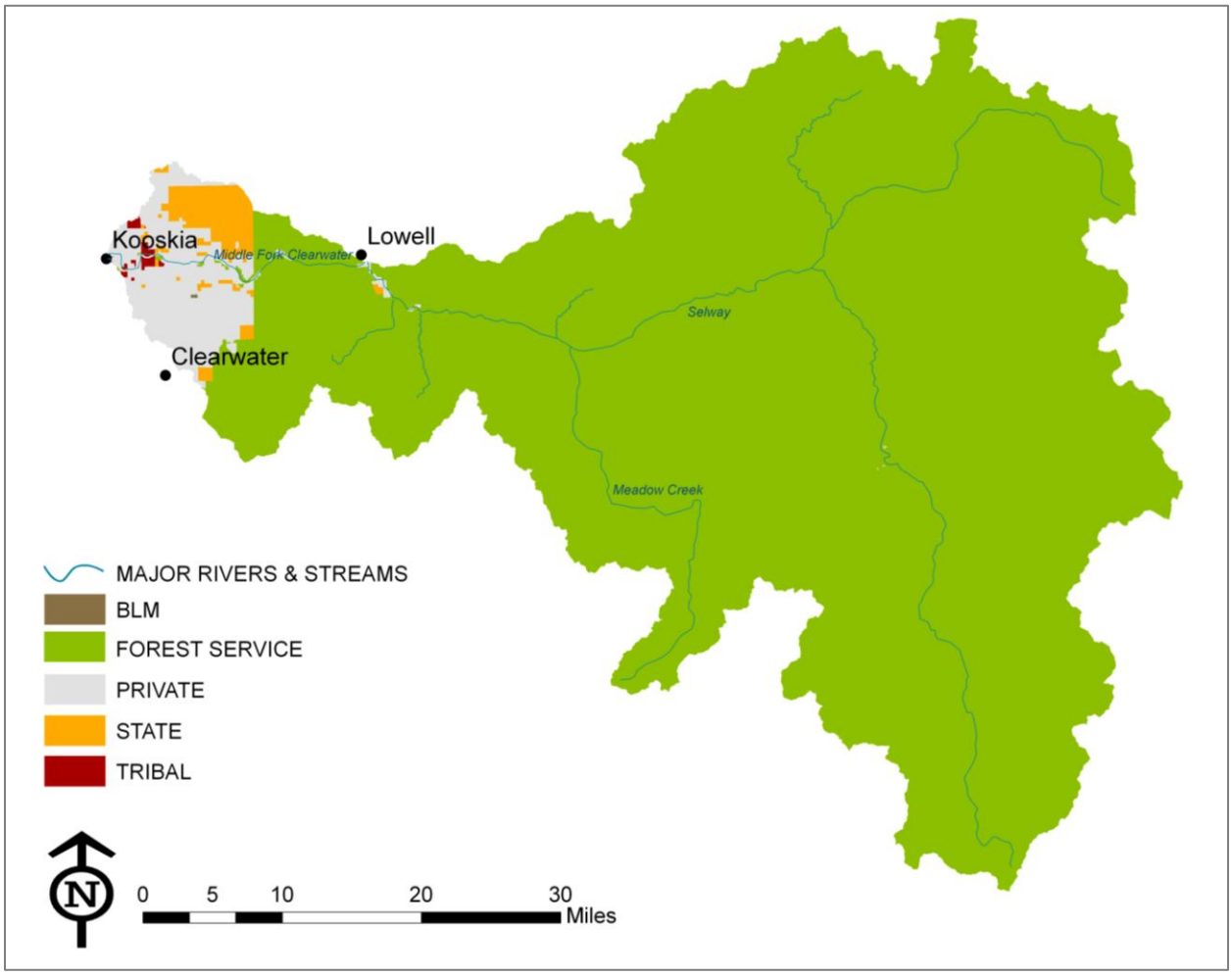


Figure 7: Land ownership in Selway-Middle Fork CFLRP project area (BLM Land Ownership Layer 2009)

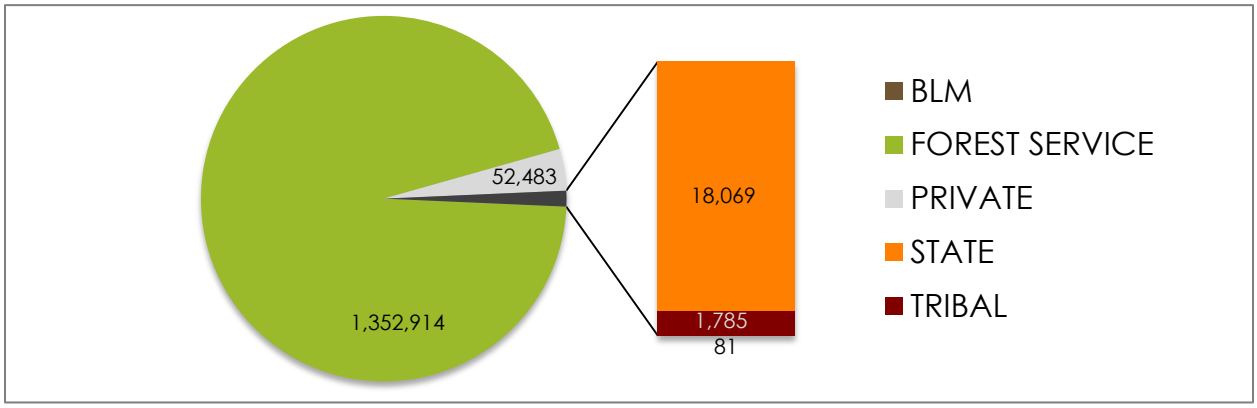


Figure 8: Land ownership breakdown by acreage in Selway-Middle Fork CFLRP project area (BLM Ownership Layer 2009)

2.3 Data Collection

Attempts were made to collect all existing data relating to weed infestations and their management within the Selway-Middle Fork CLFRP project area. Because the USFS manages the vast majority of land in the project area, most weed management data for the area is submitted to and handled by USFS personnel, who enter this data into their Natural Resources Manager Threatened Endangered and Sensitive Plants-Invasive Species Integrated Application (NRM TESP-Invasive Species Application) and track it with the Forest Service ACtivity Tracking System (FACTS).

2.3.1 NRM TESP-Invasive Species Application and FACTS Database

The NRM TESP-Invasive Species Application is utilized by the invasive species program of the USFS to integrate data management from field surveys and inventory records through treatment and treatment-monitoring activities into a single interface. The NRM TESP-Invasive Species Application uses an ArcMap interface and requires a spatial feature for each area where data was collected. Invasive species inventory, treatment, and effectiveness monitoring records are created and edited in this application.

The FACTS database is an activity tracking application storing data on all activities performed across all lands in the Forest Service system. It standardizes the automation of activity information nationwide, providing tools to plan, track, and upward report activity data related to fire/fuels, silviculture, invasive species, NEPA decisions, timber sales and KV trust funds (FACTS User Guide 2014). The application currently consists of an integrated set of forms, reports, and map products that supports entry, edit, and retrieval of activity information. Invasive species treatment and effectiveness monitoring records created in the NRM TESP-Invasive Species Application are available for viewing and querying in FACTS; inventory records are available for edit and viewing in the NRM TESP-Invasive Species Application. **(For the purposes of this assessment, invasive species inventory, treatment and effectiveness monitoring records are hereafter referred to as being sourced from and entered into FACTS, though they were originally created and edited in the NRM TESP-Invasive Species Application.)**

Working with the Invasive Species Activities portion of FACTS can be tedious, with forms spanning multiple pages of required fields and utilizing numerous codes for entries. To obtain/utilize data in the FACTS database, users must be granted access to certain Forest Service organizations and maintain a United States Department of Agriculture eAuthorization account. Utilizing such an account, all data relating to weed presence, treatment and monitoring over time within the CFLRP project area was extracted from the FACTS database for use in this assessment.

2.3.2 Other Data Sources

Because weed infestation and treatment data in the FACTS database only reaches back to 1980 for the CFLRP project area, additional vegetation data was collected from other sources within the USFS where available. One such dataset was obtained from the Forest Inventory and Analysis (FIA) Program. The FIA is a census for USA forests that utilizes changes in historical measurements to project how forests are likely to appear 10 to 50 years from now. The dataset includes status and trends in: forest area and location; species, size, and health of trees; total tree growth, mortality, and removals by harvest; wood production and utilization rates by various products; forest land ownership. Measurements of soil, understory vegetation, tree crown conditions, coarse woody debris, and lichen community composition are included for a subsample of FIA plots. An FIA dataset obtained for the CFLRP project area contains

a list of all species encountered for a subsample of FIA plots measured from 2004-2012. All exotic plant data included therein was extracted for use in this assessment. Cover estimates for state-listed noxious weeds have only been documented in FIA datasets since 2011 in Idaho, unless they reached 3% or more of estimated cover. In which case, cover was estimated as early as 2004. Spatial coordinates of FIA monitoring plots are only accurate to within a ½ mile, so were not of use for spatial analyses in this assessment.

Vegetation monitoring has historically been included in many USFS activities, e.g. measurements of habitat type, remote sensing classifications, etc.. Any available datasets where vegetation monitoring included presence/absence of weeds were queried for data relating to the CFLRP project area and added to the weeds assessment dataset to add historical depth. These data sources are hereafter referred to as Miscellaneous Ecodata.

The FACTS reporting system was not designed to preserve differing and/or greater levels of detail present in the datasets of many contractors/contracting agencies submitting weed data to the USFS. Existing datasets with additional detail were gathered from stakeholders for use in this assessment. Such datasets include biological control releases stored in the Idaho statewide biocontrol database housed by the Nez Perce Biocontrol Center (NPBC), biocontrol permanent transect monitoring data housed by the BLM and the Nez Perce Biocontrol Center, and inventory data and point note observations made by the Nez Perce Biocontrol Center inventory team.

GIS base layers utilized in spatial analyses and/or geographical representations of findings were obtained from:

- Bureau of Land Management
- Idaho Department of Agriculture
- Idaho Department of Water Resources
- Nez Perce Tribe Watershed Division
- Nez Perce Tribe Biocontrol Center
- University of Idaho
- US Census Bureau
- US Forest Service

2.4 Analyses

2.4.1 Inventory Data

All weed species included in all datasets collected for assessment, or recorded in inventory or treatment records by any stakeholder, were compiled to determine all weed species historically or currently present in the Selway-Middle Fork CFLRP project area. The year of first appearance for each species in each dataset was queried.

Weed infestation data was separated for each year of the dataset and arranged spatially and in tabular format to analyze change over time. The majority of inventory efforts do not overlap significantly from year to year, so deeper analysis of change over time was not statistically feasible.

The spatial resolution for the FIA dataset was too imprecise for spatial use in this assessment. All weed species included therein were added to other inventory records to indicate presence/absence and first appearance of each species. The frequency of occurrence for each species was compared by year and

against the total number of plots measured. No plots in the FIA dataset were sampled in subsequent years, so multi-year comparisons of species composition were not possible.
The spatial resolution for Miscellaneous Ecodata was also too imprecise for use in this assessment. Instead, all weed species included therein were added to other inventory records to indicate presence/absence and first appearance of each species in the project area.

Point notes taken during inventory work by Nez Perce Biocontrol Center crews were added to the spatial and tabular inventory datasets. Species included therein were added to other inventory records to indicate presence/absence and first appearance of each species in the project area. Point notes do not indicate acreage infested, so this information was not available for addition to inventoried acreage obtained from FACTS. Spatial locations of observed weed infestations as well as surveyed areas determined to be free of weeds were added to the spatial component of FACTS inventory data.

2.4.2 Treatment Data

Treatment data from the FACTS system has a spatial component from 2012 onwards. Treatment data collected prior to this date is tabular only. Tabular treatment data for the Bitterroot National Forest was obtained from reports run in-house in the Bitterroot office. The following queries were used in FACTS to isolate all tabular data pertinent to the Nez Perce-Clearwater National Forest portions of the Selway-Middle Fork CFLRP project area:

> FACTS_Nezperce – SQL query on FACTS invasives treatment data, retaining all records within the watersheds of the area of interest: 1706030103, 30105, 30106, 30107, 30201, 30202, 30203, 30204, 30401. Only where treatment record is associated with an infestation ID.
> FACTS_Clearwater – SQL query on FACTS invasives treatment data, retaining all records within the watershed: 1706030402. Only where treatment record is associated with an infestation ID.

Separate queries were run for Nez Perce, Clearwater and Bitterroot FACTS data, then joined based on Site ID to only those Site IDs in the CFLRP project area. Treatments without reference to a Site ID are missing from the output data, which may be significant for early years, though an infestation ID is now required for all new entries into FACTS.

2.4.2.1 Biological Treatments

The FACTS database contains incomplete records for biological control releases. Consequently, data from the Nez Perce Tribe Biocontrol Center's Idaho database was utilized to plot releases over time according to agent species and target weed.

2.4.2.2 Chemical Treatments

FACTS treatment entries assigned a chemical treatment code were isolated and analyzed separately to determine the species and size of treated sites as well as the amount of chemical applied over time. Duplicate entries resulting from two chemicals being used in one tank mix were eliminated to prevent the double accounting of acres treated and gallons used. Infestations in the Nez Perce-Clearwater National Forest were separated by treatment priority over time. In the Bitterroot National Forest, treated acres were plotted against total acres surveyed for weeds.

2.4.2.3 Physical Treatments

FACTS treatment entries assigned a physical treatment code were isolated and analyzed separately to determine species and size of treated sites. Infestations in the Nez Perce-Clearwater National Forest were separated by treatment priority over time. Inventory point notes from NPBC inventory crews documented additional hand-pull treatments not available in FACTS. Acreage and percent control were not measured in these point notes so were not added to analyses with FACTS physical treatment data and are only mentioned in this report anecdotally.

2.4.3 Rehabilitation

The majority of rehabilitation efforts conducted in the project area are implemented by road decommissioning crews of the USFS and the Nez Perce Tribe Watershed Division. Both groups work together on restoration projects and perform monitoring at regular intervals on decommissioned roads. Results of their rehabilitation monitoring activities are analyzed in-house and included in annual reports. Results of their analyses were obtained from their year-end reports and are included herein with no modifications.

2.4.4 Monitoring

Monitoring data exists for only a subset of treated sites. Methods utilized for biological control differ from those used at sites treated chemically or physically.

2.4.4.1 Biological Treatments

Permanent monitoring transects have been established by numerous entities throughout the CFLRP project area in order to monitor the establishment and impact (or lack thereof) of released biocontrol agents. Biocontrol monitoring data collected from the BLM, NPBC, and private contractors was combined into the same format and queried for plots occurring in the project area. Correlations were used to identify any relationships between insect populations and vegetation changes across years. Insect populations and vegetation makeup were evaluated individually for changes over time for sites where multi-year monitoring occurred.

2.4.4.2 Chemical and Mechanical Treatments

Monitoring data available spatially in FACTS consists of anecdotal ocular measurements applied to select treatment polygons. This was queried for the CFLRP project area and split by forest for the ease of separation of species and control measurements. Monitoring information with increased information (including additional records, infestation priorities, and follow-up treatments applied) was queried from the Idaho County Weed Control post-treatment monitoring database and narrowed to the infestations occurring in the CFLRP project area. Priorities used for infestations were those assigned in 2013. The treatment effectiveness recorded in monitoring data is expressed as a range; the midpoint of the range was used in analyses.

2.4.5 Funds Spent

Weed management funding is typically recorded only forest-wide and cannot be reliably broken down into sub regions. Consequently changes in funding within the CFLRP project area (gleaned from CFLRP annual reports) were graphed against forest-wide weed budgets from 2008-2014, and further analyses were not feasible.

2.5 Stakeholder Interviews

The objectives, target species, treatment methods, monitoring requirements, and data collection protocols for weed management in the Selway-Middle Fork CFLRP project area can differ according to the agency, job position within the agency, contract requirements, and location of weed work conducted. In order to capture all information pertaining to current weed management approaches and accomplishments, interviews were conducted with stakeholders identified in the project area. Pre-determined questions were asked of each stakeholder during interviews to ensure the same types of information were requested and collected from each person or group. Questions were differentiated based on the type of stakeholder interviewed (e.g. USFS weed program administrator, private contractor, private landowner), but typically included the recipient's:

1. Definition of "weed" and species targeted
2. Personal or agency objectives for weed management
3. Geographical area of focus within the CFLRP project area
4. Weed treatment activities performed or observed
5. Data collection methods (if applicable)
6. Monitoring efforts conducted (if applicable)
7. Opinions for weed treatment efficacy
8. Observed trends, limitations, recommendations for weed management in the CFLRP project area

All questions are included in Appendix 2. Results of interviews were also utilized to add historical significance or fill gaps in existing weed data.

3. Results

3.1 Stakeholders

Several stakeholders were identified based on their past or current involvement with weed management in the Selway-Middle Fork CFLRP project area. These can be categorized into three main groups:

1. Agencies or groups tasked with managing weed issues in the project area. This category includes individuals making large-scale weed management decisions, developing and/or overseeing weed

management contracts with external individuals or groups, or conducting on-the-ground weed management activities.
    a. US Forest Service
    b. Idaho County Weed Control
    c. Nez Perce Tribe
2. Individuals or groups contracted to conduct weed management activities in the project area
3. Private citizens or volunteer groups with historical knowledge of weed management activities and trends in the project area or those currently involved in weed management.

Approximately forty individuals falling within these three categories were interviewed to better understand their roles and perspectives on weed management in the Selway-Middle Fork CFLRP project area. (**Additional information on each stakeholder is given in section 3.2 (Weed Management Practices: Past and Present) in order to place their weed management activities in the context of their backgrounds and relations to the project area.**

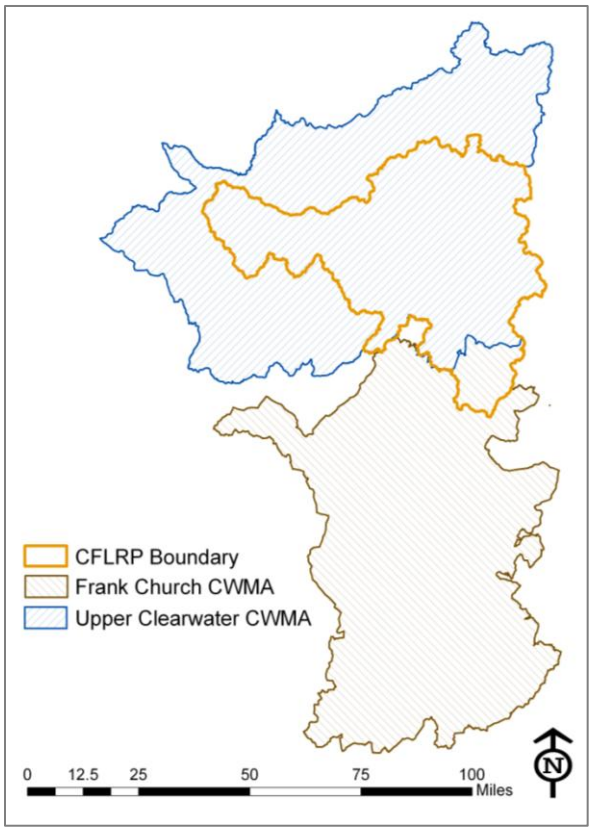


Figure 5: Selway-Middle Fork CFLRP project area overlapping two different CWMAs (Idaho Department of Agriculture CWMA Layer 2006)

Because so many different groups and individuals are working in weed management in the same region, much overlap occurs in goals, activities, and target areas. Cooperative Weed Management Areas (CWMAs) are part of an organizational framework developed to consolidate and unite weed management approaches and accomplishments for a given area. A CWMA is a distinguishable hydrologic, vegetative, or geographic zone based upon weed infestations, climate or human-use patterns, and geography. CWMAs consist of federal, tribal, state and regional land managers, as well as concerned private landowners, within a designated zone who come together against exotic plants. These partnerships pool and stretch limited resources and manpower for combating invasive species and protecting/restoring native habitat.

The Selway-Middle Fork CFLRP project area overlaps two different CWMAs: the bulk of the project area (91.8%) falls within the Upper Clearwater CWMA, while the southeastern corner (8.2%) falls within the Frank Church-River of No Return Wilderness CWMA (Figure 5). Both CWMAs play a key role in the coordination and application of weed management efforts in the CFLRP project area.

3.1.1 Cooperative Weed Management Areas

As described in section 1.2 (Purpose of Weeds Assessment), in 2005 the Upper Clearwater Weed Management Area (UCWMA) broke off from the Clearwater Basin CWMA (formed in 1995). The Frank

Church-River of No Return Wilderness Weed Management Area (FCWMA) was formed in 2003. Cooperating partners for both CWMAs include private landowners, county weed control affiliates, the Nez Perce Tribe, state agencies, federal land management agencies, and interested organizations and individuals.

Partnerships and grant funding are vital to the success of both CWMAs. For the past several years, partners including the Nez Perce Tribe National Forest Foundation, National Fish and Wildlife Foundation, Rocky Mountain Elk Foundation, Foundation for North American Wild Sheep, Center for Invasive Plant Management and Idaho State Department of Agriculture Cost Share Program have provided essential grant funding which supplements the weed control budgets for the primary weed management agencies in the project area: the USFS and Idaho County. In addition, several partner associations and foundations as well as various private landowners have volunteered labor, equipment and supplies in support of integrated weed management activities within both CWMAs.

Steering committees for both CWMAs meet annually to develop and revise strategic plans for utilizing combined resources to treat weeds in a cooperative manner. Strategic plans are designed to employ limited resources in the most effective manner to achieve the greatest amount of weed control possible in the CWMAs. Efforts are made to incorporate the different goals each entity has for weed management so that as stakeholders implement the strategic plans, they are (ideally) simultaneously implementing the objectives of their individual agencies or personal interests.

Though the weed issues and cooperating partners differ between the two CWMAs intersecting the CFLRP project area, both groups follow a similar approach in their strategic plans, and this includes the generic five step process for effective integrated weed management: inventory, treatment, rehabilitation, monitoring, and prevention/education.

3.1.1.1 CWMA Strategic Plans

Inventory: A critical part of integrated weed management is having a current inventory of infestations occurring within the management area. Inventory provides necessary information for establishing site-specific priorities, management objectives and for prescribing treatment methods. It highlights the need for preventive measures and is the baseline for effective monitoring. The CWMA strategic plans emphasize the importance of mapping the location and extent of all invasive weed infestations, with collected data including the following:

- weed species
- size of the weed infestation
- general density of the weeds
- infestation location
- any other useful site specific information which may be affecting the weed
- percent control of infestations during post-treatment monitoring visits

Treatment (with Prioritization): Utilizing information gleaned during inventory efforts, management objectives and treatment priorities are assigned to all known infestations in order to provide direction for control tactics and coordinate management efforts of the CWMA cooperators. This approach helps determine where limited resources should be allocated to obtain the most effective long-

term results in both CWMAs. Objectives are ranked 1-5, with number 1 being assigned the highest priority:

Objectives	
1 Eradicate New Invaders	Infestations of New Invader species are treated to the extent that no viable seed is produced over the entire infestation and all plants (above ground portions) have been eliminated during the current field season.
2 Eradicate Satellites	New outbreaks of established weeds are treated to the extent that no viable seed is produced over the specific outbreak. All plants are eliminated during the current field season.
3 Control	Infestations of established species are treated along transportation corridors, areas of concentrated activities, or susceptible habitat to the extent that treated infestations diminish because no viable seed is produced and/or plants have been eliminated.
4 Contain	Portions of infestations are treated to the extent that the weed is not expanding beyond the established treatment zones. The main body of the infestation may be left untreated.
5 Reduce	Large infestations are treated to the extent that densities and/or rates of spread are reduced to an acceptable level.

In both CWMAs, new invader infestations and satellite populations are given the highest treatment priorities, respectively. "New invaders" are defined as weed species recently found to occur in the weed management area with limited distribution and density, thus making eradication feasible (less than 250 acres across the CWMA). Satellite populations are new infestations of established species that are also small enough in size to allow for eradication. Preventing the successful establishment of new invaders and satellite populations is much more cost effective than constantly treating infestations of species allowed to establish widely. The devastating impacts of some weed species widely established in the CFLRP project area are well documented. However, the impacts of species not yet present or not yet strongly established are largely unknown, and may well be greater than those of species already widespread.

The importance of 100% elimination of new invader infestations or satellite populations is depicted in Figure 6. If control of common crupina (example new invader) were 95%, elimination of all plants from the site would require 138 years. If, however, control were 99.9%, eradication could be achieved in two

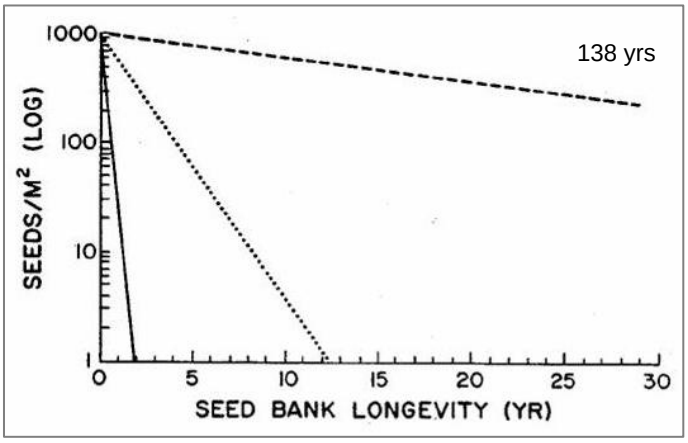


Figure 6: Years required to deplete viable common crupina seeds from the soil with 99.9% (–), 97% (…), and 95% (--) control. From: Zamora, D.L., D.C. Thill and R.E. Eplee. 1989. An eradication plan for plant invasions. Weed Technology 3:2-12.

years. This highlights the importance of the complete elimination of seed production and vegetative spread each year for new invader infestations. To ensure the complete eradication of these high priority infestations, the UCWMA strategic plan recommends sites be visited a minimum of three times per season in order to fully treat all missed plants, regrowth, germinates, and late developing plants. When an eradicated site successfully yields no recurrence of the target weed after three growing seasons, it is categorized as custodial and can be visited only once per year thereafter. Both CWMAs emphasize the importance of monitoring eradicated populations for multiple years to ensure the weed infestations are truly eradicated.

Treating larger infestations of established weeds in key locations (e.g. transport corridors, high use areas, or susceptible habitats) is the third most effective use of weed management resources. Treating these infestations does not remove the larger populations of the weed species across the landscape, but prevents the further spread of seeds and vegetative material and protects sensitive areas.

Lower emphasis is placed on containing or reducing large-scale infestations where the saturated seedbank and/or continual infestation or disturbance patterns limit the impacts of weed management efforts in the long run. Established and widespread weed species within the CWMAs can be stratified into management zones. Zones with isolated and/or low population levels of an identified weed would be prioritized for maintaining weed-free areas and eradicating new invaders as they appear.

Rehabilitation: When weed infestations occur at sites with significant amounts of native vegetation, simply removing weeds from the habitat may be sufficient to restore balance to the ecosystem by allowing native species to return. At sites dominated by invasive species, weed control efforts are likely to be followed by invasions of the same or secondary invasive species. At such sites, activities that purposefully enhance and maintain the growth of desired vegetation are recommended. Examples include seeding, planting, and retaining brush and tree canopy cover. Minimizing the extent and duration of exposed soil during management actions can also reduce the risk of weed establishment post-treatment and allow for native species rejuvenation.

Monitoring: Monitoring is a key component to effective weed management. It is only with monitoring (focused on changes in the density and rate of spread of targeted plant species, and the response of desired vegetation) that cooperators can determine the effectiveness of treatment actions in meeting management objectives. Monitoring is combined with inventory efforts in that infestations treated in the current or previous growing season are monitored for past treatment efficacy, and changes in infestation features are recorded in new inventory records. All new invader and satellite infestations assigned to priority 1 or 2 should be monitored three times within the same growing season (in the UCWMA). After three years of no recurrence, eradicated sites become custodial and can be monitored just once per year, similar to the FCWMA, to ensure all plants are truly eradicated.

Prevention/Education: Increasing awareness for the threat of weeds to the CWMA's natural resources and the need for weed management will provide the foundation for active treatments, early alert programs and prevention practices that minimize disturbance and the spread of weed seeds or vegetative fragments. Continued education of practitioners may ensure that effective strategies and new technologies will be incorporated into management actions. Both CWMA strategic plans include a mixture of the following components for prevention and education:

Prevention

- To the extent possible, minimize disturbance in areas or habitats highly susceptible to weed invasion
- Re-seed disturbed sites as soon as possible after disturbance utilizing weed-free seed (where feasible)
- Promote the use of certified weed-free seed and feed; require stock to be cleaned and fed weed-free hay for 2-3 days prior to traveling in the back country
- Keep gravel pits, disturbance equipment (road construction, logging, fire), and high use areas (campgrounds, trailheads, turnouts, parking lots) free of weeds
- Map and maintain existing weed-free areas
- Maintain rangeland and open forest sites in a healthy vigorous condition
- Limit access through heavily infested areas (where feasible)
- Maintain a structured early detection program where cooperators and interested publics communicate the location of new weeds or new location of existing weed infestations

Education

- Conduct annual weed fairs, seminars and tours
- Maintain a weed management display for public gatherings such as fairs, and conventions
- Develop interpretive signs to alert the general public of the threat of weeds
- Post weed identification signs at specific trailheads, road turnouts and other public places
- Include weed information in permit packages to river users and at all launch sites
- Include weed information in permit packages for guides and outfitters, as well as in hunting/fishing license packages
- Develop an Adopt-A-Weed program at specific beaches, campgrounds, and trailheads
- Provide presentations to classrooms and special interest groups
- Develop and implement training programs to familiarize agency personnel with invasive plant identification and proper management
- Develop demonstration plots for treatment and management techniques

3.1.1.2 CWMA Plan Implementation

Infestations within each CWMA change and vary each year. New species are introduced and become established, past treatment efforts affect existing infestations, and land conditions are altered by management decisions, wildfire or climate. Consequently, the strategic plan for each CWMA must be customized each year in annual operating plans to meet the current needs of the project area.

Both strategic plans indicate it is the responsibility of the lead cooperators to contact other partners/stakeholders to develop and coordinate the annual operating plans. Yearly accomplishments are to be reviewed by the steering committees during a fall-winter meeting. The reviews should focus on accomplishments in relation to the priorities outlined in the strategic plans and the annual operating plans for the current year. Updates and modifications to the strategic plans should be discussed, agreed upon, and documented during scheduled meetings. New annual operating plans should be finalized by mid-March of each year. Implementation of the annual operating plans is the responsibility of all cooperators and should be conducted in a manner that will further the goals, objectives and priorities of the strategic plans.

Treatment schedules should follow the priorities outlined in the strategic plans and modified annual operating plans such that infestations assigned to an eradication objective are treated prior to those assigned to control, contain, or reduce. All infestations treated during the current or previous year should be re-visited to monitor treatment success. Sites within the UCWMA that are targeted for eradication should be visited three times within a single year for at least three years. In both CWMAs, eradication sites should be monitored for multiple years following the eradication. When monitoring visits to these

sites indicate control is less than 100%, sites should be re-treated to accomplish the eradication objective. All changes in infestations over time should be recorded in inventory and monitoring efforts.

All inventory, treatment, and monitoring data should be recorded in a thorough and accurate manner and be submitted to lead cooperators. Data from all activities conducted on USFS land must be entered into the FACTS database. Individual project overseers should implement rehabilitation and prevention/education activities wherever applicable.

Though both CWMA strategic plans offer clear approaches for effective cooperative weed management, the implementation of the plans is completely dependent on the CWMA members (stakeholders). Consequently, in the next section (3.2), all weed management efforts conducted in the project area are addressed according to stakeholder.

3.2 Weed Management Activities: Past and Present

This section documents weed management activities that have been or still are being conducted in the Selway-Middle Fork CFLRP project area, presented according to stakeholder. Each stakeholder's background, weed management goals, treatment approach, and data collected are included. Many stakeholders' weed management activities apply not only to the CFLRP project area, but also to the surrounding region. Though many stakeholders work together on weed management projects, the cooperation often yields different roles and perspectives. Consequently, all perspectives are described separately below.

3.2.1 US Forest Service

As indicated above, the US Forest Service covers nearly 95% (1,352,419 acres) of the Selway-Middle Fork CFLRP project area. Historically the forestland spanned three National Forests: Bitterroot, Clearwater, and Nez Perce (Figure 7). The Nez Perce and Clearwater have recently been combined.

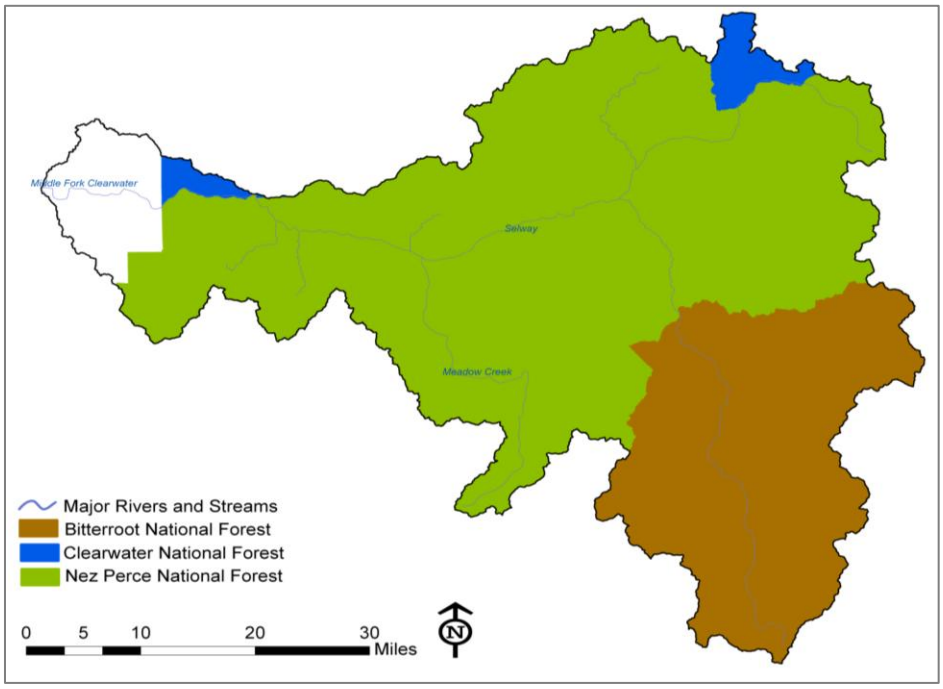


Figure 7: National Forests included in Selway-Middle Fork CFLRP Project Area. The Nez Perce and Clearwater National Forests were recently combined (USFS Administration

The USFS-managed land in the project area overlaps four ranger districts (Figure 8a), and just over 68% of the project area (970,914.9 acres) is federally designated wilderness. The Selway-Bitterroot Wilderness (SBW) spans 855,091.1 acres of the CFLRP project area, and the Frank Church-River of No Return Wilderness (FCRONRW) 115,823.8 acres (Figure 8b).

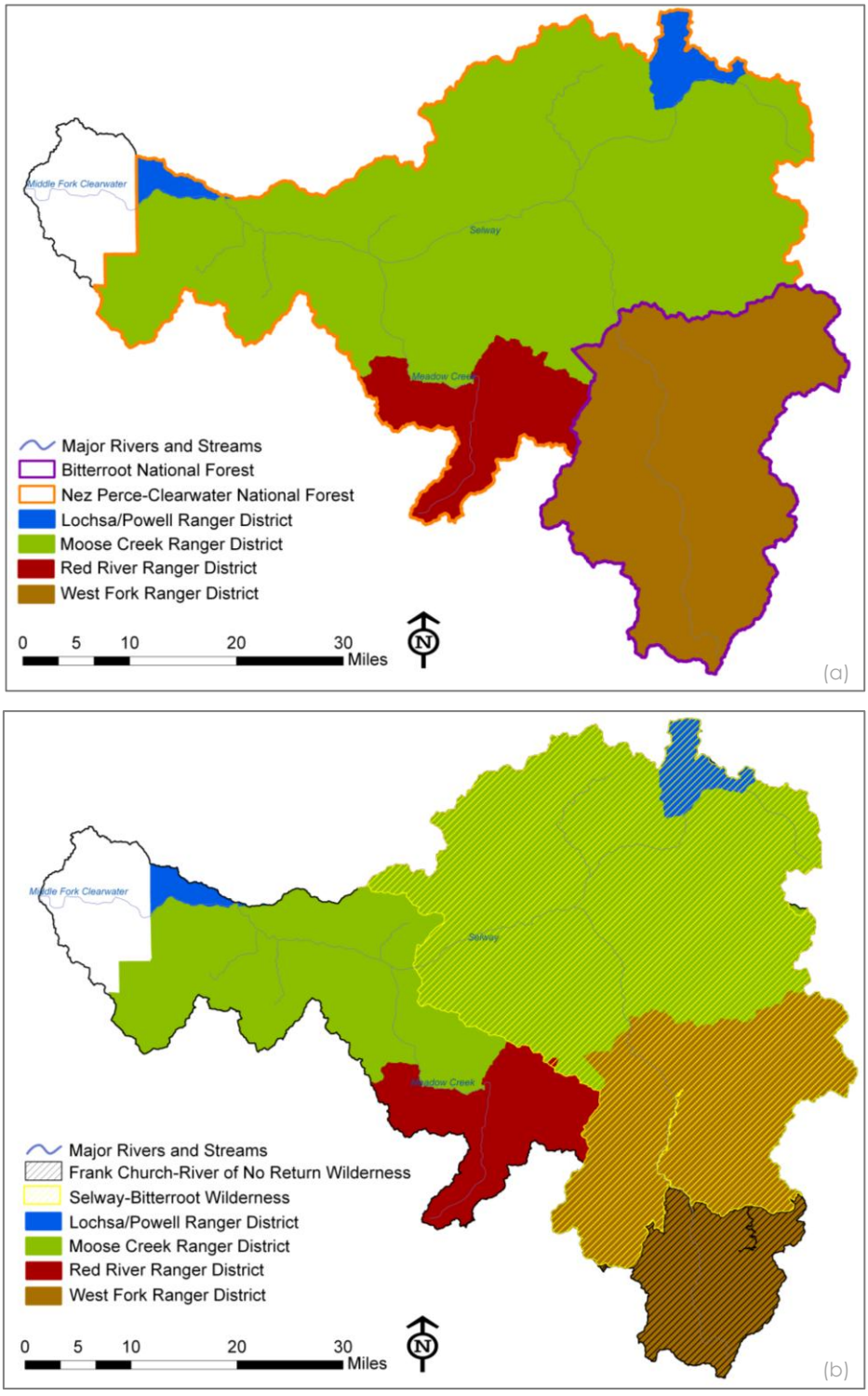


Figure 8: Selway-Middle Fork CFLRP project area overlapping: (a) four different ranger districts , (b) federally designated wilderness (USFS Administration Layers)

Weed management activities on general forestland managed by the USFS are subject to the National Environmental Policy Act (NEPA) of 1969. Prior to 1984, weed control programs in the Nez Perce, Clearwater and Bitterroot National Forests were fully functioning, in line with each Forest's Management Plan, and combined the use of biological, chemical and physical weed treatments. In 1984, a 9th Circuit District Court case resulted in the banning of herbicide use on all Northern Region Forest lands, pending risk assessments for herbicides on human health (USDA FS 1988). In compliance with the ruling and with NEPA, environmental assessments were completed for the Nez Perce Forest in 1988 (USDA FS 1988), the Lochsa and Powell Ranger Districts of the Clearwater Forest in 2007 (USDA FS 2007b) and the Bitterroot Forest in 2003 (USDA FS 2003). The approved environmental assessments restored the use of herbicides in all Forest's integrated weed management programs, complementing the still-approved use of biological, physical and cultural treatments. The approved environmental assessments provide guidelines for the amounts, types/compounds, application rates, frequency and locations for accepted weed management tools.

Weed management in federally designated wilderness areas has historically been more restrictive. Biological control measures were initiated in at least the Selway-Bitterroot Wilderness prior to its federal wilderness designation. Some populations of biological control agents released adjacent to both the SBW and the FCRONRW after their wilderness designations have since spread naturally and established within both wilderness boundaries. Prior to the approval of the Environmental Impact Statements (EIS) for the SBW Invasive Plants Management Project and the FCRONRW Noxious Weed Treatments Plan, biocontrol populations established from both sources were permitted for existence, but not supplementation. Cultural weed treatment methods have been limited in both wilderness areas since their designation. Grazing and cropping are not conducive to the Wilderness Act of 1964. Though revegetation with native seed and native ecotypes was always approved, the rugged topography and remoteness of the SBW and Upper Selway portion of the FCRONRW have made revegetation largely infeasible. Prior to the approval of the EIS for the SBW, invasive plants were treated chemically primarily at administrative sites and a few selected areas along trails and campsites on the Bitterroot National Forest (less than 20 acres). Chemical applications were not utilized in the FCRONRW. Physical treatment (typically hand-pulling and/or mowing at select administrative sites) occurred regularly on approximately 100 acres of the SBW and "hundreds of acres" in the FCRONRW.

The EIS of the FCRONRW Noxious Weed Treatments Plan was accepted in 1999 and expanded with supplementation in 2007 (USDA FS 1999, 2007a). The Final EIS of the SBW Invasive Plants Management Project was submitted in 2009 and signed into action in 2010. Since their acceptance, the scope of cultural and physical control methods approved for use in each area have either not changed or increased, and the use of biocontrol agents and selective, ground-based chemical applications were approved for increase in both (USDA FS 1999, 2007a, 2009).

The most appropriate methods for weed management on general forest or wilderness land in the Selway-Middle Fork CFLRP project area differ depending on the climatic, edaphic and physical setting of infestations, the surrounding vegetation, and land management goals. Within the 1,352,419 acres of the USFS-managed land in the CFLRP project area, four general management categories are most affiliated with weed treatment and monitoring:

1. Designated Weed Crews
2. Timber Management
3. Road Decommissioning/Restoration
4. Fire Management

Each category has unique management goals and (sometimes) differing methods for accomplishing those goals.

3.2.1.1 Designated Weed Crews

Each national forest has one or more designated weed crews consisting of two or more individuals specifically tasked with managing weed issues. The assigned geographic areas for weed crews vary from forest-wide, to ranger district, to smaller regions within a ranger district. Weed crews actively treat weed infestations, monitor contracted weed treatment efforts, inventory vegetation pre- and post-timber harvesting and fire activities, and participate in public awareness efforts for weed issues. There are at least four designated weed crews working in and around the Selway-Middle Fork CFLRP project area, each differing in their treatment approach, data collection methods, and geographic areas of focus.

Target Weeds: Weed crews working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Weed crews working in the Bitterroot National Forest typically follow the Montana noxious weed list. In the portions of the Bitterroot Forest that overlap the CFLRP project area, weed crews use a weed list created specifically for the SBW weeds EIS, which is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. Additional species may be targeted in the FCRONRW portions of the CFLRP project area. See section 3.3.1.1 for a full listing of species targeted in each area. When weed crews encounter new species, these are identified by botanists and may be added to the various weed lists.

Weed Management Goals: All designated weed crews adhere to the strategic plans and goals of the CWMAs in which they operate. Infestations are typically treated based on the priority they have been assigned in the applicable CWMA strategic plan and annual operating plan.

Weed Management Activities:

Inventory: Inventory efforts for all designated weed crews entail documenting the location, size, and species of weed infestations. Some weed crews record this information electronically in the field utilizing handheld GPS units with GIS capabilities, from which it is transferred into FACTS. Others record this information by paper either in the field or back in the office, later entering it by hand into FACTS. The majority of infestations are inventoried at the time of treatment. Weed crews often set out with an intention to treat a designated trail or administrative zone, and all infestations encountered and treated are recorded. It is not common practice for weed crews to survey an area with the sole intention of documenting weeds. Areas traversed by weed crews and found to be free of weeds are not entered into FACTS as the database was not designed to incorporate this information. As such, inventory data resulting from weed crew efforts only indicate the presence of infestations encountered. Areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date.

Treatment: Known infestations are treated according to their assigned CWMA priority, with new invaders, satellite populations, and transportation corridors given the highest priorities, respectively. Within each crew's geographic region, as many sites are treated as possible during the growing season. In addition to treating known infestations, designated weed crews are sometimes requested to

treat infestations as part of specific Forest Service projects, such as timber harvest, road decommissioning, and fire management. These infestations often represent lower priorities for the CWMA but are temporarily higher priorities for the USFS.

Most treatments applied by designated weed crews are chemical. Similar to inventory efforts described above, weed crew treatment activities include documenting the location, size, and species of weed infestations treated. The herbicide and rate applied are also recorded. Some weed crews record this information electronically in the field utilizing GPS/GIS, while others record this by paper. All treatment records are entered into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Much of the weed work in the project area is conducted by private contractors. They must fill out treatment logs for work accomplished, including the location and size of infestations, species treated, herbicides used, and application rates. Logs are typically hard copy, with weed crew personnel later entering this information into FACTS.

Some weed crews are actively involved in the release of biological control agents on general forestland within the CFLRP project area. Agents are typically obtained from the Nez Perce Biocontrol Center (see section 3.2.3.2) or organizations/field insectaries in Montana and released in various infestations at the discretion of the weed crew member. Presence/absence of previously released agents is not always determined prior to the new release. Releases are often recorded on hard copy forms, including the coordinates of the release location, species, target weed, and number and stage of the agent released. Most release information is entered into FACTS at a later date. In recent years, the FACTS database assigns each release to a treatment polygon of five acres. For releases occurring in Idaho, release forms are also typically submitted to the Nez Perce Biocontrol Center for addition into their state database.

Mechanical treatments applied by weed crews are typically too small to warrant recording and entering into FACTS. For larger infestations, the size, location, species of infestation and treatment applied are recorded and entered into FACTS.

Rehabilitation: Designated weed crews are typically not involved with rehabilitation efforts within the CFLRP project area.

Monitoring: All designated weed crews attempt to adhere to the monitoring protocols laid out in the strategic plans of the CWMAs in which they operate. In the UCWMA, infestations treated according to an eradication objective (new invaders and satellite populations) are ideally visited three times during a single growing season to ensure the complete eradication of the infestation. This is done for three years, after which time eradicated sites become custodial and can be monitored once per growing season.

The percent control from previous treatments are recorded and entered into FACTS. The UCWMA maintains a separate database for post-treatment monitoring activities, so monitoring information collected for high priority infestations is entered separately into both databases. If monitoring reveals that the location and size of infestations have changed due to treatment effects, the inventory layer in FACTS is updated with these changes. In the Bitterroot National Forest, new invader infestations are visited at least once each year to either ensure their complete eradication or to apply another treatment if plants persist. Monitoring results for these infestations are not typically added to FACTS unless

infestations were large or required extensive effort to be reached. If new invader sites must be treated again, that information is entered into FACTS via new treatment records.

In the UCWMA, lower priority infestations treated by designated weed crews are usually surveyed for their current status prior to treatment. Similar to higher priority infestations, this survey information includes the percent control of previous treatments. For lower priority sites, however, this information is recorded but only entered into FACTS as time permits, and later in the season. In the Bitterroot National Forest, lower priority infestations treated by designated weed crews are not usually systematically monitored.

In both the Nez Perce-Clearwater and Bitterroot National Forests, it is a requirement that 50% of acres treated are monitored in the same growing season in order to receive credit for treatments. For infestations treated by designated weed crews, this often is only a simple ocular estimate. Though this information is submitted to USFS databases, it is typically not sufficiently detailed to allow for comparisons or analyses over time.

Since 2010, some quantitative vegetation monitoring has been conducted in the CFLRP project area to determine the efficacy of past treatment efforts. The University of Montana has established plots in portions of the SBW falling within the Nez Perce-Clearwater National Forest. Simultaneously, the Bitterroot National Forest weed crew has established plots in their portions of the SBW. The protocols differ somewhat, but both monitoring efforts seek to measure changes in the plant community in both herbicide and control plots over time. Species composition monitoring has also been conducted by designated weed crews and their hired contractors in the Moose Creek Ranger District following the same protocol utilized in the Bitterroot National Forest.

Education/Prevention: Most weed crews (in conjunction with wilderness rangers) post weed awareness signs at wilderness portals, trailheads and campsites throughout the CFLRP project area and examine hay at trailheads and campsites to ensure it is weed-free. Both activities are considered routine and occur anytime crews and/or rangers are in these designated areas.

3.2.1.2 Timber Management

Timber harvest is an important component of forest management and has been utilized regularly in non-wilderness areas of the Selway-Middle Fork CFLRP project area. Two different types of timber contracts have been employed in the Nez Perce-Clearwater National Forest: conventional and stewardship. In both contract systems, timber harvest projects are put out to bid, and are typically awarded to private mills in the region. In conventional contracts, revenue from the project can be used only for activities specifically related to the sale of the timber. If weeds occur along the haul routes in the project, weed treatment along routes is included in the contract. Revenues cannot be utilized to treat weeds elsewhere in the project area or at a later date beyond the completion of the contract. Conventional contracts have not been used in the CFLRP project area since 2007.

Stewardship projects require collaboration between groups, and must meet at least one of the following seven land management goals:

- Road and trail maintenance or obliteration to restore or maintain water quality
- Soil productivity, habitat for wildlife and fisheries, or other resource values
- Setting of prescribed fires to improve the composition, structure, condition and health of stands or improve wildlife habitat
- Removing vegetation or other activities to promote healthy forests, reduce fire hazards, or achieve other land management objectives
- Watershed restoration and maintenance
- Restoration and maintenance of wildlife and fish habitat
- Control of noxious weeds and exotic weeds, and re-establishment of native plant species

Stewardship projects are an important tool not only for timber management, but for all other forest management activities. Revenues from stewardship contracts can be used for other projects throughout the designated area, including weed management. Following the completion of a stewardship contract, it is possible to use remaining funds (if available) for weed management and/or other projects.

Target Weeds: For conventional timber contracts in the CFLRP project area, the Idaho noxious weed list was strictly followed; non-listed species could not be treated with project funds. In stewardship contracts, a forest-wide invasive plant list is used, which is patterned after the UCWMA and consists of weeds designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest (see section 3.3.1.1). Additional weed species can be added to the list on the recommendation of a weed or range specialist affiliated with the stewardship project.

Weed Management Goals: In conventional contracts, weed management goals were restricted to the treatment of weeds relating solely to the sale of the timber (typically only along haul routes). These infestations would usually be considered only intermediate or low priorities in the strategic plan of the UCWMA, depending on the species. In stewardship contracts, weed management goals are more in line with the UCWMA in that new invaders are a high priority. If these species are found in the project area, they are included for treatment in the timber contract. In most contracts, roadsides are the primary targets for weed management, which typically include only species and infestations assigned low priorities in the UCWMA strategic plan.

Weed Management Activities:

Inventory: USFS timber harvest teams usually include at least one botanist or range specialist familiar with weeds. When weeds are present, they are recorded anecdotally and included in the harvest contract, along with the size of the infestation to be treated, species present, recommended chemicals and application rates.

Treatment: Weed infestations targeted in timber management are primarily treated with chemicals. The purchaser of the timber contract may treat the weeds in-house following the specifications in the contract, but in most cases private contractors are hired. All invasive species present in the designated area must be treated completely, including new invaders (if present) and lower priority weed species. Many contracts require weed infestations to be sprayed twice over the course of the project. This is usually done in the first and second year, but sometimes both

applications occur in the same field season. Weed treatments can be made again at a later date at the discretion of the project leader working with the weed division, provided revenue is still available in project funds.

Some contracts stipulate the use of GPS units with GIS capabilities in order to spatially document treatment efforts (location, size, species, herbicides, rates). Other contracts require only paper records. All treatment records are submitted to the USFS, and a member of a designated weed crew (see section 3.2.1.1) enters the information into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation: Rehabilitative activities related to weed management are only included in stewardship contracts at the discretion of each project's administrator.

Monitoring: Following weed treatment in a timber harvest area, infestations must be monitored to confirm the contractual specifications were met. Monitoring is accomplished by a member of the designated weed crew, the USFS timber harvest project administrator, or the botanist/range specialist responsible for the initial weed inventory. This information is utilized to provide full payment to contractors, and the majority of the monitoring information is added to FACTS.

Education/Prevention: To prevent the further spread of invasive species, all timber contracts within the Selway-Middle Fork CFLRP project area require the contract purchaser to clean all off-road equipment prior to entry into the sale area. This cleaning must remove "all soil, plant parts, seeds, vegetative matter, or other debris that could contain or hold seeds of designated weeds of concern to the National Forest." When the sale area is already/still infested with invasive weeds, the purchaser must also clean off-road equipment prior to leaving the sale area. The USFS strictly enforces all cleaning requirements.

3.2.1.3 Road Decommissioning/Restoration

There are numerous roads in the Nez Perce-Clearwater National Forest that are unnecessary for the Forest's transportation system. Decommissioning these roads:

- Reduces erosion from road surfaces and slopes and related sedimentation of streams
- Reduces the risk of mass failures and subsequent impact on streams
- Restores natural surface and subsurface drainage patterns
- Restores vegetation and site productivity
- Restores stream channels at road crossings and where roads run adjacent to channels
- Uses road maintenance funds more effectively - concentrating the available funds on roads that are needed for long-term access
- Protects and restores fish habitat

Hundreds of miles of roadway have been decommissioned in the Nez Perce-Clearwater National Forest. In the Selway-Middle Fork CFLRP project area, 73.6 miles of roadway have already been decommissioned (Figure 9, USDA FS & NPT 2005-2012), and additional decommissioning is included in several CFLRP projects in the near future.

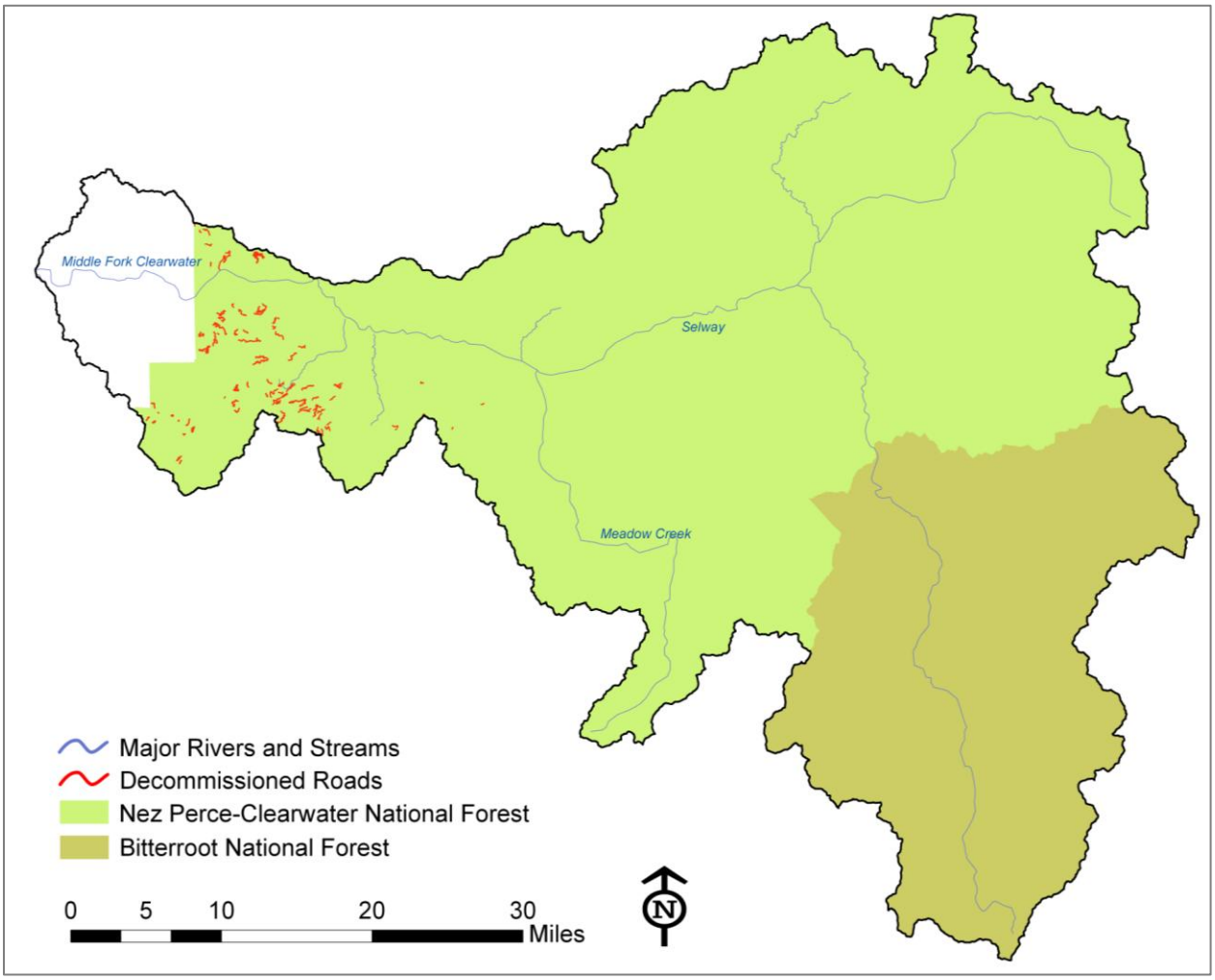


Figure 9: Decommissioned roads in the Selway-Middle Fork CFLRP project area (CBC Geoportal 2014)

Since 1996, extensive road decommissioning in the Nez Perce-Clearwater National Forest has been accomplished via direct cooperation with the Nez Perce Tribe (NPT) under a watershed restoration partnership. For cooperative projects, road decommissioning monitoring teams are funded by and consist of employees from both the USFS and the NPT. Decommissioning crews typically inventory the project area prior to work commencing. A road of interest is targeted either for abandonment or some level of decommissioning, based on its condition at the time of inventory. A road assigned to abandonment is already stable, and revegetation is occurring naturally. No physical work is required for abandonment; the decommissioned road is simply removed from the forest road database.

A road assigned to active decommissioning requires physical work in addition to the database change. The work required varies depending on the condition of the road, but typically involves the use of heavy equipment to decompact road surfaces, removal of drainage structures and fill material from streams and draws, re-contouring through unstable areas, and revegetation.

Weed infestations encountered in the decommissioning project area are noted during inventory. Historically, the treatment of weed infestations was included in contracts bid out to private

decommissioning engineers (e.g. culvert replacement contracts). This approach proved ineffective because contractors were often highly skilled with engineering, but less familiar with invasive plants and their management. Subsequently, USFS designated weed crews (see section 3.2.1.1) were tasked with treating weeds in road decommissioning projects. This also proved ineffective, due to differing weed management goals; the decommissioning crew targets all invasive species in their restoration work (including low priority infestations), while designated weed crews follow the prioritization of the UCWMA whereby only high priority new invader or satellite populations are typically treated (see section 3.1.1.1).

In more recent years, decommissioning crews have utilized either weed specialists from the NPT Watershed Division or the Invasive Species Strike Team (ISST) from the Montana Conservation Corps to treat weeds in project areas.

Target Weeds: A forest-wide invasive plant list is used, which is patterned after the UCWMA and consists of weeds designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest (see section 3.3.1.1).

Weed Management Goals: Road decommissioning projects seek to restore project areas to a natural and functioning state. Native species are the desired vegetation cover. As such, all exotic invasive species in the project area are targeted for treatment, regardless of the priority level assigned in the UCWMA strategic plan.

Weed Management Activities:

Inventory: Road decommissioning teams usually include at least one plant specialist familiar with weeds. When weeds are present, they are recorded anecdotally and included in the agreement for the Montana Conservation Corps ISST, along with the size of the infestation to be treated, species present, recommended chemicals and application rates. Alternatively this information is used in-house for treatment conducted by NPT weed specialists.

Treatment: Weed infestations targeted in road decommissioning are primarily treated with chemicals. All invasive species present in the designated area must be treated completely, including new invaders (if present) and lower priority weed species. Infestations are typically treated once per year, but may be treated for multiple years throughout the duration of the project to ensure restoration goals are met. Most infestations are treated following the decommissioning activity, though some infestations are treated before heavy machinery is used to help limit the weed seedbank before disturbance activities. Weed specialists in the NPT as well as the ISST often utilize GPS units with GIS capabilities in order to spatially document treatment efforts (location, size, species, herbicides, rates). All treatment records are submitted to the USFS, and a member of a designated weed crew enters the information into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation: Revegetation is included in all decommissioning projects for roads not assigned to simple abandonment. The preferred approach is to save plants already growing at the target site for subsequent re-planting following decommissioning activities. Native plants already growing in the area are adapted to the conditions of the site, and the clump-planting method employed in their use often yields the best revegetation results due to retaining/trapping: organic material, recruiting seeds, nutrients, soil microbes and other beneficial organisms.

Nursery-grown stock, cuttings of shrubs and trees, and seed mixes are used in areas of specific need. The seed mixture used from 1999-2004 was designed to be aggressive in the short term and less persistent over time, promoting native species succession. During that time frame, all disturbed areas were seeded with a non-native seed mix of annuals and non-persistent perennials. In 2005, monitoring data indicated clover and other non-native species were more persistent that anticipated. Consequently, the seed mix was thereafter switched to a native mix of bluebunch wheatgrass, mountain brome and Idaho fescue, plus the exotic but less persistent annual rye.

Monitoring: The Nez Perce-Clearwater National Forest/NPT road decommissioning teams actively monitor road decommissioning projects in order to track the effectiveness of the program. For every 10 miles of road decommissioned, a ¼ mile-segment of decommissioned road is selected for monitoring. Monitoring segments are established in the year they were decommissioned (year 0). Data is collected in the first, second, fifth, and tenth years after decommissioning. Vegetation and ground cover are monitored using methods from ECODATA (USDA FS 1992). Results of monitoring efforts are not entered into FACTS.

Education/Prevention: To prevent the further spread of invasive species, all heavy equipment utilized in road decommissioning activities must be cleaned of plant fragments, seeds, or contaminated soil prior to entry into the project area. When the project area is already/still infested with invasive weeds, equipment is again cleaned prior to leaving the project area.

3.2.1.4 Fire Management

When weeds invade a new area, they can have drastic impacts on the timing and frequency of wildfires, and can alter the intensity and duration of fires both prescribed and naturally occurring (D'Antonio and Vitousek 1992, DiTomaso and Johnson 2006 and references therein). Not only do weeds impact fire regimes, fire can have significant impacts on weed populations. Though fire is occasionally successfully utilized as a form of weed management (DiTomaso and Johnson 2006, and see section 1.1), the disturbance caused by fire often promotes the infestation and successful establishment of numerous weed species (Zouhar 2003 and references therein, Kinter et al. 2007).

In natural areas such as the Selway-Middle Fork CFLRP project, where fire is an important driver of forest cycles, weeds have a drastic impact on all aspects of the ecosystem. Treating weeds effectively in order to reduce their impact on the natural fire cycle is (and should be) a significant motivator for all stakeholders in the project area.

Treating weeds following major fire events on forestland often falls under the umbrella of Burned Area Emergency Response (BAER). BAER is a standing or ad hoc team of technical specialists (hydrologists, rangeland management specialists, biologists, soil scientists, etc.) assigned to assess what, if any, emergency stabilization treatments are needed following a fire and to prepare a BAER emergency stabilization plan. Emergency stabilization is a set of emergency planned actions carried out within one year of a wildland fire to:

1. Stabilize and prevent further degradation to natural and cultural resources
2. Minimize threats to life or property resulting from the effects of a fire, or
3. Repair/replace/construct physical improvement necessary to prevent degradation of land or resources

A member of a designated weed crew (see section 3.2.1.1) who is also fire-qualified serves as the acting weed specialist on BAER for any fires occurring in the Selway-Middle Fork CFLRP project area. For every wildfire greater than 500 acres, a BAER team assesses the location and severity of the fire and its threat to life, infrastructure, and cultural resources, threatened and endangered species and critical habitat. If the weed representative identifies weed issues requiring attention, this information is included in the BAER report (due 7 days following the containment of the fire) along with the findings of other BAER team members. BAER reports may or may not request funding. All weed treatment activities approved for BAER funding must be accomplished within one year of the fire event. The short time frame and often remote or difficult access to burn areas can make the implementation and completion of BAER projects a challenge.

When BAER funding is obtained for weed management in the CFLRP project area, treatment activities are typically carried out in-house by designated weed crews, but may be contracted out to the private sector. The same holds true for burn areas not qualified for BAER. Inasmuch, the target species and weed management activities for fire are very similar to those described in section 3.2.1.1 for designated weed crews.

Target Weeds: Weed crews working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Weed crews working in the Bitterroot National Forest typically follow the Montana noxious weed list. In the portions of the Bitterroot Forest that overlap the CFLRP project area, weed crews use a weed list created specifically for the SBW weeds EIS, which is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. Additional species may be targeted in the FCRONRW portions of the CFLRP project area. See section 3.3.1.1 for a full listing of species targeted in each area. When weed crews encounter new species, these are identified by botanists and may be added to the various weed lists.

Weed Management Goals: On BAER-funded projects, weeds are treated according to the stipulations laid out in the BAER proposal and within a one-year timeframe from the fire event. **Preexisting infestations in the burned area cannot be treated with BAER funds, despite their risk of spread throughout the susceptible area.** Consequently, existing inventory data is key to BAER proposals. When burn areas were originally weed-free, but occur adjacent to weed infestations, satellite and new invader populations arising post-fire are typically the target for BAER funding, which is also in line with the priorities laid out in CWMA strategic plans.

Both the UCWMA and FCWMA recognize the importance of managing weed issues in relation to fire in order to prevent the establishment of new invaders and satellite populations on freshly disturbed ground, and to prevent preexisting infestations from gaining an even stronger hold. In an ideal situation, all burn areas not qualified for BAER would be inventoried and treated within two years of the fire event. (Weeds appear most obvious and susceptible to treatment approximately two years following the fire.) Unfortunately, fluctuating funding and increased constraints regarding the use of funding post-fire hinder post-fire weed management efforts. Temporarily diverting weed management funding to recent fires also decreases resources available to other critical weed management efforts. Consequently, post-fire weed management efforts often follow the existing priority system for those areas pre-burn, as laid out in the CWMA strategic plans. Priorities assigned to burn areas are typically increased only as funding and time allow. This often does not occur in the UCWMA, but is more frequent in the FCWMA.

Weed Management Activities:

Inventory:

Infestations targeted in BAER projects post-wildfire are inventoried within 12 months of the fire event. In the Bitterroot National Forest, burn areas are a high priority for inventory and treatment regardless of being included in BAER and regardless of the preexisting weed situation. Where funding and time allow, increased effort is made to inventory burn areas within two years of the fire. In the UCWMA, inventory efforts typically follow the existing strategic plan. Burn areas are given a high priority if they contain or were adjacent to high priority infestations (new invaders or satellite populations) pre-burn. Burns occurring in areas believed to be free of weeds prior to a burn are not prioritized for inventory.

In all scenarios above, encountered infestations are surveyed for the location, size, and weed species. Some designated weed crews and contractors record this information electronically in the field utilizing handheld GPS units with GIS capabilities, from which it is transferred into FACTS. Others record this information by paper either in the field or back in the office, later entering it by hand into FACTS. The majority of infestations are inventoried at the time of treatment. Areas traversed post-fire by weed crews or contractors and found to be free of weeds are not entered into FACTS as the database was not designed to incorporate this information. As such, inventory data only indicates the presence of infestations encountered; it should not be relied upon to determine weed-free areas.

Treatment:

In BAER projects, infestations are treated according to the treatment plan outlined in the BAER proposal, and most involve chemical applications following existing NEPA authorization. In non-BAER burn areas, preexisting infestations are treated according to their assigned CWMA priority, with new invaders, satellite populations, and transportation corridors given the highest priorities, respectively. In the Bitterroot National Forest, lower priority infestations that occur in burn areas may temporarily be assigned to a higher priority. Most treatments applied by designated weed crews and private contractors in non-BAER burn areas are chemical.

Similar to inventory efforts described above, treatment activities for BAER and non-BAER burn areas include documenting the location, size, and species of weed infestations treated. The herbicide and rate applied are also recorded. Some weed crews and contractors record this information electronically in the field utilizing GPS/GIS, while others record this by paper. All treatment records are entered into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation:

Rehabilitative activities related to weed management are not typically included in fire management efforts in the CFLRP project area and are not included in BAER projects.

Monitoring:

BAER does not require follow-up monitoring to determine efficacy or thoroughness of applied treatments. Post-treatment monitoring of burned areas (BAER and non-BAER) typically follows standard Forest Service protocol, which is patterned after the strategic plan of the CWMA in which each Forest operates. In the UCWMA, infestations treated according to an eradication objective (new invaders and satellite populations) are ideally visited three times during a single growing season to ensure the complete eradication of the infestation. This is done for three consecutive growing seasons, after which eradicated sites can be visited just once per year. Remote locations and often-limited access make it difficult if not impossible to visit high-priority infestations in burn areas three times per growing season. If monitoring is possible, the percent control from previous treatments are recorded and entered into FACTS. The UCWMA maintains a separate database for post-treatment monitoring activities, so monitoring information collected for high

priority infestations is entered separately into both databases. If monitoring reveals that the location and size of infestations have changed due to treatment effects, the inventory layer in FACTS is updated with these changes.

In the Bitterroot National Forest, new invader infestations are visited at least once each year to either ensure their complete eradication or to apply another treatment if plants persist. Monitoring results for these infestations are not typically added to FACTS unless infestations were large or required extensive effort to be reached. If new invader sites must be treated again, that information is entered into FACTS via new treatment records

In the UCWMA, lower priority infestations treated by designated weed crews or contractors in burn areas are usually surveyed for their current status prior to treatment; this survey information includes the percent control of previous treatments. This information is recorded but may only be entered into FACTS and the UCWMA post-treatment monitoring database as time permits, and later in the season. In the Bitterroot National Forest, lower priority infestations treated by USFS designated weed crews are not systematically monitored.

In both the Nez Perce-Clearwater and Bitterroot National Forests, it is a requirement that 50% of acres treated are monitored in the same growing season in order to receive credit for treatments. For infestations treated by designated weed crews, this often is only a simple ocular estimate. Though this information is submitted to USFS databases, it is typically not sufficiently detailed to allow for comparisons or analyses over time.

Education/Prevention: To prevent the further spread of invasive species, all vehicles and heavy equipment utilized in fire management activities must be cleaned of plant fragments, seeds, or contaminated soil prior to entry into the burn area. When the burn site is already infested with invasive weeds, equipment is again cleaned prior to leaving the site. The USFS strictly enforces all cleaning requirements.

3.2.2 Idaho County Weed Control

The entire Selway-Middle Fork CFLRP project area falls within the boundaries of Idaho County (Figure 10). The Idaho Noxious Weed Law directs counties to develop weed control districts to plan and implement weed control efforts, including all land within each county that is owned or administered by a federal agency (Idaho Code Title 22-2404). Idaho County Weed Control (ICWC) is a key member of the UCWMA; the Idaho County Weed Supervisor currently serves as the Chair for the UCWMA.

Figure 10: Selway-Middle Fork CFLRP project area falls entirely within Idaho County

ICWC utilizes both in-house employees as well as private contractors to perform weed management efforts throughout Idaho County. Both are paid by the hour, rather than by a pre-determined or contracted set of accomplishments. Weed work conducted by ICWC employees or its private contractors in the CFLRP project area is largely restricted to non-wilderness areas and falls under an operating agreement with the Nez

Perce-Clearwater National Forest.

Target Weeds: ICWC employees and its private contractors utilize the invasive plant list for the Nez Perce-Clearwater National Forest, which is patterned after the weed list for the UCWMA. The list is a combination of weeds designated as noxious in the state of Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest (see section 3.3.1.1). When ICWC employees encounter new species, these are identified by botanists and may be added to the forest-wide weed lists.

Weed Management Goals: ICWC and its private contractors typically treat infestations throughout Idaho County based on the priority they have been assigned in the UCWMA strategic plan and annual operating plan. For the CFLRP project area, ICWC works with the USFS designated weed division (see section 3.2.1.1) and follows the UCWMA strategic plan to annually submit a proposal for weed management work to be performed during the current growing season. The proposal includes an approximate number of acres to be treated, species targeted, and suggested control methods. Accepted proposals are funded by the USFS under the current operating agreement.

Weed Management Activities:

Inventory:

Inventory efforts for all ICWC employees and its private contractors entail documenting the location, size, and species of weed infestations. This information is recorded electronically in the field utilizing handheld GPS units with GIS capabilities, from which USFS personnel transfer it into FACTS. The majority of infestations are inventoried at the time of treatment. ICWC employees and its private contractors often set out with an intention to treat a designated trail or administrative zone, and all infestations encountered and treated are recorded. It is not common practice for ICWC employees and its private contractors to survey any parts of the Selway-Middle Fork CFLRP project area with the sole intention of documenting weeds. Areas traversed by ICWC employees and its private contractors and found to be free of weeds are not entered into FACTS as the database was not designed to incorporate this information. As such, inventory data only indicates the presence of infestations encountered. Areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date.

Treatment:

Known infestations are typically treated according to their assigned UCWMA priority, with new invaders, satellite populations, and transportation corridors given the highest priorities, respectively. At times, the USFS designated weed division may request ICWC employees to first treat infestations considered a low priority in the UCWMA. Following the treatment of these infestations, ICWC employees and its private contractors revert back to the priority system, treating new invaders and satellite populations for eradication. As many sites are treated as possible during the growing season.

Most treatments applied by ICWC employees and its private contractors are chemical. Similar to inventory efforts described above, the treatment activities for ICWC employees and its private contractors entail documenting the location, size, and species of weed infestations treated. The herbicide and rate applied are also recorded. All information is recorded electronically in the field utilizing GPS/GIS, and entered into FACTS by USFS personnel. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Biological control in the project area is typically managed by USFS designated weed crews or the Nez Perce Biocontrol Center (see section 3.2.3.2). In some instances, however, the NPT Biocontrol

Center gives biocontrol agents to ICWC employees for release. These are often released at sites following the recommendation of the NPT Biocontrol Center, but are ultimately at the discretion of the ICWC employee. Presence/absence of previously released agents is not always determined prior to the new release. Releases are recorded on hard copy forms, including the coordinates of the release location, species, target weed, and number and stage of the agent released. Most release information is entered into FACTS at a later date. Release forms are also submitted to the Nez Perce Biocontrol Center for addition into their state database.

Rehabilitation: ICWC employees and its private contractors are typically not involved with rehabilitation efforts within the CFLRP project area.

Monitoring: ICWC employees and its private contractors adhere to the monitoring protocols laid out in the strategic plans of the UCWMA. Infestations treated according to an eradication objective (new invaders and satellite populations) are ideally visited three times during a single growing season to ensure the complete eradication of the infestations. This is done for three years, after which time eradicated sites become custodial and can be monitored once per growing season. The percent control from previous treatments are recorded and entered into FACTS, regardless of the assigned priority of the infestation. The UCWMA maintains a separate database for post-treatment monitoring activities, so monitoring information collected for high priority infestations is entered separately into both databases. If monitoring reveals that the location and size of infestations have changed due to treatment effects, the inventory layer in FACTS is updated with these changes.

In 2009, ICWC included a biological control assessment in their agreement with the USFS. As part of the study, several permanent monitoring transects were established at various biocontrol release points throughout the Nez Perce-Clearwater National Forest. Some of these fell within the Selway-Middle Fork CFLRP project area. The Standardized Impact Monitoring Protocol (SIMP), a biocontrol assessment method utilized by land managers throughout the state of Idaho, was applied at each transect. The study was repeated annually through 2012 in order to document (and correlate) changes in the vegetation cover, target weed density, and biological control agent population over time. Results of monitoring efforts were not entered into FACTS.

Education/Prevention: ICWC has posted weed signs in Idaho County to help educate the public about the importance of weed identification and management. ICWC also provides weed educational material and presentations to the interested public. The majority of ICWC weed educational efforts pertain to portions of Idaho County outside of the Selway-Middle Fork CFLRP project area.

3.2.3 Nez Perce Tribe*

The historical homeland of the Nez Perce Tribe (NPT) once covered more than 13 million acres in what are now Idaho, Oregon, Washington and Montana. In the Treaty of 1855, millions of acres were ceded to the US Government, and a reservation spanning ~7.9 million acres was formed (Columbia River Inter-Tribal Fish Commission 2014). In 1863, after the discovery of gold in the region, the reservation was reduced by 90% to its current size of 770,000 acres (Figure 11). The health and function of their current and historical homeland are of crucial importance to the NPT.

* The information included in this section does not necessarily represent the opinions and views of the Nez Perce Tribe. Some information was gleaned from employees of the Nez Perce Tribe, and represents the experiences and perspectives of those employees only.

3.2.3.1 NPT Watershed Division

In the Treaty of 1855, the NPT retained total fishing rights on all streams and rivers within the boundaries of the ceded land and original reservation. Salmon and steelhead runs have since declined drastically throughout the ceded lands, due largely to hydroelectric dams, habitat degradation, water quality issues, and over-harvesting. The Pacific Northwest Electric Power Planning and Conservation Act of 1980 formally recognized the impacts of hydroelectric dams on fish and wildlife in the Columbia River Basin, including the traditional homeland of the Nez Perce Tribe (Northwest Power Act 1980). The Act directs the Northwest Power and Conservation Council and Bonneville Power Administration (BPA) to adopt a program (including the provision of funding) to protect, mitigate and enhance fish and wildlife resources on the Columbia River and its tributaries.

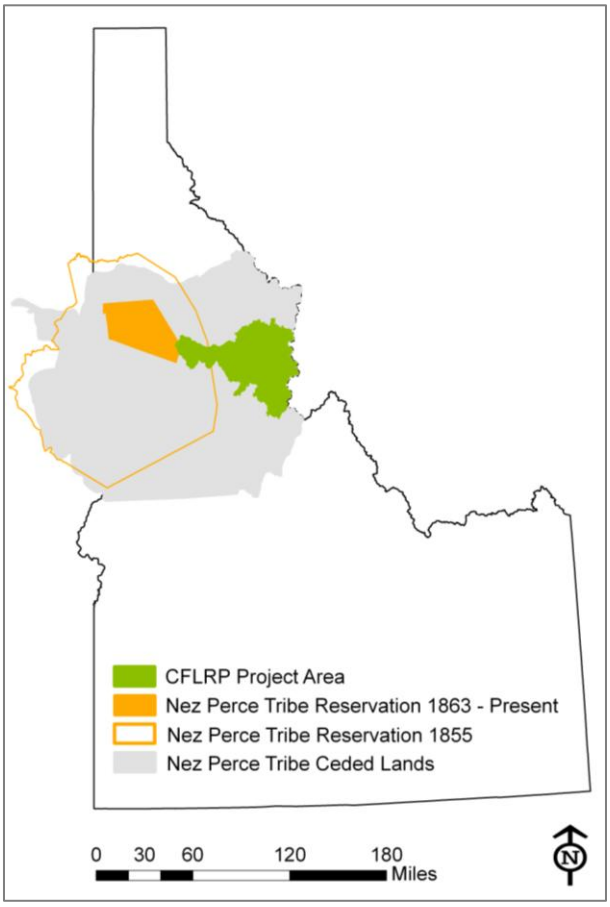


Figure 11: Selway-Middle Fork CFLRP project area in relation to the current boundaries of the Nez Perce Tribe Reservation and the historic land ceded to the U.S. Government (Nez Perce Tribe, U.S. Census Bureau)

With significant funding from BPA, the Nez Perce Department of Fisheries Resources Management is tasked with improving and maintaining the watershed of the ceded land in order to "recover and restore all species and populations of anadromous and resident fish within the traditional lands of the Nez Perce Tribe" (NPT DFRM 2014). An important component of recovering resident fish populations is the restoration of critical habitat. The Watershed Division of the Department of Fisheries Resources Management plays a key role in the monitoring and improvement of riparian habitats throughout the ceded lands. Watershed management efforts take place in 19 distinct project areas (Figure 12) and focus on restoring the functions of:

1. Natural stream flows
2. Appropriate sediment loads
3. Floodplain connectivity
4. Appropriately vegetated riparian corridors

Since 1996, the NPT Watershed Division has worked extensively in partnership with the Nez Perce-Clearwater National Forest on watershed restoration projects throughout the ceded lands. For cooperative projects, restoration teams are funded by and consist of employees from both the USFS and the NPT. Road decommissioning (see section 3.2.1.3) and culvert replacement are frequently included in restoration projects. In recent years, invasive plant management has also become an important consideration in the Watershed Division's habitat restoration efforts.

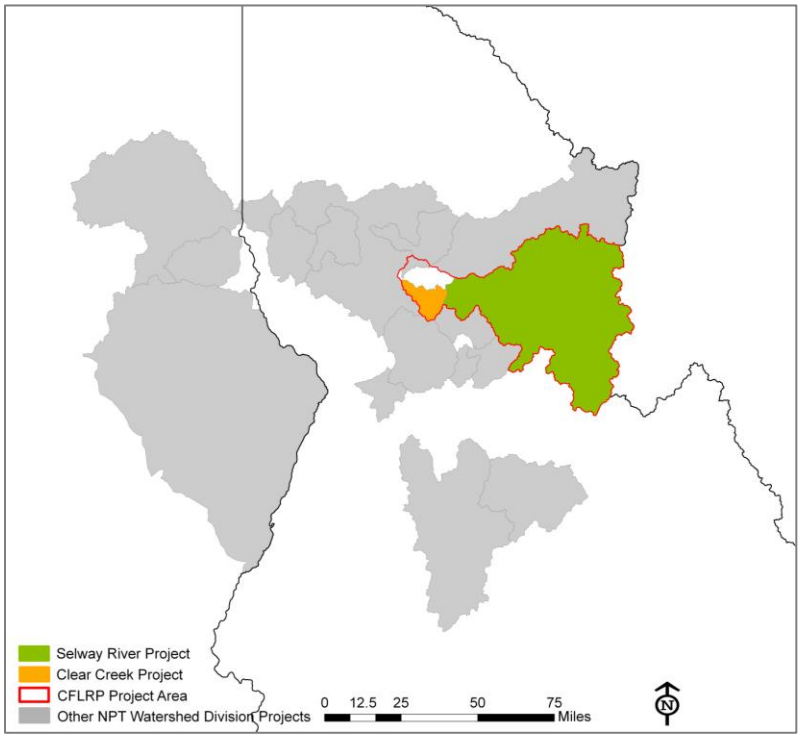


Figure 12: Selway-Middle Fork CFLRP project area in relation to the 19 project areas of the NPT Watershed Division. The Clear Creek and Selway River projects fall completely within the CFLRP project area (Nez Perce Tribe)

Project leaders typically inventory a targeted restoration area prior to work commencing. Weed infestations encountered during inventory are noted and either shared with weed specialists from the NPT Watershed Division for in-house control, or their treatment is contracted to private applicators or the ISST of the Montana Conservation Corps. The Selway-Middle Fork CFLRP project area primarily overlaps the NPT Selway River project area (Figure 12). The majority of weed work conducted in NPT project areas to date has occurred in projects other than the Selway River. Consequently most weed management activities discussed below apply either to the surrounding region or to the upcoming weed management work proposed for the Selway River project area later in 2014.

Target Weeds:

Because the goals of the NPT are to restore habitat, all exotic species capable of hindering healthy ecosystem function are considered for control. The invasive species targeted for management generally vary by project area. Known invaders present on watch lists for the CBC and the Nez Perce-Clearwater National Forest (patterned after the UCWMA) are included in management efforts. Both lists consist of weeds designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the region (see section 3.3.1.1). In addition, if new species are encountered which are determined to be non-native and considered a problem anywhere else, those are treated as a threat and added to management efforts.

Weed Management Goals:

Watershed restoration projects seek to restore project areas to a natural and functioning state. Native species are the desired vegetation cover. As such, all exotic invasive species in active restoration zones of project areas are targeted for treatment, regardless of the priority level assigned in the UCWMA or FCWMA strategic plan.

Weed Management Activities:

Inventory:

In the Lochsa River project area (grayed out, Figure 12) from 2002-2006, NPT survey crews generated a weed inventory layer that has been utilized extensively for identifying new infestations throughout the project area. Other NPT project areas do not have these layers. In most other areas (including some parts of the Lochsa), watershed restoration teams usually include at least one plant specialist familiar with weeds. When weeds are present, they are recorded anecdotally. This information is used in-house for treatments conducted by NPT Watershed weed specialists, or it

is included in external weed treatment contracts with the private sector or the ISST of the Montana Conservation Corps.

In the NPT Selway River project area, weed management efforts are planned for initiation later in 2014. A designated weed management team will be hired with the sole goal of mapping and treating weeds in the backcountry of the Selway River. Efforts will be made to coordinate activities with those of the USFS in order to prevent overlap as well as to utilize and add to inventory information already present in FACTS. Small infestations will be mapped upon treatment; large infestations will be mapped and the information used for treatment at a later date. All mapping information will be collected used GPS units with GIS capabilities and include the location, size, and species in an infestation.

Treatment: Weed infestations targeted in restoration activities are primarily treated with chemicals. When the weed issues are minor and the restoration project is small (e.g. replacing a culvert), all invasive species present in the designated activity areas are treated. On larger projects and where weed issues are extensive, infestations are treated according to priority with new invaders receiving a higher priority than widespread species. New invaders for the NPT are project-based. A species not widely established in a restoration area may be considered a new invader for that project, even though it may be widespread and a lower priority throughout all other project areas or the CWMA.

Infestations are typically treated once per year, but may be treated for multiple years throughout the duration of the project to ensure restoration goals are met. Most infestations are treated following the restoration activity, though some infestations (those with preexisting heavy weed cover) are treated before heavy machinery is used in order to help limit the weed seedbank before disturbance activities. Weed specialists in the NPT as well as the ISST often utilize GPS units with GIS capabilities in order to spatially document treatment efforts (location, size, species, herbicides, rates). Polygons are typically drawn around the treated area and all species treated within are recorded. If sites are treated in sequential years, polygons are not altered to account for changes in a species' patch size or its eradication; the eradicated species just would not appear in the species list associated with the treatment polygon. All treatment records are submitted to the USFS, and a member of a designated weed crew enters the information into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation: Revegetation is often included in restoration projects. As described in section 3.2.1.3, the preferred approach for the NPT and the Nez Perce-Clearwater National Forest is to save plants already growing at the target site for subsequent re-planting following restoration activities. Native plants already growing in the area are adapted to the conditions of the site, and the clump-planting method employed in their use often yields the best revegetation results due to retaining/trapping: organic material, recruiting seeds, nutrients, soil microbes and other beneficial organisms.

Nursery-grown stock, cuttings of shrubs and trees, and seed mixes are used in areas of specific need. The seed mixture used from 1999-2004 was designed to be aggressive in the short term and less persistent over time, promoting native species succession. During that time frame, many disturbed areas were seeded with a non-native seed mix of annuals and non-persistent perennials. In 2005, monitoring data indicated clover and other non-native species were more persistent than anticipated. Consequently, the seed mix was thereafter switched to a native mix of bluebunch wheatgrass, mountain brome and Idaho fescue, plus the exotic but less persistent annual rye.

Monitoring: Formal vegetation monitoring was previously incorporated into NPT Watershed restoration efforts, but BPA has since halted funding for this activity. NPT weed specialists still anecdotally monitor past treatments when visiting the same sites during subsequent weed management efforts. This information is not submitted for entry into FACTS.

As described in section 3.2.1.3, the Nez Perce-Clearwater National Forest/NPT road decommissioning teams actively monitor road decommissioning projects in order to track the effectiveness of the program. For every 10 miles of road decommissioned, a ¼ mile-segment of decommissioned road is selected for monitoring. Monitoring segments are established in the year they were decommissioned (year 0). Data is collected in the first, second, fifth, and tenth years after decommissioning. Vegetation and ground cover are monitored using methods from ECODATA (USDA FS 1992). Results of monitoring efforts are not entered into FACTS.

For any infestations contracted out for treatment, a NPT Watershed weed specialist is always present to ensure all treatment specifications are met. This guarantees the highest rate of weed control and limits nontarget impacts.

Education/Prevention: The NPT Watershed Division has posted signs to help educate the public about the importance of weed identification and management. They have also provided education to the public and to land managers on weed identification, mapping, and treatment. Education efforts to date have largely occurred outside of the Selway-Middle Fork CFLRP project area.

To prevent the further spread of invasive species, all heavy equipment utilized in restoration activities must be cleaned of plant fragments, seeds, or contaminated soil prior to entry into the project area. When the project area is already/still infested with invasive weeds, equipment is again cleaned prior to leaving the project area.

3.2.3.2 Nez Perce Biocontrol Center

Non-native plants pose a large threat to the NPT and the entire region by disturbing native plant communities that are culturally important to Nez Perce people, economically important to the area, and ecologically important to the Columbia River Basin. As a means of combatting the threat of invasive species, the Nez Perce Biocontrol Center (NPBC) was established in Lapwai, Idaho in 1999. Utilizing an on-site greenhouse and garden plots containing target weeds, NPBC staff raises select approved biocontrol organisms for distribution throughout the traditional homeland of the NPT and the entire Pacific Northwest. Through partnerships, the NPBC has access to collections of all approved biocontrol agents pertinent to the Northwest.

In addition to their work with biological control, NPBC employees provide extensive outreach and education to land managers and the public. Under an operating agreement with the Nez Perce-Clearwater National Forest, NPBC employees also play a key role in weed inventory work throughout forestland of northern central Idaho.

Target Weeds: A forest-wide invasive plant list is used, which is patterned after the UCWMA and consists of weeds designated as noxious in Idaho as well as other species considered invasive and a threat

to the ecological integrity of the Nez Perce-Clearwater National Forest (see section 3.3.1.1). If additional exotic invasive species are encountered, these are added to the plant list.

Weed Management Goals:

The primary goal of the NPBC is to provide biological control agents to landowners and land managers throughout the Pacific Northwest in order to reduce the threat of non-native species and help restore ecological balance in the traditional homeland of the NPT and the entire region. Additional goals further the management of weeds and restoring ecological balance by: providing weed education/outreach services throughout the region and providing assistance in maintaining weed inventory databases in the traditional homeland of the NPT.

Weed Management Activities:

Inventory:

Under an operating agreement with the Nez Perce-Clearwater National Forest in place since 2009, the NPBC has conducted large-scale weed inventory throughout portions of the Nez Perce-Clearwater National Forest. Target inventory areas are determined by discussions between the head of the Nez Perce-Clearwater National Forest weed division and NPBC employees. Target inventory areas are prioritized on an annual basis. Throughout the growing season, the NPBC inventory crew systematically inventories each priority area, documenting weed infestations they encounter as well as presence/absence of biocontrol agents.

Though inventory data has been collected since 2009, only the 2011-2013 inventory areas overlap the Selway-Middle Fork CFLRP project area (Figure 13). The inventories fill data gaps in regions that have never been inventoried, ground truth previously mapped sites and susceptibility models, and form the basis for shaping exclusion zones, which are weed-free areas delineated in order to identify defensible boundaries for preventing the further encroachment of weeds into wilderness areas. Every effort is made to fully cover each priority area during the growing season. Wildfires and inclement weather sometimes interfere with inventory efforts such that priority areas must be re-visited the following growing season.

Inventory methods are adaptive based on vegetation/habitat type, terrain, vectoring potential (e.g. roads, trails, waterways), and susceptible habitat for wind-disseminated species. Vehicles are utilized in accessible areas, but the vast majority of inventory efforts are conducted on foot. A high-powered spotting scope and field binoculars are utilized when surveying extremely steep slopes and inaccessible cliffs. Aerial

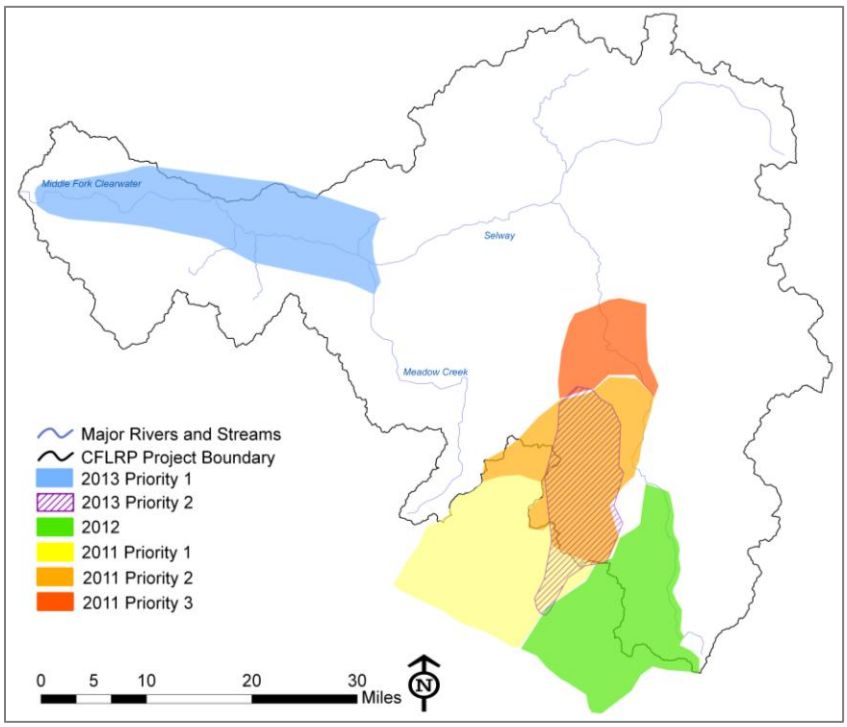


Figure 13: Selway-Middle Fork CFLRP project area in relation to select priority areas inventoried by the NPBC from 2011-2013 (NPBC)

imagery, GIS, and the University of Idaho Rush Skeletonweed Dispersal and Susceptibility Model are utilized to help identify disturbance zones and other areas highly susceptible to weed invasion. In highly susceptible areas, systematic survey methods are applied by following a grid pattern to check the area fully for weed invasions. In less susceptible areas, inventory methods follow the probable routes of weed spread, including transportation corridors, waterways, disturbed sites, and forest openings. When target weed species are encountered, concentric transects are inventoried to a minimum of ¼ mile from the point of location (or as permitted by terrain), in order to determine the extent of the infestation and identify outlying populations (Prather 2010).

Encountered weeds are mapped with GPS units with GIS capabilities in order to spatially document the location, size and species of the infestation. Points or polygons are utilized, each depending on the assigned CWMA priority of the species and location being mapped. Under the direction of the Nez Perce-Clearwater National Forest weed crews, lowest priority species already widespread in certain areas are mapped with points. Where encountered species are assigned higher priorities in the CWMA strategic plans, polygons are utilized to outline the perimeter of each infestation. All infestation information is submitted to the USFS, and a member of a designated weed crew (see section 3.2.1.1) later enters the information into FACTS, updating the forest-wide inventory layer.

In addition to mapping invasive species points and polygons, hundreds of photos and point notes are taken systematically throughout the inventoried area. Photos are taken from all angles and capture the appearance of the point and landscape at the time of inventory as well as key observations such as plants or biocontrol agents present. Point notes are recorded with GPS units with GIS capabilities and include additional information such as:

- All invasive species encountered (when more than one are present in a mapped area)
- If no invasive species are present
- If biocontrol species are present, and current abundance
- Control methods employed (if this is not included in treatment layers)
- Other general observations about the point or nearby landscape

Photos and point notes are included in year-end reports submitted to the USFS. However, they are not entered into FACTS as the database was not designed to incorporate this type or format of information. An important component of NPBC point note data is that by utilizing points where no weeds were encountered, weed-free areas can be safely and accurately determined. Utilizing the weed inventory layer in FACTS alone does not allow for the accurate creation of weed-free areas or exclusion zones. The inventory layer identifies existing weed infestations. Areas without infestations could be free of weeds, or simply could not have been inventoried to date.

Treatment: It is generally accepted in the CWMAs that inventory and treatment of weeds are two distinct activities that are accomplished more thoroughly and accurately by distinct crews. As such, the NPBC inventory crew typically does not participate in weed treatments. Exceptions include the treatment of new invaders and the use of biological control agents. The NPBC recognizes the importance of early detection and rapid response for new invading weeds in the region. When species prioritized as new invaders are encountered during inventory efforts, attempts are made to immediately treat the population, provided the infestation is small enough to make such attempts feasible. Species that do not regenerate from roots or root fragments are often hand-pulled. Perennials which do regenerate in this manner are targeted for chemical spot-treatments utilizing

chemicals and rates approved for use in the designated area. When very small populations of well-established species are encountered, hand pulling is done to help limit the species' spread. Hand-pulling and herbicide treatments are often limited in size and are not typically submitted for entry into FACTS, but the infestation size, species, and application/rate are included in point notes.

When large infestations suitable for biocontrol agents are encountered, infestations are surveyed for presence of existing agents, point notes are taken, and information is shared with the NPBC biocontrol crew for future release efforts. At remote sites in the backcountry otherwise difficult to access, NPBC inventory crews may release biocontrol agents immediately when suitable sites are encountered.

Under a continuing operating agreement with the USFS, the NPBC biocontrol crew has made numerous releases of approved biocontrol agents throughout the Nez Perce-Clearwater National Forest. Prior to 2009, the majority of releases were delivered to USFS designated weed crews who made releases at their own discretion. Since 2009, the NPBC has directly made the majority of releases in the project area. In annual discussions between the head of the Nez Perce-Clearwater National Forest weed division and NPBC employees, the number and species of biocontrol agents to be released are determined, along with the target areas. Much of the information utilized in discussions arises from previous inventory efforts by the NPBC inventory crew. Aerial imagery and GIS are also utilized to identify appropriate release sites.

Releases of between 50-200 agents are made at designated sites. Signs are typically added to release sites in an effort to protect each area from activities that might hinder the development of biocontrol agent populations (e.g. alternative control methods). The species, stage and number of individuals released, target weed, release location, release personnel, and GPS coordinates are recorded for each release. This information is submitted to the USFS, and a member of a designated weed crew enters it into FACTS at a later date. Releases are also entered into the statewide biocontrol release database the NPBC maintains for the state of Idaho.

Rehabilitation: Rehabilitative activities related to weed management are not typically included in NPBC weed management efforts.

Monitoring: The NPBC actively monitors the establishment and impact of select biocontrol agents by following the same monitoring protocol (SIMP) mentioned in section 3.2.2. At designated release sites throughout the region, the NPBC has established several permanent transects to document vegetation cover, target weed density, and biological control agent abundance over time. Sites are ideally visited once annually, though time/funding limitations and wildfires sometimes make this impossible at all sites. Results of monitoring efforts are submitted to the Idaho State Department of Agriculture for inclusion in their statewide biocontrol monitoring database. Results are not entered into FACTS.

Education/Prevention: The NPBC conducts numerous workshops each year in which employees teach regional land managers and the public about the history and proper methodology for implementing biological control efforts. The NPBC has hosted (and will continue to host) plant identification workshops that provide hands-on identification experience for new and established invaders. Workshops on both topics have been presented to USFS personnel and the ISST of the Montana Conservation Corps for application within the Selway-Middle Fork CFLRP project area. The NPBC also extensively distributes pertinent weed and biocontrol agent educational material throughout the region.

3.2.4 Private Contractors

Private contractors are regularly utilized for weed management throughout the Selway-Middle Fork CFLRP project area. The species targeted and management activities performed vary depending on the agency/group for which work is conducted. Some private contractors work for multiple agencies/groups, requiring them to (potentially) learn different species and/or different record-keeping methods.

Target Weeds: Some private contractors may be contracted to target a specific set of species occurring in a given geographic area. Others may be expected to target all weeds appearing on regional lists for the forest in which they are working. Contractors working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Contractors working in the portions of the Bitterroot Forest that overlap the CFLRP project area use a weed list created specifically for the SBW weeds EIS, which is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. See section 3.3.1.1 for a full listing of species targeted in each area.

Weed Management Goals: Private contractors adhere to the specifications in their contracts. While some contracts follow the priority system outlined in the CWMA strategic plans, many contracts in the CFLRP project area stipulate that all target weeds occurring in a designated area be treated, regardless of their assigned priority in the CWMA strategic plans. Many contracts require a 90% kill rate for treated area, which may be achieved in as little as one treatment.

Weed Management Activities:

Inventory: The majority of private contractors working in the CFLRP project area are not required and do not collect inventory information. Though they always record the location, size and species in a treated infestation, this information is included in treatment records rather than separately as inventory. A member of a designated weed crew transfers information from treatment records into FACTS at a later date. Since 2012, a spatial component has been required for all treatment records entered into FACTS; this is stored in the inventory layer of FACTS.

Contractors working for the ICWC do conduct separate inventory work. This entails documenting the location, size, and species of weed infestations, which is done electronically in the field utilizing handheld GPS units with GIS capabilities and later transferred into FACTS by USFS personnel. Again, this is typically collected at the time of treatment, so the same information is collected in treatment records. ICWC contractors often set out with an intention to treat a designated trail or administrative zone, and all infestations encountered are recorded. It is not common practice for ICWC contractors to survey an area with the sole intention of documenting weeds. Areas traversed by ICWC contractors and found to be free of weeds are not entered into FACTS as the database was not designed to incorporate this information. As such, inventory data resulting from ICWC contractor efforts only indicate the presence of infestations encountered. Areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date.

Contractors working along backcountry trails in the SBW and FCRONRW are instructed to prioritize the trails they inventory according to use. Those with high recorded use and that are maintained by trail crews are higher priorities than disused trails with minimal to no trail clearing. Contractors treating backcountry trails often indicate with hard-copy maps and statements the trails they covered

during their weed management efforts. Though this information may be utilized in-house to track progress, it is not entered into FACTS as the database was not designed to incorporate weed-free data.

Treatment: In most USFS contracts, extra emphasis is often placed on new invaders such that contractors know new invaders are to be targeted for treatment. However, most contracts also include other invasive species, and they do not require multiple visits and treatments if the overall kill rate is 90% or above. In this manner, the complete eradication of new invaders is not (typically) explicitly required in USFS contracts. Most contracts are annual, with contractors responsible for the treatment of all target weeds in a specified geographic area. Even for multi-year agreements, infestations are typically treated only once per year, regardless of the assigned CWMA priority. Contracts pertaining to timber harvest are usually treated twice per multi-year agreement, though on some projects both treatments may occur in the same growing season.

ICWC contractors are contracted to treat weed infestations according to their assigned CWMA priority, with new invaders, satellite populations, and transportation corridors given the highest priorities, respectively. Within each contractor's geographic region, as many sites are treated as possible during the growing season.

The vast majority of weed treatments applied by private contractors are chemical. Rates and herbicides are typically stipulated in the contract. Some contractors must provide their own chemical; ICWC contractors are provided with the herbicides they are to use.

Similar to inventory efforts described above, contractor treatment activities include documenting the location, size, and species of weed infestations treated. The herbicide and rate applied are also recorded. Some contractors record this information electronically in the field utilizing GPS/GIS, while others record this by paper. All treatment records are entered into FACTS by USFS personnel. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation: Private contractors are typically not involved with rehabilitation efforts within the CFLRP project area.

Monitoring: USFS personnel (typically designated weed crews, section 3.2.1.1) attempt to monitor all contractor-treated infestations to ensure the terms of the contract are met. This usually entails confirming a ~90% kill rate of targeted weeds, complete coverage of the entire infestation, limited nontarget impacts, and any other items specified in the contracts. This information is utilized to provide full payment to contractors, and the majority of the monitoring information is added to USFS databases (typically consisting of only basic ocular estimates).

Because ICWC contractors follow the priority system laid out in the UCWMA strategic plan, infestations treated according to an eradication objective (new invaders and satellite populations) are ideally visited three times during a single growing season to ensure the complete eradication of the infestation. This is done for three years, after which time eradicated sites become custodial and can be monitored once per growing season. The percent control from previous treatments are recorded and later entered into FACTS by USFS personnel. The UCWMA maintains a separate database for post-treatment monitoring activities, so monitoring information collected for high priority infestations is entered separately into both databases. If monitoring reveals that the location and size of infestations have changed due to treatment effects, the inventory layer is updated with these changes, and later entered into FACTS by USFS personnel.

Lower priority infestations are not typically treated by ICWC contractors. If they are treated, they are typically surveyed for their current status prior to treatment and resulting information is entered into both databases as outlined above for higher priority infestations.

Education/Prevention: Private contractors are typically not involved with weed education/prevention efforts within the CFLRP project area.

3.2.5 Other Entities

In addition to the primary stakeholders described above, several other groups/individuals participate in weed management, though typically to a more limited extent than primary stakeholders.

3.2.5.1 Back Country Horsemen of Idaho

Back Country Horsemen of Idaho (BCHI) is a member of Back Country Horsemen of America and consists of 14 chapters spread throughout Idaho. Each chapter of BCHI is a non-profit organization. The purpose of the BCHI is five-fold:

1. To perpetuate the common sense use and enjoyment of horses in America's backcountry and wilderness
2. To work to ensure that public lands remain open to recreational stock use
3. To assist the various government and private agencies in their maintenance and management of said resource
4. To educate, encourage and solicit active participation in the wise use of the backcountry resource by horsemen and the general public commensurate with our heritage
5. To foster and encourage the formation of new units of the organization

In line with all BCHI goals, the Back Country Horsemen of North Central Idaho (BCHI of NCI) are annually involved in weed treatment along back county trails in the Selway-Middle Fork CFLRP project area and surrounds as well as weed education/prevention in the region. All weed management efforts are volunteer. BCHI of NCI members volunteer labor, stock, vehicles, fuel and equipment to apply herbicides provided by ICWC. Costs and accomplishments are submitted to the UCWMA annually. Up to half of total costs can be reimbursed, but all reimbursement funds are given to the BCHI of NCI chapter, rather than the individual volunteers.

Target Weeds: Species targeted for control by BCHI of NCI are those encountered along backcountry trails that are considered deleterious to the forest habitat. Target species overlap somewhat with the UCWMA invasive species list, but some differences exist (see section 3.3.1.1).

Weed Management Goals: BCHI of NCI members seek to treat all target species occurring along back country trails such that: some infestations/species may be eradicated, the spread of weed seeds along back country trails can be prevented, and the spread of infestations away from trails and into the surrounding wilderness or forest can be prevented. All target species encountered are treated, regardless of the priority assigned in the UCWMA strategic plan.

Weed Management Activities:

Inventory: On hard copy maps, BCHI of NCI marks all trail segments that were inventoried as part of backcountry treatment efforts. Treated points along trails are not differentiated from trail segments that are weed-free. Maps are submitted to the UCWMA and entered into both the treatment and inventory layers of FACTS by USFS personnel.

Treatment: Trails to be treated are often coordinated with the head of the designated weed department (see section 3.2.1.1). BCHI of NCI members typically walk a trail from the trailhead until weed infestations no longer occur. Upon reaching the weed-free area, members turn around and treat all infestations encountered on the return trip. All weeds are treated, regardless of the assigned UCWMA priority. Stock saddlebags often contain pre-measured chemical, which is used to spot-spray weeds occurring up to 30 or 40 feet uphill of the trail and 50 feet downhill. Because some weed species are more obvious or are only present at varying times of the growing season, the same trail may be sprayed more than once in a year to ensure the complete treatment of all invasive plants.

All trail segments covered are marked on hard copy maps. Treatment logs include the trail name, species encountered, miles treated, and amount of herbicide applied. Maps are submitted to the UCWMA and entered into FACTS by USFS personnel. Multiple species are often treated along the same stretch. The inventory and treatment records are assigned to only the first weed species listed in BCHI treatment records.

Rehabilitation: BCHI of NCI are not involved with rehabilitation efforts within the CFLRP project area.

Monitoring: Because the work achieved by BCHI of NCI is volunteer-based, the USFS is not required to monitor the efficacy of the treatments. BCHI of NCI members often monitor their own work during subsequent trail rides along treated trails. Plants surviving an initial treatment or sprouting following the application are often targeted again during a second treatment event. Secondary treatment information is recorded and added to the first prior to submission to the UCMWA. Monitoring observations, however, are not entered into the post-treatment datasets for FACTS or the UCWMA.

Education/Prevention: In line with the overall goals of the BCHI, members of the NCI chapter often volunteer time and resources to give presentations at local schools and other interested groups in the community. Presentations are typically geared toward increasing the audience's appreciation for nature and the ecosystem, for which weeds play an important role. Some members of BCHI of NCI also volunteer their time and resources examining hay at select Forest Service checkpoints and administration sites to ensure it is weed-free.

3.2.5.2 Montana Conservation Corps

The Montana Conservation Corps (MCC) is a nonprofit organization employing young adults and teens to complete conservation projects in local communities, national forests, state and national parks, wildlife refuges and federally designated wilderness areas. The MCC mission is to inspire young people through hands-on conservation service to be leaders, stewards of the land, and engaged citizens who improve their communities.

In 2010, the MCC initiated the Invasive Species Strike Team (ISST). The ISST is a team dedicated to invasive species issues in wilderness and forest areas. The ISST consists of crew leaders (previously members of AmeriCorps) and crewmembers (often college students with an emphasis or interest in natural resources). ISST members are trained in weed identification and are certified to spray weeds. The MCC has an agreement with the USFS that overlaps several national forests. Under this agreement, the ISST is utilized for weed treatment throughout much of the forestland in Idaho and Montana.

Target Weeds: Species targeted for control by the ISST vary depending on the project area and forest in which the team is working. Teams working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Teams working in the portions of the Bitterroot Forest that overlap the CFLRP project area use a weed list created specifically for the SBW weeds EIS, which is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. See section 3.3.1.1 for a full listing of species targeted in each area.

Weed Management Goals: The goal of the ISST is to fulfill the invasive treatment needs of each partner with whom they work. Some collaborators follow the prioritization system of the CWMA strategic plan for the area in which they operate. Other collaborators seek to control all invasive species in areas of interest, regardless of their assigned CWMA priority.

As a personal goal, the MCC wishes to build a lasting program around the ISST in order to perpetuate this program that has proven highly beneficial for all parties involved. In support of this, the MCC has invested in its own vehicles and weed management equipment.

Weed Management Activities:

Inventory:

Throughout most agreements the ISST has in the CFLRP project area, inventory data is not required or collected. Though the ISST often records the location, size and species in a treated infestation, this information is included in treatment records rather than separately as inventory. Since 2012, a spatial component has been required for all treatment records entered into FACTS; this is stored in the inventory layer of FACTS.

Treatment:

The MCC/USFS operating agreement does not specify a required number of acres treated or desired kill rate be achieved by the ISST. Rather, the ISST attempts to accomplish specific treatment goals of collaborators on a project-by-project basis. For many collaborators, the goal is to treat all invasive species in a given geographic area. For others, the goal is to treat only new invaders, in which case the ISST is asked to ignore lower priority infestations en route to those with new invaders.

The ISST works with several different collaborators per year, and crewmembers typically must change the treatment approach and data collection method on each project. The vast majority of weed treatments applied by the ISST are chemical. On all projects, the ISST provides its own herbicides and follows the application rate recommended by the label and the project collaborator. Treatment activities include documenting the location, size, and species of weed infestations treated. The herbicide and rate applied are also recorded. On some projects, this information is recorded electronically in the field utilizing GPS/GIS, while at others, hard copy daily treatment logs are utilized to document accomplishments. All treatment records are submitted to the project

collaborator and are eventually entered into FACTS by a member of a USFS designated weed crew (see section 3.2.1.1). Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Each project is accomplished within a pre-determined time frame, during which as many sites are treated as possible. When inclement weather prevents the use of herbicides, hand pulling is utilized in an effort to reach project goals. The size and species of mechanically treated infestations are recorded, and may be entered into FACTS at a later date by a member of a designated weed crew.

On some projects, the ISST has conducted releases of biocontrol agents. Releases are made at sites following the recommendation of the USFS collaborator. Presence/absence of previously released agents is not always determined or recorded prior to the new release. New releases are typically recorded on hard copy forms, including the coordinates of the release location, species, target weed, and number and stage of the agent released. Some release information is entered into FACTS at a later date by a member of a designated weed crew.

Rehabilitation: The ISST is typically not involved with rehabilitation efforts within the CFLRP project area.

Monitoring: The ISST is typically not involved with monitoring efforts. The USFS designated weed crews are responsible for monitoring the efficacy of past treatments made by the ISST and other contracted individuals/groups. Members of the ISST have occasionally been trained and utilized to measure species composition during the transect monitoring efforts of the designated weed crews in the West Fork and Moose Creek Ranger Districts. Results of all monitoring are submitted to designated weed crews and utilized for in-house purposes.

Education/Prevention: The ISST is typically not involved with weed education/prevention efforts within the CFLRP project area.

3.2.5.3 Outfitters/Guides

Several outfitters and guides work out of the Selway-Middle Fork CFLRP project area, offering guided trips (e.g. hunting, fishing, rafting) for compensation. To operate legally in Idaho, outfitters must be licensed with the state Outfitters and Guides Licensing Board. Guides work for licensed outfitters and must also be licensed with the state board. In addition to state requirements, outfitters and guides utilizing Forest Service-managed land must also obtain permits issued by the USFS. In Idaho, permitted outfitters and guides are assigned specific regions and camps and must follow the campsite management plan in keeping their sites maintained, including the treatment of invasive plant species.

Target Weeds: Outfitters and guides working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Outfitters and guides working in the portions of the Bitterroot Forest that overlap the CFLRP project area use a weed list created specifically for the SBW weeds EIS, which is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. See section 3.3.1.1 for a full listing of species targeted in each area.

Weed Management Goals: Outfitters and guides aim to maintain their assigned camps and areas in a natural state free of invasive plants. This is not only a requirement of the USFS permitting process, but is also in the best interest of outfitters and guides. Wide-scale weed invasions decrease habitat for big game (D'Antonio and Vitousek 1992) and diminish the aesthetic value of the camp or area.

Weed Management Activities:

Inventory: Outfitters and guides are typically not involved with weed inventory efforts within the CFLRP project area. If they encounter species considered new invaders in their region, they notify designated weed crews (see section 3.2.1.1) who add this information to inventory layers in FACTS and may assist outfitters/guides in eradication.

Treatment: Most outfitters and guides utilize hand pulling or spot-spraying (with approved herbicides and rates) to maintain their assigned regions and camps as weed-free. These efforts are typically too small and infrequent to warrant entry into FACTS. When infestations are too large to control in this manner, or when new invaders are encountered, designated weed crews are notified and provide assistance. Treatments applied by designated weed crews are documented for the species, size, and location of an infestation, and this information is entered into FACTS. Since 2012, a spatial component has been required for all treatment records entered into FACTS.

Rehabilitation: Outfitters and guides are typically not involved with weed rehabilitation efforts within the CFLRP project area.

Monitoring: USFS weed crews and permitting officers are responsible for ensuring outfitters and guides maintain their sites and areas according to the campsite management plan. Post-treatment monitoring data is typically not collected. Invasive plant treatment by outfitters/guides has generally not been an issue to date because maintaining the area as weed-free is in the best interest of outfitters and guides.

Education/Prevention: Outfitters and guides are typically not involved with weed education/prevention efforts within the CFLRP project area.

3.2.5.4 Selway Bitterroot Foundation

The Selway-Bitterroot Foundation was formed in 2005 as a non-profit organization partnering with the USFS to steward the Selway-Bitterroot Wilderness amid declining federal funding. In 2011, they became the Selway-Bitterroot Frank Church Foundation (SBFC), expanding their area of service to the Frank Church-River of No Return Wilderness and surrounding wildlands. The goals of the SBFC include:

1. Promote stewardship of the cultural and natural resources of the Selway-Bitterroot and Frank Church-River of No Return Wilderness Areas and surrounding wildlands
2. Build citizen and community support for wilderness and wildland programs and projects
3. Create opportunities for volunteer participation in wilderness and wildland programs and projects
4. Foster awareness of wilderness and wildland values and promote understanding of wilderness and wildlands ethics, history and ecology
5. Mentor future leaders in the field of wilderness and wildland leadership

6. Form long-term relationships with individuals, communities, tribes, organizations, businesses, universities and other agencies to achieve these goals.

The SBFC program is three-pronged, consisting of: staff, wilderness ranger interns, and volunteers. Staff and volunteers work throughout the field season (spring through fall) to perform land stewardship activities such as clearing trails and campsites, making public contacts, monitoring boat and plane usage, inventorying invasive species, and many additional activities. Wilderness ranger interns are typically college students interested in natural resources who utilize the intern program and expertise of overseeing SBFC staff to gain on-the-ground experience in land stewardship throughout the summer.

The SBFC has existing agreements with the USFS through which funding can be channeled to SBFC projects as well as to external groups for their land management efforts. For example, in 2011 and 2012, agreements with the SBFC were used to hire a backcountry weed-spraying contractor. The majority of SBFC funding is collected from sources outside the USFS.

Target Weeds:

SBFC staff, volunteers, and wilderness ranger interns are trained to ID and inventory the occurrence of invasive species on the Idaho noxious weed list. Additional species could be added to the search list, if educational/identification material is provided that covers the additional species.

Weed Management Goals:

SBFC staff, volunteers, and wilderness ranger interns attempt to inventory the invasive species they encounter in remote areas of the wilderness wherein they are working. Invasive species are recognized as threats to the health and function of wilderness ecosystems so the species, location, and size of infestations encountered are documented. Small infestations may be mechanically treated where feasible in order to prevent the further spread of satellite infestations into pristine areas.

Weed Management Activities:

Inventory:

SBFC staff, volunteers, and wilderness ranger interns attempt to inventory all invasive species they encounter by documenting (hard copy) the species and size of infestations, adding GPS coordinates, and providing written descriptions of infestation locations. All inventory data collected is submitted to USFS wilderness rangers in corresponding ranger districts. Some of this information is entered into FACTS at the year-end by wilderness rangers at their own discretion. It is unknown if all information is formally entered.

Treatment:

Most SBFC staff, volunteers, and wilderness ranger interns do not treat infestations encountered unless patches are very small and warrant mechanical (hand-pull) eradication in order to prevent future spread. In 2011 and 2012, agreements between SBFC and the USFS were utilized to hire a backcountry weed-spraying contractor who utilized mule teams to chemically treat weeds in the wilderness backcountry. Oversight and specifications of this contract were handled by the USFS.

Rehabilitation:

SBFC staff, volunteers, and wilderness ranger interns are often involved with habitat restoration activities in the CFLRP project area, though these activities are not typically associated with weed management.

Monitoring:

SBFC staff, volunteers, and wilderness ranger interns are not directly contracted to treat weeds in the CFLRP project area, so monitoring requirements are not applicable. For the backcountry weed management contract facilitated by the SBFC, USFS designated weed crews were responsible for monitoring the efficacy of treatments made.

Education/Prevention: SBFC staff, volunteers, and wilderness ranger interns are often involved with public education activities during their public contacts, but weeds are typically not included in these efforts.

3.3 Existing Data

This section presents all weed-related data collected from FACTS and stakeholders in the Selway-Middle Fork CFLRP project area. Due to the nature of the FACTS data entry process, individual stakeholder information is frequently lost. Consequently, the majority of the following sections present the data as a whole, with stakeholder separation included in the few places where doing so is possible.

3.3.1 Inventory

Inventoried species can be separated into two categories:

1. Species for which stakeholders are actively looking during inventory efforts
2. Species actually found present in the CFLRP project area

3.3.1.1 Weed Watch Lists

As discussed throughout section 3.2, differing land management goals result in stakeholders targeting different species for weed control efforts. Designated USFS weed crews, ICWC employees, private contractors, the MCC ISST, outfitters/guides, and other groups working on USFS land in the project area utilize regional invasive plant lists specific to the forest in which they are working. Those working in the Nez Perce-Clearwater National Forest (including portions of the SBW) utilize a forest-wide invasive plant list in their weed management efforts. This list is patterned after the weed list for the UCWMA and includes species designated as noxious in Idaho as well as other species considered invasive and a threat to the ecological integrity of the Nez Perce-Clearwater National Forest. Those working in the portions of the Bitterroot Forest that overlap the CFLRP project area use a weed list created specifically for the SBW weeds EIS. This list is patterned after the Idaho and Montana noxious weed lists and includes other species of concern. Additional species may be targeted in the FCRONRW portions of the CFLRP project area. When weed crews, ICWC employees, or private contractors encounter new species, these are identified by botanists and may be added to the regional weed lists.

The NPBC inventory crew works off a weed list similar to, but more narrow in scope, than the UCWMA list. It is annually customized by USFS weed crew personnel to include species of high priority and those known to be established in inventory project areas. The BCHI target a still smaller number of species they deem problematic on the specific trails they inventory and treat annually. Because habitat restoration is the overall goal for the NPT Watershed Division and USFS road-decommissioning crews, all exotic species are potentially targeted for control. Those are not formally elucidated due to the large and fluctuating number, but may include the species on the forest-wide lists as well as any other exotics encountered in the project area.

All 188 weed species formally slated for inventory and/or control in the Selway-Middle Fork CFLRP project area are listed in Table 1.

Table 1: 188 weed species on watch lists for various stakeholders in the Selway-Middle Fork CFLRP project area. Not all species occur in the project area. Some lists vary from year to year. Priorities are included where applicable; a key is included at the bottom. Some species are assigned multiple priorities, depending on location.

Taxonomic Name	Common Name	UCWMA	FCWMA	Selway-Bitterroot Wilderness Weeds EIS	Nez Perce Biocontrol Center	Back Country Horsemen	Idaho Noxious Weed List	Montana Noxious Weed List
Abutilon theophrasti	velvetleaf							
Acaena novae-zelandia	biddy biddy							
Acmella repens	oppositeleaf spotflower							
Adonis annua	blooddrops	1						
Aegilops cylindrica	jointed goatgrass			ID Contain			Contain	
Aegilops geniculata	ovate goatgrass							
Aegilops tauschii	tausch's goatgrass							
Aegilops triuncalis	barbed goatgrass							
Aegilops ventricosa	goatgrass							
Ailanthus altissima	tree of heaven							
Alhagi maurorum	camelthorn							
Alliaria petiolata	garlic mustard	1cust			1			
Alopecurus myosuroides	slender meadow foxtail							
Ambrosia artemisiifolia	annual ragweed							
Ambrosia tomentosa	skeletonleaf bur ragweed							
Amorpha fruticosa	false indigo bush							
Amsinckia	fiddleneck							
Anchusa arvensis	small bugloss			ID Control			Control	
Anchusa officinalis	common bugloss							
Anthriscus caucalis	bur chervil				5			
Anthriscus sylvestris	wild chervil							
Arctium minus	lesser burdock		3					
Artemisia absinthium	absinth wormwood							
Azolla pinnata	feathered mosquito fern			ID EDRR			EDRR	
Barbarea orthoceras	American yellowrocket							
Barbarea vulgaris	garden yellowrocket	1cust, 1			1			
Berteroa incana	hoary alyssum	1	1, 2, 3	ID Contain, MT 2A	2		Contain	2A
Brassica	mustard		1					
Bromus tectorum	cheatgrass		5	MT 3				3
Bryonia alba	white bryony			ID Contain			Contain	
Butomus umbellatus	flowering rush			ID Contain, MT 2B			Contain	2B
Cabomba caroliniana	Carolina fanwort							
Cardaria chalapensis	lenspod whitetop							
Cardaria draba	whitetop			ID Contain, MT 2B	1		Contain	2B
Cardaria pubescens	hairy whitetop							
Carduus acanthoides	plumeless thistle	2cust		ID Contain	1		Contain	
Carduus nutans	musk thistle	1cust		ID Control	1		Control	
Carduus pycnocephalus	Italian plumeless thistle				1			
Carduus tenuiflorus	winged plumeless thistle							
Carthamus lanatus	woolly distaff thistle							
Carthamus leucocaulos	whitestem distaff thistle							
Carthamus oxyacantha	jeweled distaff thistle							
Cenchus longispinus	mat sandbur							

Taxonomic Name	Common Name	UCWMA	FCWMA	Selway-Bitterroot Wilderness Weeds EIS	Nez Perce Biocontrol Center	Back Country Horsemen	Idaho Noxious Weed List	Montana Noxious Weed List
Centaurea calcitrapa	purple starthistle							
Centaurea diffusa	diffuse knapweed	1		ID Contain, MT 2B	1		Contain	2B
Centaurea iberica	Iberian knapweed							
Centaurea jacea jacea (previously *C. jacea*)	brown knapweed							
Centaurea jacea nigra (previously *C. nigra*)	black knapweed							
Centaurea jacea nothosubsp. *pratensis* (previously *C. debeauxii*)	meadow knapweed			ID Control			Control	
Centaurea macrocephala	bighead knapweed							
Centaurea nigrescens	tyrol knapweed				1			
Centaurea solstitialis	yellow starthistle		1	ID Contain, MT 1A	1		Contain	1A
Centaurea stoebe (previously *C. maculosa* and *C. biebersteinii*)	spotted knapweed		3, 5	ID Contain, MT 2B	2		Contain	2B
Centaurea tricocephala	feather-head knapweed							
Centaurea virgata squarrosa	squarrose knapweed			ID EDRR	1		EDRR	
Chaenorhinum minus	dwarf snapdragon							
Chondrilla juncea	rush skeletonweed		3, 5	ID Contain, MT 1B	1		Contain	1B
Cichorum intybus	chicory							
Cirsium arvense	Canada thistle		3	ID Contain, MT 2B	5		Contain	2B
Cirsium vulgare	bull thistle		3					
Clematis orientalis	Oriental virginsbower							
Cobomba caroliniana	fanwort			ID EDRR			EDRR	
Conium maculatum	poison hemlock		1	ID Contain			Contain	
Convolvulus arvensis	field bindweed		1	ID Contain, MT 2B	2		Contain	2B
Cotula mexicana	Mexican brassbuttons							
Crupina vulgaris	common crupina		1	ID Control	2		Control	
Cuscuta americana	american dodder							
Cuscuta approximata	alfalfa dodder							
Cynoglossum officinale	houndstongue		1, 3	ID Contain, MT 2B	5		Contain	2B
Cyperus esculentus	yellow nutsedge							
Cyperus rotundus	nutgrass							
Cytisus scoparius	Scotch broom	1cust		ID Control, MT 2B	1		Control	1B
Cytisus striatus	striated broom							
Datura inoxia	pricklyburr							
Datura stramonium	jimsonweed							
Daucus carota	Queen Anne's lace							
Digitalis purpurea	purple foxglove				1			
Dipsacus fullonum	Fuller's teasel							
Echium vulgare	common viper's bugloss			ID Control, MT 2A			Control	2A
Egeria densa	Brazilian Elodea			ID EDRR			EDRR	
Eichhornia crassipes	water hyacinth						Temporaril	
Elaeagnus angustifolia	Russian olive			MT 3				3
Elymus repens	quackgrass							

Taxonomic Name	Common Name	UCWMA	FCWMA	Selway-Bitterroot Wilderness Weeds EIS	Nez Perce Biocontrol Center	Back Country Horsemen	Idaho Noxious Weed List	Montana Noxious Weed List
Equisetum arvense	field horsetail							
Equisetum telmateia	giant horsetail							
Eruca vesicaria	rocketsalad							
Euphorbia cyparissias	cypress spurge	1						
Euphorbia dentata	toothed spurge				1			
Euphorbia esula	leafy spurge	1cust, 1	1	ID Contain, MT 2B	1		Contain	2B
Euphorbia myrsinites	myrtle spurge				1			
Gallium aparine	bedstraw							
Genista monspessulana	French broom							
Gypsophila paniculata	baby's breath							
Halogeton glomeratus	saltlover							
Helianthus ciliaris	Texas blueweed							
Hemizonia pungens	common tarweed							
Heracleum mantegazzianum	giant hogweed			ID EDRR			EDRR	
Hesperis matronalis	dames rocket							
Hibiscus trionum	flower of an hour							
Hieracium ×ambiguum (previously *Hieracium glomeratum*)	yellow devil hawkweed			ID EDRR	1		EDRR	
Hydrcharis morsus-ranae	European frogbit			ID EDRR			EDRR	
Hydrilla verticillata	hydrilla, waterthyme			ID EDRR, MT 3			EDRR	3
Hyoscyamus niger	black henbane		1	ID Control	1		Control	
Hypericum perforatum	St. Johnswort		3	MT 2B	5			2B
Hypochaaris radicata	hairy cat's ear							
Impatiens glandulifera	ornamental jewelweed			ID EDRR	1		EDRR	
Iris pseudacorus	pale yellow iris			ID Contain, MT 2A			Contain	2A
Isatis tinctoria	dyer's woad		1	ID Control, MT 1A	1		Control	1A
Jacobaea vulgaris (previously *Senecio jacobaea*)	tansy ragwort			ID Contain	1		Contain	2A
Kochia scoparia	burningbush							
Kochia spuria	roundleaf cancerwort							
Lamium purpureum	purple deadnettle							
Lathyrus latifolius	perennial pea		1, 2, 3		1			
Lepidium latifolium	perennial pepperweed	1		ID Contain, MT 2A	2		Contain	2A
Lepyrodiclis holosteoides	false jagged-chickweed							
Leucanthemum vulgare (previously *Chrysanthemum leucanthemum*)	oxeye daisy		1, 2, 3, 5	ID Contain, MT 2B	2		Contain	2B
Linaria dalmatica dalmatica	Dalmatian Toadflax		1	ID Contain, MT 2B	3		Contain	2B
Linaria vulgaris	yellow toadflax	1	1	ID Contain, MT 2B	1		Contain	2B
Lysimachia vulgaris	garden yellow loosestrife							
Lythrum salicaria	purple loosestrife			ID Contain, MT 1B	1		Contain	1B
Lythrum virgatum	European wand loosestrife							
Milium vernale	milium			ID Contain			Contain	
Millium vernata	spring milletgrass							
Mirabilis nyctaginea	heartleaf four o'clock							

Taxonomic Name	Common Name	UCWMA	FCWMA	Selway-Bitterroot Wilderness Weeds EIS	Nez Perce Biocontrol Center	Back Country Horsemen	Idaho Noxious Weed List	Montana Noxious Weed List
Myriophyllum aquaticum	parrot feather			ID Control			Control	
Myriophyllum heterophyllum	variable-leaf-milfoil			ID EDRR			EDRR	
Myriophyllum spicatum	Eurasian watermilfoil			ID Control, MT 2B	1		Control	2B
Nardus stricta	matgrass			ID Control	1		Control	
Nassella Viridula	green needlegrass				2			
Nymphoides pelata	yellow floating heart			ID EDRR			EDRR	
Onopordum acanthium	Scotch thistle		1	ID Contain	1		Contain	
Panicum capillare	witchgrass							
Panicum miliaceum	proso millet							
Peganum harmala	marmal peganum							
Phalaris arundinacea	reed canarygrass				2			
Phragmites australis	common reed			ID Control			Control	
Picris hieracioides	hawkweed oxtongue							
Pilosella aurantiaca (previously *Hieracium aurantiacum*)	orange hawkweed			ID Control, MT 2A	1		Control	2A
Pilosella caespitosa (previously *Hieracium pratense* and *H. caespitosum*)	meadow hawkweed	2cust		ID Control, MT 2A	1		Control	2A
Pilosella officinarum (previously *Hieracium pilosella*)	mouse-ear hawkweed							
Pilosella piloselloides (previously *Hieracium piloselloides*)	king-devil hawkweed			ID EDRR	1		EDRR	
Polygonum bohemicum	bohemian knotweed			ID Control, MT 1B			Control	1B
Polygonum cuspidatum	Japanese knotweed			ID Control, MT 1B	1		Control	1B
Polygonum polystachyum	cultivated knotweed			MT 1B				1B
Polygonum sachalinense	giant knotweed			ID Control, MT 1B			Control	1B
Potamogeton crispus	curlyleaf pondweed			ID Contain, MT 2B			Contain	2B
Potentilla recta	sulphur cinquefoil		3, 5	MT 2B	5			2B
Proboscidea louisianica	ram's horn							
Pueraria montana	kudzu							
Ranunculus acris	tall buttercup		1	MT 2A				2A
Rhamnus cathartica	common buckthorn							
Rhaponticum repens (previously *Acroptilon repens*)	Russian knapweed	1		ID Control, MT 2B	1		Control	2B
Rorippa austriaca	Austrian yellowcress							
Rorippa sylvestris	creeping yellowcress							
*Rosa rubiginosa** (previously *Rosa eglanteria*)	sweetbriar rose				2			
Rubus armeniacus	Himalayan blackberry							
Salsola tragus (previously *Salsola kali*)	Russian thistle							
Salvia aethiopis	Mediterranean sage			ID Control			Control	
Salvinia molesta	giant salvinia			ID EDRR			EDRR	
Secale cereale	cereal rye							
Silene latifolia	bladder campion							

Taxonomic Name	Common Name	UCWMA	FCWMA	Selway-Bitterroot Wilderness Weeds EIS	Nez Perce Biocontrol Center	Back Country Horsemen	Idaho Noxious Weed List	Montana Noxious Weed List
Silybum marianum	blessed milkthistle							
Sisymbrium altissimum	tall tumblemustard							
Solanum dulcamara	climbing nightshade							
Solanum elaeagnifolium	silverleaf nightshade							
Solanum robustum	shrubby nightshade							
Solanum rostratum	buffalobur nightshade	1		ID Control	1		Control	
Solanum sisymbriifolium	sticky nightshade						Temporaril	
Sonchus arvensis	field sowthistle			ID Control			Control	
Sorghum halepense	Johnsongrass			ID Control	1		Control	
Sphaerophysa salsula	alkali swainsonpea							
Taeniatherum caput-medusae	medusahead							
Tamarix africana	African tamarisk							
Tamarix spp	saltcedar		1	ID Contain, MT 2B	1		Contain	2B
Tanacetum vulgare	common tansy		1, 2, 3	MT 2B	2			2B
Tonilis arvensis	spreading hedgeparsley							
Trapa natans	water chestnut			ID EDRR			EDRR	
Tribulus terrestris	puncturevine		1	ID Contain	2		Contain	
Trifolium pratense	red clover							
Tripleurospermum inodorum (previously *T. perforatum*)	scentless chamomile							
Tussilago farfara	coltsfoot							
Ulex europaeus	common gorse							
Ventenata dubia	ventenata							
Verbascum thapsus	common mullein		3					
Xanthium spinosum	spiny cocklebur							
Zygophyllum fabago	Syrian beancaper			ID EDRR			EDRR	

UCWMA cust: Eradicated populations now assigned to Custodial (once annually) monitoring schedule to ensure eradication is maintained
UCWMA, FCWMA & NPBC Priority 1: Populations of new invaders assigned to an eradication objective
UCWMA, FCWMA & NPBC Priority 2: Satellite populations of established weeds assigned to an eradication objective
UCWMA, FCWMA & NPBC Priority 3: Populations of established species are treated along transportation corridors, areas of concentrated activities, or susceptible habitat
UCWMA, FCWMA & NPBC Priority 5: Large infestations are treated to the extent that densities and/or rates of spread are reduced to an acceptable level
ID EDRR: Early Detection / Rapid Response focuses on an eradication objective
ID Contain: Focuses on preventing the spread of the target species
ID Control: Focuses on reducing the size and density of the target species
MT Priority 1A: These weeds are not present or have a very limited presence in Montana. Management criteria will require eradication if detected, education, and prevention.
MT Priority 1B: These weeds have limited presence in Montana. Management criteria will require eradication or containment and education.
MT Priority 2A: These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
MT Priority 2B: These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. Management shall be prioritized by local weed districts.
MT Priority 3: Regulated Plants (Not Montana Listed Noxious Weeds) These regulated plants have the potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education and prevention to minimize the spread of the regulated plant.
* *Rosa rubiginosa* is sometimes erroneously referred to as *Rosa* canina in the project area

3.3.1.2 Weed Species in the CFLRP Project Area

Weed management data available for the Selway-Middle Fork CFLRP project area was compiled to create a list of all weed species ever encountered and/or treated within the project boundary (48 species total). This included data from: FACTS inventory, FACTS treatment, FIA, Miscellaneous Ecodata, NPT inventory crew point notes, NPBC biocontrol releases, and BCHI inventory reports. All weeds recorded in the CFLRP project area are listed in Table 2. Many species (e.g. spotted knapweed and sulphur cinquefoil) have been established in the region for several decades, though formal weed management efforts were initiated much more recently. Table 2 includes the first year each species was recorded in the project area from the weed data sources mentioned above.

Table 2: 48 weed species historically or currently present in the Selway-Middle Fork CFLRP project area. "Year first documented" indicates the first year the species appeared on official weed management records.

Taxonomic Name	Common Name	Year First Documented	FACTS Treatment	NPBC Release	FACTS Inventory	NPBC Inventory	FIA Inventory	Ecodata Inventory
Ailanthus altissima	tree of heaven	2012				2012		
Arctium minus	lesser burdock	2006	2006		2006			
Barbarea vulgaris	garden yellowrocket	2007	2007		2007			
Berteroa incana	hoary alyssum	2004	2006		2004			
Brassica	mustard	2009	2009		2009			
Bromus tectorum	cheatgrass	1982	2006		2006	2011	2010	1982
Cardaria draba	whitetop	2008	2008		2008			
Carduus acanthoides	spiny plumeless thistle	2007	2009		2007			
Carduus pycnocephalus	Italian plumeless thistle	2006	2009		2006			
Centaurea solstitialis	yellow starthistle	2000	2000	2007	2000	2013	2012	
Centaurea stoebe	spotted knapweed	1980	1980	1983	1980	2011	2004	1987
Chondrilla juncea	rush skeletonweed	2008	2008		2008	2013		
Cirsium arvense	Canada thistle	1982	1999		1999	2011	2007	1982
Cirsium vulgare	bull thistle	1989	2006		2006	2013		1989
Conium maculatum	poison hemlock	2008	2008		2008			
Convolvulus arvensis	field bindweed	2008		2008	2008			
Crupina vulgaris	common crupina	2006			2006	2013		
Cynoglossum officinale	houndstongue	1982	2010		2010	2013		1982
Cytisus scoparius	Scotch broom	1996	2003		1996			
Daucus carota	Queen Anne's lace	2010	2010		2010			
Equisetum arvense	field horsetail	2011					2011	

Taxonomic Name	Common Name	Year First Documented	FACTS Treatment	NPBC Release	FACTS Inventory	NPBC Inventory	FIA Inventory	Ecodata Inventory
Euphorbia esula	leafy spurge	2000	2000		2000			
Galium aparine	bedstraw	2013				2013		
Hypericum perforatum	St. Johnswort	1982	2005		2003	2011	2011	1982
Lactuca serriola	prickly lettuce	1989						1989
Lathyrus latifolius	perennial pea	2003	2003		2003	2013		
Lepidium latifolium	broadleaved pepperweed	2011	2011		2011			
Leucanthemum vulgare	oxeye daisy	1980	1980		1980	2011		1989
Linaria dalmatica	Dalmatian toadflax	2004	2006		2004			
Linaria vulgaris	butter and eggs	2000	2005		2000			
Lythrum salicaria	purple loosestrife	2008	2008		2008			
Onopordum acanthium	Scotch thistle	2005	2008		2008		2005	
Pilosella	hawkweed	2011				2011		
Pilosella aurantiaca	orange hawkweed	1999	1999		1999			
Pilosella caespitosa	meadow hawkweed	1999	2005		1999		2005	
Polygonum cuspidatum	Japanese knotweed	2002	2002		2002			
Potentilla recta	sulphur cinquefoil	1980	1980		1980	2011		
Ranunculus acris	tall buttercup	2002	2002		2002	2011		
Rosa rubiginosa	sweetbriar rose	2009	2009		2009	2013		
Rubus armeniacus	Himalayan blackberry	2013				2013		
Sisymbrium altissimum	tall tumblemustard	1989				2013		1989
Taeniatherum caput-medusae	medusahead	2013				2013		
Tanacetum vulgare	common tansy	2006	2006		2006	2012		
Taraxacum officinale	dandelion	1982						1982
Tragopogon dubius	yellow salsify	1982						1982
Trifolium pratense	red clover	1988						1988
Ventenata dubia	ventenata	2011				2011		
Verbascum thapsus	common mullein	2006	2006		2006			

FACTS Inventory Data

Inventory data from FACTS is available from 1980 to present. Inventory efforts in the CFLRP project area can be tallied and illustrated over time, but doing so requires several caveats:

Inventoried infestations represent mapping efforts only, they do not represent total infested acres: For example, 16.7 acres containing three weeds were mapped in 1980. This *does not* imply only 16.7 acres of only three invasive species were present in the project area in 1980; it indicates that only 16.7 acres of existing infestations were actually mapped.

Inventoried infestations cannot be used to track efficacy of weed treatment efforts over time: Inventory efforts have increased substantially since 1980. Depicting inventory efforts in sequential years (Figures 14, 15) illustrates that the majority of these efforts target new areas rather than revisiting and documenting change in previously mapped infestations. Monitoring efforts *are* regularly conducted in the project area (see section 3.3.4), but this typically results in changes to the percent cover of the weed rather than the boundaries of the mapped infestation. Of the 1349 individual infestations documented in the CFLRP project area in FACTS, the boundaries of only 43 were altered following subsequent monitoring visits. Most of these 43 increased over time, not necessarily due to spreading weeds, but rather due to inventory efforts being applied to a larger area.

Inventoried infestations inflate the total acreage for some infestations: FACTS inventory records are broken down by species in Table 3 and presented according to acreage inventoried per year. All revisits and re-draws of infestation boundaries are included in "Total Acres" for the 43 sites re-inventoried from 1980-2013, inflating summed acreage. Only the most recent boundary is included in "Current Acres." Current Acres represents the total acreage believed to be infested with each species in 2013. Infestations containing multiple weeds are duplicated for each weed species; consequently summed infested acreage is inflated to some extent.

All weed infestations with spatial information are included in Figure 16 to illustrate the location, size and species of infestations known to be present in the CFLRP project area in 2013. Included are the point notes of the NPBC inventory crew, which document infestations not submitted to FACTS (due to being a low priority or infestations of mixed species). Point notes do not include acreage, so these infestations are not included in the acreage summaries in Table 3. Also included in NPBC point notes are areas inventoried and determined to be free of weeds. As indicated in Figure 16, many large infestations in FACTS are over-estimates of true infested acreage, as subsequent inventorying by NPBC crews found many portions of supposed large-scale infestations to be free of weeds.

Inventoried infestations only document weed patches found, not all areas surveyed: As discussed throughout section 3.2 (Weed Management Activities: Past and Present), areas in the CFLRP project area that are traversed by the majority of stakeholders and found to be free of weeds are not entered into FACTS as the database was not designed to incorporate this information. As such, FACTS inventory data only indicates the presence of infestations encountered. Areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date. The NPBC inventory crew is the one stakeholder which documents all locations covered during inventory efforts (see Figure 16).

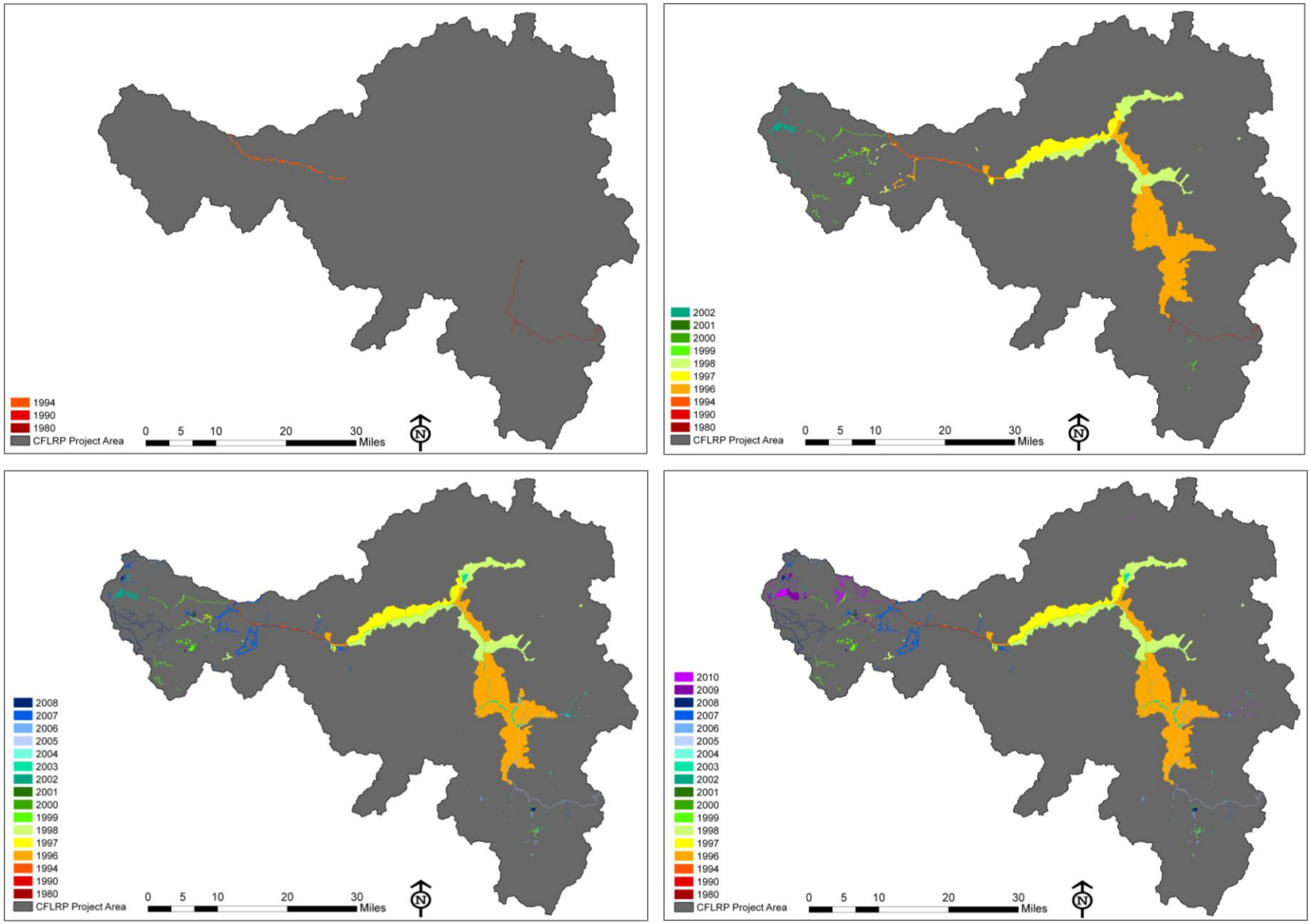
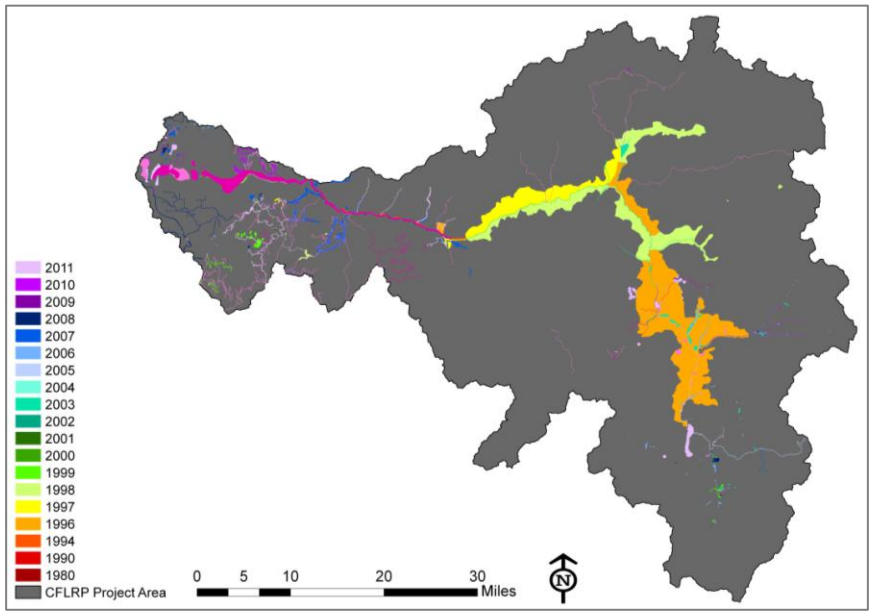
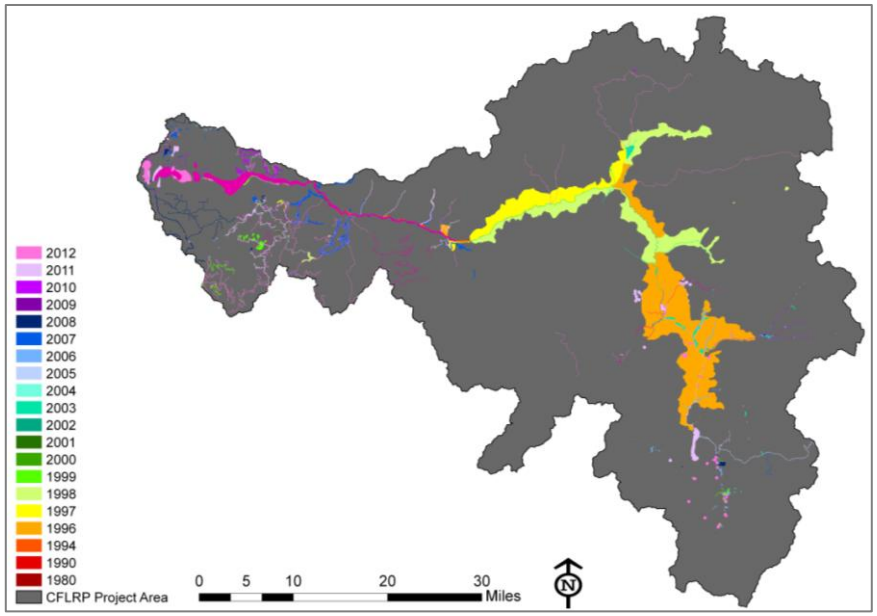


Figure 14: Weed infestations inventoried in Selway-Middle Fork CFLRP project area, presented by year. Multiple years are included in a single map until infestations overlap. Maps do not indicate weed increase over time; rather they indicate increases in weed inventory efforts. Data from FACTS inventory.





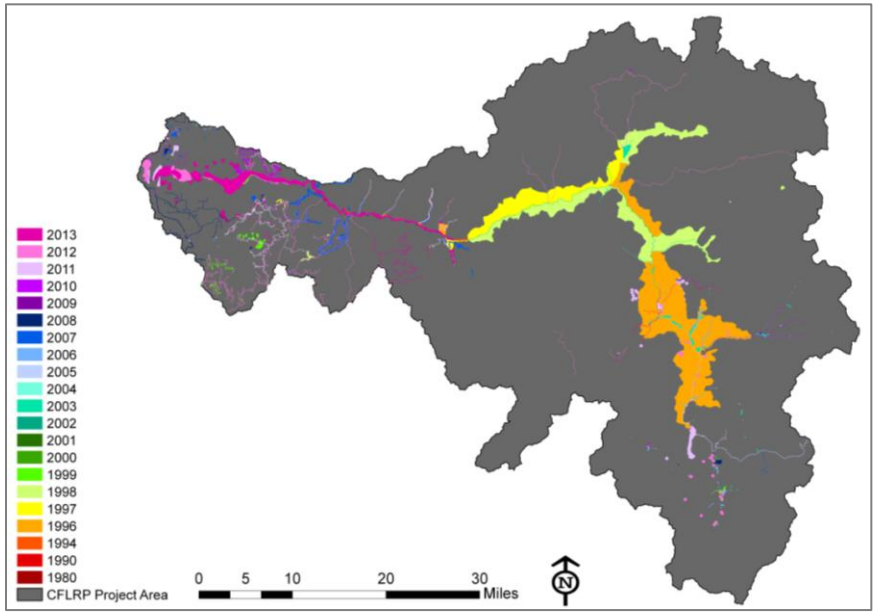


Figure 15: Weed infestations inventoried in Selway-Middle Fork CFLRP project area, presented by year. Multiple years are included in a single map until infestations overlap. Maps do not indicate weed increase over time; rather they indicate increases in weed inventory efforts. Data from FACTS inventory (polygons) and NPBC inventory crew point notes (circles).

Table 3: 36 weed species inventoried in the Selway-Middle Fork CFLRP project area and submitted to FACTS, presented by acres added per year (1980-2013). Acreage represents only those infestations inventoried to date, not the total weed acreage likely present in the project area each year. Infestations containing multiple weeds are duplicated for each weed species. Weed common names can be found in Appendix 1.

Weed Species	1980	1990	1994	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Arctium minus													
Barbarea vulgaris													
Berteroa incana												0.13	
Brassica													
Bromus tectorum													
Cardaria draba													
Carduus acanthoides													
Carduus pycnocephalus													
Centaurea solstitialis								11.31	2.74	1511.57			
Centaurea stoebe	16.75	315.94	1048.42	36036.26	12522.24	20412.05	381.04	274.74	39.83	87.25	188.52	5.63	83.87
Chondrilla juncea													
Cirsium arvense							498.63					0.31	
Cirsium vulgare													
Conium maculatum													
Convolvulus arvensis													
Crupina vulgaris													
Cynoglossum officinale													
Cytisus scoparius				3.36							0.39		
Daucus carota													
Euphorbia esula								0.04					
Hypericum perforatum											971.01		322.71
Lathyrus latifolius											10.59		
Lepidium latifolium													
Leucanthemum vulgare	16.75						1.61			30.14	27.49	2.37	424.52
Linaria dalmatica												0.27	
Linaria vulgaris								0.05					2.65
Lythrum salicaria													
Onopordum acanthium													
Pilosella aurantiaca							38.90			13.35	0.06	0.06	6.45
Pilosella caespitosa							25.96						9.08
Polygonum cuspidatum										77.14	0.55		
Potentilla recta	16.75										1493.78		
Ranunculus acris										13.08	27.05	1.71	
Rosa rubiginosa													
Tanacetum vulgare													
Verbascum thapsus													
TOTAL	50.24	315.94	1048.42	36039.62	12522.24	20412.05	946.14	286.14	42.57	1732.53	2719.43	10.47	849.28

Table 3 (cont.): 36 weed species inventoried in the Selway-Middle Fork CFLRP project area and submitted to FACTS, presented by acres added per year (1980-2013). Acreage represents only those infestations inventoried to date, not the total weed acreage likely present in the project area each year. All revisits and re-draws of infestation boundaries are included in "Total Acres" for the 43 sites re-inventoried from 1980-2013, inflating summed acreage. Only the most recent boundary is included in "Current Acres." Current Acres represents the total acreage believed to be infested with each species in 2013. Infestations containing multiple weeds are duplicated for each weed species; consequently summed infested acreage is inflated to some extent. Weed common names can be found in Appendix 1.

Weed Species	2006	2007	2008	2009	2010	2011	2012	2013	Total Acres	Current Acres
Arctium minus	1.57								1.57	1.57
Barbarea vulgaris		99.88	100.20	0.91		38.91			239.89	131.57
Berteroa incana	2.42		17.62						20.17	20.04
Brassica				2.42					2.42	2.42
Bromus tectorum	157.68						1.65		159.33	159.33
Cardaria draba			86.97	1.67					88.64	88.64
Carduus acanthoides		0.29		1.11			2.85		4.25	3.96
Carduus pycnocephalus	0.04			35.30		13.46	4.09	22.46	75.35	62.38
Centaurea solstitialis	17.81	127.11	12.96	1355.61	939.83	2118.92	2257.97	107.11	8462.95	4110.55
Centaurea stoebe	317.94	3820.91	1074.68	280.27	1005.81	2740.39	1702.38	8758.89	91113.80	90186.45
Chondrilla juncea			3.25	0.22		0.04	12.00	62.42	77.94	77.94
Cirsium arvense	11.05	41.54	191.34		1.95	35.42	153.90	1.23	935.38	935.38
Cirsium vulgare	40.31							1.71	42.02	42.02
Conium maculatum			16.75						16.75	16.75
Convolvulus arvensis			46.59						46.59	46.59
Crupina vulgaris	9.45	0.30						1244.31	1254.06	1254.06
Cynoglossum officinale					268.34	0.70	0.00		269.04	268.94
Cytisus scoparius					1.25		6.91		11.92	7.30
Daucus carota					22.00				22.00	22.00
Euphorbia esula									0.04	0.04
Hypericum perforatum	34.42		13.09		64.65	3.01	45.21		1454.10	1454.10
Lathyrus latifolius				1.98		7.98	17.54	1800.38	1838.47	1838.47
Lepidium latifolium						0.56			0.56	0.56
Leucanthemum vulgare	34.27	0.27	250.60		18.22	265.90	149.61	22.11	1243.85	1243.85
Linaria dalmatica	0.78	0.36		0.19		11.83	0.05		13.48	13.48
Linaria vulgaris		23.14	7.35	1.88	156.21		0.06	0.10	191.42	190.80
Lythrum salicaria			0.00						0.002	0.002
Onopordum acanthium			3.71						3.71	3.71
Pilosella aurantiaca	9.28	61.61	0.80	2.12	0.02		20.84		153.49	152.15
Pilosella caespitosa	16.48	6.95	0.25		16.39		12.49	37.07	124.67	124.67
Polygonum cuspidatum			0.11	1.46	2.03	0.50	2.29		84.09	82.56
Potentilla recta	242.54		3.29		85.57	0.27	74.31		1916.50	1916.42
Ranunculus acris	13.46				1.01	1.18	0.21		57.69	57.69
Rosa rubiginosa				56.54	69.66			404.35	530.55	460.89
Tanacetum vulgare	0.01		1.31	4.28	5.07		239.02	32.19	281.88	281.88
Verbascum thapsus	1.00		445.72				2.62		449.34	449.34
TOTAL	910.50	4182.36	2276.58	1745.96	2658.01	5239.07	4706.01	12494.33	111187.89	105708.50

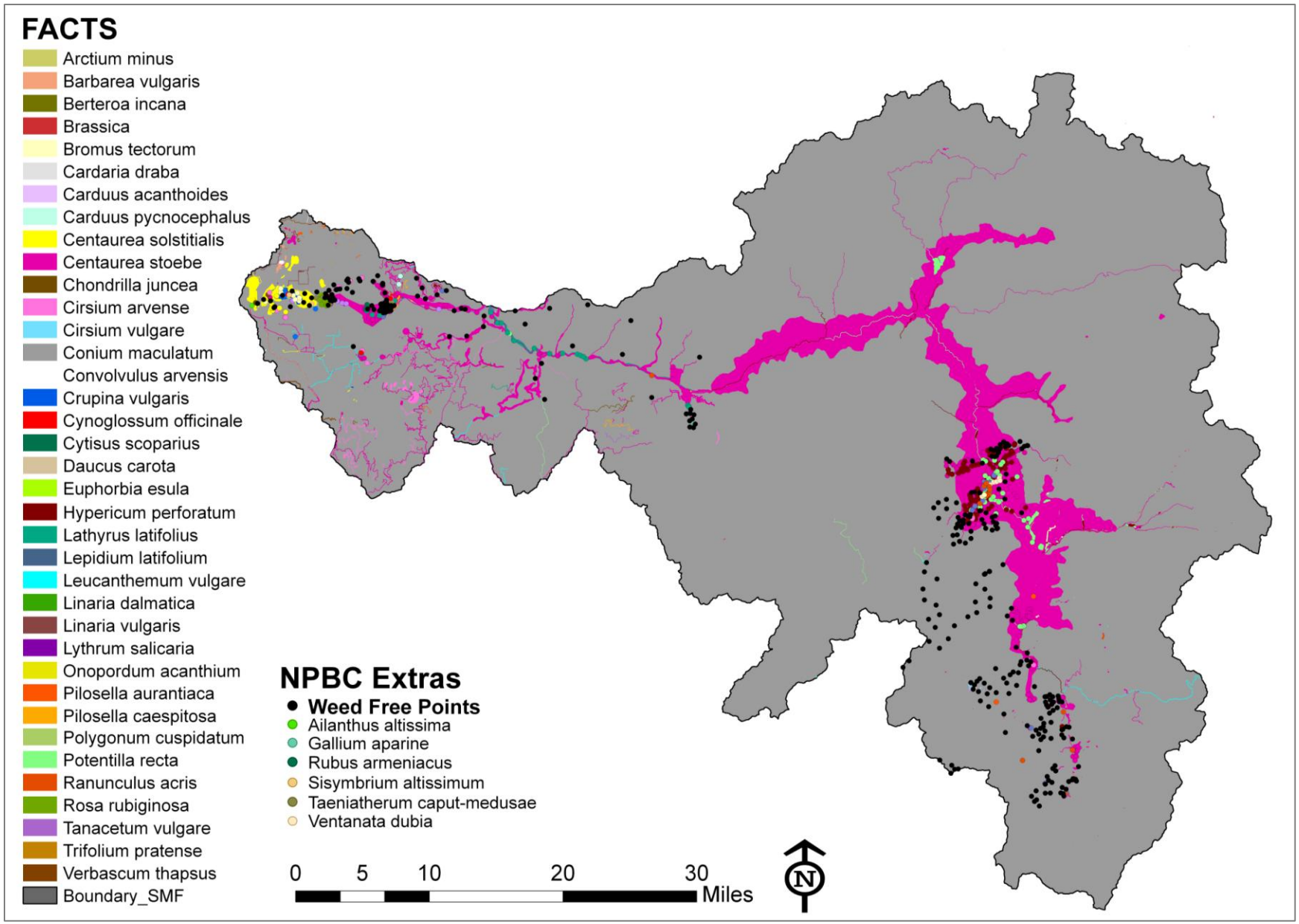


Figure 16: Weed infestations currently documented in Selway-Middle Fork CFLRP project area, presented by species. Data from FACTS inventory (polygons) and NPBC inventory crew point notes (circles). Weed free points (black circles) indicate areas inventoried by NPBC inventory crews and found to be free of weeds. Note some weed-free areas were found in areas documented as weed-infested in FACTS, indicating some mapped infestations are inaccurate. Weed common names can be found in Appendix 1.

As discussed in section 3.1.1 (Cooperative Weed Management Areas), CWMAs play a critical role in directing weed management efforts in the Selway-Middle Fork CFLRP project area. As part of the strategic and annual operating plans for both the UCWMA and FCWMA, priorities are assigned to all known infestations in order to provide direction for control tactics and coordinate management efforts among the CWMA cooperators. Priorities are ranked 1-5, with 1 being assigned the highest priority. Infestations occurring in the CFLRP project area are currently assigned only to priorities 1, 2, 3, and 5.

Priority 1: Populations of new invaders assigned to an eradication objective
Priority 2: Satellite populations of established weeds assigned to an eradication objective
Priority 3: Populations of established species treated along transportation corridors, areas of concentrated activities, or susceptible habitat
Priority 5: Large infestations treated to the extent that densities and/or rates of spread are reduced to an acceptable level

Table 4 lists all species in the CFLRP project area recorded in FACTS, along with their corresponding priority. Note that some species are assigned to multiple priorities depending on the location of the infestation. For example, yellow starthistle (*Centaurea solstitialis*) is considered a new invader in the Selway-Bitterroot Wilderness, but the species is well established and a lower priority in non-forestland in western portions of the project area.

Figures 17 and 18 compare the acres and number of infestations inventoried, respectively, by year and priority. Figure 19 illustrates the location of all infestations submitted to FACTS for the project area, separated by species and priority. Figure 20 combines the information in Figures 17 and 20 such that inventoried acres are displayed by species, year, and priority.

Table 4: 36 weed species inventoried in the Selway-Middle Fork CFLRP project area along with their assigned priority, as recorded in CWMA strategic/annual operating plans and FACTS.

Weed Species		Management Priority				
Taxonomic Name	Common Name	1	2	3	4	5
Arctium minus	lesser burdock			x		x
Barbarea vulgaris	garden yellowrocket	x				
Berteroa incana	hoary alyssum	x				
Brassica	mustard	x				
Bromus tectorum	cheatgrass					x
Cardaria draba	whitetop		x			
Carduus acanthoides	spiny plumeless thistle		x			
Carduus	Italian plumeless thistle		x			x
Centaurea solstitialis	yellow starthistle	x	x	x		x
Centaurea stoebe	spotted knapweed					x
Chondrilla juncea	rush skeletonweed					x
Cirsium arvense	Canada thistle			x		x
Cirsium vulgare	bull thistle			x		x
Conium maculatum	poison hemlock	x				
Convolvulus arvensis	field bindweed					x
Crupina vulgaris	common crupina					x
Cynoglossum officinale	houndstongue			x		x
Cytisus scoparius	Scotch broom	x				
Daucus carota	Queen Anne's lace					x
Euphorbia esula	leafy spurge	x				
Hypericum perforatum	St. Johnswort			x		x
Lathyrus latifolius	perennial pea		x			
Lepidium latifolium	broadleaved pepperweed	x				
Leucanthemum vulgare	oxeye daisy			x		x
Linaria dalmatica	Dalmatian toadflax					x
Linaria vulgaris	butter and eggs	x				
Lythrum salicaria	purple loosestrife	x				
Onopordum acanthium	Scotch thistle					x
Pilosella aurantiaca	orange hawkweed		x			x
Pilosella caespitosa	meadow hawkweed		x			x
Polygonum cuspidatum	Japanese knotweed		x			x
Potentilla recta	sulphur cinquefoil					x
Ranunculus acris	tall buttercup	x				
Rosa rubiginosa	sweetbriar rose					x
Tanacetum vulgare	common tansy	x		x		x
Verbascum thapsus	common mullein			x		x

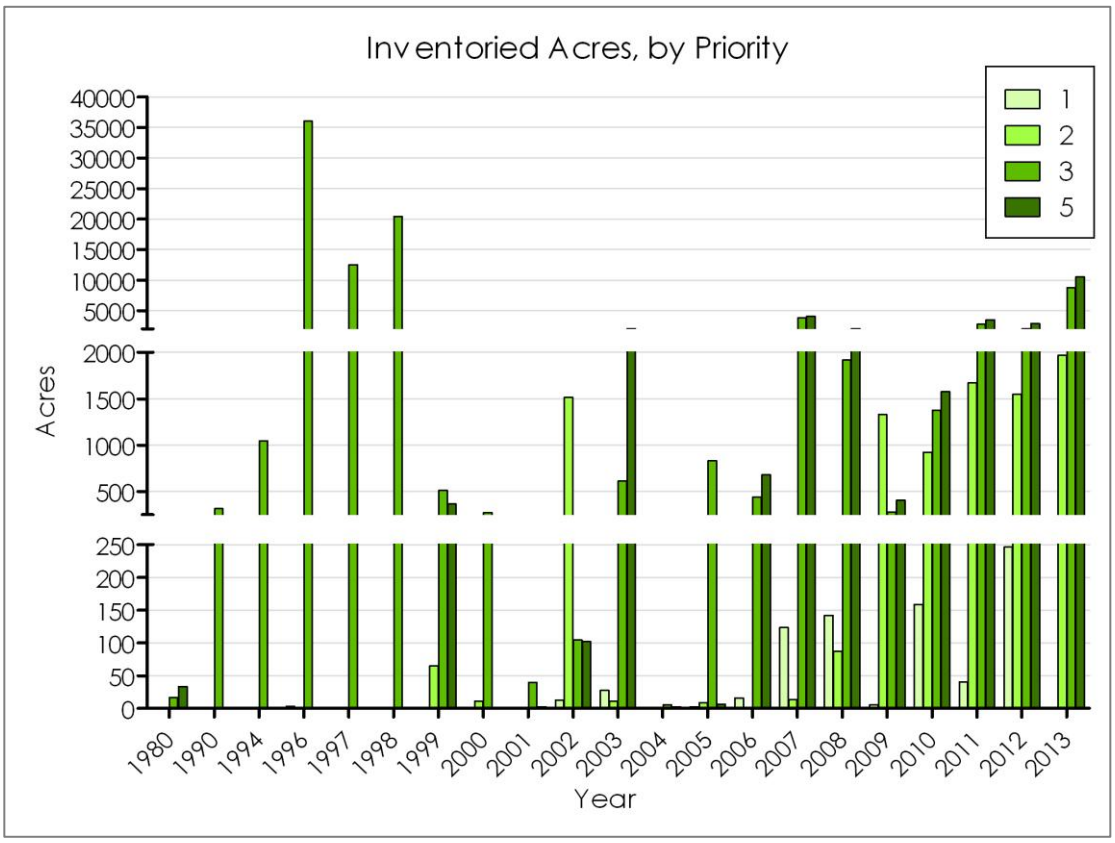


Figure 17: Weed acreage inventoried in Selway-Middle Fork CFLRP project area, presented by year and priority. (Data source FACTS inventory) Acreage represents only those infestations inventoried to date, not the total weed acreage likely present in the project area each year. All revisits and re-draws of infestation boundaries are included for the 43 sites re-inventoried from 1980-2013, inflating summed acreage.

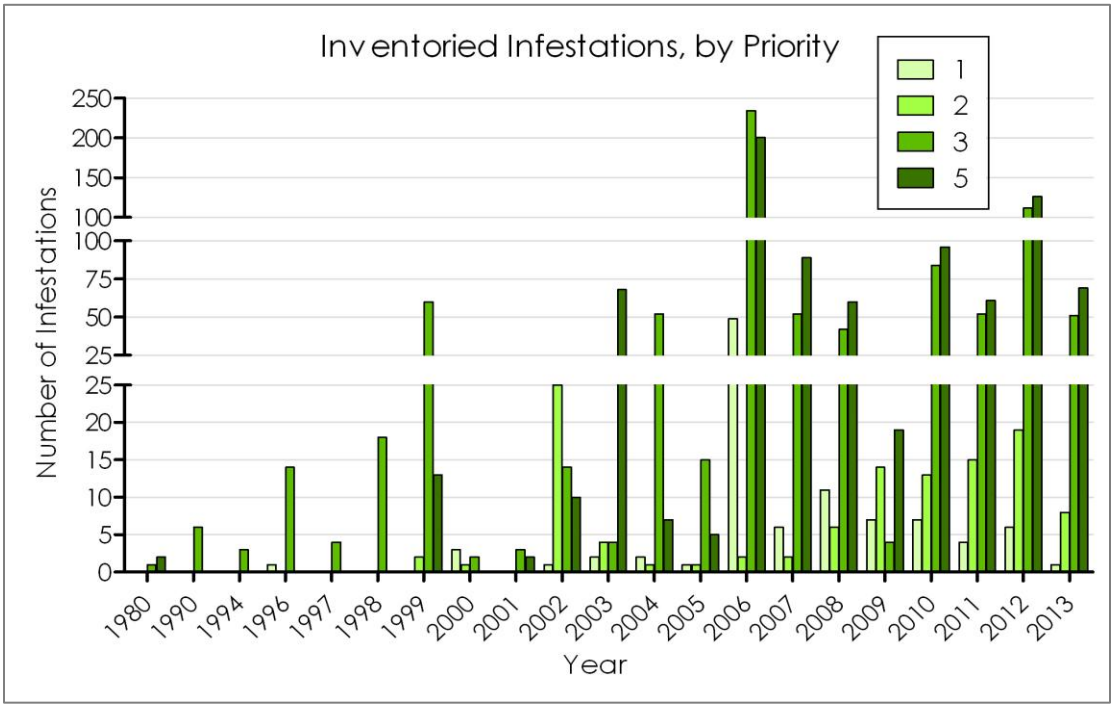
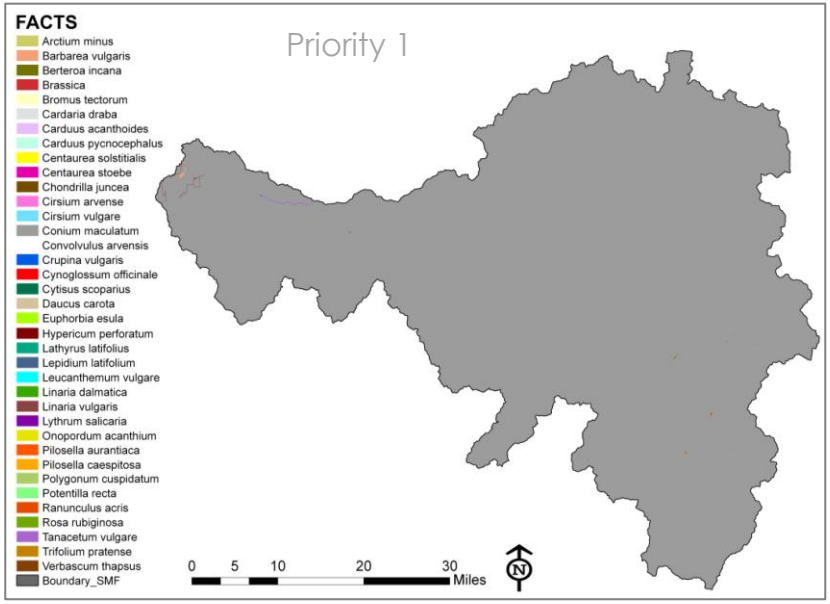
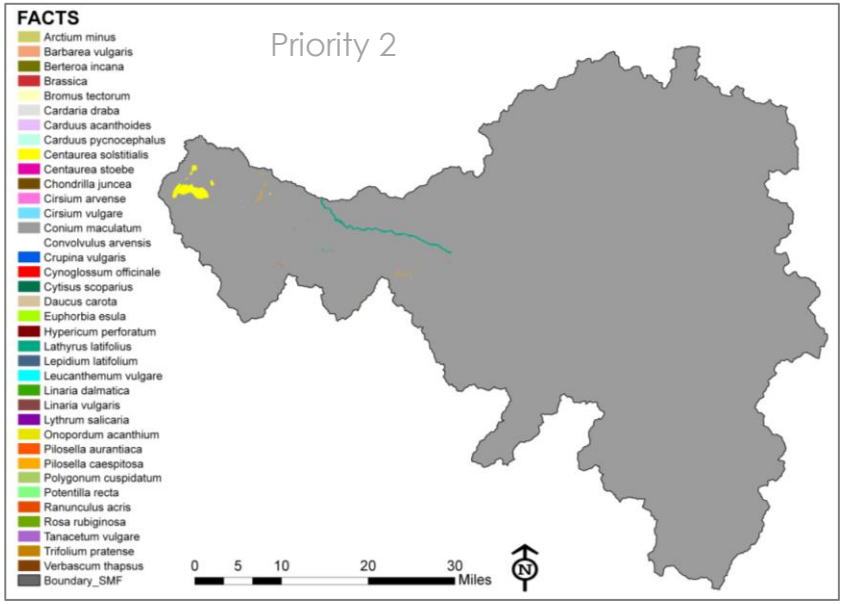
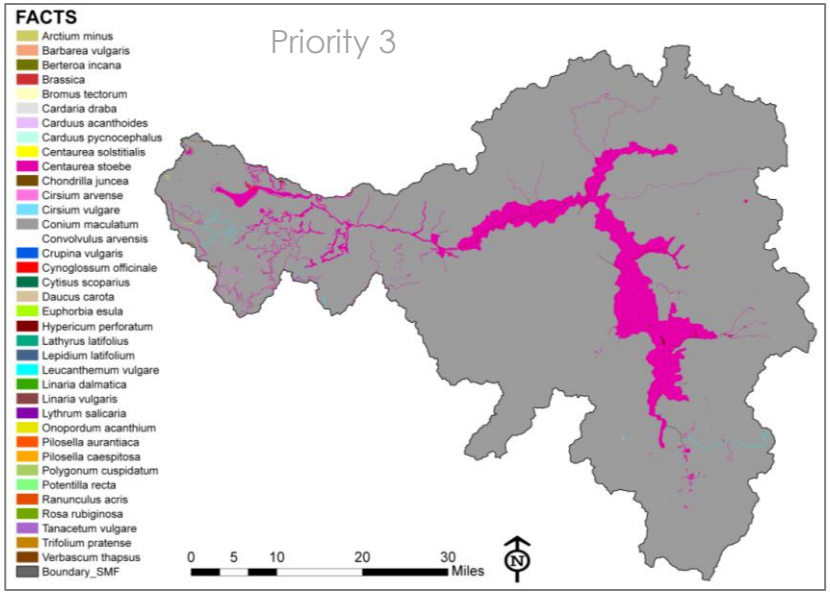


Figure 18: Weed infestations inventoried in Selway-Middle Fork CFLRP project area, presented by year and priority. (Data source FACTS inventory)







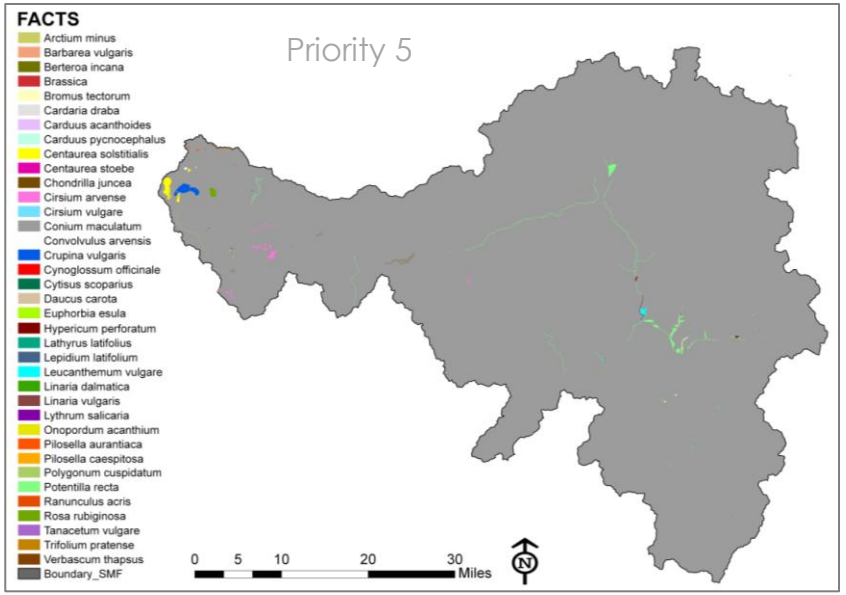
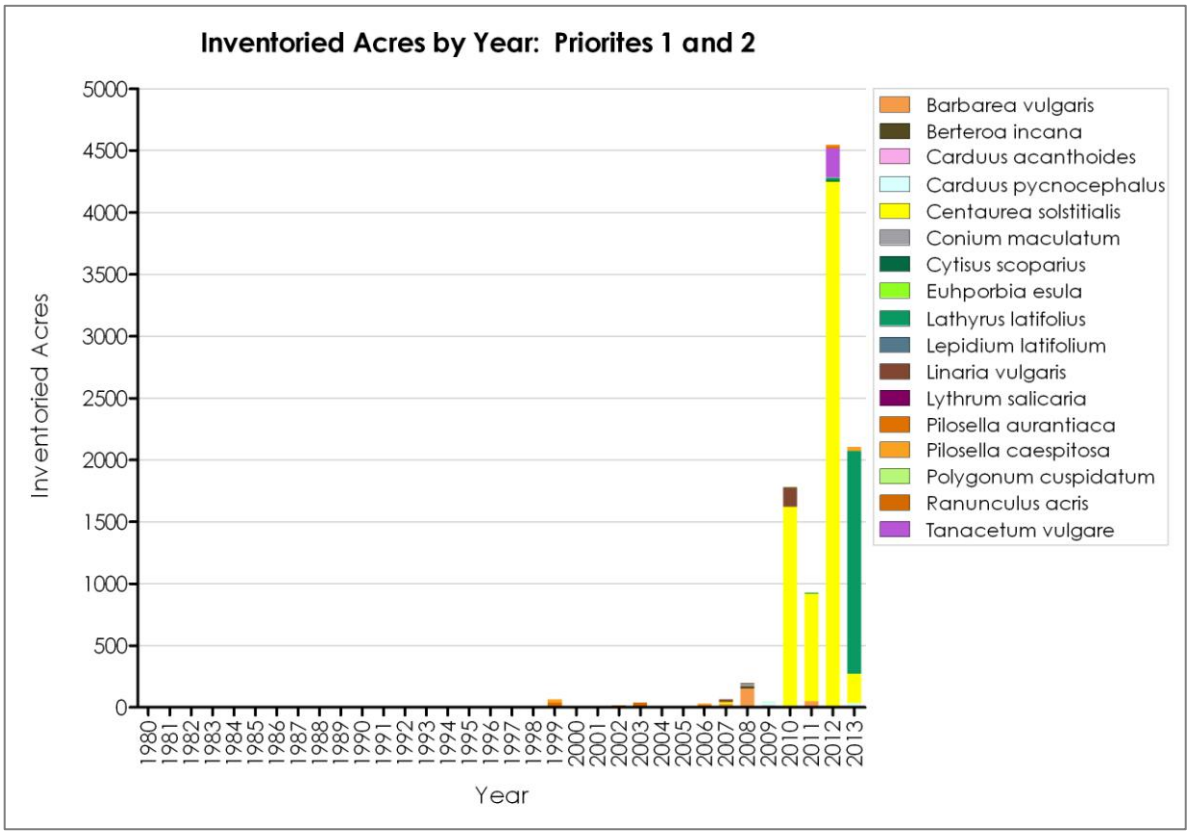


Figure 19: Weed infestations currently documented in Selway-Middle Fork CFLRP project area, presented by species and priority. See Table 4 for comparison list of all species present in project area. (Data source FACTS inventory, weed common names can be found in Appendix 1)



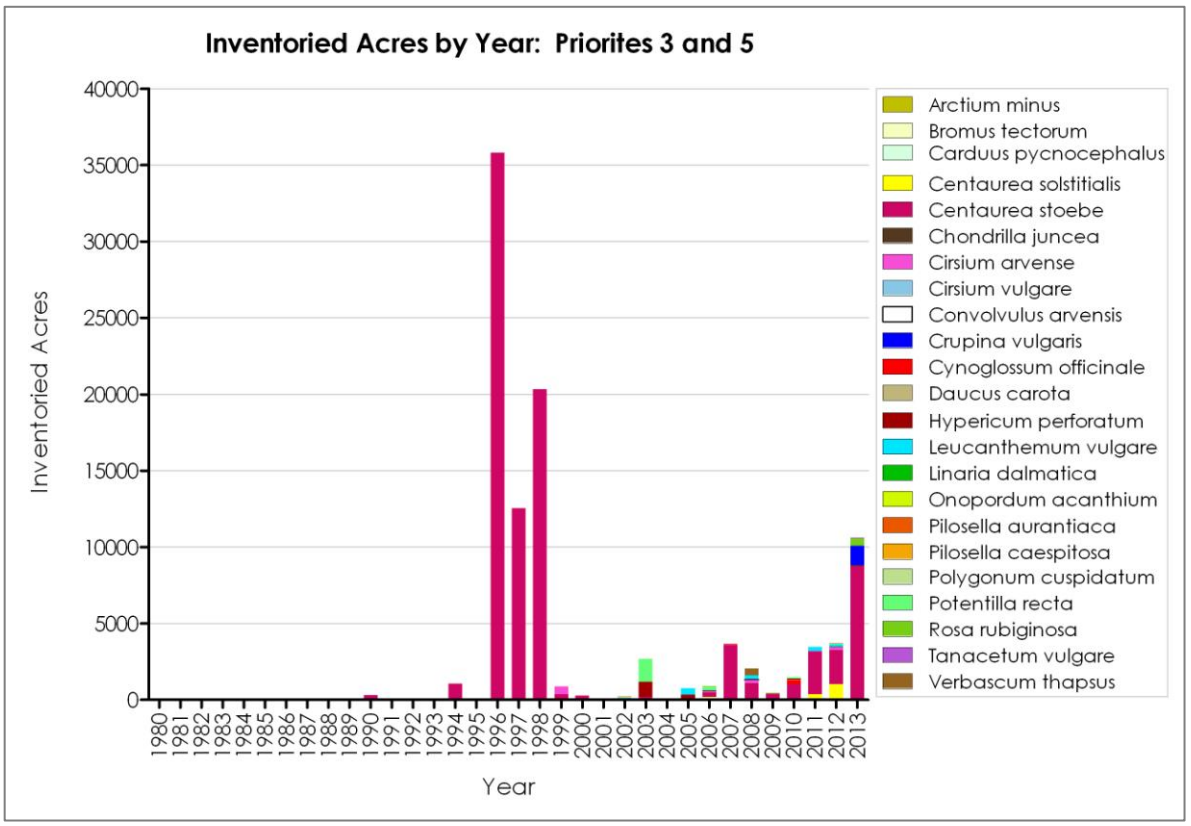


Figure 20: Weed acreage inventoried in Selway-Middle Fork CFLRP project area, presented by year and priority (Priorities 1,2 top; 3,5 bottom). Acreage represents only those infestations inventoried to date, not the total weed acreage likely present in the project area each year. (Data source FACTS inventory, weed common names can be found in Appendix 1)

NPBC Inventory Data

The NPBC inventory crew conducted inventory efforts in the Selway-Middle Fork CFLRP project area from 2011-2013. Most infestations they encountered were entered into the FACTS system and are already included in the inventory data presented above. In addition, some infestations were documented in point notes but not submitted to FACTS (due to being a low priority for the USFS or infestations of mixed species). Point notes indicate spatial locations of infestations but do not include acreage. Also included in NPBC point notes are areas inventoried and determined to be free of weeds. Point notes are presented spatially in Figure 16 along with FACTS infestations, and alone in Figure 21. Point notes are broken down by species and number of infestations over time in Figure 22.

One of the most important goals of the NPBC inventory crew from 2011-2013 was to document infestations of rush skeletonweed (*Chondrilla juncea*). This highly invasive species is well established along the Salmon River south of the CFLRP project area, but is not yet believed to be established along the upper Selway River in the project area. Inventory records from both the NPBC and other members of the UCWMA indicate small infestations exist in western portions of the project area, but the upper Selway has to date not been infested by populations spreading from the Salmon River Drainage (Figure 23).

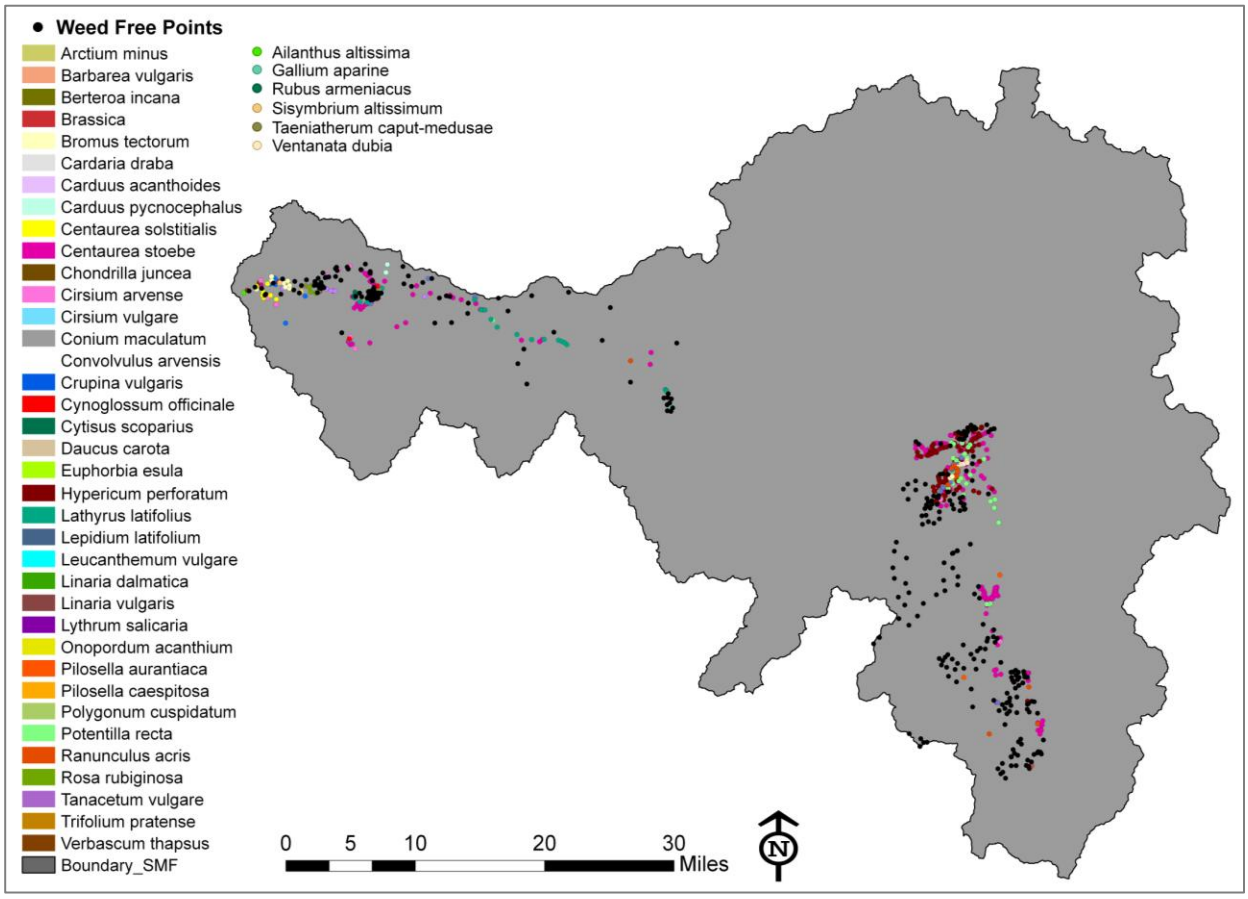


Figure 21: Weed infestations documented in point notes of NPBC inventory crews. Weed free points (black circles) indicate areas inventoried and found to be free of weeds. (Data source NPBC, weed common names can be found in Appendix 1)

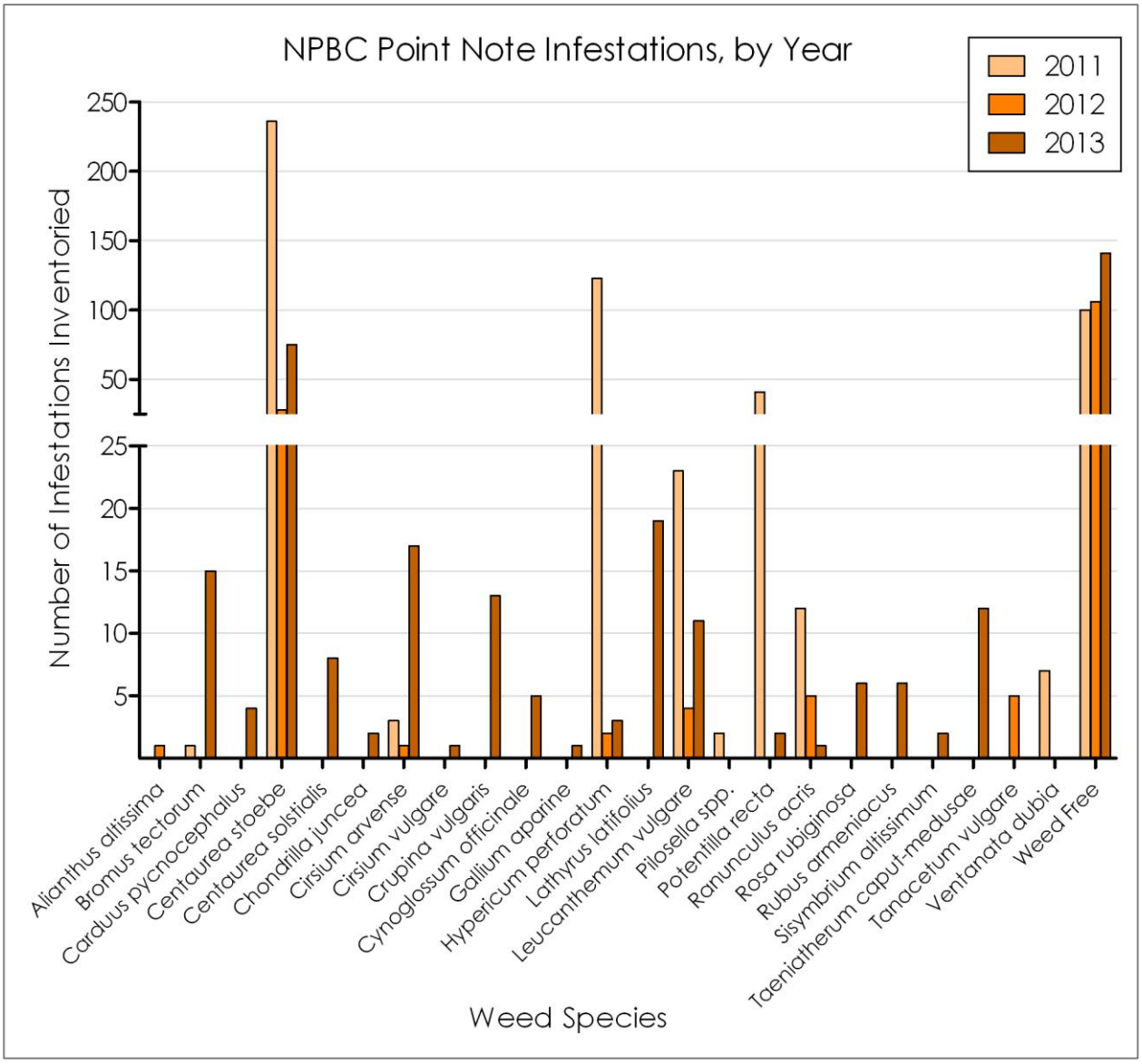


Figure 22: Weed infestations or weed free zones documented in point notes of NPBC inventory crews, presented by year of inventory (2011-2013). (Data source NPBC; weed common names can be found in Appendix 1)

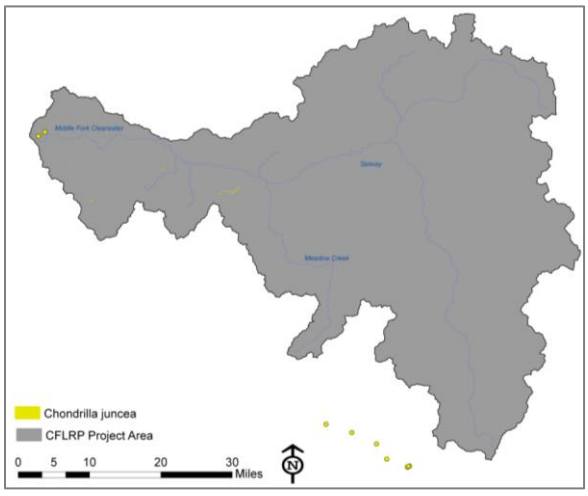


Figure 23: Infestations of rush skeletonweed (*Chondrilla juncea*) established in western portions of the CFLRP project area and south of the project area. Though populations have not yet spread from the Salmon River Drainage into the upper Selway River, this is a major concern for the future and a key factor dictating the location of NPBC inventory efforts to date. (Infestations enlarged to increase visibility; data source NPBC point notes, FACTS)

Other Inventory Data

As discussed in section 2.4.1 (Analyses Methods of Inventory Data), the spatial resolution for the FIA dataset and Miscellaneous Ecodata were too imprecise for spatial use in this assessment. All weed species included in both datasets were added to other inventory records to indicate presence/absence and first appearance of each species (Table 2 above). The tabular information for the FIA data did allow for the measurement of weed frequency in plots measured over time. Between 1990 and 2012, 544 plots were monitored for vegetation cover, though only since 2004 were noxious weeds specifically noted (221 plots since 2004). During that period, plots with noxious weeds present varied from 0-10.5%, with no statistical difference over time (P>0.05). When considering other weedy plants besides state-listed species, weed frequency varied significantly over time (Figure 24). This was primarily due to one low elevation site containing an abnormally high amount of weeds. No plots in the FIA dataset were re-sampled following the original visits, so multi-year comparisons of noxious weed presence or weedy species composition were not possible.

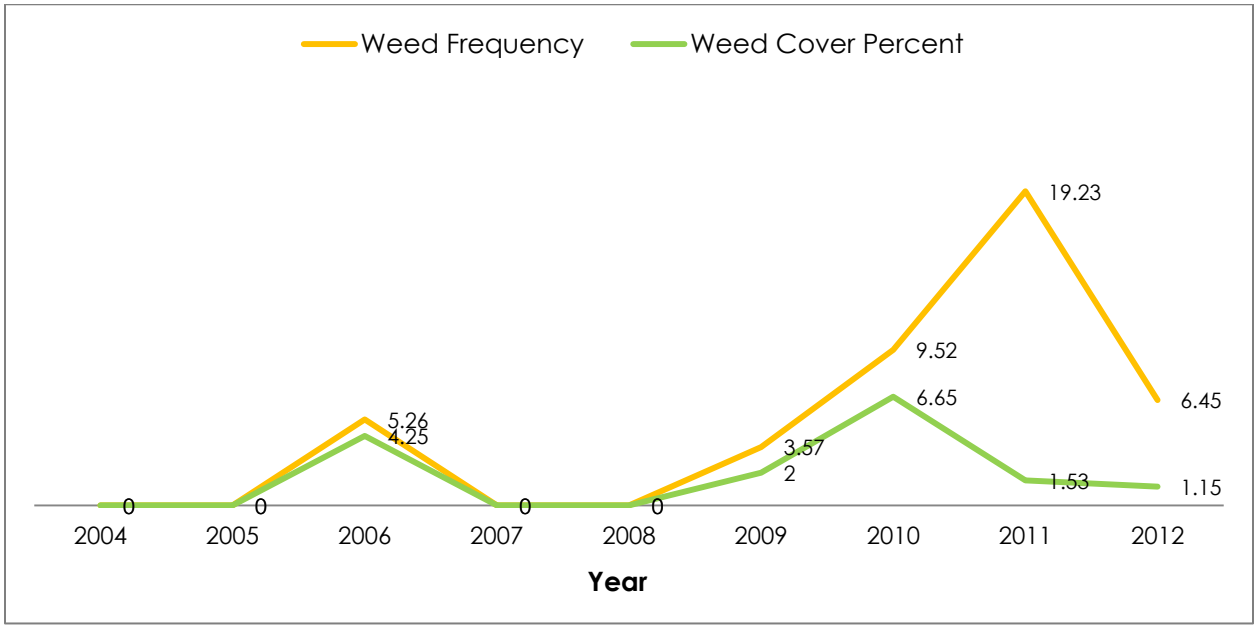


Figure 24: Frequency and percent cover of weeds measured during FIA vegetation monitoring in 221 plots from 2004-2012. (Data source USFS FIA program)

3.3.2 Treatment

The FACTS database has only required spatial components for treatment data since 2012. So while some treatment data for the Selway-Middle Fork CFLRP project area extends back to 1980, this is largely in tabular format, and spatial representation of treatment efforts is limited.

Three forms of treatment have been utilized against invasive plants in the CFLRP project area, and each will be analyzed individually:

1. Biological
2. Chemical
3. Mechanical

3.3.2.1 Biological Control

The FACTS database has changed over time in regards to biocontrol release information. Historically, the agent species, target weed species, number of individuals, and location of release were recorded tabularly. More recently, 5-acre polygons are assigned to each release to indicate an estimated dispersal and impact zone. Site IDs are also now assigned to many releases, though historical releases lack these. Consequently, when biocontrol treatment information is queried for designated areas based on spatial data or Site ID, many early releases are omitted. Because of this, the much more thorough and consistent biocontrol release database maintained by the Nez Perce Biocontrol Center for the state of Idaho was utilized for this assessment.

399 releases of biological control agents have been made in the CFLRP project area since 1983. Over 99,000 individuals spanning 11 insect species and one mite species have been released against three target weeds (Table 5). *Chrysolina* spp. were most likely introduced into the project area in the mid 1900's for use against St. Johnswort (*Hypericum perforatum*), however those release records are missing from the datasets obtained for this assessment. Figure 25 illustrates biocontrol was in limited use in the 1980s and 90s, and increased significantly after 2000. Spotted knapweed (*Centaurea stoebe*) is by far the most targeted weed, with 391 of the releases having been made against this species (Figures 25, 26). Biocontrol releases are presented spatially by release year and target weed in Figures 27 and 28, respectively. Comparing Figures 16 and 28 illustrates the majority of spotted knapweed infestations in the CFLRP project area have been targeted by biocontrol.

Table 5: 12 biocontrol agent species released in the Selway-Middle Fork CFLRP project area since 1983, presented with year first released, number of individuals released, and establishment status. (Data source NPBC, USFS)

Agent	Host Taxonomic	Host Common	First Released	Total Released
Aceria malherbae	*Convolvulus arvensis*	Field bindweed	2008	3000
Agapeta zoegana	*Centaurea stoebe*	Spotted knapweed	1994	1738
Bangasternus fausti	*Centaurea stoebe*	Spotted knapweed	2001	18500
Cyphocleonus achates	*Centaurea stoebe*	Spotted knapweed	1994	31095
Eustenopus villosus	*Centaurea solstitialis*	Yellow starthistle	2007	2575
Larinus curtus	*Centaurea solstitialis*	Yellow starthistle	2007	1375
Larinus minutus	*Centaurea stoebe*	Spotted knapweed	1996	32510
Larinus obtusus	*Centaurea stoebe*	Spotted knapweed	2002	3950
Metzneria puacipunctella	*Centaurea stoebe*	Spotted knapweed	1998	2850
Tyta luctuosa	*Convolvulus arvensis*	Field bindweed	2011	Unknown
Urophora affinis	*Centaurea stoebe*	Spotted knapweed	1983	1600
Urophora quadrifasciata	*Centaurea stoebe*	Spotted knapweed	1983	300

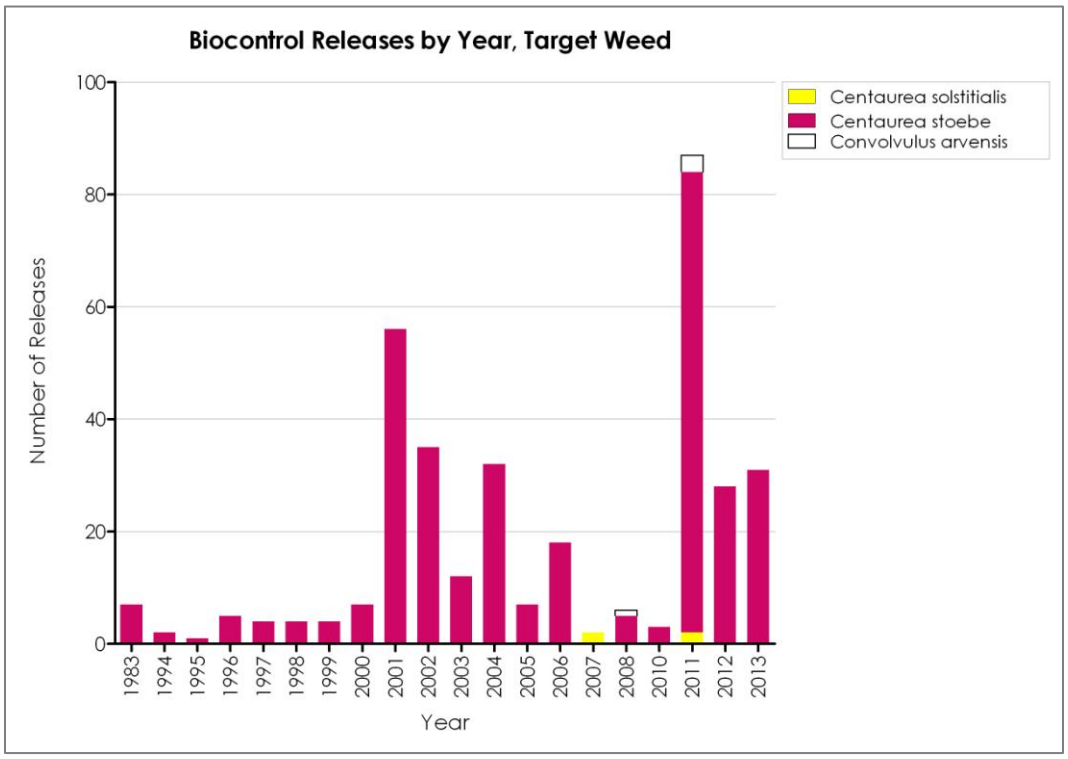


Figure 25: Number of biocontrol releases made in the Selway-Middle Fork CFLRP project area since 1983, presented by target weed. (Data source NPBC, USFS; weed common names can be found in Appendix 1)

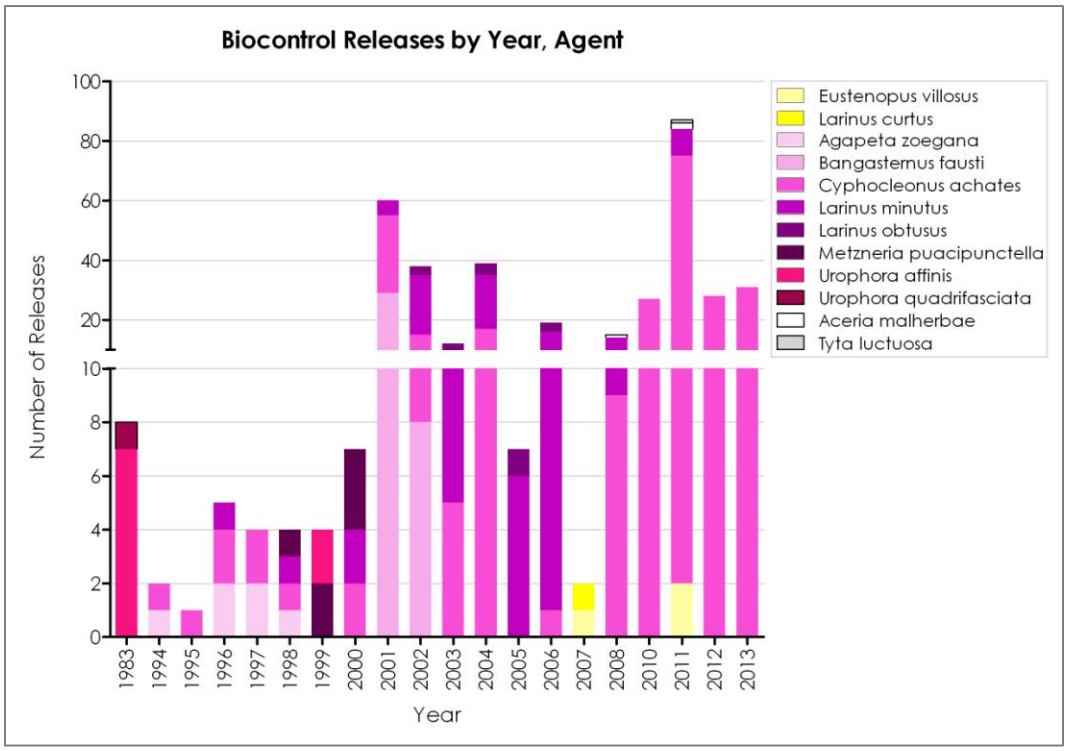


Figure 26: Number of biocontrol releases made in the Selway-Middle Fork CFLRP project area since 1983, presented by agent species. Like colors target the same weed. (Data source NPBC, USFS)

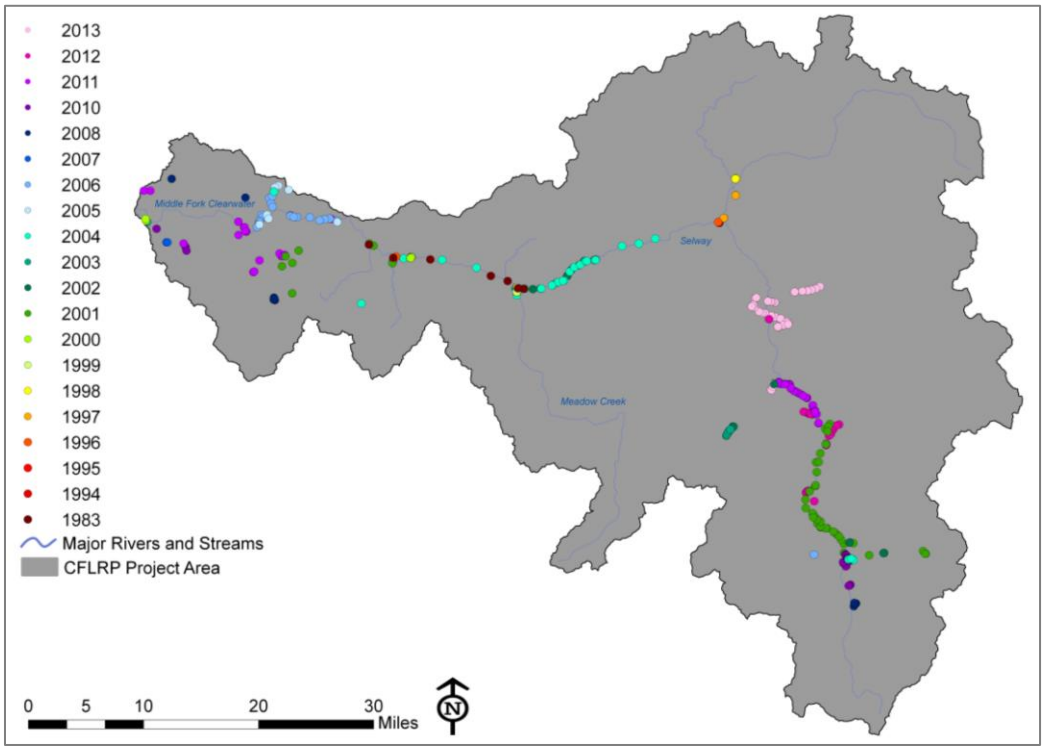


Figure 27: Biocontrol releases in Selway-Middle Fork CFLRP Project area since 1983. (Data source NPBC, USFS)

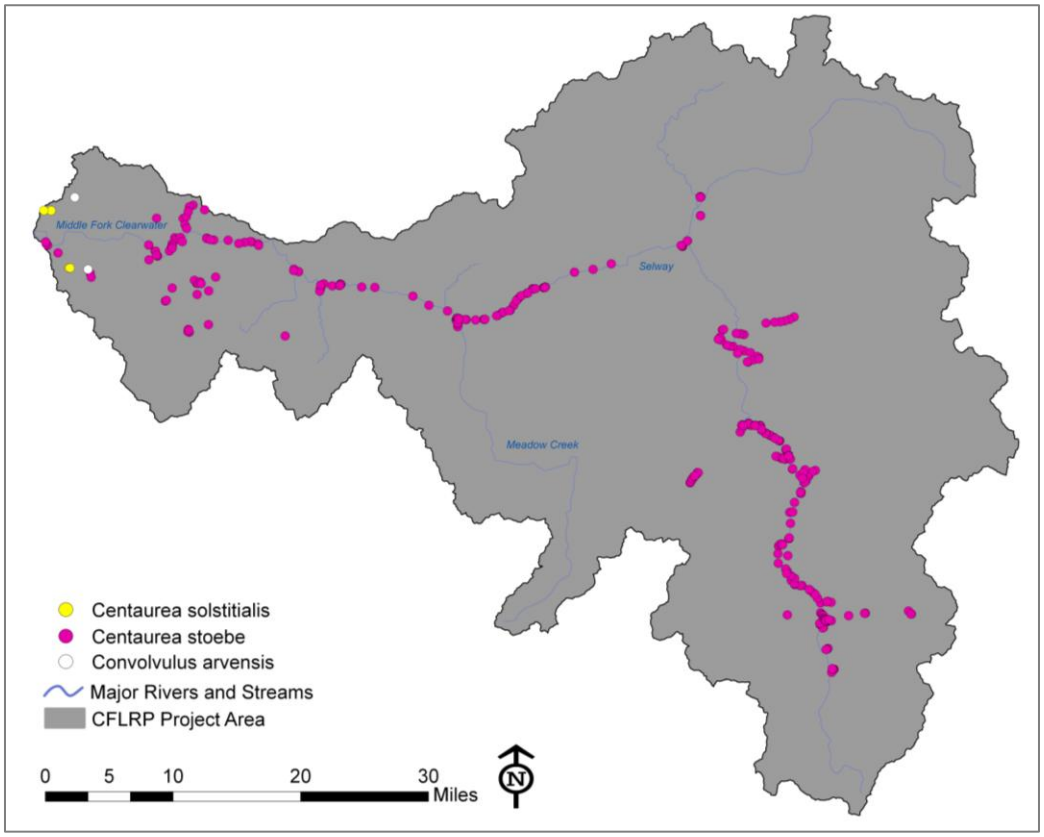


Figure 28: Biocontrol releases in Selway-Middle Fork CFLRP Project area since 1983 have targeted 3 weed species. (Data source NPBC, USFS; weed common names can be found in Appendix 1)

3.3.2.2 Chemical Control

Most chemical treatment data in FACTS is available only from 2006 onwards. Data is sparse for pre-2006 in the Nez Perce-Clearwater National Forest and is sparse for pre-2007 in the Bitterroot National Forest. Analyses discussed below utilize treatment data from 2006 and 2007 onwards in both forests, respectively. Prior to 2012, treatment data was recorded in tabular format only. Since 2012, a spatial component was required for treatment records. Consequently, the majority of treatment information available in the Selway-Middle Fork CFLRP project area cannot be reliably presented spatially over time.

Though the FACTS reporting system has consolidated and solidified the manner in which chemical weed treatments are recorded, there is significant flexibility in the interpretation for many required data fields. Consequently, the records pertaining to the Nez Perce-Clearwater National Forest can be utilized for certain analyses and conclusions, while the records kept for the Bitterroot National Forest can only be used in different analyses. The majority of information gathered from both Forests cannot be accurately compared or combined, and so is presented separately below.

UCWMA and Nez Perce-Clearwater National Forest

Chemical treatment data is spatially available for 2012 and 2013 in the Nez Perce-Clearwater National Forest, though limited records are also available for 2008-2010. Treatment records obtained for this Forest were sufficiently detailed to allow for separation by weed species (Figure 29) and year (Figure 30).

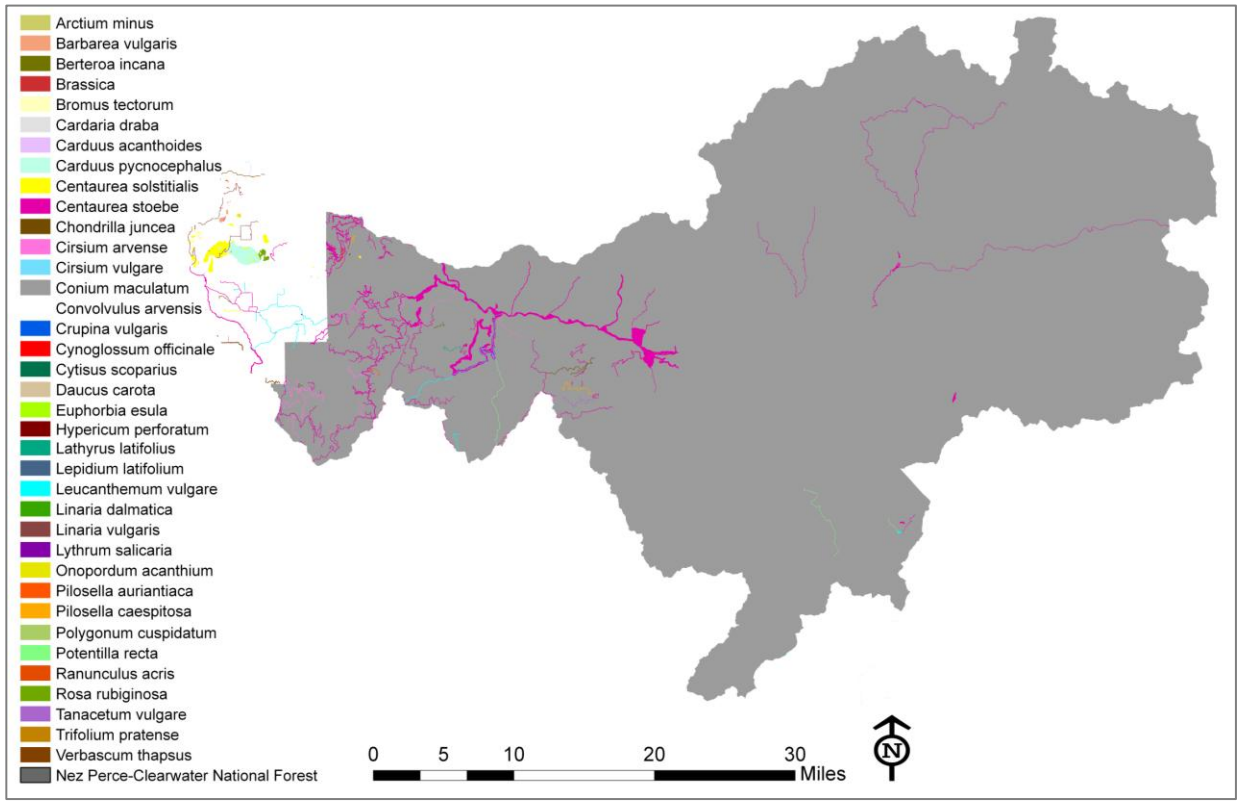


Figure 29: Chemical treatment records available spatially for the UCWMA and Nez Perce-Clearwater National Forest. (Data source FACTS; weed common names can be found in Appendix 1)

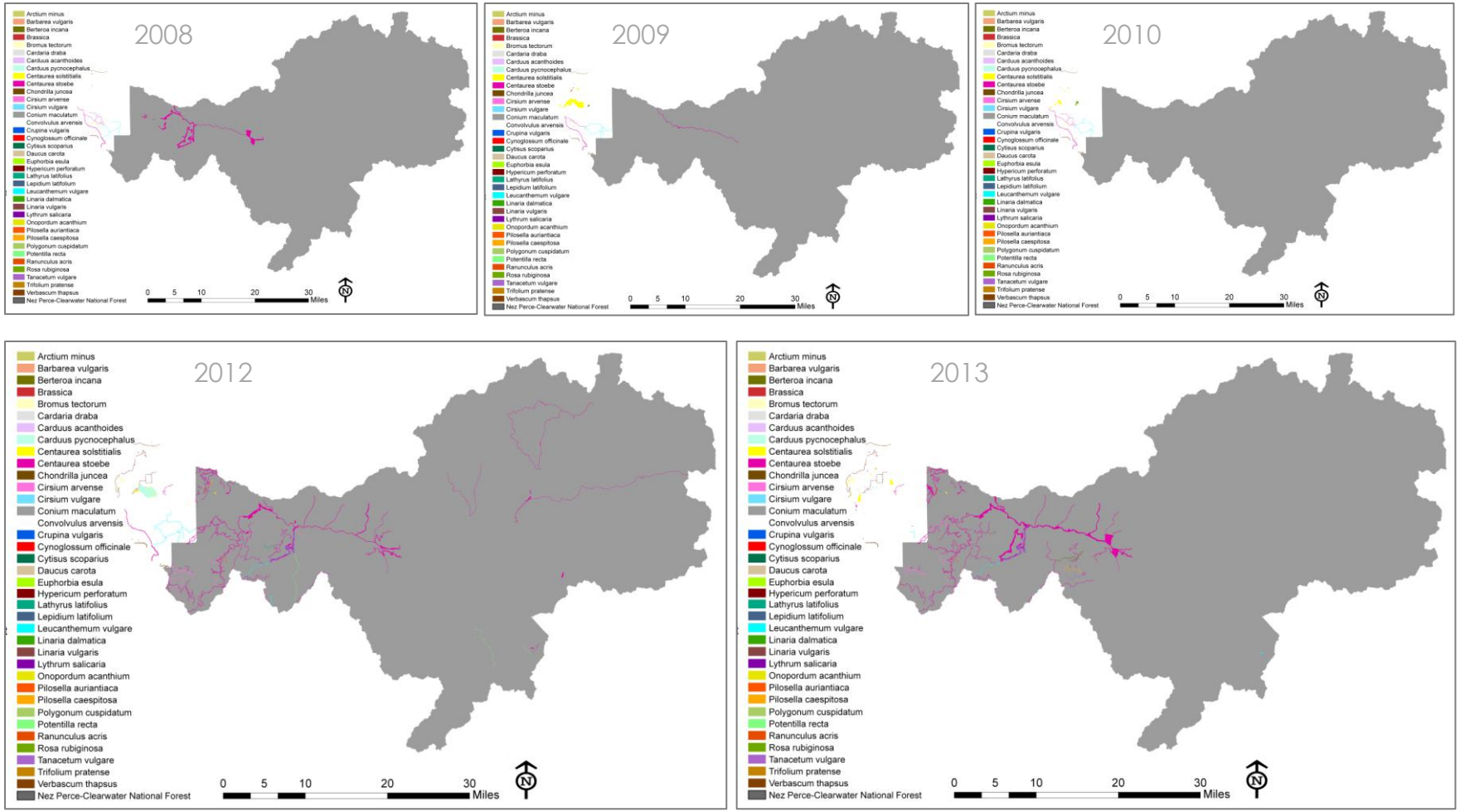
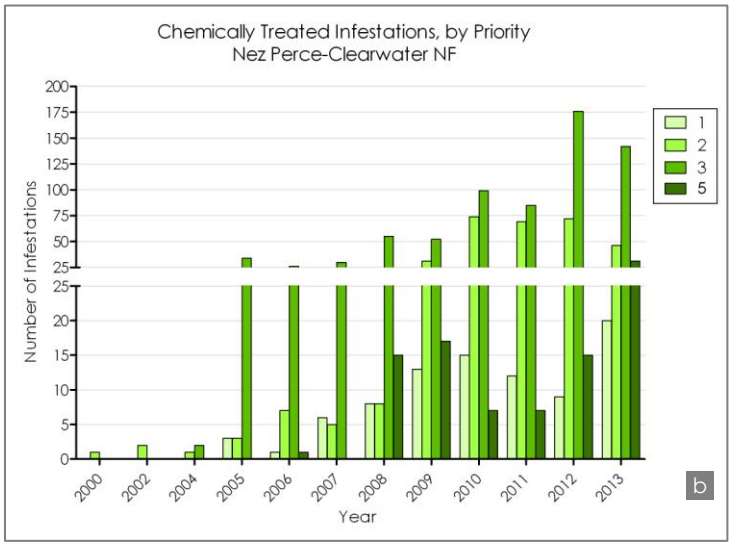
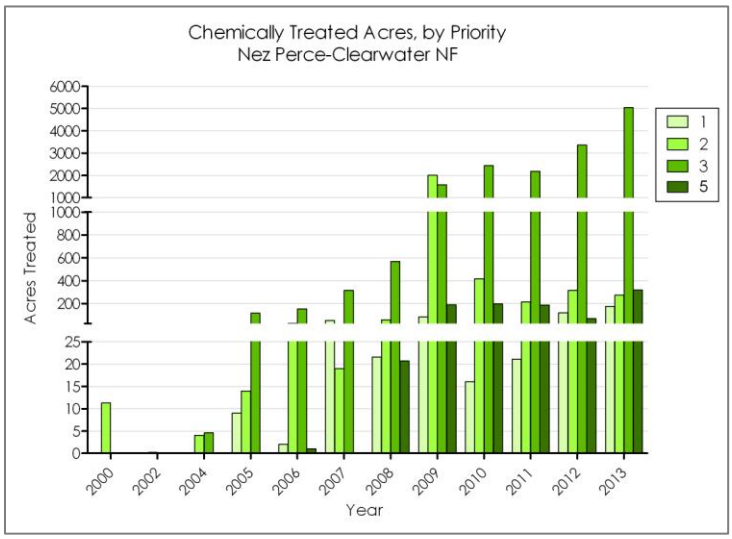


Figure 30: Chemical treatment records available spatially for the UCWMA and Nez Perce-Clearwater National Forest 2008-2010, 2012, 2013. (Data source FACTS; weed common names can be found in Appendix 1)

The tabular dataset is much more complete and is presented in Figure 31. The number of infestations chemically treated has increased regularly from 2000-2013, with 2012 recording the highest number of treated patches (Figure 31a). The majority of infestations treated to date have been assigned a priority 3 by the UCWMA (701). 87, 319, and 93 infestations assigned to priority 1, 2, and 5, respectively, have been treated since 2000. Many treatments are re-visits to previously treated sites.

The total acres treated have followed a similar pattern (Figure 31b, 31c) with 496, 3,355, 15,757, and 982 acres having been treated that were assigned to priority 1, 2, 3, and 5, respectively. Many treatments are re-visits; acreage is counted again in subsequent visits. The lower numbers of priority 1 infestations and acres treated are not indicative of this category receiving less attention than it should. Rather, it may help illustrate that fewer patches of new invaders exist in the project area compared to more established weeds. Treated acres are separated by weed species and priority in Figure 32.





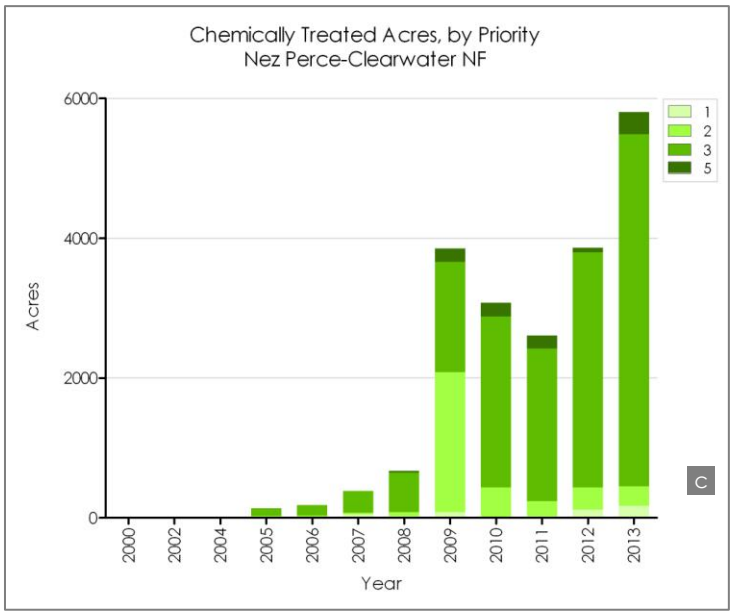
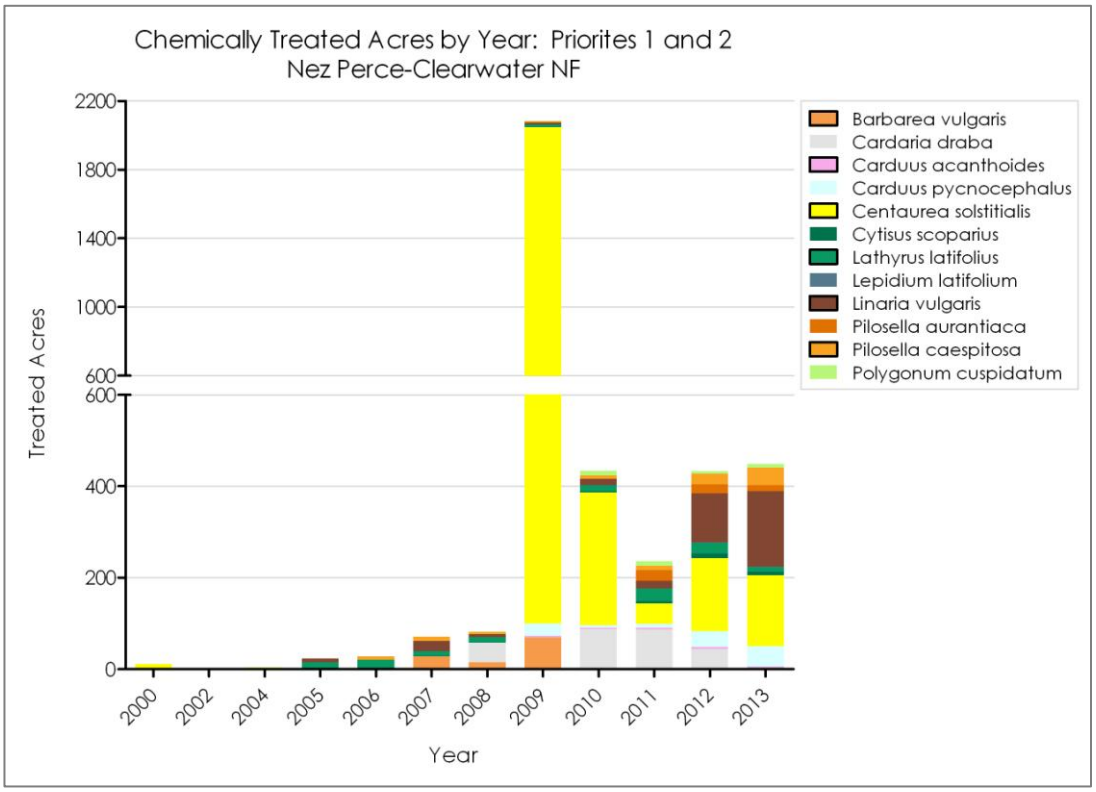


Figure 31: a) infestations and b,c) acres chemically treated in the Nez Perce-Clearwater (UCWMA) portions of the Selway-Middle Fork CFLRP project area, separated by priority. (Data source FACTS; weed common names can be found in Appendix 1)



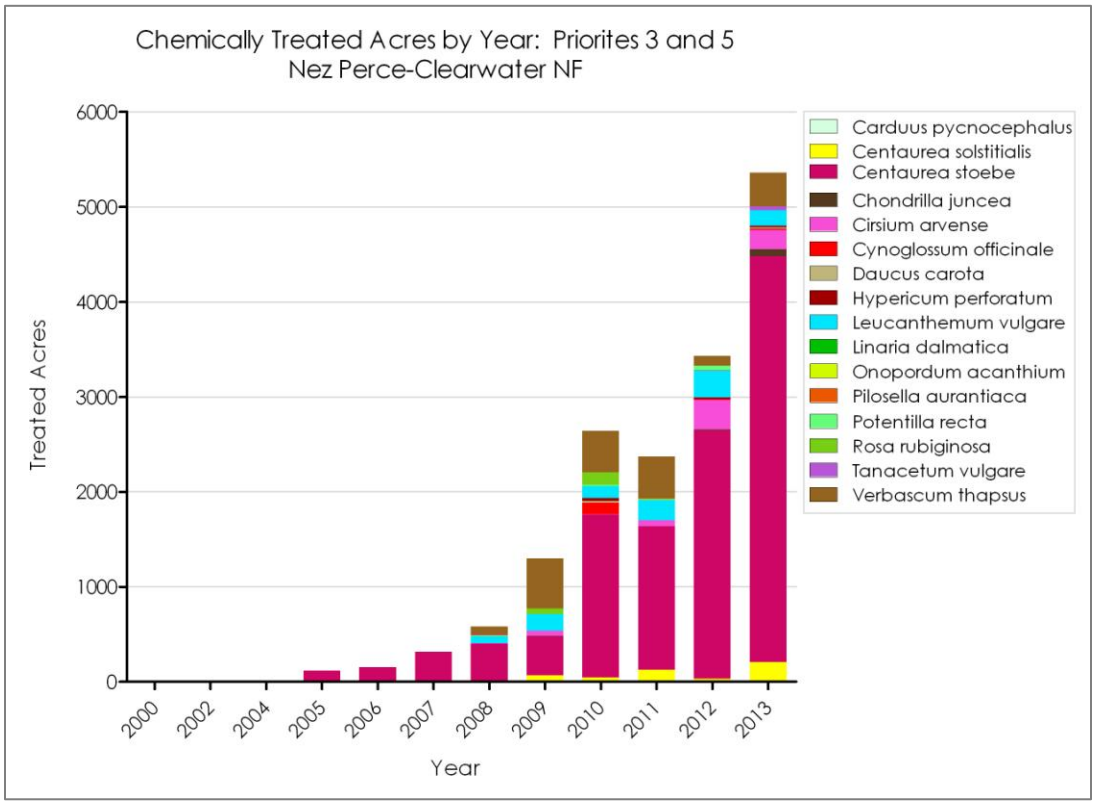


Figure 32: Weed acreage chemically treated in Nez Perce-Clearwater (UCWMA) portions of the Selway-Middle Fork CFLRP project area, presented by year and priority (Priorities 1,2 top; 3,5 bottom). (Data source FACTS; weed common names can be found in Appendix 1)

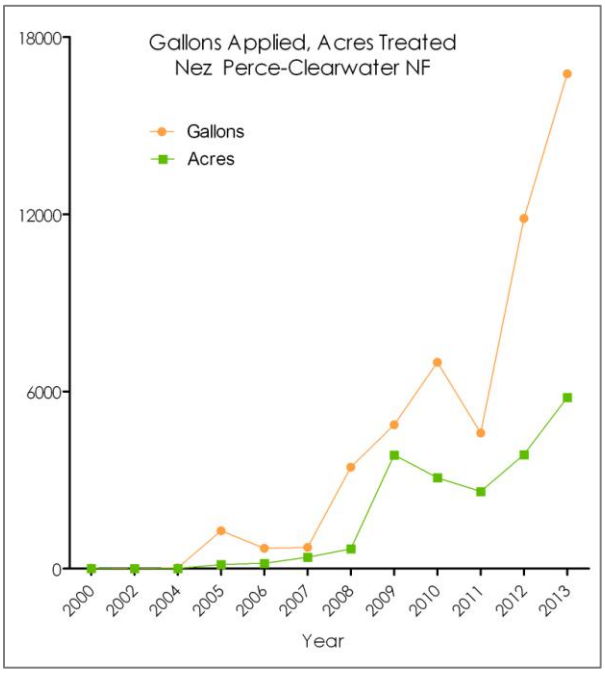


Figure 33: Weed acreage chemically treated and amounts of herbicide used by year in Nez Perce-Clearwater (UCWMA) portions of the Selway-Middle Fork CFLRP project area. (Data source FACTS)

Gallons of herbicide applied in the Nez Perce-Clearwater Forest portions of the Selway-Middle Fork CFLRP project area are illustrated in Figure 33. Since 2008, acres treated and total herbicide used have both increased dramatically.

Bitterroot National Forest

Chemical treatment data is spatially available for 2012 and 2013 in the Bitterroot National Forest portions of the Selway-Middle Fork CFLRP project area. The manner in which herbicide treatments are recorded in this region prevents the splitting out of weed species both spatially and tabularly. Contractors and USFS designated weed crews often record treatments according to search areas. At the close of the treatment span, treatment logs indicate all weeds encountered and total herbicides applied for the given area. Records do not break down the acreage, herbicide applied, and spatial location of individual weed species; all information is lumped. Figure 34 highlights a section of the Magruder Corridor. 11 species were encountered and treated along this stretch in 2013, though it is unclear where each species occurred and how much chemical was applied to each. Consequently the current manner in which the Bitterroot National Forest utilizes FACTS to store spatial treatment applications does not allow for analyses by species. Table 6 lists all species treated in the Bitterroot National Forest sections of the CFLRP project area since 2007.

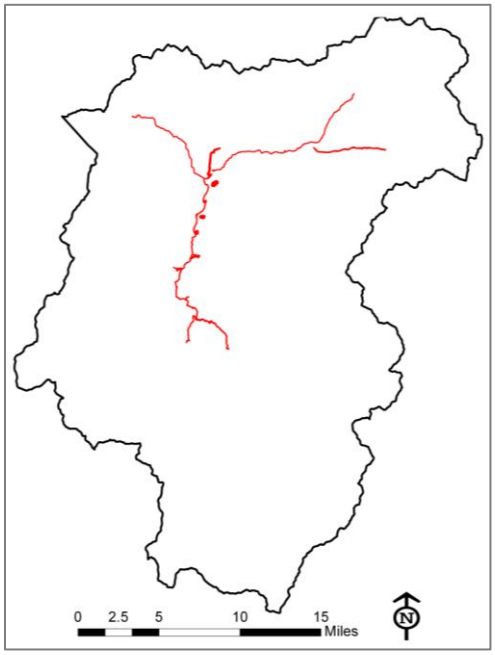


Figure 34: Magruder Corridor in Bitterroot National Forest portion of Selway-Middle Fork CFLRP project area where 11 species and 542 acres total were treated in 2013. (Data source FACTS)

Table 6: Weed species treated in the Bitterroot National Forest portions of the Selway-Middle Fork CFLRP project area from 2007-2013. (Data source FACTS)

Taxonomic Name	Common Name	2007	2008	2009	2010	2011	2012	2013
Arctium minus	lesser burdock						x	x
Berteroa incana	hoary alyssum	x	x	x		x	x	x
Brassica	mustard			x			x	x
Bromus tectorum	cheatgrass						x	x
Centaurea solstitialis	spotted knapweed	x					x	x
Centaurea stoebe	yellow starthistle	x	x	x	x	x	x	x
Cirsium arvense	Canada thistle	x	x	x		x	x	x
Cirsium vulgare	bull thistle	x		x		x	x	x
Cynoglossum officinale	houndstongue						x	x
Euphorbia esula	leafy spurge			x		x	x	x
Hypericum perforatum	St. Johnswort	x		x	x	x	x	x
Leucanthemum vulgare	oxeye daisy	x	x	x	x	x	x	x
Potentilla recta	sulphur cinquefoil	x	x	x	x	x	x	x
Ranunculus acris	tall buttercup	x	x	x	x	x	x	x
Tanacetum vulgare	common tansy							x
Verbascum thapsus	common mullein							x

Contrary to the Nez Perce-Clearwater National Forest, the manner in which the Bitterroot National Forest records treatment information allows for the tabular tracking of total acres surveyed (gridded), rather than just acres actually treated with herbicides (wetted acres). Figure 35a presents the total acres surveyed each year alongside actual acres treated. Survey efforts have increased dramatically since 2010, though wetted acres have decreased since 2011. These results indicate that while more area is covered during weed surveys, fewer infestations are encountered and treated. This is further illustrated in Figure 35b, which plots gallons of herbicide applied against surveyed and wetted acres. 5,363 acres have been gridded since 2007, while 727.2 acres have been wetted.

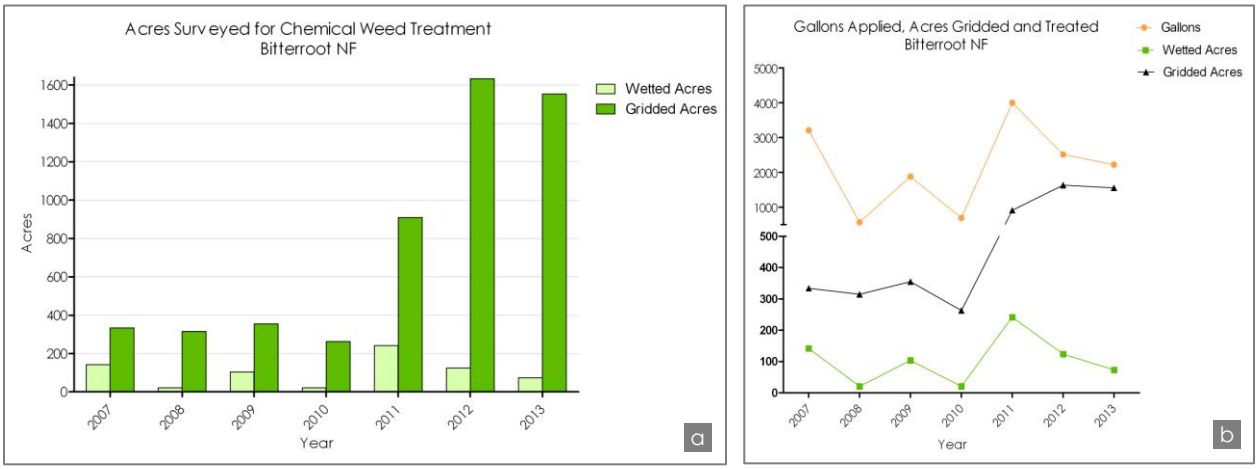


Figure 35: a) acres surveyed (gridded) for weeds and acres treated (wetted), b) acres gridded and wetted against gallons of herbicides applied, both in the Bitterroot National Forest portions of the Selway-Middle Fork CFLRP project area, presented by year. (Data source FACTS)

In both National Forests within the Selway-Middle Fork CFLRP project area, the relationship between gallons of herbicide applied and the number of acres treated was significant (P<0.0001). Figure 36a indicates that as more chemical was applied, more total acres were treated. Figure 36b plots gallons applied against acres treated, separated by National Forest. Significantly more acres are treated in the Nez Perce-Clearwater National Forest, though it's important to note the Bitterroot National Forest comprises only 28.7% of the forestland in the CFLRP project area. Despite the difference in acreage treated, gallons of herbicides applied annually were similar between both forests in 2007 and 2011. By 2013, significantly more gallons were being applied annually in the Nez Perce-Clearwater.

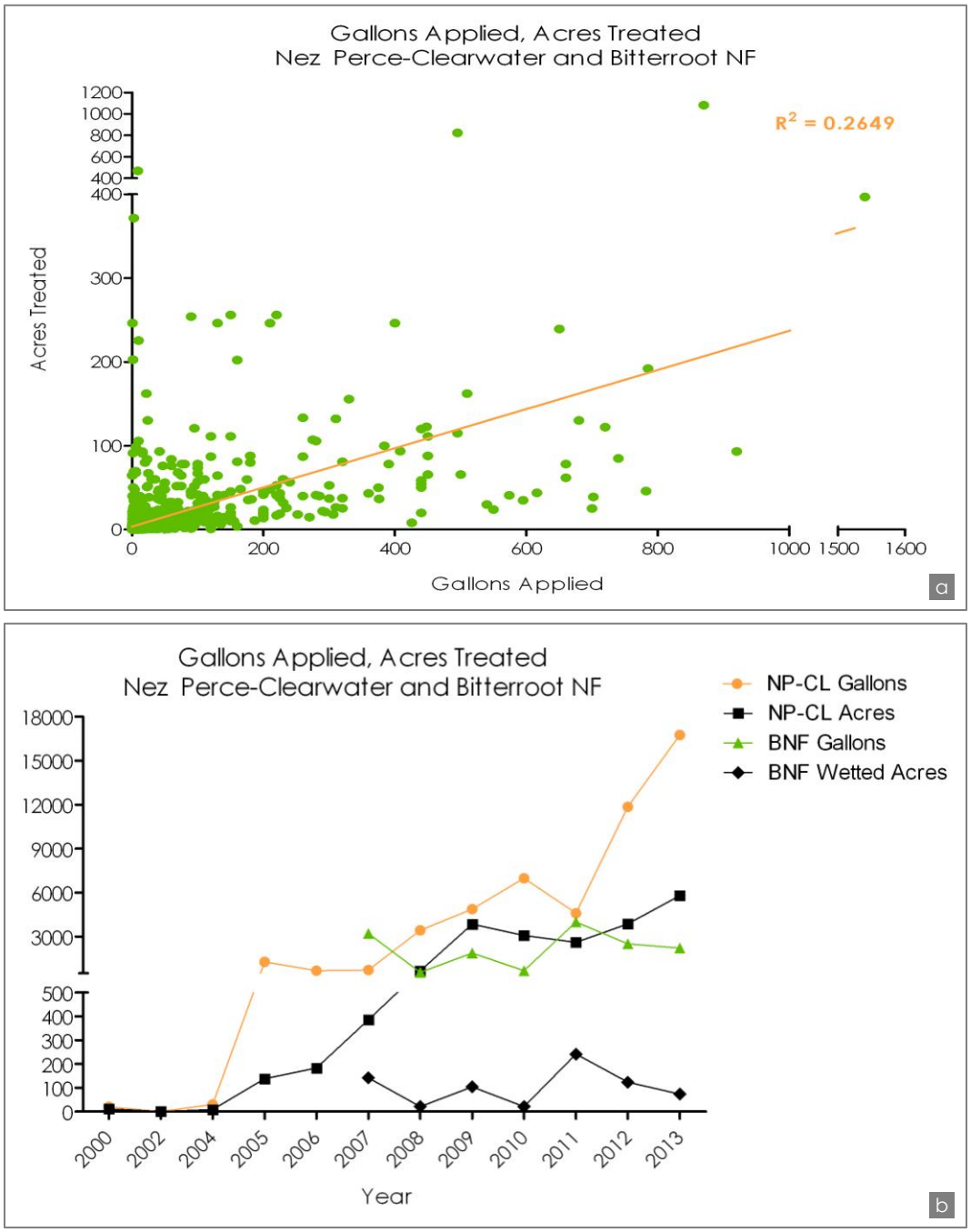


Figure 36: a) gallons applied versus acres treated b) gallons applied and acres treated chemically both National Forests within the Selway-Middle Fork CFLRP project area since 2000, presented by year. (Data source FACTS)

3.3.2.3 Physical Control

Physically controlling weeds can be accomplished via hand-pulling, digging, mowing, or using prescribed fire to reduce or contain weed populations. 1855 acres within the Selway-Middle Fork CFLRP project area have been treated with physical control methods since 2008 (Figure 37a); all fall within the UCWMA but outside of the Nez Perce-Clearwater National Forest. An average of 11 sites are physically treated per year and documented in FACTS (Figure 37b). The vast majority of physical treatments in this dataset have been applied to infestations of garden yellowrocket (*Barbarea vulgaris*) targeted for immediate eradication as a new invader (Figure 38a). The FACTS database does not differentiate the method of physical control utilized in treatments. Spatial components are available for 45 physically treated infestations (1,114.3 acres, Figure 38b). In addition to the sites reported in FACTS, 12 small infestations of the following weeds were hand-pulled by NPBC inventory crews during inventory efforts: yellow starthistle (*Centaurea solstitialis*), spotted knapweed (*Centaurea stoebe*), oxeye daisy (*Leucanthemum vulgare*), and tall buttercup (*Ranunculus acris*). Acreage of these infestations was not recorded, but is expected to have been minimal.

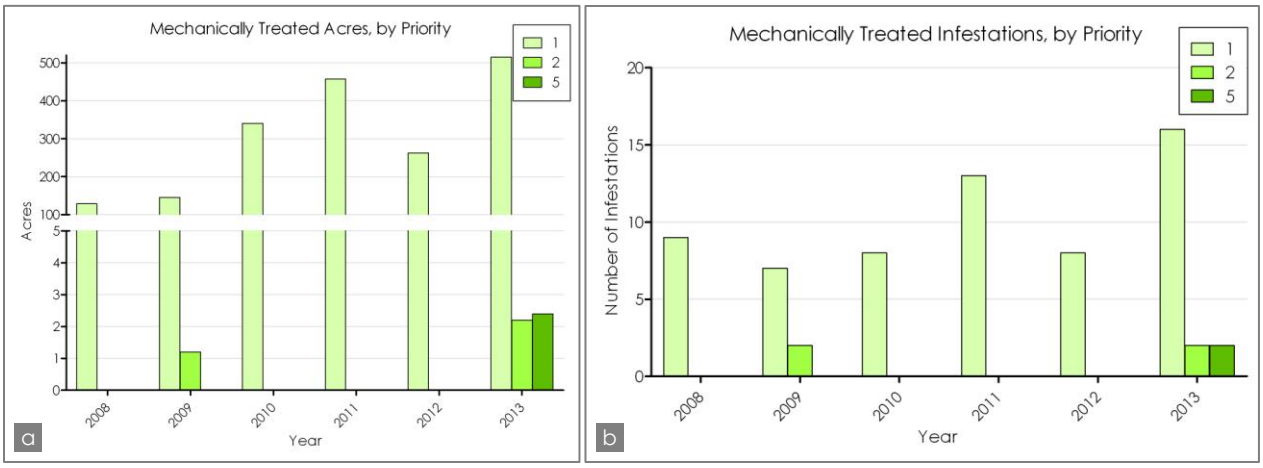


Figure 37: a) acres and b) number of infestations physically treated in the Selway-Middle Fork CFLRP project area since 2008, presented by year and priority. (Data source FACTS)

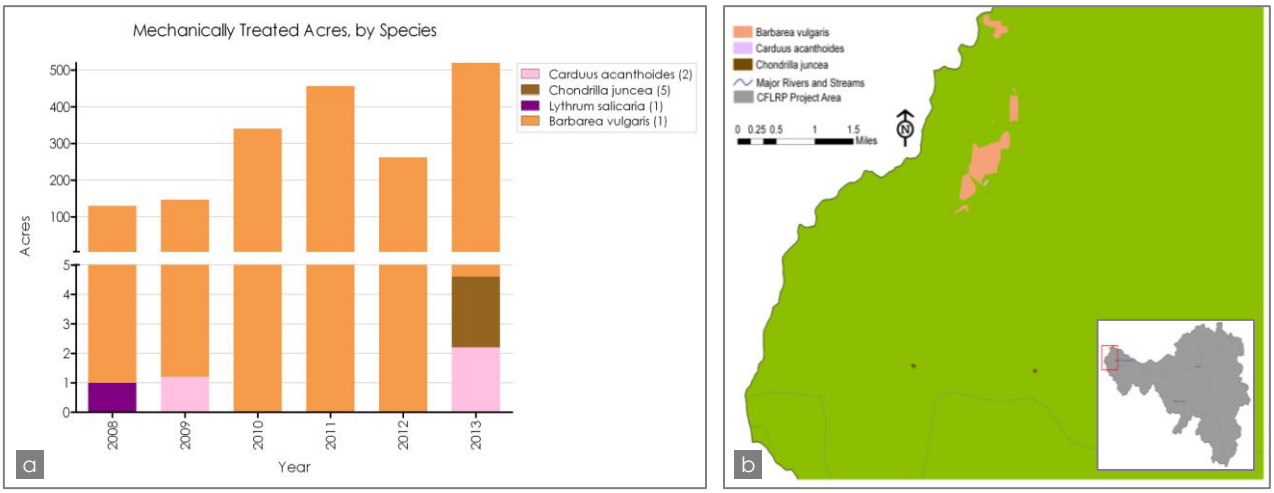


Figure 38: a) acres physically treated in the Selway-Middle Fork CFLRP project area since 2008, presented by year, species, and priority, b) spatial representation of 1114 of the 1855 physically treated acres (Data source FACTS; weed common names can be found in Appendix 1)

3.3.3 Rehabilitation

As indicated in section 3.2 (Weed Management Activities: Past and Present), the majority of stakeholders in the Selway-Middle Fork CFLRP project area typically do not participate in dedicated rehabilitation efforts related to weed management. Many infestations treated by stakeholders in the project area consist of weed patches interspersed with native/desirable vegetation. When native or more desirable species make up more than 30% of the overall plant cover, the simple act of removing the competing weeds may be sufficient to tip the balance back in favor of the native/desirable species (Goodwin et al. 2006). In this manner, weed treatment itself serves as an important step in site rehabilitation. Measuring native/desirable species cover is not currently a requirement in weed treatment records, so no rehabilitation data is available for the majority of weed treatment records queried from FACTS and other sources in this assessment.

Revegetation with native/desirable species may be a component of timber harvests falling within a stewardship contract. This occurs at the discretion of each project's administrator. No data was obtained pertaining to revegetation/rehabilitation in relation to weed management in timber harvest projects.

Rehabilitation is a key component to restoration activities carried out by road decommissioning crews and the Nez Perce Tribe Watershed Division. Roads assigned to abandonment are protected from future soil disturbance, thus preventing the further creation of weed microhabitats and the spread of weeds. Revegetation is included in all decommissioning projects for roads not assigned to simple abandonment. Native species already growing in the project area are preferentially used in re-plantings, followed by nursery-grown stock and seed mixes containing native and desirable exotic species. Monitoring is conducted at a subset of all restoration sites to track the effects of road decommissioning efforts (including revegetation and weed treatment) on the plant community and nearby streams. Results of road decommissioning monitoring efforts are described in section 3.3.4.3.

3.3.4 Monitoring

This section compiles all information available for any site revisited following weed treatment efforts. Biological control is addressed separately from chemical and physical control sites due to the differing nature of monitoring data.

3.3.4.1 Biological Control

At 123 locations throughout the Selway-Middle Fork CFLRP project area, presence/absence of biological control agents has been noted (Figure 39) by either observing adults on weed foliage or dissecting roots or seed heads to reveal larvae, pupae or characteristic feeding damage. The majority of these observations were anecdotal, and agent numbers and impacts were typically negligible if recorded at all. At 22 of these sites, attempts were made to measure biocontrol agent populations by performing repetitive sweeps of vegetation or conducting timed counts. At 10 of these 22 sites, weed infestation size was estimated, but no attempts were made to systematically measure vegetation variables. At the remaining 12 sites, permanent transects were established following the Standardized Impact Monitoring Protocol (SIMP) currently utilized by all research and land management organizations in the state of Idaho to measure changes in vegetation cover over time. A full description of the SIMP methodology can be found in Appendix 3. Some of the 12 sites were visited more than once from 2009-2013, allowing for multi-year

comparisons of resulting data. Other sites were visited only once during this time period and are only capable of serving as baseline measurements for future monitoring efforts.

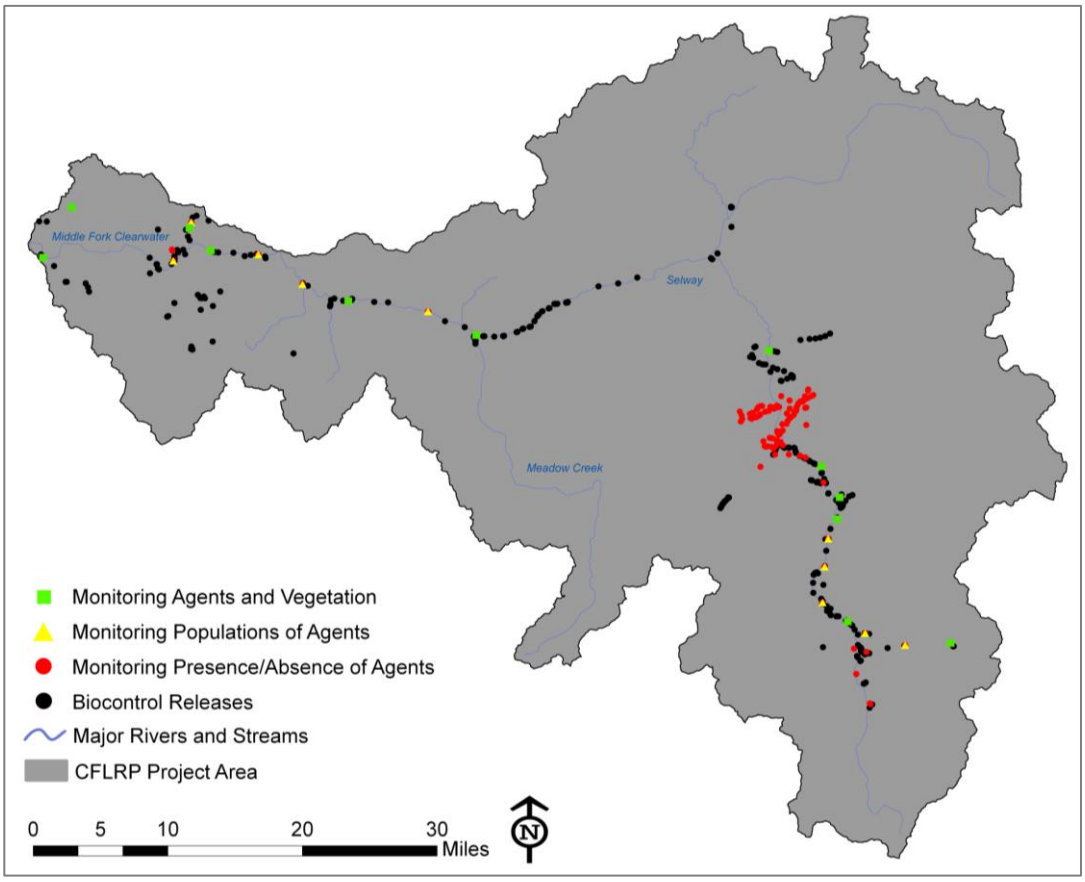


Figure 39: Biocontrol agent monitoring sites with three levels of measurement: presence/absence of agents, measurement of agent populations, measurement of agent populations and vegetative community. (Data source NPBC, BLM, Contractors)

Out of the 12 biological agents released in the Selway-Middle Fork CFLRP project area, eight successfully established (Table 7). Because some monitoring records lump the two *Urophora* species (*U. affinis* and *U. quadrifasciata*), they are hereafter lumped throughout this assessment for the sake of consistency. The same applies to *Larinus minutus* and *L. obtusus*, which are hereafter lumped by their genus. One additional species, *Chaetorellia acrolophi*, was not released in the project area but migrated naturally from release sites elsewhere in Idaho or Montana. *Chrysolina* spp. (including *C. hyperici* and *C. quadrigemina*) were likely released on St. Johnswort (*Hypericum perforatum*) in the project area in the mid-1900's, though there is no record of the original release date in the sources queried for this assessment. *Chrysolina* spp. are successfully established throughout the project area (Figure 40).

Table 7: Biocontrol agents established in the Selway-Middle Fork CFLRP project area (Data source NPBC, BLM, Contractors)

Agent	Host Taxonomic	Host Common	First Released	# Sites Established
Agapeta zoegana	*Centaurea stoebe*	Spotted knapweed	1994	2
Chaetorellia acrolophi	*Centaurea stoebe*	Spotted knapweed	NA	13
Chrysolina spp.	*Hypericum perforatum*	St. Johnswort	NA	47
Cyphocleonus achates	*Centaurea stoebe*	Spotted knapweed	1994	7
Larinus spp.	*Centaurea stoebe*	Spotted knapweed	1996	106
Metzneria puacipunctella	*Centaurea stoebe*	Spotted knapweed	1998	3
Urophora spp.	*Centaurea stoebe*	Spotted knapweed	1983	9

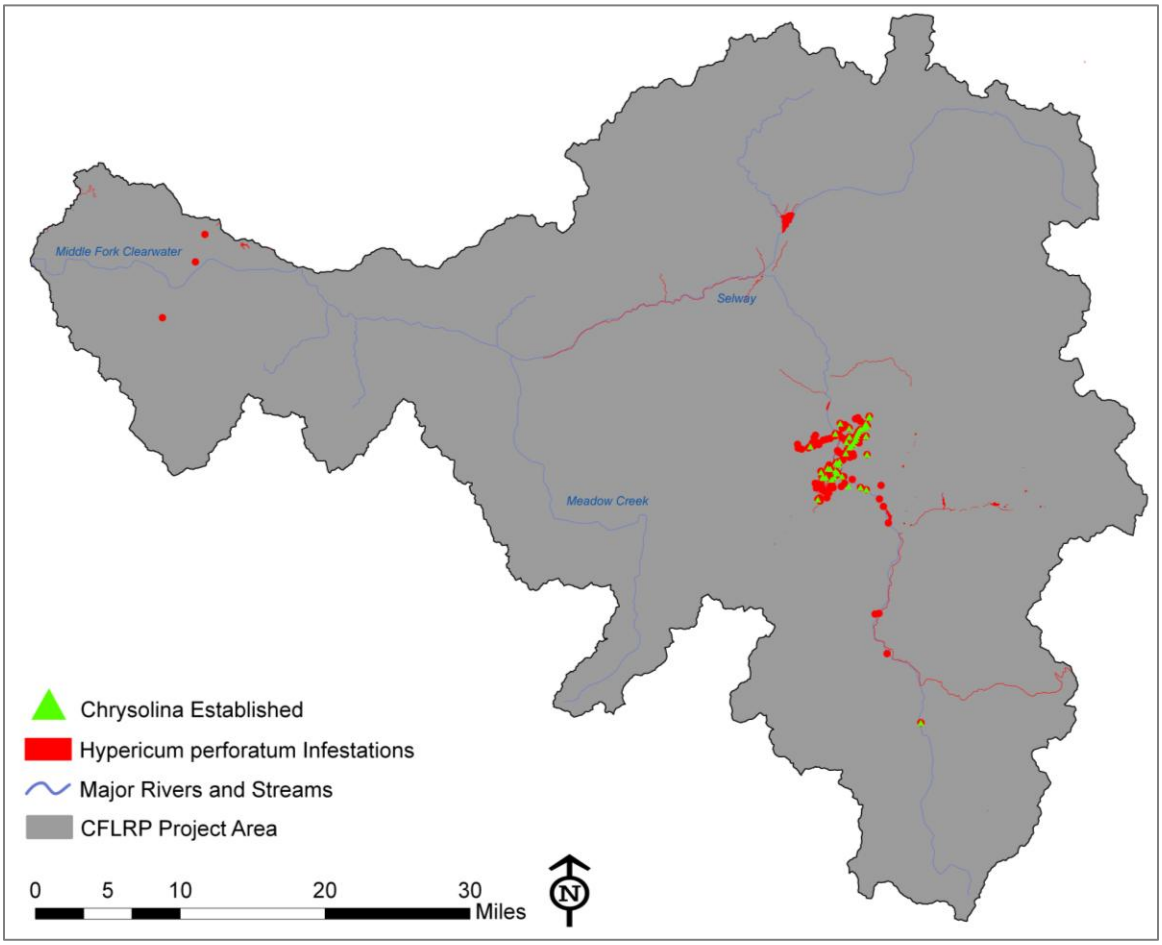


Figure 40: Establishment of *Chrysolina* spp. on infestations of their host, St. Johnswort (*Hypericum perforatum*) in the Selway-Middle Fork CFLRP project area. (Data source NPBC, BLM, Contractors)

Fluctuating and sometimes increasing populations of St. Johnswort have prompted new redistributions of *Chrysolina* in recent years in the wider Clearwater Basin. To date, the observations of *Chrysolina* establishment in the CFLRP project area are all anecdotal; none were quantified. It is not possible to determine impact and/or changes in the beetle or weed populations with the data currently available. Outside of the project area, the release of the *Chrysolina* beetles in Idaho was generally followed by a drastic reduction in the abundance of St. Johnswort two to three years post release at the majority of sites. Following the initial reduction, fluctuation in populations of both St. Johnswort and the *Chrysolina*

beetles occurred; increases in the plant population were followed in a year or two by increases in the beetle population and a subsequent reduction in St. Johnswort abundance (Tisdale 1976). Considerable fluctuations in St. Johnswort plant numbers still occur in Idaho today, and the weed appears to be more locally abundant than in recent history. However, its current abundance is significantly less than what it was in the 1930's and 40's, prior to the release of *Chrysolina* (Tisdale 1976, Randall 2014 pers comm). Redistributions of *Chrysolina* are recommended where agent populations have crashed locally following past successful reductions in the weed. Redistributions should be made to open, sunny areas. Both *Chrysolina* spp. have limited impact in heavily timbered and shaded regions (Winston et al. 2010).

The remaining established species all attack spotted knapweed (*Centaurea stoebe*). *Urophora* spp., *Chaetorellia acrolophi*, and *Metzneria paucipunctella* attack seeds of spotted knapweed, thus reducing future reproductive potential. *Agapeta zoegana* and *Cyphocleonus achates* attack spotted knapweed roots, reducing the stature and reproductive output of this weed, and sometimes causing plant death. *Larinus* spp. primarily attack spotted knapweed seeds, though adults are also known to feed on knapweed foliage, which may decrease the vigor and reproductive output of attacked plants. Figure 41 illustrates the established locations of these agents in relation to known spotted knapweed infestations.

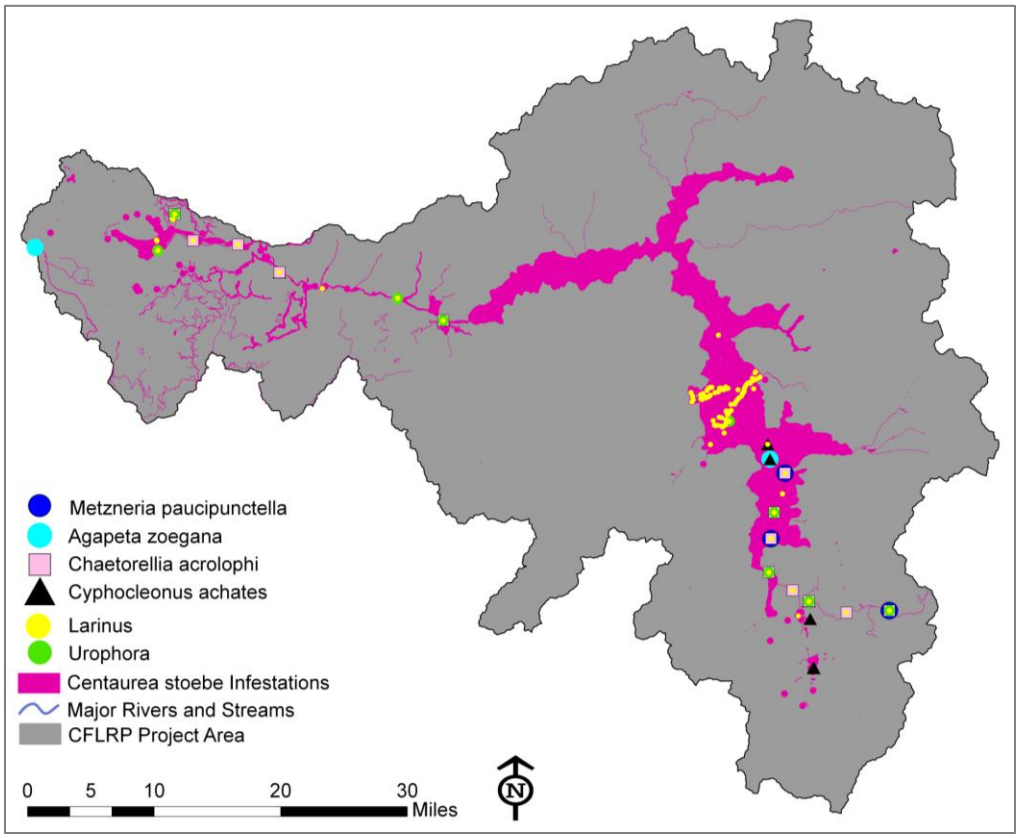


Figure 41: Establishment of biocontrol agents on infestations of spotted knapweed (*Centaurea stoebe*) in the Selway-Middle Fork CFLRP project area. (Data source NPBC, BLM, Contractors)

Of the 22 sites where biocontrol agent populations were measured, one site pertained only to field bindweed (*Convolvulus arvensis*). Because the agent (*Aceria malherbae*) released against this weed did not establish at this site, the data is not of use for this assessment and will be omitted. The results of the remaining 21 sites (all targeting spotted knapweed) can be seen in Figure 42. *Larinus* spp., *Urophora*

spp., and *Chaetorellia* spp. were by far the most common biocontrol agents collected during sweep sampling in the CFLRP project area, while *Agapeta zoegana* and *Cyphocelonus achates* were swept from 0 and 1 spotted knapweed sites, respectively. Both *A. zoegana* and *C. achates* are established in the project area (see Figure 41), but these were typically recorded during non-quantified root dissections.

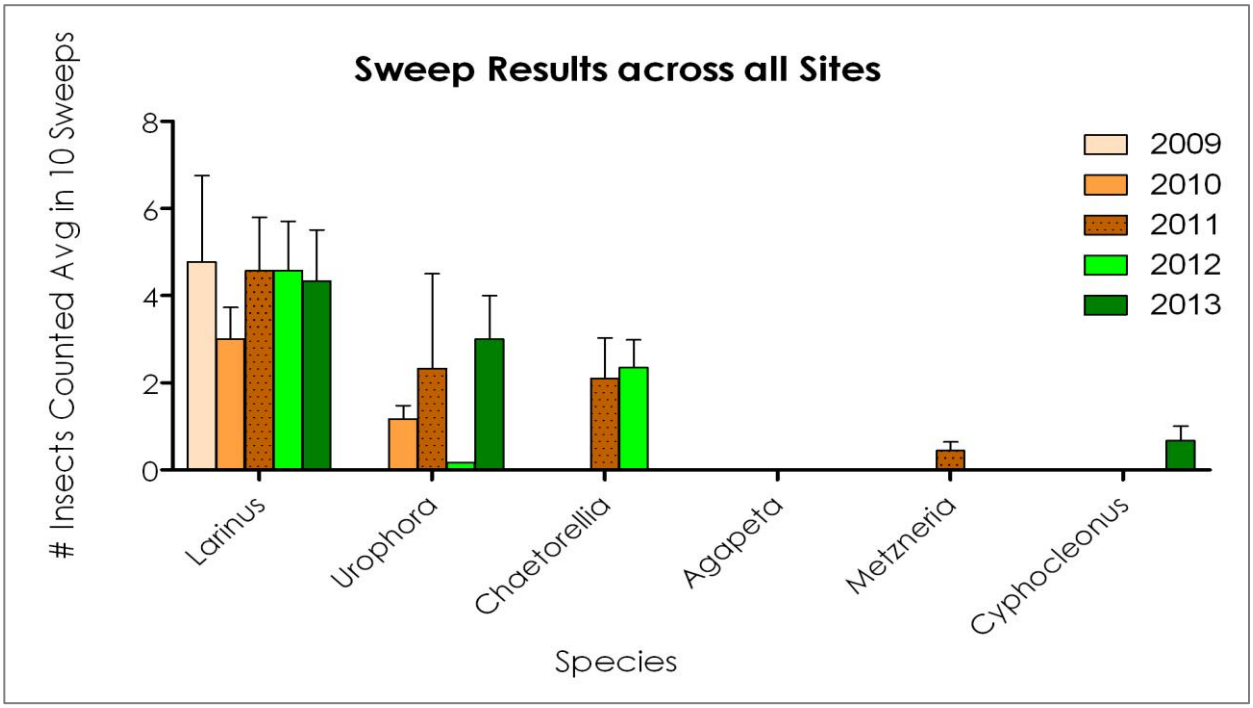


Figure 42: Average number of spotted knapweed (*Centaurea stoebe*) biocontrol agents collected during 10-sweep intervals in the Selway-Middle Fork CFLRP project area. (Data source NPBC, BLM, Contractors)

Of the 12 sites where permanent transects were established and the SIMP monitoring methodology was applied, one site pertained only to field bindweed. Because the agent (*Aceria malherbae*) released against this weed did not establish at this site, the data is not of use for this assessment and will be omitted. The remaining 11 sites were all established on spotted knapweed. Measurements at these sites include knapweed density, height of the tallest knapweed plants per plot, and seven categories for plot percent cover: knapweed, other weeds, native forbs/shrubs, perennial grasses, bare ground, plant litter, and moss. Figure 43 presents knapweed density and height across all sites and years. Six sites have had only one year of monitoring, due to limited time and funding and to sites being destroyed in subsequent years by chemical control. These six sites vary tremendously in their existing vegetation communities as well as their responses to changing climatic conditions across years, so cannot be reliably compared against each other. Some of these six can serve as baseline measurements for future monitoring efforts, but are otherwise not of use for this assessment.

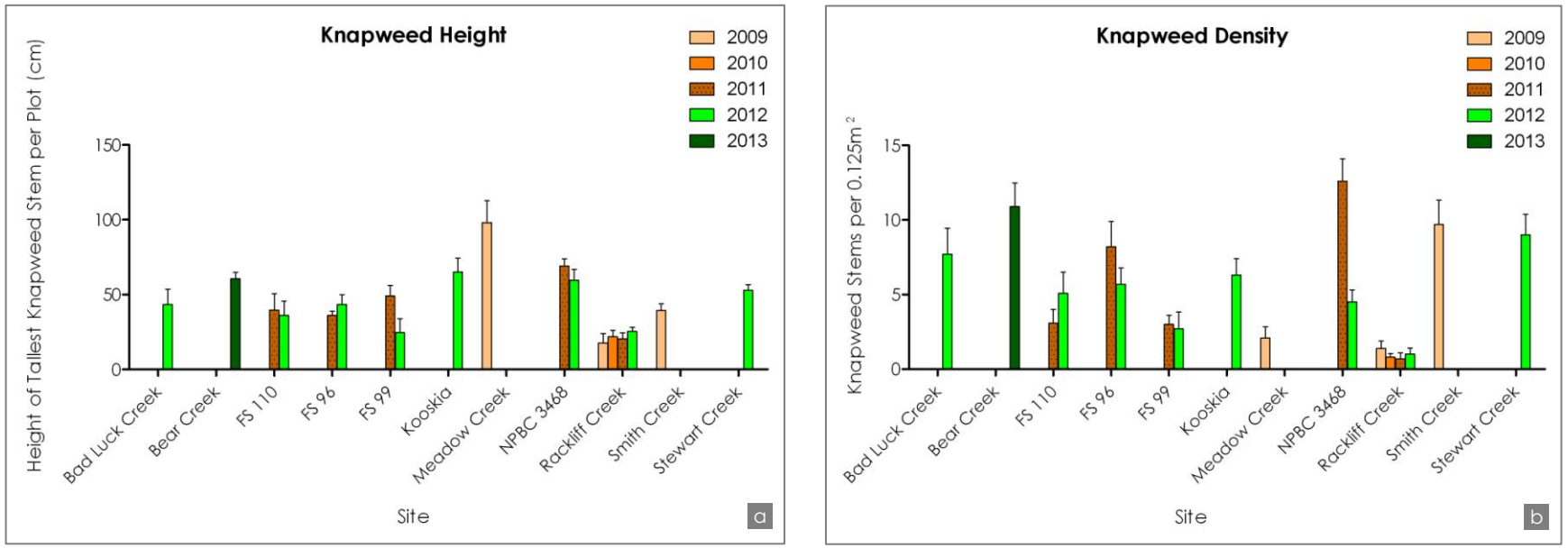


Figure 43: a) Height of tallest knapweed plants, b) number of knapweed plants per plot. Both across all sites and years (Data source NPBC, BLM, Contractors)

One site (Rackliff Creek) had four consecutive years of monitoring data collected. Figure 44 illustrates changes in cover categories measured over time. While it appears spotted knapweed decreased across all years, a closer inspection (Figure 45) indicates the change was not significant (P= 0.6274). During the same time period, the most abundant biocontrol agent (*Larinus* spp.) decreased significantly (Figure 47), suggesting it was not responsible for the slight decrease in knapweed cover. Only one additional biocontrol agent was recovered from this site during sweep sampling. A few *Urophora* individuals were observed in 2010 but never again. In all four years, spotted knapweed was only a minor component of the plant community at Rackliff Creek.

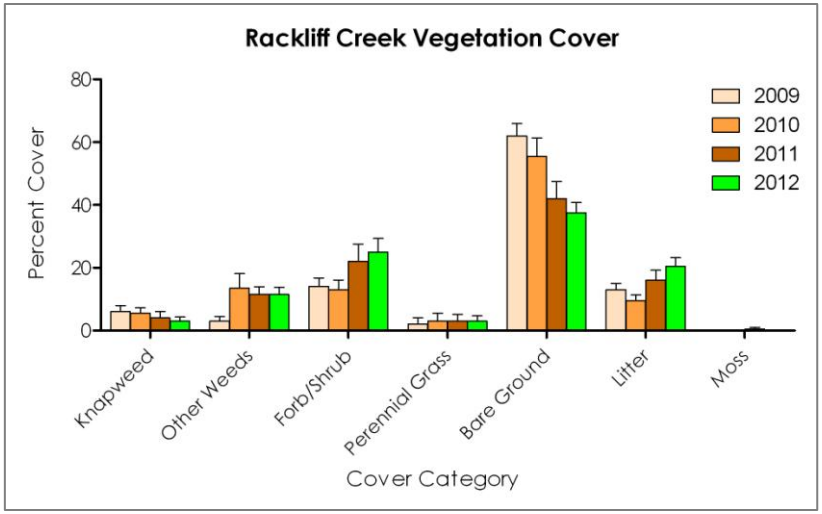


Figure 44: Percent cover of seven measured categories at one site across four years. (Data source Contractors)

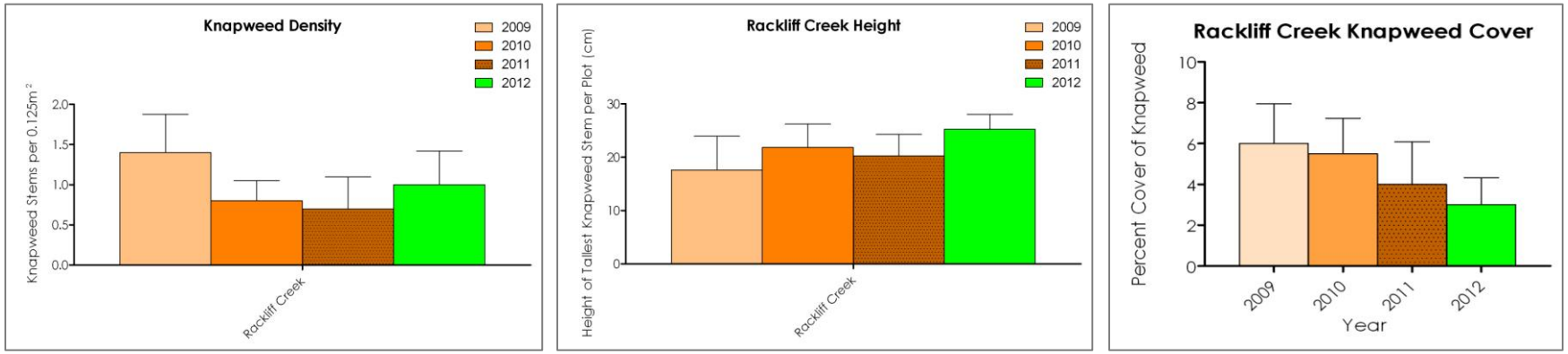


Figure 45: Spotted knapweed density, height, and average percent cover in plots monitored at one site (Rackliff Creek) over four years (Data source Contractors)

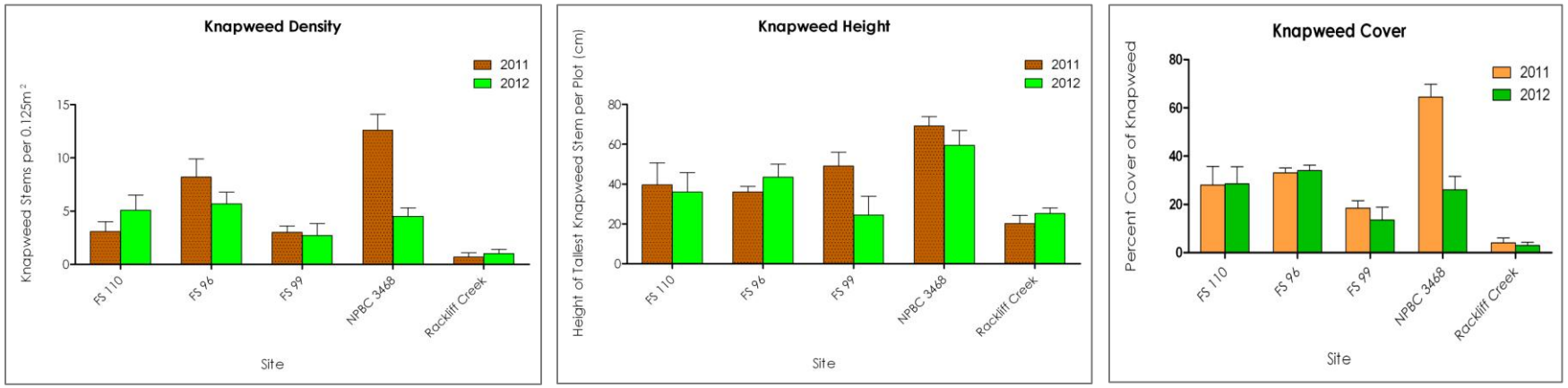


Figure 46: Spotted knapweed density, height, and average percent cover in plots monitored at five sites over two years (Data source Contractors)

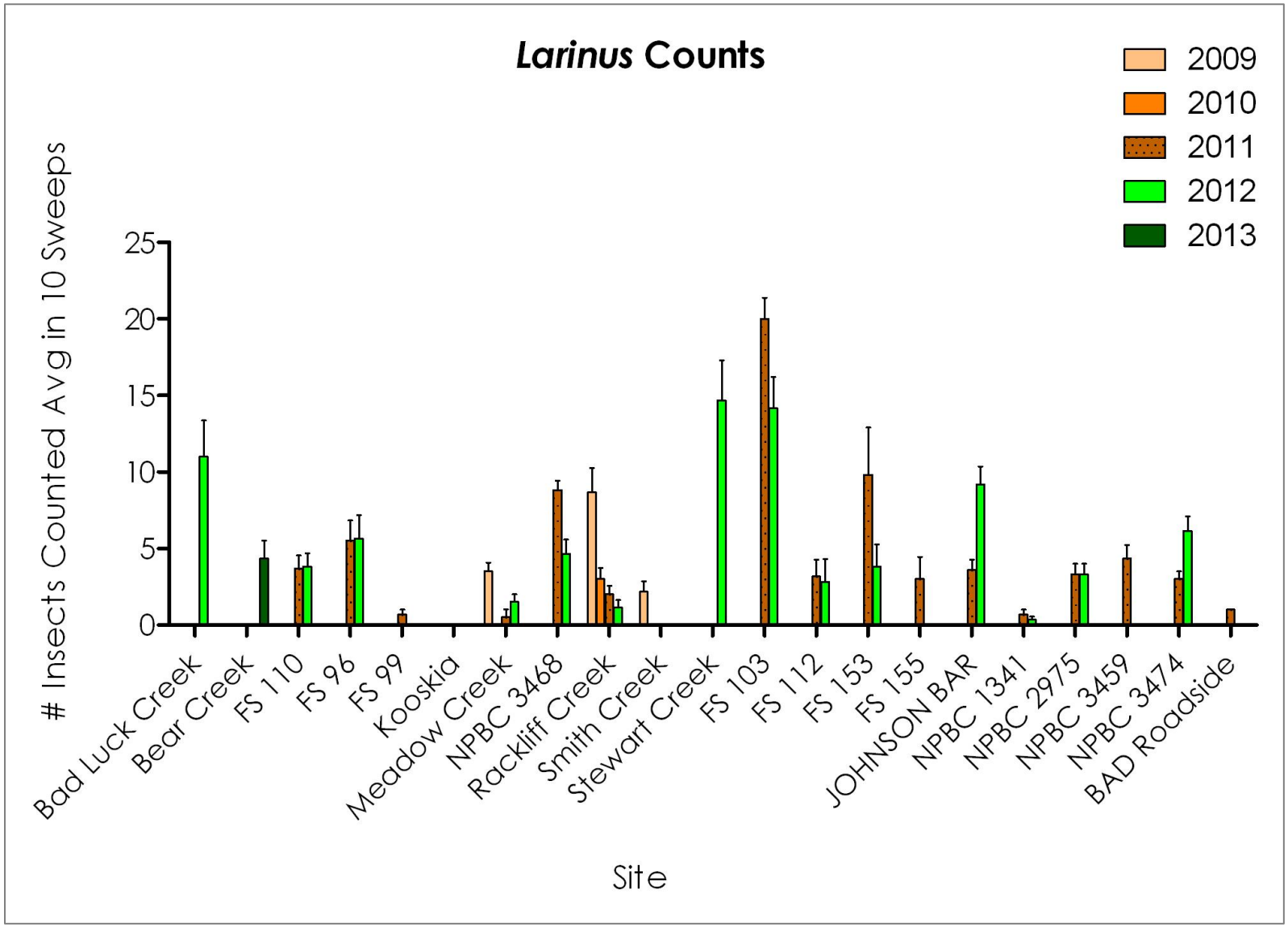


Figure 47: Average number of *Larinus* spp. beetles collected during 10-sweep intervals in the Selway-Middle Fork CFLRP project area. (Data source NPBC, BLM, Contractors)

At five sites (including Rackliff Creek discussed above), biocontrol monitoring data was collected for two consecutive years (Figure 46). Spotted knapweed plants, along with others in their genus, are capable of growing larger when at lower densities. So a reduction in plant numbers does not necessarily equate to a reduction in reproductive output or vegetative cover (Garren and Strauss 2009). Looking strictly at percent of spotted knapweed cover (Figure 46), at only one of the five sites (NPBC 3468) did spotted knapweed decrease significantly from 2011 to 2012. At this same site, the most prevalent biocontrol agent (*Larinus* spp.) decreased significantly as well (Figure 47), suggesting it was not responsible. *Chaetorellia acrolophi* was the only other biocontrol agent observed at this site, but always in much smaller numbers than *Larinus* spp., indicating its role is minor.

The success of biological control against spotted knapweed in North America is much debated in the literature, with results varying from place to place and study to study (Crowe and Bourchier 2006, Story et al. 2006, Story et al. 2008, Myers et al. 2009, Harris 2011, Knochel et al. 2010, Wooley et al. 2011). Under ideal conditions, high densities of seed-feeding insects can decrease seed production to below a threshold where spotted knapweed becomes seed-limited (Story et al. 2008). Once below this threshold, plant populations decrease as insufficient viable seeds are released each year to replenish populations. The *Larinus* spp. are particularly important seed feeders in that they also feed upon the foliage of spotted knapweed, complementing the effects of seed reduction by decreasing plant vigor and survival (Wooley et al. 2011). High densities of the root-feeding biocontrol agents can decrease plant aboveground biomass, seed head production, and plant survival (Story et al. 2006, Knochel et al. 2010). Throughout North America, spotted knapweed has been negatively impacted by biocontrol at dry sites with poor nutrients and high competing vegetation. However in settings more favorable to the plant (e.g. sufficient water and soil nutrients and limited competition), plants are often able to compensate for attack, and infestations continue to persist and/or spread (Jacobs et al. 2006, Knochel et al. 2010, Knochel and Seastedt 2010, Wooley et al. 2011).

In many interviews with stakeholders, it is apparent many believe biological control is still a viable control method for spotted knapweed in the CFLRP project area. This is evidenced in the dramatic increase in releases of *C. achates* since 2008 (Figure 26). While there have been increasing reports from stakeholders regarding elevated establishment of *C. achates* in the project area, the documented results to date do not reflect this. 31,095 *C. achates* have been released on spotted knapweed in the project area since 1994, while 36,460 *Larinus* spp. have been released since 1996 (Table 5, Figure 26). Despite the similar amounts and time frame, *Larinu*s spp. have been recovered at 106 sites, while *C. achates* has only been recovered from 7 (Table 7). *C. achates* reportedly thrives in areas with large, non-linear patches greater than ~5 acres, at mid elevations between ~3,000 and 5,000 ft, with sandy/gravelly soil and hot summers (Clark et al 2001, Sturdevant et al. 2006). Many of the *C. achates* release locations in the CFLRP project area to date do not exhibit all of these characteristics (USDA Forest Service 2013). Consequently, though this agent is established, population growth at most of the unsuitable sites would not be expected to reach the high levels observed elsewhere at locations where the agent had significant (if still insufficient in some areas) impact on spotted knapweed populations (Story et al. 2006, Knochel et al. 2010, Wooley et al. 2011).

In the Selway-Middle Fork CFLRP project area, the limited number of sites with quantified biocontrol monitoring data over multiple years makes drawing conclusions difficult. Much of the monitoring data available for the CFLRP project area was collected during a larger scale, two-year biocontrol monitoring assessment targeting the entire Clearwater Basin (USDA Forest Service 2013). The study found that while spotted knapweed cover, height, and density varied greatly from site to site within the Clearwater Basin in both 2011 and 2012, it did not differ overall between years. This between-site variation was not related to environmental conditions (elevation, precipitation, or temperature) or to adult insect densities

collected during within-year sweep sampling. Foliage and root attack by *Larinus* spp. and *C. achates*, respectively, did not result in decreased plant height, stem density, or number of seed heads produced. Rather, the data only indicated these species are attracted to weed patches with greater spotted knapweed densities and taller plants that grow from larger roots and produce more seed heads.

Additional time and consistent monitoring efforts are needed to fully understand the impact of biological control on spotted knapweed in the CFLRP project area. Existing information indicates any future releases on spotted knapweed should only be made in large patches growing under conditions conducive to high agent population growth (long/hot summer temperatures, mid elevation, sandy soil). At most areas in the project area where these conditions do not exist, alternative control methods should be employed.

3.3.4.2 Chemical and Physical Control

In both the Bitterroot and Nez Perce-Clearwater National Forests, it is a requirement that 50% of acres treated be monitored in order to receive credit for treatments. This usually entails simple ocular measurements of the percent control for the treated weed (i.e. the percentage of treated plants killed). Though this monitoring information is recorded in USFS databases, it is often not in a manner conducive to in-depth analyses to track the success (or lack thereof) of overall weed management efforts. This anecdotal monitoring information is available spatially for the Bitterroot National Forest since 2011 and for the Nez Perce-Clearwater National Forest since 2008 (Figure 48). Monitored infestations are broken down by species and year and separated by Forest in Figures 49 and 50, respectively.

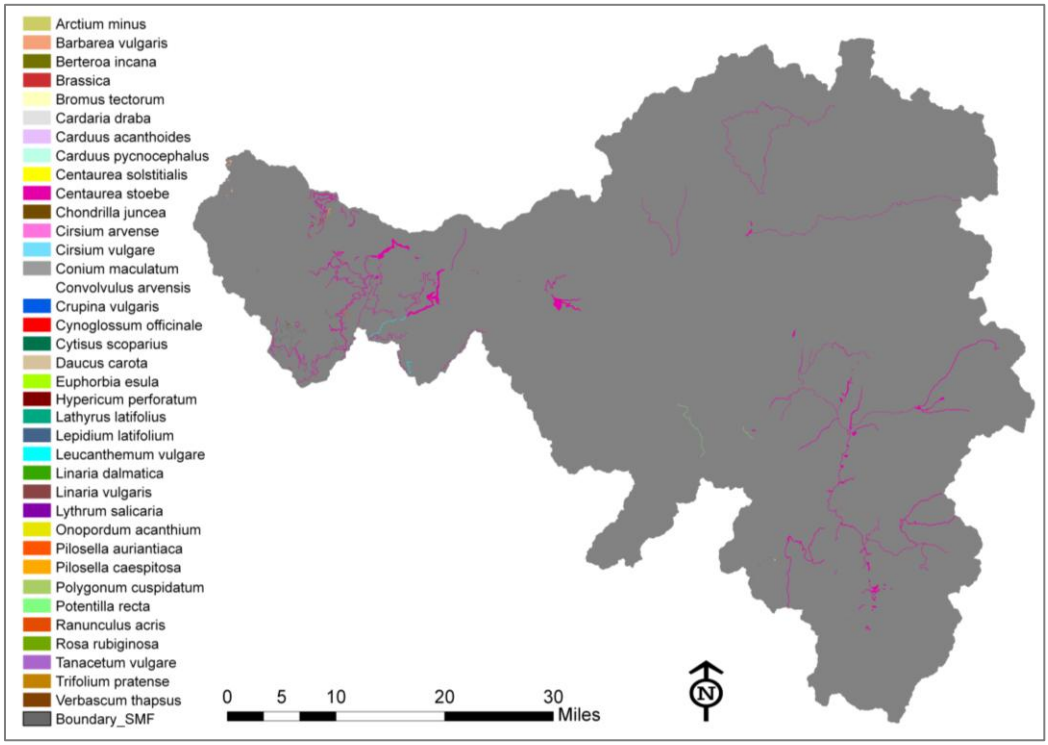


Figure 48: Treated sites subsequently monitored anecdotally for treatment efficacy in the Selway-Middle Fork CFLRP project area. (Data source FACTS; weed common names can be found in Appendix 1)

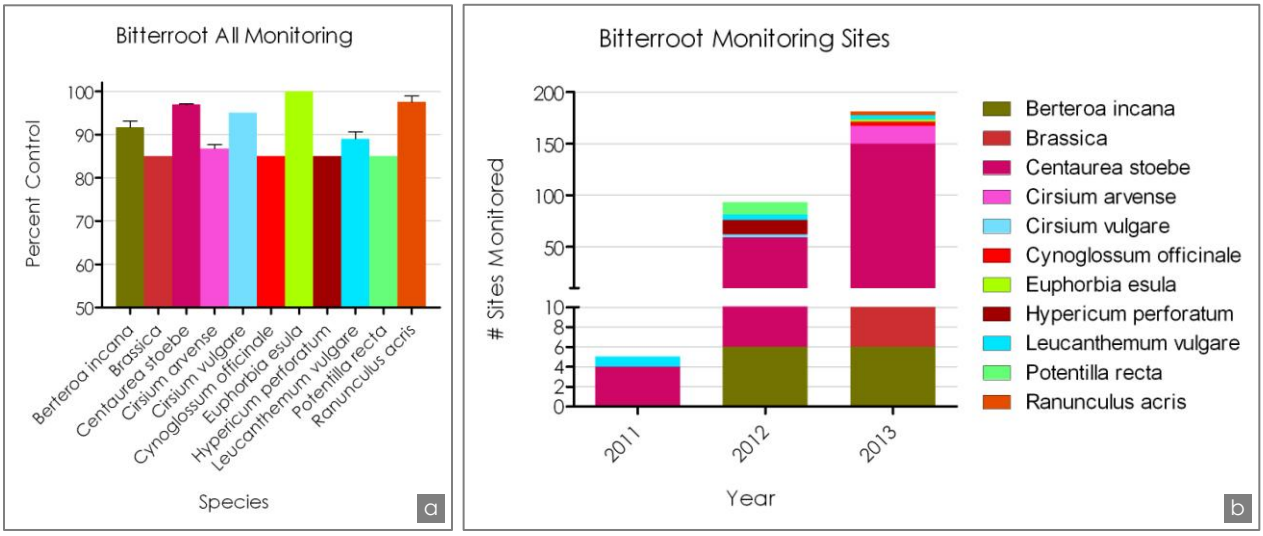


Figure 49: Sites treated chemically in the Bitterroot National Forest and subsequently monitored anecdotally for treatment efficacy, presented by a) percent control according to species, b) number of infestations of each species treated each year 2011-2013. (Data source FACTS; weed common names can be found in Appendix 1)

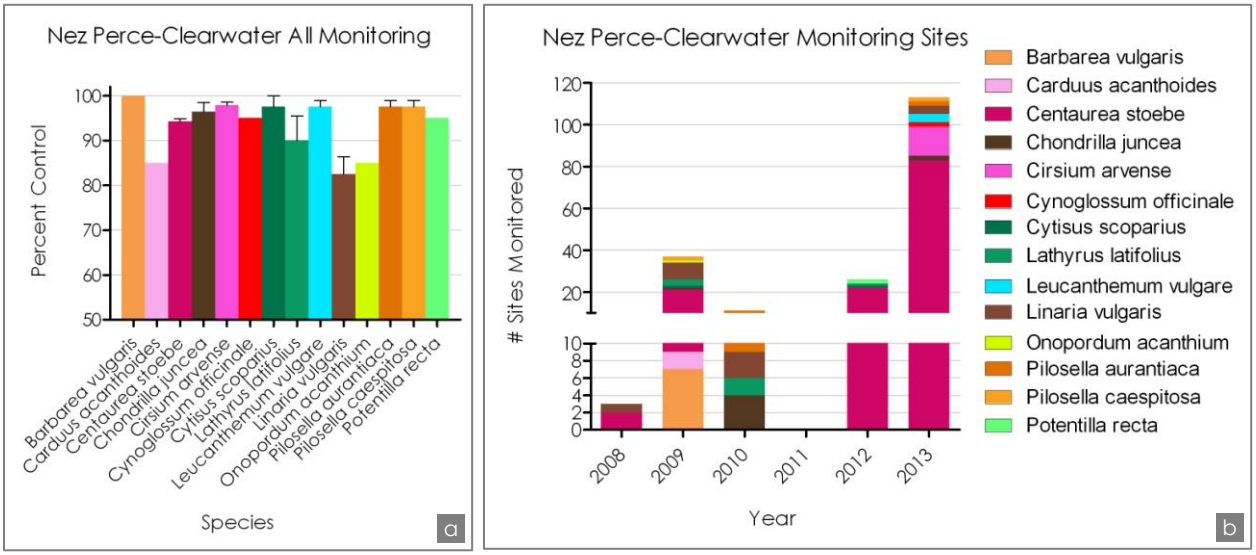


Figure 50: Sites treated chemically in the Nez Perce-Clearwater National Forest and subsequently monitored anecdotally for treatment efficacy, presented by a) percent control according to species, b) number of infestations of each species treated each year 2008-2013. (Data source FACTS; weed common names can be found in Appendix 1)

Percent control can be a very subjective measurement because it requires knowledge of the infestation prior to the original treatment. However, many individuals conducting monitoring were not present at the infestation originally. Consequently, the safest monitoring measurements to use are those where 100% control was achieved, as this indicates ***all*** treated plants were killed at the site. In the Bitterroot National Forest, 80 monitoring visits for infestations of spotted knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), and tall buttercup (*Ranunculus acris*) indicated 100% control. (Some infestations subsequently recovered from the soil seedbank.) The other 199 monitoring visits indicated control of all species fluctuated between 85 and 95%. In the Nez Perce-Clearwater National Forest, 73 monitoring visits for infestations of garden yellowrocket (*Barbarea vulgaris*), Scotch broom (*Cytisus scoparius*),

orange and meadow hawkweed (*Pilosella aurantiaca, P. caespitosa*), rush skeletonweed (*Chondrilla juncea*), spotted knapweed, Canada thistle (*Cirsium arvense*), and oxeye daisy (*Leucanthemum vulgare*) indicated 100% control. (Some infestations subsequently recovered from the soil seedbank.) The other 137 monitoring visits indicated control fluctuated between 35 and 95%. Average overall control for anecdotally monitored sites in each Forest was just above 94%. Monitoring information from FACTS does not indicate the priority of the infestation monitored, nor does it indicate if the infestation was treated again where monitoring demonstrated 100% control was not achieved.

As stated in section 3.1.1.1 (CWMA Strategic Plans), in the UCWMA, infestations treated chemically or physically according to an eradication objective (new invaders and satellite populations, or priorities 1 and 2) are ideally visited three times during a single growing season to ensure the complete eradication of the infestation. This should be done for three years, after which time eradicated sites become custodial and can be monitored once per growing season. The percent control from previous treatments are recorded and entered into FACTS as well as a more detailed monitoring database maintained by ICWC. Information from the ICWC database (spanning 2009-2013) was queried in order to look deeper into monitoring efforts in the Nez Perce-Clearwater National Forest.

UCWMA (Nez Perce Clearwater NF), Chemical Treatment Monitoring

Monitoring data from the ICWC database can be summarized for the CFLRP project area over time. Because information can be entered and interpreted differently depending on the user, there are several caveats for drawing meaningful conclusions from the data:

- Original treatment records are missing for some infestations with multiple years of monitoring.
- Some large polygons treated by helicopter subsequently had monitoring visits to multiple treated sub-polygons, making interpretation difficult.
- In some instances, monitoring crewmembers recorded 100 percent control, but the same day applied herbicides to that "site". It appears crewmembers occasionally sprayed different weed species present at the site but attached the work to the original inventory, making interpretation difficult. Attempts were made to identify and remove these instances.
- Some infestations are recognized as being larger than originally thought during subsequent monitoring. If the larger area is then treated, the increased chemical can confound analyses with herbicides applied over time.
- Priorities for some infestations have changed over time due to altering management goals. Using comparisons of priorities to draw conclusions on monitoring success can thus be confounded at the landscape scale.

425 unique weed infestations have been treated chemically in the UCWMA (including the Nez Perce-Clearwater National Forest) since 2000. Many have been treated multiple times, and some infestations have been merged together over time. Monitoring records do not exist (or were not available) for 312 of these treated sites, suggesting no monitoring has occurred at the majority of sites. 113 treated sites were subsequently monitored at least once by stakeholders. 105 of these monitored sites were treated solely with chemicals, while the remaining eight were treated both chemically and physically. 19 additional sites have been actively monitored, but the original treatment records were not obtained. 571 monitoring visits have been recorded across all sites in the UCWMA in total, but only 34 of these occur in the Nez Perce-Clearwater National Forest. Monitored infestations are broken down by species and year in Figure 51. It is interesting to note that despite one year less of data compared to the monitoring information stored in FACTS, far more site visits spanning additional and differing species have been recorded in the ICWC monitoring database (Figures 50 and 51).

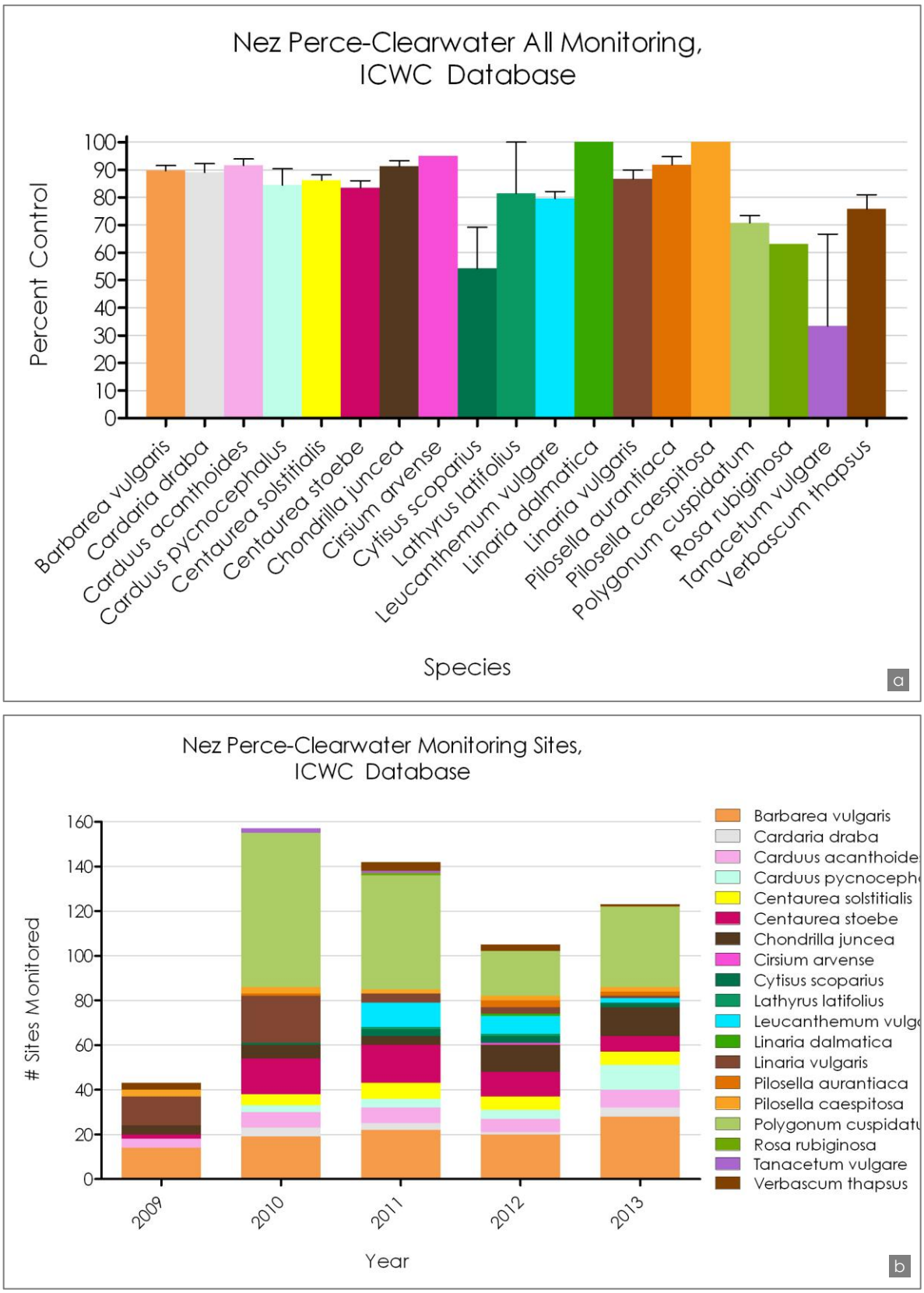


Figure 51: Sites treated chemically in the UCWMA and Nez Perce-Clearwater National Forest and subsequently monitored for treatment efficacy, presented by a) percent control according to species, b) number of infestations of each species treated each year 2009-2013. (Data source ICWC; weed common names can be found in Appendix 1)

Figure 52 illustrates that despite the goal of monitoring 1 and 2 priority sites three times each year, this does not often occur. Of *all high priority sites treated since 2000* (100 total), only 10 sites received 3 or more visits during the 2013 growing season. 31 and 13 sites received 1 and 2 visits, respectively. 48 high priority sites did not receive any monitoring visits in 2013. It should be noted that 3 of the 48 sites were first inventoried and treated late in 2013, when there was insufficient time left in the season for follow-up monitoring. Of the 10 sites that received 3 or more visits annually, only two of these were on forestland.

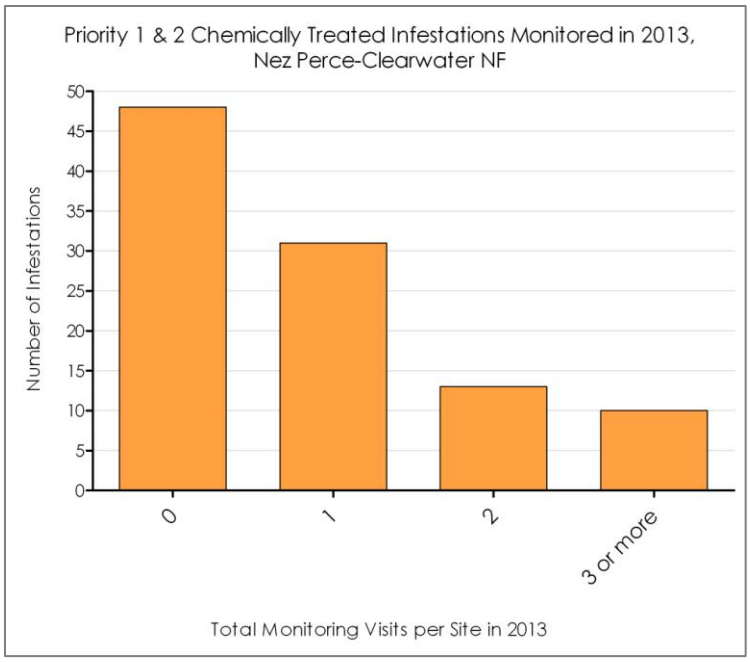


Figure 52: 1 and 2 priority sites monitored in 2013 for treatment efficacy in the Nez Perce-Clearwater National Forest. Graph illustrates the number of infestations with 1, 2, or 3-or-more site visits in 2013. Priorities used are those assigned in 2013. (Data source ICWC)

Figure 53 plots the number of sites chemically treated per year (separated by priority) against the number of sites monitored per year (again separated by priority). The same figure illustrates monitoring in 2010 and 2011 was nearly equal to the number of sites treated, while reaching less than half in 2009, 2012 and 2013.

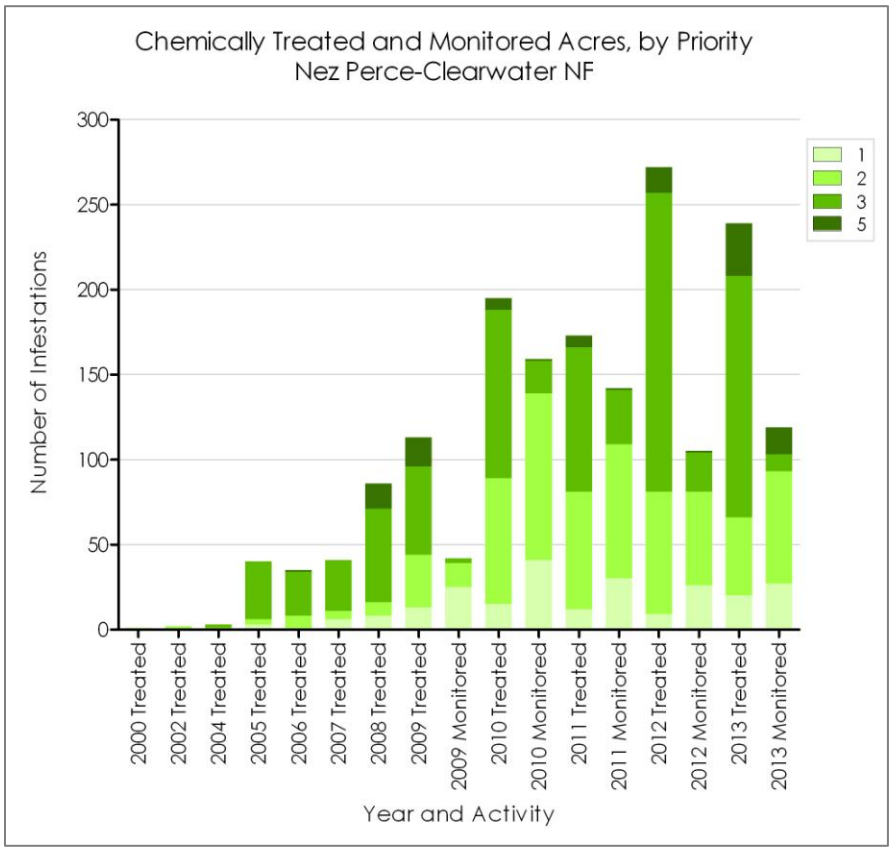


Figure 53: Chemically treated infestations in the Nez Perce-Clearwater National Forest. (2000-2013, separated by priority), versus monitored infestations (2009-2013, separated by priority). Priorities used are those assigned in 2013. (Data source FACTS and ICWC)

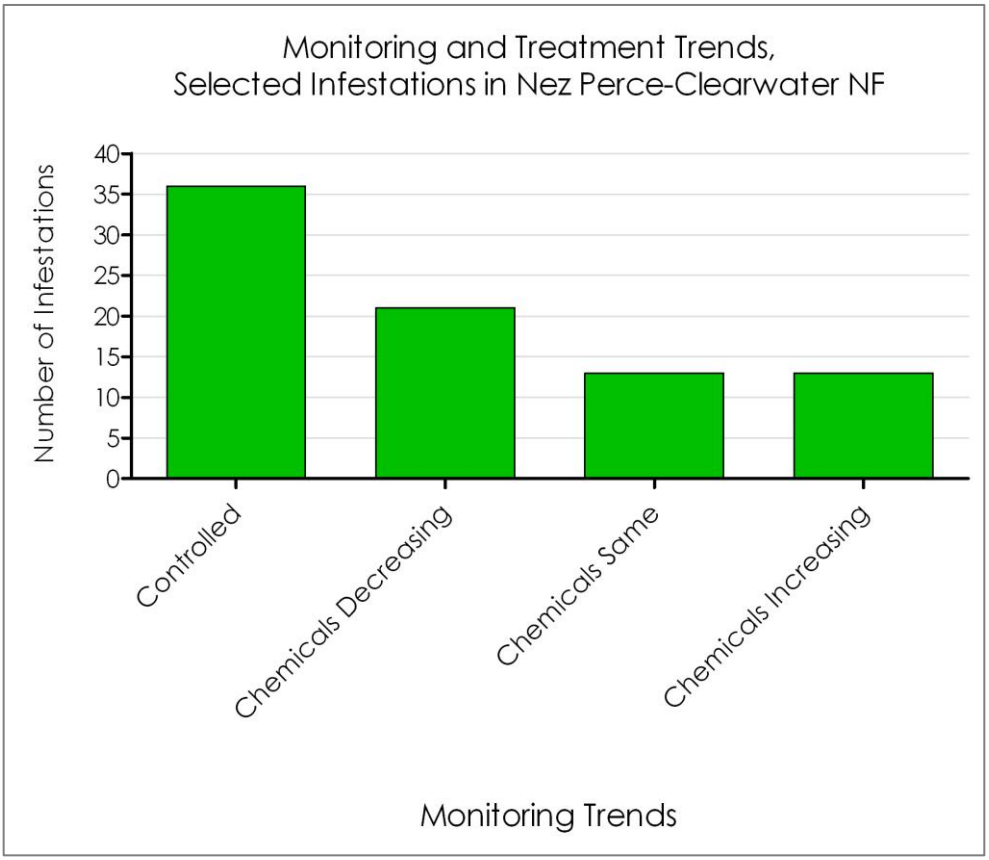


Figure 54: Chemically treated infestations in the Nez Perce-Clearwater National Forest whose treatment and monitoring records were used to summarize treatment efficacy by site. Infestations included were selected based on one or more monitoring records indicating 100% control at some point during the treatment history. (Data source FACTS and ICWC)

Average overall control for monitored sites in the ICWC database is approximately 82%, though again, any readings less than 100% are subjective and useful largely for indicating previous treatments were not fully successful. Consequently, infestations with 100% control reported for one or more monitoring visits were queried from the FACTS treatment dataset. Doing so allowed for the tracking of changes in chemicals applied at these sites over time, potentially indicating trends in control. Figure 54 summarizes the general trends for the queried sites. At 36 sites, chemicals applied continually decreased over time, eventually reaching zero for the most recent monitoring events. Weed infestations at these sites appear to be in control. At 21 sites, herbicides applied have fluctuated over time, but are decreasing overall compared to initial treatment records. Control appears possible at these sites. At 13 sites, applied herbicides appear to fluctuate regularly, with no obvious indication of increasing or decreasing. At a final 13 sites, the amounts applied again fluctuate over time, but most recent records indicate the chemicals needed are increasing overall.

There are numerous explanations for the sites with apparent lack of control. As discussed above, records indicate many sites are not visited as frequently as would be required in order to consistently overcome infestations with constantly regenerating plants and their sometimes extensive seedbank. Records also indicate the wrong herbicide, application rate, and application timing are responsible for a lack of efficacy following treatment. Finally, at many sites exhibiting no control, infestation boundaries are increased due

to more thorough inventory efforts. Rather than indicating a rapid increase in the population following treatment, records at these sites indicate existing plants were only discovered and treated at a later date. All records readily demonstrate the importance of multiple visits with any follow-up treatments applied at the correct time and rate.

UCWMA (Nez Perce Clearwater NF), Physical Treatment Monitoring

12 unique weed infestations have been treated physically in the UCWMA (including the Nez Perce-Clearwater National Forest), though these infestations have often been treated multiple times since 2008. All 12 sites occur on non-forestland. 10 of these sites have been treated at some point with herbicides, in addition to the physical treatment. Consequently, monitoring results are not necessarily restricted to the efficacy of physical treatment efforts alone. All 12 sites are assigned to either a 1 or 2 priority. Nine of these 12 sites have been visited by ICWC employees performing post-treatment monitoring; three have never been monitored for efficacy. Monitoring of the nine sites has been performed each year since 2009, with each site (on average) receiving three visits during the growing season. Four of the monitored sites have maintained 100 percent control since 2010. These sites had been treated with a combination or herbicides and physical treatment. The remaining five sites have had fluctuating efficacy measurements since 2011, indicating additional monitoring and follow-up treatments are warranted to ensure full infestation eradication.

Bitterroot National Forest, Quantitative Treatment Monitoring

As stated in section 3.2.1.1 (Designated Weed Crews), since 2010 the Bitterroot National Forest has been involved in designated vegetation monitoring in the CFLRP project area to determine the efficacy of past treatment efforts. Their quantitative monitoring effort seeks to measure changes in the plant community in both herbicide and control plots over time. Results are not currently available for analysis as this is an ongoing multi-year effort.

3.3.4.3 Road Decommissioning Monitoring Plots

As described earlier in sections 3.2.1.3 and 3.2.3.1, the Nez Perce-Clearwater National Forest/NPT road decommissioning teams actively monitor road-decommissioning projects in order to track the effectiveness of the program. For every 10 miles of road decommissioned, a ¼ mile-segment of decommissioned road is selected for monitoring vegetation and ground cover. Monitoring segments are established in the year they were decommissioned (year 0). Data is collected in the first, second, fifth, and tenth years after decommissioning.

Cumulative monitoring results are displayed in Figures 55 and 56. Figures are reproduced with permission from USFS road decommissioning reports; raw data was not obtained for analyses. Comparing results of recent years (data not shown) against cumulative results indicates the amount of overall vegetation is increasing for recent projects compared to previous efforts, which correlates to improving methods in revegetation on decommissioned roads (USDA Forest Service and Nez Perce Tribe 2005-2012). Weeds account for ~10% of the plant community at monitored decommissioned sites, indicating continued treatment is warranted.

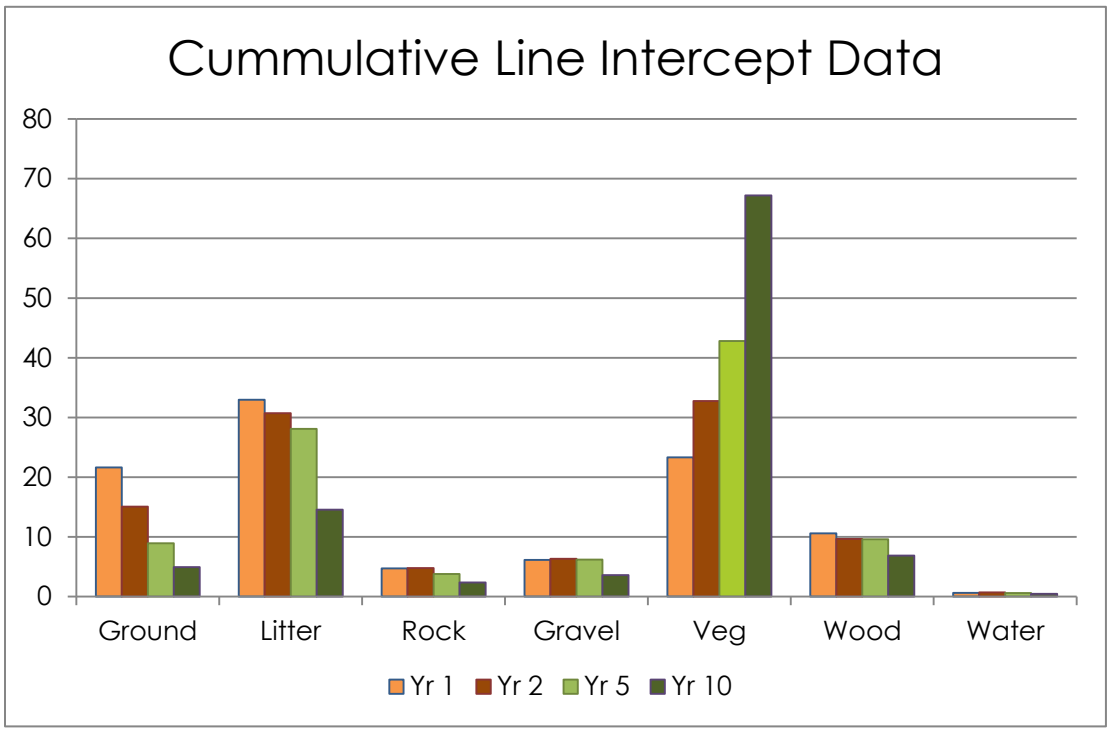


Figure 55: Changes in ground cover type over time on all decommissioned roads monitored through 2012. (Graph copied from USDA Forest Service and Nez Perce Tribe Road Decommissioning Report 2012)

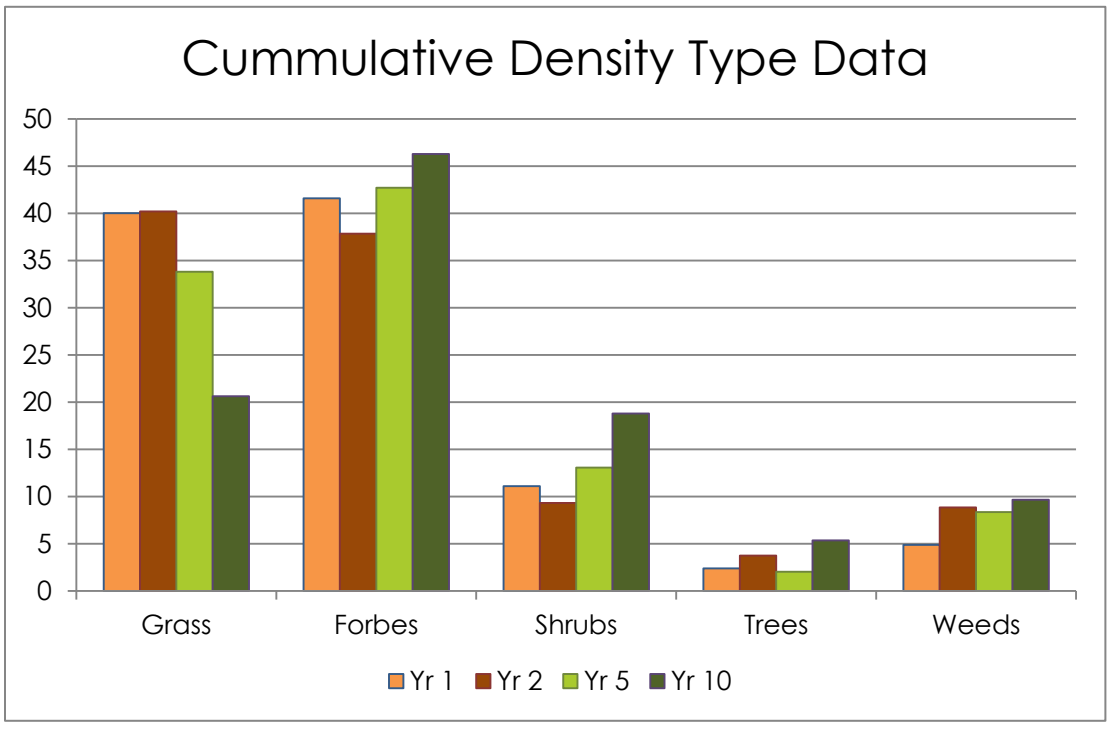


Figure 56: Breakdown of vegetative cover type changes over time on all segments monitored through 2012. (Graph copied from USDA Forest Service and Nez Perce Tribe Road Decommissioning Report 2012)

3.3.5 Education/Prevention

Weed education and prevention activities in the Selway-Middle Fork CFLRP project area involve the posting of signs (e.g. Figure 57) informing the public about the importance of preventing the introduction and spread of weeds into natural areas. Signs are posted at trailheads, wilderness portals, and many campgrounds. Certified noxious weed-free hay is required throughout forestland in the project area. Maintaining signs and checking hay are not activities formally recorded in FACTS or other USFS databases, but are done regularly on an as-needed basis by designated weed crews, wilderness rangers, other USFS personnel, and volunteers. Consequently no data is available regarding the amount, frequency, or trends of education and prevention activities.

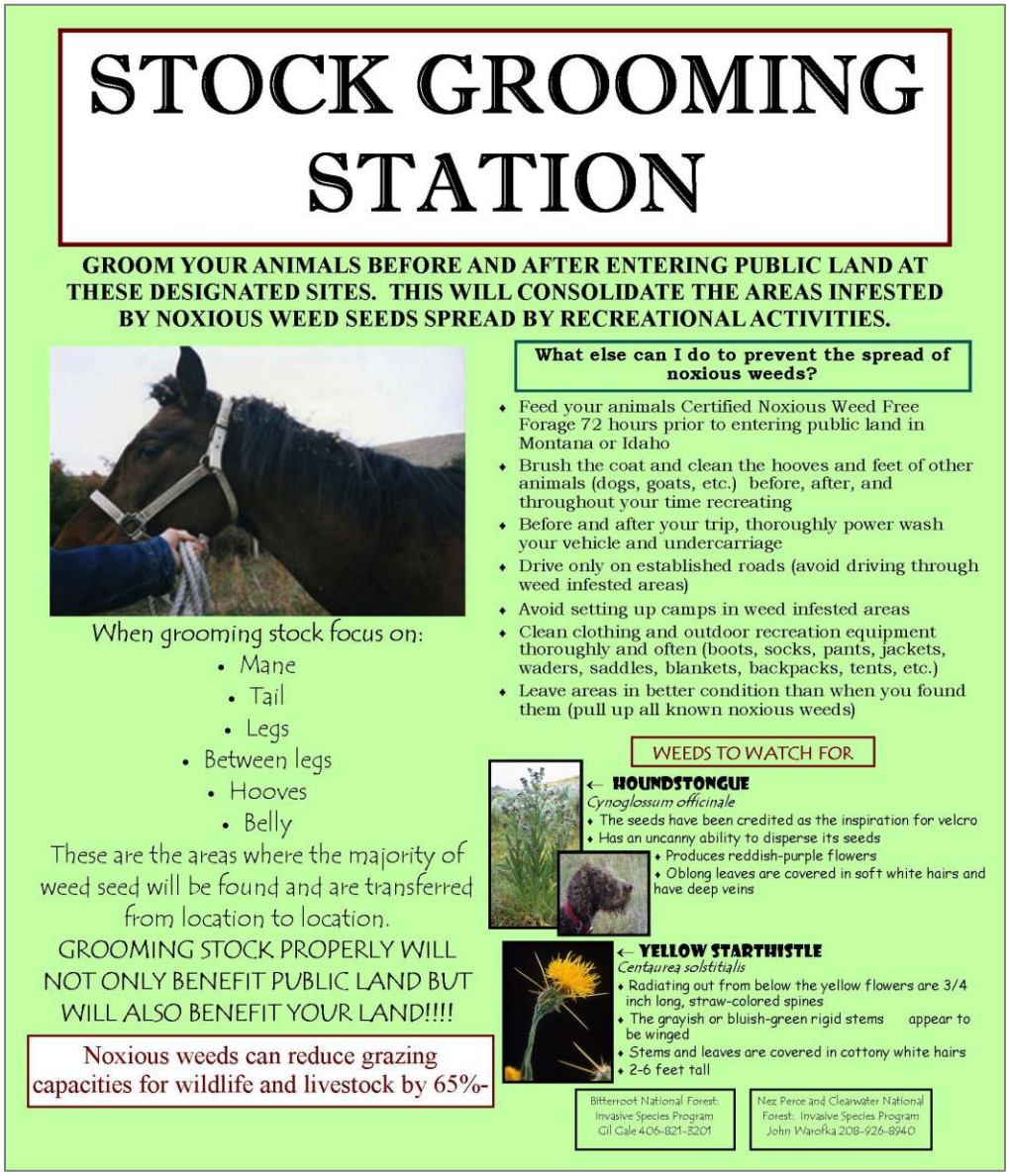


Figure 57: Weed education poster utilized in the Nez Perce-Clearwater and Bitterroot National Forests (USFS)

3.3.6 Funds Spent

As indicated in the introduction, funding for weed management has increased significantly in the region following the initiation of the Selway-Middle Fork CFLR program. Since the project's inception, funding can be tracked annually in the CFLRP project area. However, weed management funding prior to 2010 was recorded only forest-wide and cannot be queried for values pertaining solely to the project area. As the majority of the CFLRP project area overlaps the Nez Perce-Clearwater National Forest, information from this forest is herein utilized to illustrate forest-wide changes in weed management funding since the initiation of the CFLRP project.

Prior to the CFLR program, weed management in the Nez Perce-Clearwater National Forest was funded by four primary sources: Forest money appropriated annually, partner funds (largely from the Nez Perce Tribe), federal funds allocated by the Resource Advisory Committee (RAC), and Stewardship funds generated through timber sales (Figure 58). While combined funding from these sources has decreased recently, CFLRP funds have led to a substantial increase in weed management funds overall. Despite only 21.3% of the Nez Perce-Clearwater National Forest falling within the CFLRP project boundary (Figure 59a), CFLRP weed management funding more than doubles the yearly weed budget of the entire Forest (Figure 59b). (It should be noted a portion of CFLRP funding is directed to the Bitterroot National Forest.)

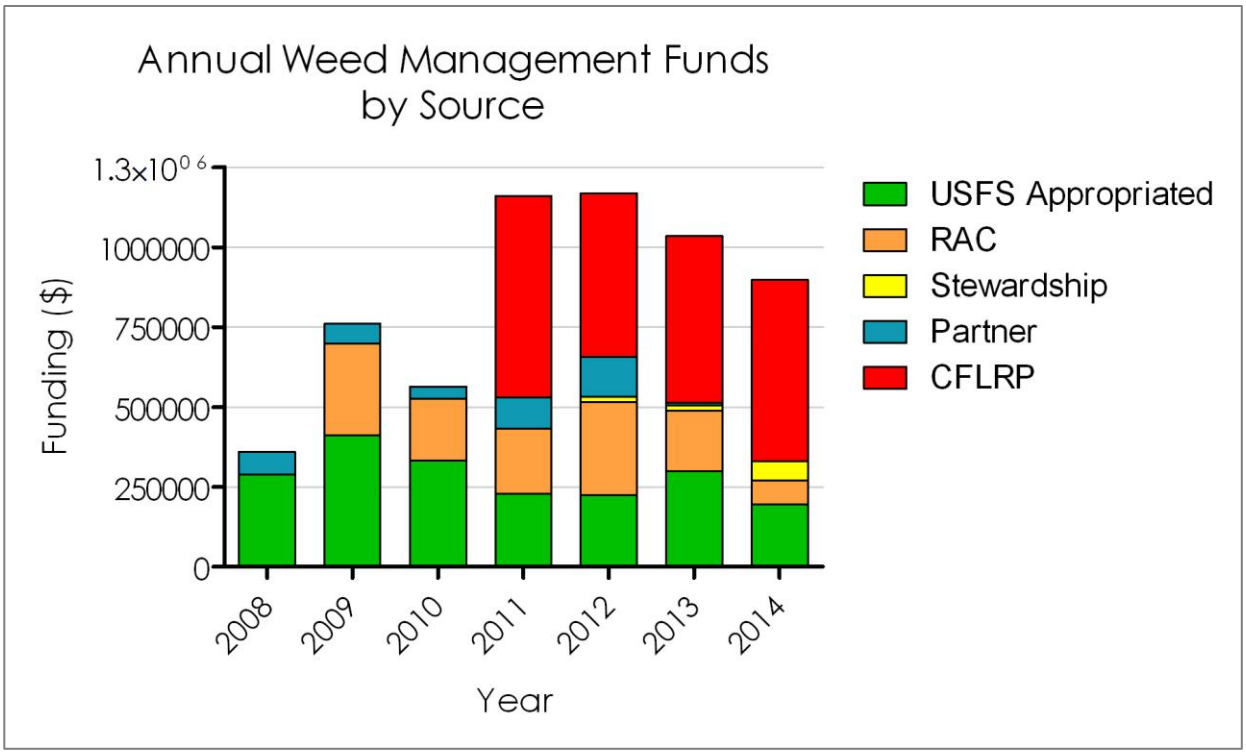


Figure 58: Weed management funding sources in Nez-Clear National Forest by year (USFS)

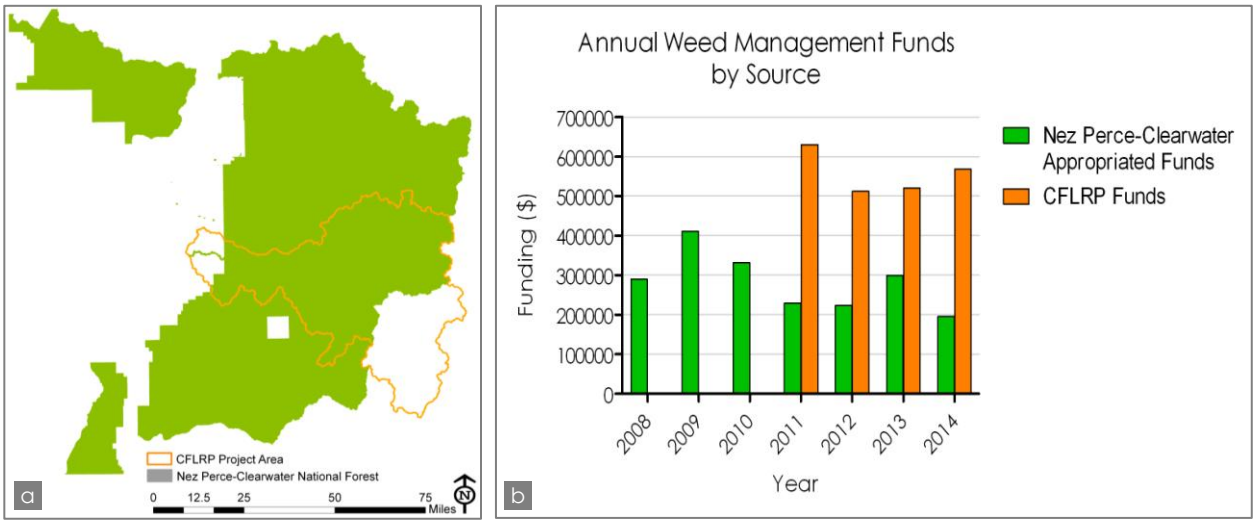


Figure 59: a) CFLRP project area in relation to Nez-Perce Clearwater National Forest, b) weed management funds appropriated annually by CFLRP and entire Nez-Perce Clearwater National Forest (USFS Administration layers, Nez-Clear National Forest)

3.4 Interview Results

Every effort was made to utilize all existing data related to weed management in order to determine the historical and current situation for weeds and their control in the Selway-Middle Fork CFLRP project area. As described throughout this assessment, existing datasets have many limitations and gaps that prevent some key management questions from being properly addressed. In order to supplement existing data, personal observations and opinions were gleaned from approximately forty stakeholders in the project area. This supplemental information is separated into seven sections and summarized below. Not all stakeholders provided usable answers to all questions posed during interviews.

3.4.1 Trends in Treatment and Education

3.4.1.1 Small Scale Treatment Efficacy

70.6% of stakeholders interviewed feel that chemical (occasionally physical) treatment methods successfully decrease weed populations where applied to small infestations along trails, roads, and campgrounds (Figure 60). 23.5% of stakeholders feel that small treated infestations largely stay the same, primarily due to the constant influx of new species and propagules. 5.9% feel that at the small scale, infestations are increasing even after treatment, due to the migration rate always surpassing the control rate. All stakeholders interviewed feel that small infestations should remain a priority for treatment in order to prevent wide scale spread such as that of present-day spotted knapweed (*Centaurea stoebe*) infestations.

3.4.1.2 Large Scale Treatment Efficacy

7.7% of stakeholders interviewed feel that overall weed populations in the project area are decreasing across the landscape due to treatment efforts (Figure 60). 53.8% feel that the most widespread species

have already filled available niches and the soil seedbank so populations are largely staying the same across the landscape, despite treatment efforts. 38.5% of stakeholders believe weed populations are still increasing across the project area in general, regardless of treatment efforts.

A few stakeholders with extensive history in the region indicated biological control of St. Johnswort (*Hypericum perforatum*) has been effective. The majority of stakeholders were largely only familiar with biocontrol efforts against spotted knapweed. Of this group, 30.8% do not feel that agents currently established will have any significant impact on the weed (Figure 60). 46.1% feel it is too soon following the release of knapweed biocontrol agents, and that more time will be needed before impacts become obvious. 23.1% feel knapweed agents are already having an impact, though 66.7% of that smaller group feels the agents at best thin the weed population and will never decrease the population as dramatically as other successful weed biocontrol programs.

3.4.1.3 Species Composition

Though difficult to quantify, most stakeholders interviewed felt that the weed issues in the Selway-Middle Fork CFLRP project area revolve around the same general group of species year after year. Only a few stakeholders felt that new species previously unrecorded in the area are a constant threat at trailheads and campgrounds and that invasive species watch lists must be updated regularly.

3.4.1.4 Infestation Size and Location

Nearly all stakeholders addressing this section indicated weed infestations are most problematic at areas of disturbance and frequent use by humans and livestock. 84.6% feel that widespread infestations of the most common species may be spreading into uninfested areas following disturbance events, but that these species are already largely established in most of their potential suitable habitat. The most common species include spotted knapweed, oxeye daisy (*Leucanthemum vulgare*), sulphur cinquefoil (*Potentilla recta*), and St. Johnswort.

3.4.1.5 Education Efficacy

Conducting education and prevention activities in the project area is a difficult endeavor because the users of the land come from all over the United States and even the world. Consequently, targeting one or just a few specific schools, businesses, or towns is insufficient. Measuring the efficacy of education and prevention efforts is even more difficult and subjective compared to the efficacy of treatment efforts. 90% of stakeholders interviewed believe that education efforts are having at least some positive impact in the project area (Figure 60), while 10% feel that users of public land are not changing behavior despite all education efforts to which they have been subjected. 50% believe that current efforts are effective and should not necessarily be increased if doing so would divert funds from other aspects of weed management programs. 40% feel education efforts are crucial for future weed management success, and funding for this avenue should be increased. The remaining 10% believe education efforts should either be altered in order to have an impact, or those resources should be directed at other weed management activities entirely.

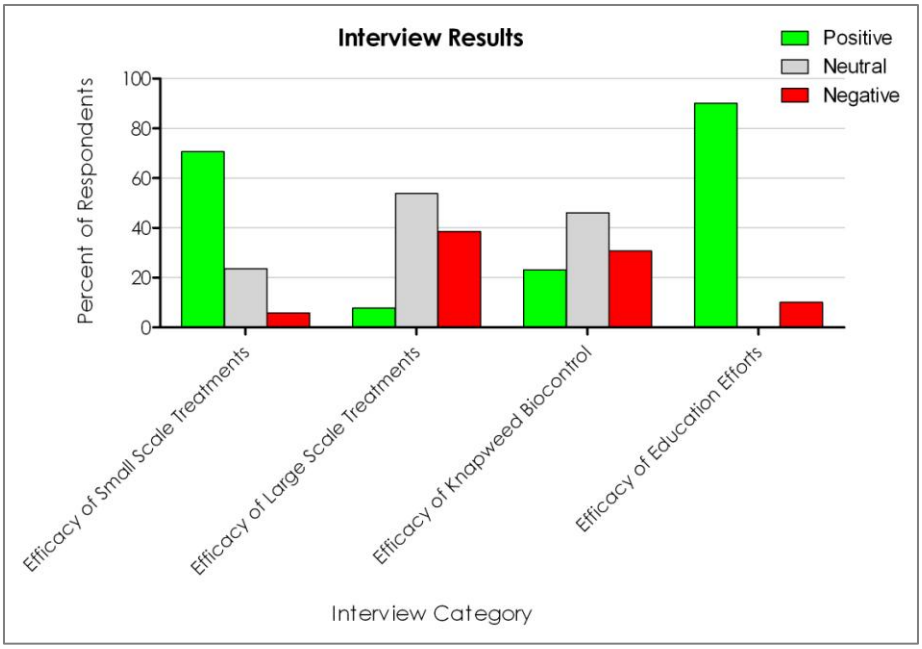


Figure 60: Stakeholder opinions (%) for efficacy of four weed management categories. (Source Stakeholder Interviews)

3.4.2 Weed Program Limitations

Stakeholders identified a lengthy number of limitations that prevent successful implementation of weed control efforts or hinder the efficacy of all treatments applied. These are summarized below in the order of decreasing importance as identified by stakeholders; items at the top were listed most frequently by multiple stakeholders. Some limitations directly influence (or are directly influenced by) other limitations listed.

1. Funding- Though the Selway-Middle Fork CFLRP project has significantly increased the funding available for weed management in the region, this funding is only temporary. Prior to the onset of the CFLRP project, limitations in funding prevented stakeholders from being able to create and maintain successful long-term programs. Fluctuating money meant: trained seasonal employees could not always be retained, experienced contractors could not be guaranteed work in the area so often left for more fruitful endeavors, infestations in need of treatment could not always be reached, objectives and goals could not be consistently reached year after year. Numerous stakeholders observed infestations that appeared under successful control to rebound after just one season when treatment was skipped. Consequently, insufficient funding not only impacts current and future weed management programs, but also affects the efficacy of past control efforts.

   One contributor to the fluctuating and typically insufficient funding available is the lack of emphasis placed on weeds issues by the USFS at the national level. 10-12 years ago, weeds were recognized for the important role they played in habitat loss and ecosystem degradation. Following subsequent changes in national USFS management positions, invasive species have become a lower priority, even though their impact on the landscape has not changed.

2. Leadership- Successful weed management in the CFLRP project area requires the cooperation of numerous groups including several divisions of the USFS, the Nez Perce Tribe, Idaho County Weed Control, multiple private groups/individuals, and volunteers. Because over 95% of the project area falls on USFS land, the USFS holds the key position for maintaining effective cooperation among all partners. Numerous stakeholders expressed their frustration with past USFS weed management leadership at the Forest level and their concern that future leaders selected for the role might not be focused sufficiently on weed management issues. As the geographic boundaries of several groups overlap, many stakeholders noted that improper management resulted in a high duplication of control efforts in some areas, the complete omission of other areas, the failing of several collaborations due to insufficient communication, and the overall decrease in the quality of treatment information collected.

   An additional concern related to leadership is the observation that while several individuals in management positions within the CFLRP project area claim to adhere to the operating plans for the associated CWMAs, the treatment records of some clearly indicate they are not following the priorities outlined in the plans. Because operating plans were designed in a collaborative manner to maximize treatment efficacy and the use of limited funds, it is frustrating to numerous partners and also to employees/contractors when they feel their efforts are disorganized and have little overall effect.

3. FACTS Reporting System- One of the limitations stakeholders most commonly cited for the FACTS database is its cumbersome design and application. Access to the system has proven difficult for some outside users, who have resorted to utilizing their own system for data management purposes and submitting information to the USFS through alternative channels. Others who have made the effort to pattern their data collection methods after the FACTS design have found that the FACTS system is not compatible with newer versions of software they would have otherwise found useful for their programs. Finally, the FACTS system is not designed to seamlessly incorporate additional information of use to weed management stakeholders in the project area. Finding a means or the time to manually enter this information into FACTS at a later date often results in the data not being entered at all.

4. Insufficient Weed Training- A handful of stakeholders expressed concern that not all stakeholders working in weed management were sufficiently trained in weed identification to recognize new invaders or lesser known established invaders. Many were concerned that public users of the land were also uneducated about new invader species and their threat to the project area.

5. Treatment Limitations- Influence from outside agencies and the public sometimes prohibits the use of effective herbicides in certain locations or at rates needed to have a sufficient impact on weed populations. Catering to these outside groups has at times limited the overall efficacy of weed treatment efforts.

6. Accessibility- Though out of control of weed managers in the region, much of the area included in the CFLRP project area is too large, rugged and inaccessible to perform regular and effective weed treatments.

7. Miscellaneous- The following limitations were mentioned infrequently by interviewed stakeholders:

a. Site Disruption- Those working in biological control have returned to many clearly-marked biocontrol release sites, only to find that weed populations have been subjected to chemical or mechanical control and are hence ruined for their biocontrol potential.
b. Contractors- Though some agencies/groups have had tremendous success with private contractors, others have found that poor contracting work can have significant nontarget effects which can do more harm to plant communities than the weeds themselves.
c. Varying Methodology- Some contractors work on numerous projects and have found it difficult to constantly change the management methodology depending on the micro location of work being conducted. Some sites require generic paper logs while others require detailed entries in GIS programs on PDA's. In addition to changing data collection requirements, the species and priorities can also change dramatically in the same general area, depending on the objectives of the specific sub group leading the project.

3.4.3 Recommendations

Stakeholders identified a lengthy number of recommendations that may help increase successful implementation of weed control efforts. These are summarized below in the order of decreasing importance as identified by stakeholders; items at the top were listed most frequently by multiple stakeholders.

Fill the Forest-level weed management position with someone passionate about communication, outside collaboration, consistency, and modern technology/research in order to create an effective, long-term weed management program.
Utilize the opportunities provided by the CFLRP project to maximum extent such that an effective weed management program is created and sufficient support is obtained so that the program becomes permanent and receives adequate/consistent funding from year to year. Explore all means possible to help make weed management funding self-sufficient and sustainable.
Increase weed management partnerships among interested external individuals and groups. Amidst declining federal funds, external individuals and groups are often more likely to be on the ground and are currently under-utilized as a resource in weed management.
Provide workshops, etc. for weed management personnel and the public to increase training in weed identification (especially new invaders), the most effective chemical control methods and timing, and the proper implementation of biological control.
Increase survey efforts to gain a solid understanding of weed infestations currently present in the entire CFLRP project area, utilizing aerial photos and susceptibility models to make the surveying of large and remote areas more feasible.
Increase the amount of information collected during weed management efforts such that areas known to be free of weeds are documented and incorporated into the USFS weed inventory layer.
Utilize changes in native/desirable plant composition to document weed management efficacy rather than using gallons, miles or acreage treated. The ultimate goal is to increase the health and productivity of managed areas so desirable species should be increasing following treatment, rather than treated weeds persisting or even being replaced by other weeds.
Change the structure of the invasive species portion of FACTS such that monitoring information can be seamlessly incorporated (and required) and such that the program is compatible with new versions of software utilized by various stakeholders.

Update infestation prioritizations in the different weed management areas with an emphasis on addressing things at the local scale rather than forest-wide. A species considered well established and a low priority on private land might be considered a new invader in forestland and should be prioritized as such to prevent its establishment in forestland.
Maintain prevention efforts. Although complaints are often recorded from individuals who believe weed free hay is too expensive when weeds such as spotted knapweed are already widespread in the wilderness, the use of weed free hay and other practices may have ensured that other weeds did not establish and spread similar to spotted knapweed.
Change contracting requirements such that high priority goals are accomplished, rather than a set number of acres. When contractors are hired by acre, they may be influenced to only treat widespread and low priority infestations. When contracted by hour, insufficient emphasis may be placed on accomplishments.
Contractors should be required to monitor infestations they treat if herbicides have been applied previously. This information would not differ significantly from the data they already log when recording the acreage and species of weeds present and the amount of chemicals applied. This would significantly increase monitoring data and efficacy.
Have cooperators follow existing CWMA operating plans as they annually agree to do anyways. Cooperators should follow through on all treatments and monitoring visits agreed upon annually.
Increase involvement with private landowners on their own land because treating adjacent public land can otherwise be futile.
Improve appearance/design of weed education signs to increase the probability of being read and followed by land users.
More emphasis should be placed on areas of cultural importance such as meadows for camas, riparian zones, etc., and less emphasis on roads which are going to be continually disturbed.
Increase communication between biological control and chemical/mechanical control activities such that practitioners of each are informed of other activities in the area.
Take steps to increase morale within the USFS and its contractors such that stakeholders take greater ownership in performing effective weed management activities.
Extend the length of effective contracts such that good contractors can be retained for quality work for longer periods of time.
Update trailhead signs more regularly to include up and coming new invaders.

4. Conclusions

Several objectives were posed by the Clearwater Basin Collaborative (CBC) at the onset of this weeds assessment, including: the identification of stakeholders and all of their weed management activities, the gathering of baseline data for weeds present in the Selway-Middle Fork CFLRP project area and their treatment history, the determination of treatment efficacy and reasons for successes/failures, and identification of ways in which weed management can be improved in the project area. This section summarizes all information stated throughout the report and addresses trends and the future outlook for weed management in the project area.

4.1 Stakeholders

The US Forest Service (USFS) is the largest weed management stakeholder in the CFLRP project area, managing 95% of the total land. The project area spans two National Forests, two federally designated wilderness areas and four ranger districts. Weed management differs according to these boundaries and also differs according to the four general management categories most affiliated with weed treatment and monitoring in the USFS: designated weed crews, timber harvest, road decommissioning/restoration, and fire management. Consequently, weed management within the USFS has many layers and facets. Outside of the USFS, weed management stakeholders include Idaho County Weed Control (ICWC), the Nez Perce Tribe (NPT), private contractors, the Back Country Horsemen of North Central Idaho (BCHI or NCI), the Montana Conservation Corps (MCC), outfitters and guides, the Selway-Bitterroot Frank Church Foundation (SBFC), and private landowners and volunteers. Two cooperative weed management areas actively attempt to coordinate the management efforts and resources of the stakeholders in the project area via strategic management plans and annual operating plans: the Upper Clearwater CWMA and the Frank Church-River of no Return CWMA. Though both CWMA management plans offer clear approaches for effective cooperative weed management, the implementation of the plans is completely dependent on the stakeholders. As discussed throughout this weeds assessment, the goals, activities, and accomplishments of individual stakeholders can vary tremendously from each other, as well as from those of the CWMAs in which they operate.

4.2 Inventory Efforts and Data

Weed inventory has been conducted largely by USFS designated weed crews, ICWC employees and contractors, the NPT and SBFC. Inventory efforts vary. Some stakeholders utilize handheld GPS units with GIS capabilities to electronically map the weed species, density, location and extent of infestations. Others utilize paper to record the species, rough location, and general infestation size. Not all inventory information is entered in the Invasive Species Activities section of FACTS. Data sources queried for this assessment yielded inventory records (some just presence/absence) from 1980-2013. Through 2013, 48 weed species have been documented in the project area; only 36 of these are present in the FACTS inventory layer.

The majority of inventory data obtained for this assessment only indicates the presence of infestations encountered. Areas with no infestations documented could be free of weeds, or could simply not have been checked for weeds to date. The NPT Biocontrol Center (NPBC) inventory crew is the one stakeholder that documents all locations covered during inventory efforts, utilizing point notes to designate surveyed areas found to be free of weeds. As their inventory efforts have only targeted select

sections of the project area, it remains unknown what proportion of the project area has been fully inventoried for weeds to date.

The majority of inventory efforts target new areas rather than revisiting and documenting change in previously mapped infestations. Monitoring efforts *are* regularly conducted in the project area (see below), but this typically results in changes to the percent cover of the weed rather than the boundaries of the mapped infestation. Of the 1349 individual infestations documented in the CFLRP project area in FACTS, the boundaries of only 43 were altered following subsequent monitoring visits. Most of these 43 increased over time, not necessarily due to spreading weeds, but rather due to inventory efforts being applied to a larger area.

The combination of these caveats stated above indicates existing weed inventory data cannot be used to track either treatment efficacy or natural weed spread over time across the project area.

4.3 Treatment Efforts and Data

Weed treatments in the CFLRP project area have been applied by USFS designated weed crews, ICWC employees and contractors, the NPT, private contractors, the BCHI of NCI, the MCC, and private landowners and volunteers. Treatments have spanned three categories to date: biological, chemical, and physical.

4.3.1 Biological Treatments

Biological control agents have been released by USFS personnel, ICWC employees, the NPT, the MCC, and private contractors. 399 releases have been made in the CFLRP project area since 1983 including more than 99,000 individuals of 12 species targeting spotted knapweed, yellow starthistle or field bindweed. 391 of recorded releases have targeted spotted knapweed. Unrecorded releases of *Chrysolina* beetles targeting St. Johnswort were likely made in the mid 1900's. The species, stage and number of individuals released, target weed, release location, release personnel, and GPS coordinates are recorded for each documented release. Some of this information is entered into FACTS, along with an accompanying 5-acre treatment polygon to simulate the potential spread and impact of released agents. Releases are also entered into the statewide biocontrol release database the NPBC maintains for the state of Idaho. The FACTS database is incomplete for biocontrol releases in the project area, so the NPBC database was utilized in this assessment.

4.3.2 Chemical Treatments

Chemical treatments have been applied by USFS designated weed crews, ICWC employees and contractors, the NPT, private contractors, the BCHI of NCI, the MCC, and private landowners and volunteers. Herbicides and rates are dictated by Environmental Impact Statements specific to each USFS region of the project area, and are supplemented by efficacy knowledge shared among CWMA members. All chemically treated infestations are recorded in FACTS, along with the species and location of infestations, herbicides and rates used, date applied, and applicator. Some stakeholders utilize handheld GPS units with GIS capabilities to electronically map the weed infestations treated; others use hard copy treatment logs only. Since 2012, treatment records entered in FACTS have required a spatial component. Spatial treatment data prior to 2012 is sparse, so tabular information was largely utilized in this assessment. There is considerable flexibility in the interpretation of required data fields in the FACTS system. Consequently, data obtained for the Nez Perce-Clearwater National Forest could be used for

certain analyses and conclusions, while data from the Bitterroot National Forest could only be used in different analyses.

In the Nez Perce-Clearwater National Forest, 28 weed species have been chemically treated since 2000. The number of infestations treated has increased regularly from 2000-2013, but dramatically so from 2009 onwards. The majority of infestations treated to date have been assigned a priority 3 by the UCWMA (701). 87, 319, and 93 infestations assigned to priority 1, 2, and 5, respectively, have been treated since 2000. The total acres treated have followed a similar pattern with 496, 3,355, 15,757, and 982 acres having been treated that were assigned to priority 1, 2, 3, and 5, respectively. Many treatments are re-visits; the number of infestations and treated acreage are counted again in subsequent visits. The lower numbers of priority 1 infestations and acres treated are not indicative of this category receiving less attention than it should. Rather, it may help illustrate that fewer patches of new invaders exist in the project area compared to more established weeds.

In the Bitterroot National Forest, 16 weed species have been chemically treated since 2007. The manner in which herbicide treatments are recorded in this region prevents the splitting out of weed species both spatially and tabularly. Contractors and USFS designated weed crews often record treatments according to search areas. At the close of the treatment span, treatment logs indicate all weeds encountered and total herbicides applied for the given area. Records do not break down the acreage, priority, herbicide applied, and spatial location of individual weed species; all information is lumped. Contrary to the Nez Perce-Clearwater National Forest, the manner in which the Bitterroot National Forest records treatment information allows for the tabular tracking of total acres surveyed, rather than just acres actually treated with herbicides (wetted acres). Survey efforts have increased dramatically since 2010, though wetted acres have decreased since 2011. These results indicate that while more area is covered during weed surveys, fewer infestations are encountered and treated. 5,363 acres have been surveyed since 2007, while 727.2 acres have been wetted. Though these totals are less than for the Nez Perce-Clearwater National Forest, it's important to note the Bitterroot National Forest comprises only 28.7% of the forestland in the CFLRP project area, and herbicides were heavily restricted in the Selway-Bitterroot Wilderness until 2010.

4.3.3 Physical Treatments

1855 acres within the Selway-Middle Fork CFLRP project area have been treated with physical control methods since 2008, all fall within the UCWMA but on non-forestland. Though seven species have been physically treated, the vast majority were infestations of garden yellowrocket (*Barbarea vulgaris*), a species targeted for immediate eradication as a new invader.

4.4 Rehabilitation Efforts

The majority of stakeholders in the Selway-Middle Fork CFLRP project area typically do not participate in dedicated rehabilitation efforts related to weed management. Many infestations treated by stakeholders in the project area consist of weed patches interspersed with native/desirable vegetation. When native or more desirable species make up more than 30% of the overall plant cover, the simple act of removing the competing weeds may be sufficient to tip the balance back in favor of the native/desirable species (Goodwin et al. 2006). In this manner, weed treatment itself serves as an important step in site rehabilitation. Measuring native/desirable species cover is not currently a requirement in weed treatment records, so no rehabilitation data is available for the majority of weed treatment records queried from FACTS and other sources in this assessment.

Rehabilitation is a key component to restoration activities carried out by road decommissioning crews and the NPT Watershed Division. Roads assigned to abandonment are protected from future soil disturbance, thus preventing the further creation of weed microhabitats and the spread of weeds. Revegetation is included in all decommissioning projects for roads not assigned to simple abandonment. Native species already growing in the project area are preferentially used in re-plantings, followed by nursery-grown stock and seed mixes containing native and desirable exotic species. Monitoring is conducted at a subset of all restoration sites to track the effects of road decommissioning efforts (including revegetation and weed treatment) on the plant community and nearby streams (see below).

4.5 Prevention/Education Efforts

ICWC, NPT Watershed Division, NPBC, and the BCHI of NCI all conduct workshops and/or give presentations to land managers, schools, and the interested public which provide training on weed identification and control methods and the importance of weeds in the environment. ICWC, NPT Watershed Division, and NPBC also distribute weed identification and control material to land managers and the public. USFS personnel, ICWC and the NPT all post signs informing the public about the importance of preventing the introduction and spread of weeds into natural areas. Signs are posted at trailheads, wilderness portals, and many campgrounds. Certified noxious weed-free hay is required throughout forestland in the project area. Maintaining signs and checking hay are not activities formally recorded in FACTS or other USFS databases, but are done regularly on an as-needed basis by USFS personnel, ICWC and volunteers with the BCHI of NCI. Consequently no data is available regarding the amount, frequency, or trends of education and prevention activities.

4.6 Funding

Over 2 million dollars of CFLRP funding has gone towards weed control efforts since the inception of the Selway-Middle Fork CFLRP project. These funds have led to a substantial increase in weed management funds overall. Despite only 21.3% of the Nez Perce-Clearwater National Forest falling within the CFLRP project boundary, CFLRP weed management funding more than doubles the yearly weed budget of the entire Forest. (A portion of CFLRP funding is also directed to the Bitterroot National Forest.)

4.7 Monitoring Efforts and Trends

4.7.1 Biological Treatments

Simple presence/absence of biocontrol agents has been recorded at 122 sites in the CFLRP project area by employees of the NPBC and private contractors. Ten biocontrol species are established, eight attacking spotted knapweed. *Larinus* spp. attacking spotted knapweed are by far the most abundant. Observations regarding the two *Chrysolina* beetles on St. Johnswort in the project area are only anecdotal. Since their introduction in the 1950's, *Chrysolina* spp. and their host have followed a boom/bust cycle. Considerable fluctuations in St. Johnswort plant numbers still occur in Idaho today, and the weed appears to be more locally abundant than in recent history. However, its current abundance is significantly less than what it was in the 1930's and 40's. Redistributions of *Chrysolina* are recommended where agent populations have crashed locally following past successful reductions in the weed. Redistributions should be made to open, sunny areas as both *Chrysolina* spp. have limited impact in heavily timbered and shaded regions.

At 22 sites, NPBC employees or private contractors measured agent populations, and at 12 of these, vegetation readings were recorded along permanent transects. Some sites have been visited only once and so are only capable of serving as baseline measurements for future monitoring efforts. At five sites (all for spotted knapweed), biocontrol monitoring data was collected for at least two consecutive years, allowing for across-year comparisons. Looking strictly at percent of spotted knapweed cover, at only one of the five sites did spotted knapweed decrease significantly from one year to the next. At this same site, the most prevalent biocontrol agent (*Larinus* spp.) decreased significantly as well, suggesting it was not responsible. *Chaetorellia acrolophi* was the only other biocontrol agent observed at this site, but always in much smaller numbers than *Larinus* spp., indicating its role is minor. At all other vegetation monitoring sites, spotted knapweed cover did not change between monitored years.

In many interviews with stakeholders, it is apparent many believe biological control is still a viable control method for spotted knapweed in the CFLRP project area. This is evidenced in the dramatic increase in releases of *Cyphocleonus achates* since 2008. While there have been increasing reports from stakeholders regarding elevated establishment of *C. achates* in the project area, the documented results to date do not reflect this. 31,095 *C. achates* have been released on spotted knapweed in the project area since 1994, while 36,460 *Larinus* spp. have been released since 1996. Despite the similar amounts and time frame, *Larinu*s spp. have been recovered at 106 sites, while *C. achates* has only been recovered from 7. *C. achates* reportedly thrives in areas with large, non-linear patches greater than ~5 acres, at mid elevations between ~3,000 and 5,000 ft, with sandy/gravelly soil and hot summers. Many of the *C. achates* release locations in the CFLRP project area to date do not exhibit all of these characteristics. Consequently, though this agent is established, population growth at most of the unsuitable sites would not be expected to reach the high levels observed elsewhere in North America where the agent had significant (if still insufficient in some areas) impact on spotted knapweed populations.

Additional time and consistent monitoring efforts are needed to fully understand the impact of biological control on spotted knapweed in the CFLRP project area. Existing information indicates any future releases on spotted knapweed should only be made in large patches growing under conditions conducive to high agent population growth (long/hot summer temperatures, mid elevation, sandy soil). At most areas in the project area where these conditions do not exist, alternative control methods should be employed.

4.7.2 Chemical Treatments

In both the Bitterroot and Nez Perce-Clearwater National Forests, it is a requirement that 50% of acres treated be monitored in order to receive credit for treatments. This usually entails simple ocular measurements of the percent control for the treated weed (i.e. the percentage of treated plants killed). Percent control can be a very subjective measurement because it requires knowledge of the infestation prior to the original treatment. However, many individuals conducting monitoring (typically USFS designated weed crews or ICWC employees) were not present at the infestation originally. Average overall control for anecdotally monitored sites in each Forest was just above 94% (2008-2013). 159 out of 489 monitoring visits indicated 100% control, though some populations later recovered from the soil seedbank. Monitoring information from FACTS does not indicate the priority of the infestation monitored, nor does it indicate if the infestation was treated again where monitoring demonstrated 100% control was not achieved.

In the UCWMA, infestations treated chemically or physically according to an eradication objective (new invaders and satellite populations, or priorities 1 and 2) are ideally visited three times during a single growing season to ensure the complete eradication of the infestation. The percent control from previous

treatments are recorded and entered into FACTS, as described above, as well as a more detailed monitoring database maintained by ICWC that includes additional records, treatment priority, and information on follow-up treatments. Records from the ICWC database illustrate that of the 425 unique weed infestations that have been treated chemically in the UCWMA (including the Nez Perce-Clearwater National Forest) since 2000; 113 have been monitored at least once since 2009 (571 monitoring visits total). Despite the UCWMA strategic plan calling for the monitoring of 1 and 2 priority sites three times each year, this does not often occur. Of all high priority sites treated since 2000 (100 total), only 10 sites received 3 or more visits during the 2013 growing season, and eight of these were on non-forestland. 31 and 13 sites received 1 and 2 visits, respectively. 48 high priority sites did not receive any monitoring visits in 2013, though three of these were first inventoried and treated late in 2013 when there was insufficient time left in the season for follow-up monitoring. In 2010 and 2011 the total number of sites monitored was nearly equal to the number of sites treated. However, in 2009, 2012 and 2013, the number of sites monitored was less than half of sites treated. Out of 571 total monitoring visits ever recorded in the UCWMA, only 34 of these occurred on forestland, indicated Nez Perce-Clearwater National Forest is not actively following the strategic plan guidelines for the UCWMA.

Average overall control for monitored sites in the ICWC database was approximately 82%. Any readings less than 100% are subjective, so comparing average percent control across years would not be an accurate method for tracking treatment progress. Readings of 100% control are the only readily interpretable measurements and can be used to track treatment progress at the site level. Infestations with 100% control reported for one or more monitoring visits were queried from the FACTS treatment dataset in order to track changes in chemicals applied at these sites over time. At 36 sites, chemicals applied continually decreased over time, eventually reaching zero for the most recent monitoring events. Weed infestations at these sites appear to be in control. At 21 sites, herbicides applied have fluctuated over time, but are decreasing overall compared to initial treatment records. Control appears possible at these sites. At 13 sites, applied herbicides appear to fluctuate regularly, with no obvious indication of increasing or decreasing. At a final 13 sites, the amounts applied again fluctuate over time, but most recent records indicate the chemicals needed are increasing overall.

There are numerous explanations for the sites with apparent lack of control. As stated above, records demonstrate many sites are not visited as frequently as necessary to ensure lasting eradication. Records also indicate the wrong herbicide, application rate, and application timing are responsible for a lack of efficacy following treatment. Finally, at many sites exhibiting no control, infestations weren't fully inventoried initially so subsequent visits revealed larger patches than originally recorded and herbicides applied necessarily increased. All records readily demonstrate the importance of multiple visits with any follow-up treatments applied at the correct time and rate.

As stated above in section 4.3.2, in the Bitterroot National Forest, survey efforts have increased dramatically since 2010, though wetted acres have decreased since 2011. These results indicate that while more area is covered during weed surveys, fewer infestations are encountered and treated. Since 2010 the Bitterroot National Forest has been involved in designated vegetation monitoring in the CFLRP project area to determine the efficacy of past treatment efforts. Their quantitative monitoring effort seeks to measure changes in the plant community in both herbicide and control plots over time. Results are not currently available for analysis as this is an ongoing multi-year effort.

4.7.3 Physical Treatments

Nine of the total 12 physically treated sites have been visited by ICWC employees performing post-treatment monitoring. All sites occur on non-forestland. Monitoring of the nine sites has been performed

each year since 2009. All nine sites are assigned an eradication objective, and each site has (on average) received three visits during each growing season, in line with the UCWMA strategic plan. Four of the monitored sites have maintained 100 percent control since 2010. These sites had been treated with a combination or herbicides and physical control. The remaining five sites have had fluctuating efficacy measurements since 2011, indicating additional monitoring and follow-up treatments are warranted to ensure full infestation eradication.

4.7.4 Rehabilitation

Measuring native/desirable species cover is not currently a requirement in weed treatment records, so no rehabilitation data is available for the majority of weed treatment records queried from FACTS and other sources in this assessment. The Nez Perce-Clearwater National Forest/NPT road decommissioning teams actively monitor road-decommissioning projects in order to track the effectiveness of their program. For every 10 miles of road decommissioned, a ¼ mile-segment of decommissioned road is selected for monitoring vegetation and ground cover. Data is collected in the first, second, fifth, and tenth years after decommissioning. Results indicate rehabilitation efforts are successful at *some* decommissioned sites as the amount of overall vegetation is increasing for recent projects compared to previous efforts. This correlates to improving methods in revegetation on decommissioned roads. Weeds account for ~10% of the plant community at monitored decommissioned sites, indicating continued treatment is warranted.

4.8 Revisit of Objectives

This assessment thoroughly addresses the objectives stated in section 1.2 of the introduction. In addition to those objectives, at the initiation of this weeds assessment, the CBC intended for the information gathered to be utilized in addressing:

1. Whether restoration treatments are establishing native communities
2. Whether control efforts minimize weeds post-disturbance
3. Whether overall occurrence of weeds across the landscape is decreasing
4. If there are opportunities for more effective use of resources among partners

1. Restoration is not a primary objective of weed management programs in the CFLRP project area. Consequently, including the analysis of restoration treatments as an objective of this assessment is really not representative of current weed management activities. Weed programs presently focus more on weed inventory, treatment, treatment monitoring, and education/prevention. Weed treatment, itself, is an important component of restoration in that removing invasive species allows for the resurgence of native plant communities (provided native species are still present at treated sites). However, the majority of weed control monitoring conducted to date does not measure native species. Most weed monitoring also does not address whether native species or secondary invaders fill niches left by treatment efforts. Small-scale quantitative monitoring efforts are underway in portions of the Selway-Bitterroot Wilderness to track efficacy of herbicide treatments. Though data is not yet available, species composition and cover are measured in these monitoring efforts and will aid in understanding plant succession following treatment. Restoration is a key activity in the road decommissioning program. Thought not representative of the entire CFLRP project area, monitoring conducted by the USFS and NPT decommissioning teams indicates revegetation efforts are proving successful *at some sites* by restoring native plant communities following disturbance caused by decommissioning activities.

2. Disturbance sources in addition to road decommissioning activities include timber harvest, fire, and land usage by people, livestock and big game. Sites with these disturbance factors are high priorities for treatment. At the individual site level, the data shows treatment efforts can result in successful control post-disturbance.

3. The limited monitoring data available indicates treatment of new invaders is crucial, and control can be achieved at the individual site level when multiple follow-up visits and treatments are made on a regular basis. Personal observations of stakeholders working in the area for multiple years suggest weed populations targeted at select sites decrease following diligent follow-up treatment, while widespread weed infestations are largely staying the same. Because most inventory efforts conducted to date do not document weed-free areas, it is unknown how much of the project area has been fully surveyed for weeds. Though inventory has increased steadily each year, these efforts often target new areas. A full inventory of the entire project area (including quantitative measurements of plant community composition) followed by repeat visits that spatially document changes in existing plant populations are both necessary before trends can be identified at the landscape-scale.

4. Weeds are a serious concern in the project area due to their extensive negative impacts on native plant communities, game habitat, water quality, fire and nutrient cycling, and cultural heritage. The remote and rugged topography of the area as well as decreasing federal funding have made weed management a very difficult endeavor. Chronically under-funded and under-manned weed programs have resulted in control efforts not being able to keep up with treatment needs. The CFLRP project has brought some much-needed funding and attention to weed management. Weed control efforts in the project area have increased dramatically since its inception, and anecdotal observations indicate their impacts are significant.

The baseline data gathered in this weeds assessment highlights the *immense* effort put into weed management by numerous stakeholders and lays the groundwork for measuring treatment efficacy in the future. The data also (along with stakeholder observations) highlights numerous gaps and limitations in current weed management activities. Because the CFLR program will continue through 2019, it is crucial that these gaps and limitations be addressed now in order to maximize the use of remaining CFLRP resources. The following section provides key recommendations for improving weed management in the project area in order to increase the efficiency and long-term efficacy of weed control programs. Examples are given from the data collected for this assessment to place each corresponding recommendation into the appropriate context. In addition to those listed below, the recommendations suggested by interviewed stakeholders (see section 3.4.3) provide an important guide for improving weed management.

*Because the majority of land in the CFLRP project area is administered by the USFS, most recommendations stated below are directed to that agency.

5. Recommendations

Organization Structure

The most effective weed management program is one that has solid leadership. The Selway-Middle Fork CFLRP project area covers an extensive amount of land with numerous administrative boundaries and

multiple stakeholders. Strong leadership is essential for coordinating the myriad of weed management activities occurring in the region, upholding and creating new partnerships, synchronizing data collection and treatment methods, and maintaining an effective overall weed management vision.

> Example: Data collected for this assessment and observations of interviewed stakeholders both illustrate inadequate weed management leadership in the Nez Perce-Clearwater National Forest has led to a wasting of limited resources by: duplicating efforts in some places and skipping essential efforts in others, causing a breakdown of external partnerships, reducing employee morale and subsequent efficacy, and failing to perform on pre-agreed activities for the UCWMA annual operating plan. Stakeholders, analyzed data, and CWMA records all highlight an overall lack in USFS **commitment** to strategic and coordinated planning, **dedication** to implementing the annual operating plan, and meaningful **evaluation** to assess program deficiencies and efficacy and adjust the next round of actions.

Re-structuring or appointing a new forest-wide leader or team is crucial for the success of weed control efforts in the project area. A good leader or team is: accountable, persuasive, supported by Forest leadership, committed to a long-term weed control program, and highly skilled in communication, organization, technological application, and integrated weed management on a large scale.

Accountability

Once an effective leader is in place, it is necessary that leader has sufficient authority so that weed management decisions can be implemented. This is presently not the case in the Nez Perce-Clearwater National Forest where the current organization structure does not lend itself to accountability. District weed management personnel answer to rangers rather than weed program leaders. Program leaders cannot directly implement weed management objectives; they must rely on rangers making their employees accountable for achieving invasive management goals, something that is not currently happening.

> Example: Monitoring data clearly illustrates the priorities of the UCWMA strategic plan are not being followed. Though the Nez Perce-Clearwater National Forest weed personnel verbally support the UCWMA strategic plan, which calls for high priority infestations to be treated and subsequently monitored three times annually, only 10 of 100 high priority sites were monitored sufficiently in 2013. Only two of these 10 sites occur on forestland.

The UCWMA plan was developed in a collaborative manner based on proven weed management research in order to maximize the effectiveness and efficiency of weed control efforts. When the plan is not followed, some weed management activities become futile and a waste of resources. Accountability for implementation is necessary to ensure all essential weed control activities are completed and in the timeframe and manner determined to be most effective by the CWMA.

Funding

Though the Selway-Middle Fork CFLRP project has significantly increased the funding available for weed management in the region, this funding is only temporary. Prior to the onset of the CFLRP project, limitations and fluctuations in funding prevented weed managers from being able to create and maintain successful long-term programs.

> Example: Interviewed stakeholders explained that insufficient and fluctuating money means: trained seasonal employees and experienced contractors cannot always be retained, infestations in need of treatment cannot always be reached, and objectives and goals cannot be consistently achieved year after year. Stakeholders also observed infestations that appeared under successful control rebounded after just one skipped season. Consequently, insufficient funding not only impacts current and future weed management programs, but also affects the efficacy of past control efforts.

Invasive plants must be recognized as a significant and persistent issue in land management, and dedicated (sufficient) funding must be allocated annually and consistently in order to develop the most effective long-term weed management programs.

Inventory

A crucial component for measuring success in weed management is being able to track populations over time. This requires knowing the locations, boundaries, and plant densities of weed infestations and having multiple years of data so that changes in any of those variables can be tracked. This is not currently possible with the inventory data in the CFLRP project area.

> Example: Aside from the NPBC, most stakeholders only document infestations they encounter rather than all places they searched. Consequently, it is unknown how much of the project area has been inventoried to date. In addition, some existing weed polygons are now known to be inaccurate. Many infestations are not visited again following treatment, making across-year comparisons impossible. Finally, percent cover or plant density within weed infestations are not consistently or accurately recorded for mapped infestations.

Inventory efforts should be conducted throughout the entire project area, including re-visits to infestation boundaries known to be inaccurate. Inventory data collection should also be changed to require documentation of areas surveyed and found to be free of weeds, as well as measurements of weed density or cover. This would ensure all surveyed areas are elucidated, that native-dominant areas in need of protection are identified, and that weed populations are less subjectively measured. The term "weed free" requires more rigorous defining in order to implement more usefully and reliably.

Treatment Data Collection and Entry

The FACTS database has consolidated and somewhat standardized the manner in which invasive species treatment information is recorded throughout the USFS-managed lands in the United States. However, there remains much flexibility for the ways in which some data fields can be interpreted. Consequently, weed data queried from the system can lead to strikingly differing results when analyzed by different users. This inconsistency makes drawing conclusions on a large scale impossible.

> Example: Treated weed infestations in the Nez Perce-Clearwater National Forest are separated by species, whereas infestations in the Bitterroot National Forest have all treated species lumped together in a given area. The interpretation for treated acres also differs between forests. In the Nez Perce-Clearwater, "treated acres" refers to acres of the target weed that were actually wetted with herbicides. In the Bitterroot National Forest, the same category is used to record acres surveyed (gridded) for any target weeds.

A user group should be queried and trained such that all stakeholders collecting weed management data will record the same categories of information in the same manner and be in agreement on the interpretation of fields and values. All information should be entered into FACTS in the same manner across all forests and users. Not only would this streamlining allow for the accurate comparison of all weed data, it would also avoid the current difficulties with performing queries that sometimes omit large amounts of data based on keywords or fields not incorporated.

The FACTS system itself has proven cumbersome for many USFS personnel and incompatible or inaccessible for non-USFS stakeholders. This has required duplication of data entry efforts and/or the use of additional databases. In some instances, large amounts of data are not entered at all. Though USFS personnel are currently attempting to make treatment data more accessible to the general public, the new data system will not be easily queried by users. If FACTS developers/managers utilizing a user group cannot sufficiently address all of the current issues with the FACTS system, it is recommended an alternative and simpler spatial database be developed that would allow seamless data entry and sharing/querying of data among all stakeholders.

Monitoring

A crucial component for tracking weed management success is monitoring the efficacy of past treatments. This requires knowing (quantitatively) how weed populations have changed since their initial inventory and being able to correlate that with the type, rate, and timing of applied treatments. Monitoring treatment effects on native or other vegetation also provides valuable information for measuring treatment efficacy. This is not currently possible with the monitoring data in the CLFRP project area.

> Example: Monitoring data is very sparse for both forests and is a subjective ocular measurement of percent control. Most of these anecdotal monitoring visits are conducted by people not present at the initial treatment, hence "percent control" is grossly unreliable for anything less than 100%. Current monitoring forms do not include any quantitative measurements and do not include native or other existing vegetation, so changes in the plant community cannot be tracked over time. In addition, 537 out of 571 total monitoring visits in the UCWMA occurred on non-forestland. Despite monitoring being a crucial component for tracking weed management progress, this is seldom done in the Nez Perce-Clearwater National Forest.

Many treatments occurring throughout a given growing season are at infestations treated previously. It should be a requirement of both employees and contractors that all infestations be monitored for past treatment efficacy prior to any new applications. Monitoring data collected should be altered to include less subjective measurements of control, e.g. briefly calculating (averaging) the number of weed stems in a given unit of area and the percent canopy cover per unit of area for: the target weed, other weeds, native/more desirable vegetation, bare ground, etc. Doing so would demonstrate decreases/increases in the target weed and reveal if it is natives or secondary weeds that are filling the new gaps. This information is required in order to fully understand the effectiveness of weed management programs. Quantitative data is necessary to derive accurate conclusions, but methodology can be simplified tremendously so as not to require extensive amounts of time. The same monitoring protocol and interpretation should be agreed upon and utilized by all stakeholders.

Training and Coordination

> Example: Throughout this assessment and the recommendations listed in this section, it has become apparent that while two CWMAs exist to help coordinate weed management efforts throughout the entire CFLRP project area, many stakeholders have

quite differing: weed management objectives, target weed species, treatment methods, and record-keeping of weed treatment/monitoring activities.

Once inventory, treatment, and monitoring data collection protocols are agreed upon by stakeholders, workshops should be held to ensure that all individuals (and interested public) are trained in: the new methodology, in weed identification (especially new invaders), and in the most effective methods/timings/rates for treating each weed. CWMA meetings are the logical starting point for holding the workshops, though not all CWMA members currently attend CWMA meetings. This is an additional example of when weed management leaders must be granted sufficient authority to enforce the attendance and proper training of all weed management personnel.

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Appendices

Appendix 1: Weed Names (Taxonomic and Common)

The following table lists the species most commonly referred to in this assessment by their taxonomic (Latin) names. Common names are provided for ease of translation.

Taxonomic Name	Common Name
Ailanthus altissima	tree of heaven
Arctium minus	lesser burdock
Barbarea vulgaris	garden yellowrocket
Berteroa incana	hoary alyssum
Brassica	mustard
Bromus tectorum	cheatgrass
Cardaria draba	whitetop
Carduus acanthoides	spiny plumeless thistle
Carduus pycnocephalus	Italian plumeless thistle
Centaurea solstitialis	yellow starthistle
Centaurea stoebe	spotted knapweed
Chondrilla juncea	rush skeletonweed
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Conium maculatum	poison hemlock
Convolvulus arvensis	field bindweed
Crupina vulgaris	common crupina
Cynoglossum officinale	houndstongue
Cytisus scoparius	Scotch broom
Daucus carota	Queen Anne's lace
Equisetum arvense	field horsetail
Euphorbia esula	leafy spurge
Galium aparine	bedstraw
Hypericum perforatum	St. Johnswort
Lactuca serriola	prickly lettuce
Lathyrus latifolius	perennial pea
Lepidium latifolium	broadleaved pepperweed
Leucanthemum vulgare	oxeye daisy
Linaria dalmatica	Dalmatian toadflax
Linaria vulgaris	butter and eggs
Lythrum salicaria	purple loosestrife
Onopordum acanthium	Scotch thistle
Pilosella	hawkweed
Pilosella aurantiaca	orange hawkweed
Pilosella caespitosa	meadow hawkweed
Polygonum cuspidatum	Japanese knotweed
Potentilla recta	sulphur cinquefoil
Ranunculus acris	tall buttercup
Rosa rubiginosa	sweetbriar rose
Rubus armeniacus	Himalayan blackberry
Sisymbrium altissimum	tall tumblemustard
Taeniatherum caput-medusae	medusahead
Tanacetum vulgare	common tansy
Taraxacum officinale	dandelion
Tragopogon dubius	yellow salsify
Trifolium pratense	red clover
Ventenata dubia	ventenata
Verbascum thapsus	common mullein

Appendix 2: Questions for Stakeholder Interviews

Stakeholders interviewed in the Selway-Middle Fork CFLRP project area were divided into four general categories relating to the role they play in weed management. Questions asked during interviews varied between categories. Some questions were intentionally varied within each category depending on the responses of the stakeholder being interviewed (i.e. some questions were determined to be non-applicable based on preceding answers and were omitted from the interview on a case-by-case basis). Pre-determined choices were often presented during the asking of questions in order to streamline answers obtained.

Group A: Land managers actively working on-the-ground with decisions/data

Name and Affiliation:

1. What is your working definition for "weed"?
2. Do you/your agency actively treat AND monitor weed populations?
3. Are your overall weed management goals patterned after a formal definition?
4. What timeline are you following to accomplish your overall goals
5. Where are your weed management activities located
6. What types of **treatment** do you/your agency use to accomplish your weed management goals?
   a. herbicides: how do you select herbicides and rates
   b. mechanical treatment: how do you select which methods and timing/frequency
   c. biocontrol releases: how do you select which agents
7. What kind of treatment data is being collected and stored for each management method?
8. Who manages this information and how is it reported?
9. If you/your agency participates in **monitoring**, what is your definition of "monitoring"
   a. What kind of monitoring is done in your program:
   b. How often do you perform monitoring activities?
   c. Who manages this monitoring data/information and how is it reported?
10. Are your treatment and/or monitoring priorities patterned after a formal definition
11. If you are a part of a CWMA, do your own management goals follow the priorities set forth by the CWMA partners?
    a. If no, why not?
12. Have your management goals ever included the complete eradication of a certain species or population?
    a. If yes, was this successful and why?
    b. If yes, what is the future outlook for this goal based on your current activities?
13. Have your management goals ever included maintaining an area as weed free? (Weed-free is defined as weeds were not present at the time this goal was initiated)
    a. If yes, where?
    b. If yes, have you been successful in this and why?
    c. What is the future outlook for this goal based on your current activities?
14. On a smaller scale, have your treatment efforts reduced the composition and density of weeds at specific sites (e.g. administrative zones)?
    a. How did you measure this?
    b. Why do you think your efforts were or were not successful?
    c. What is the future outlook for this goal based on your current activities?
    d. A lot of agency weed treatments focuses on administration sites, sometimes at the cost of treating new invaders. How do you weight those two priorities?

15. On a larger scale, have your treatment efforts contracted the overall population of targeted weed species across the landscape?
    a. How did you measure this?
    b. Why do you think your efforts were or were not successful?
    c. What is the future outlook for this goal based on your current activities?
16. Are you noticing any overall trends in:
    a. Infestation rates:
    b. Infestation locations:
    c. Control success:
    d. New weed species:
17. Have your management goals ever included restoration with revegetation of native seeds or plants?
    a. If yes, what was your approach?
    b. Have you been successful?
    c. How did you measure this?
    d. What is the future outlook for this goal based on your current activities?
    e. What is limiting your ability to accomplish restoration?
18. Have your goals included the use of biological control agents?
    a. If yes, how did you determine the appropriate sites for release?
    b. Have you found agents to be effective?
        i. If yes, in what instances?
        ii. How did you measure this?
19. Do you do any follow-up monitoring post treatment?
    a. If yes, do you have guidelines for when and how this is conducted?
20. Do you do any weed monitoring following post-vegetation treatments or disturbance
    a. If yes, what type of disturbance?
    b. If yes, do you have guidelines for when and how this is conducted?
21. Do your goals include the treatment of "new invaders"?
    a. If yes, how do you determine what qualifies as a new invader?
    b. Do new invaders have a high priority in your overall treatment goals?
    c. Do you feel your treatment activities are successful against new invaders? If yes, how do you measure that?
22. Does your weed program include any preventative measures?
    a. If yes, please describe:
    b. If yes, do you think they are effective and why?
23. Please explain any limitations you've found in your treatment/monitoring program:
24. Do you actively work with other CWMA partners to accomplish your weed management goals?
    a. If yes, please explain and also describe how this impacts your own efforts:
25. Do you have any recommendations for improving weed control and monitoring efforts among inter-agency partners?

Group B: Administrators of contracts

Name and Affiliation:

1. To what subject do your contracts pertain?
2. What is your working definition for "weed"?

4. Are weeds consistently included in project planning and contracts for ground-disturbing activities?
5. Is revegetation included in project planning and contracts? If yes, please describe:
6. Do the contractual specs get carried out?
   a. If yes, by what mechanisms?
7. Is there multi-year follow up?
   a. Who is accountable for monitoring effectiveness and doing follow up?
8. What types of data are collected during the contractural period and/or multi-year follow-up?
   a. Is this data given to someone who enters it in the NRM inventory and FACTS treatment database?
   b. Who should be accountable for:
      i. Data collection:
      ii. Data entry into the appropriate databases:
9. What are barriers to success?
10. Have you been made aware of any overall trends in:
    a. Weed infestations
    b. Rates of spread
    c. Control success/failure
    d. New weed infestations

11. Do you have any recommendations for private and public land managers to improve weed management efforts?

Group C: Contractors

Name:

1. What is your working definition for "weed"?
2. Do your contracts differentiate between weed species such that you are requested to prioritize some of the species you treat?
   a. If yes, please explain:
3. As part of your contracts do you actively treat AND monitor weed populations?
4. To what geographic region do your contracts pertain?
5. Do your contracts pertain to: timber harvest, road decommissioning, burned sites, multiple, other:
6. What is your time frame for carrying out the work in the contract?
7. What forms of treatment do you utilize in your contracts?
   a. Who/what provides oversight for the types/amounts of treatments you can/do apply?
8. What kind of treatment data do you collect and/or submit for your treatment efforts?
9. Are you noticing any overall trends in:
   a. Infestation rates:
   b. Infestation locations:
   c. Control success:
   d. New weed species:
10. Do your contracts require you to do any post-treatment follow up monitoring?
    a. If yes, what are the requirements:
    b. If yes, what kind of monitoring do you perform:
    c. If yes, how often do you perform monitoring activities?
11. Do you have any recommendations for private and public land managers to improve weed management efforts?

Group D: Private people with historical knowledge of the area and/or anecdotal observations

Name:

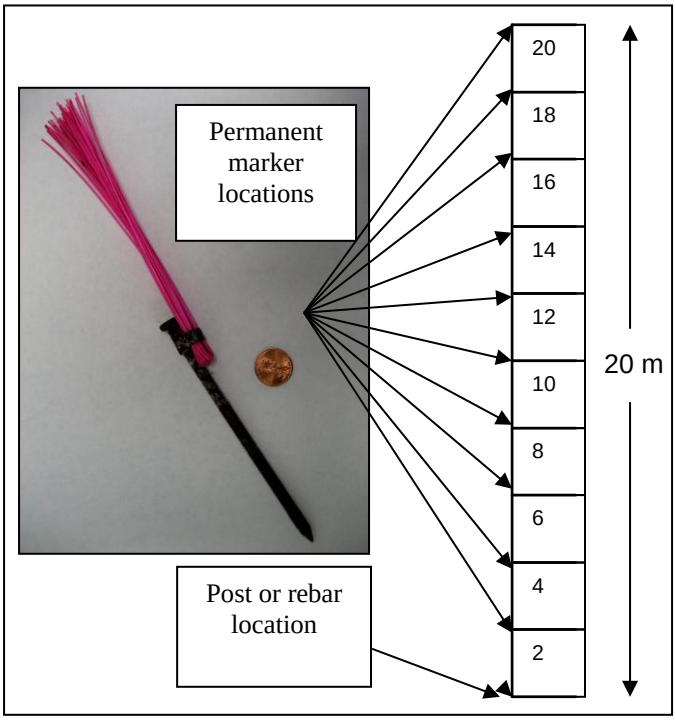
1. What is your working definition for "weed"?
2. What are the geographic boundaries of the area you're comfortable discussing for weed infestation history and change over time?
3. What is the time frame of your observations?
4. What was your role in the area you're describing during the time frame you are describing (e.g. guide, Forest Service employee, etc)?
5. Where did you gain your familiarity with weeds ?
6. Please describe the **most important** instance of weed history as you recall
   a. Weed species:
   b. First date when it(they) appeared in the region:
   c. How quickly infestations grew:
   d. Factors leading to weed introduction and spread:
   e. Were there any obvious related climate and/or land use patterns during the same time frame
   f. How landscapes changed after fire or other disturbance events:
7. Do you have any photos or other forms of documentation for changes in the landscape (or lack thereof) over time?
8. Did you observe (or do) any weed management activities?
   a. If yes, do you feel any were successful? Why or why not?
9. Have you observed any preventative measures in your area of interest?
   a. If yes, please describe:
   b. If yes, do you think they are/were effective?
   c. What would be more effective?
10. What do you think the future outlook is for your area of interest based on the trends you've been observing and/or current management practices?
11. Do you have any recommendations for private and public land managers to improve weed management efforts?

Appendix 3: SIMP Biocontrol Monitoring Methodology

Monitoring biological control agents is an essential component of a successful biocontrol program that can be used to accurately document impact and safety of this weed management practice. This monitoring form has been endorsed by the Nez Perce Biocontrol Center, University of Idaho, Forest Health Protection, Bureau of Land Management, and Idaho State Department of Agriculture. The monitoring information from this form will be used to document vegetation cover, target weed density, and biological control agent abundance and the changes that occur over time.

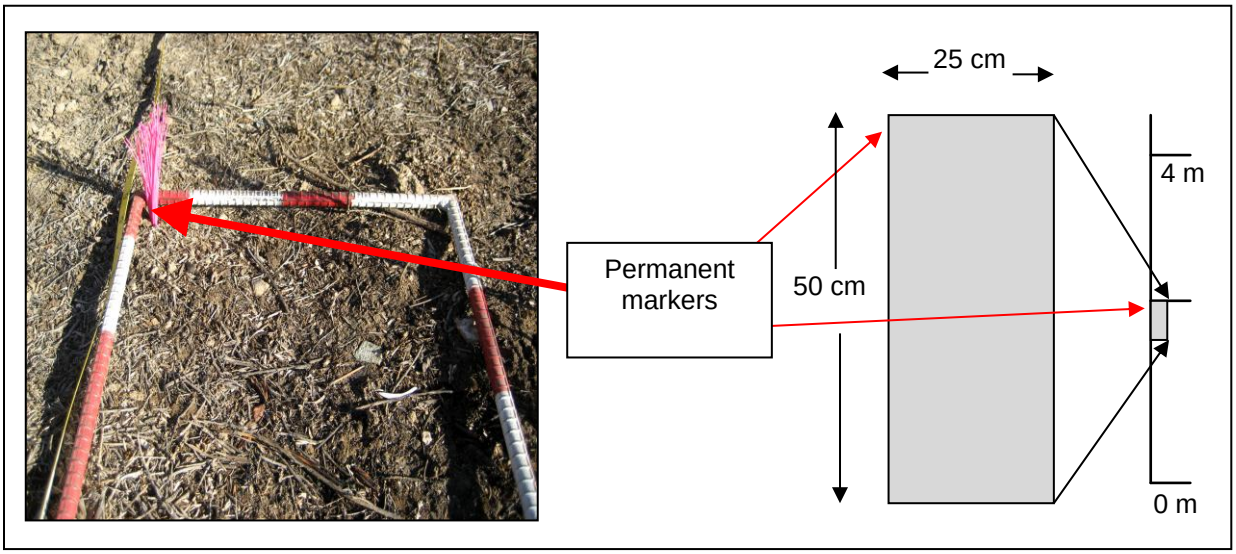
Monitoring:

The Statewide Biological Control monitoring protocol is based upon a permanent 20 meter vegetation sampling transect randomly placed in a suitable (at least 1 acre) infestation of the target weed and timed counts of target biocontrol agents. Annual vegetation sampling will allow researchers to characterize the plant community and the abundance and vigor of leafy spurge. Timed counts of target biocontrol agents will provide researchers with an estimate of target biocontrol agents population levels.



Permanent Site Set-up:

To set up the vegetation monitoring transect, you will need: 1) a 25 x 50 cm Daubenmire frame made from PVC (preferred) or rebar, 2) a 20 m tape measure for the transect and plant height, 3) 10 permanent markers (road whiskers and 16 penny nails – see picture below), 4) a post (stake or piece of rebar) to monument the site (see pictures for examples of field equipment), and 5) 30-45 minutes at the site during the peak emergence time. To set up the transect, place the 20 m tape randomly within the infestation. Mark the beginning of the transect with a post. Place permanent markers every 2 m (for a total of 10 markers) beginning at the 2 m mark and ending with the 20 m mark on the tape measure. Place the Daubenmire frame parallel to the tape on the 50 cm side with the permanent marker in the upper left corner starting at 2 m (see pictures). Refer to the "timed" data sheet for how to conduct monitoring. Repeat the frame placement at 2 m intervals for a total of 10 measurements (one at each permanent marker).



General Information:

- Observer(s) – Who are you?
- Date – Today's date.
- Landowner – Who is the landowner/land manager?
- Permanent? – Is this a permanent monitoring site?
- Site name – Which site are you monitoring? This could have a specific name if it is a permanent site.
- Weed – Which target weed are you are monitoring?
- Biocontrol agent – Which biocontrol agent you are monitoring?
- Insect Stage – What is the growth stage of the agent are you monitoring?
- Lat/Long OR UTM – What are the coordinates of the site you are monitoring? If UTM (preferred), what datum and year are your coordinate system?

Annual grass – note stems which are typically solitary or in a few stemmed tufts.

Vegetation Cover (all in %, rows should add up to total 100%) – All percentages are to be estimated to the nearest 5%. Put a "T" on the form for trace amounts less than 5%.

- Frame – Which frame number are you working on (1= 2m, 2= 4m, …,10 = 20m on transect)?
- Target weed % – What is % cover of the target weed to the nearest 5%?
- Other weeds % – What is the % cover of any other weeds in the frame to the nearest 5%? Count undesirable annual grasses as weeds.
- Forb/Shrub % – What is the % cover of native forbs/shrubs in the frame to the nearest 5%?
- Grass % – What is the % cover of grass to the nearest 5%?
- Bare Ground/Litter % – What is the % cover of bare ground/litter to the nearest 5%?

Perennial grass – note the multiple stem base with multiple year's growth.

Target Weed Size/Density

- Frame – Which frame number are you working on (1=2m,…,10=20m)?
- Number of stems – How many stems of the target weed are in the frame?
- Height of tallest stems (cm) – How tall is the tallest stem in the frame (in cm)?

Biological Control Agent Density Monitoring

Here, you collect data *for the target biocontrol agent* that helps to get an unbiased assessment of the population size of the biological control agents. This is probably the most important part of the data collection.

- Count/Sweep location – Do not count or sweep in the area where the transect is located. Instead, identify 6 similar locations around or close-by but at least 20 paces away from the transect.
- ***Counting: In 3 minutes, count the number of target insects. How many insects can you find in the 3 minute period? Carefully approach the plants and be sure to count each insect only once. Repeat the count 5 times (for a total of 6 3-minute counts) in different areas.***
- ***# of insects per 10 sweeps – How many insects are in your net after 10 sweeps of the surrounding vegetation? Take one step between each sweep. Repeat 5 more times (for a total of 6 sweep sites, 60 sweeps) moving at least 2 steps away from the last sweep location.***
- ***These are replications and provide the unbiased data to calculate the population size of the biological control agents.***

General Information:

Observer(s):		Date:	Landowner:
Permanent site? Y N	Site name:		Weed:
Biocontrol agent:		Insect Stage: Adult Larvae Pupae Egg	
Lat/Long: N ° ‘	W ° ‘	UTM Datum:	UTM E:
		UTM Year :	UTM N:

Weed Infestation:

Size in acres:	Picture taken?	Yes No	If Y, picture direction:

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub %	Grass %	Bare ground%	Litter %	Moss %	Total %
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Target weed size/density:

Frame	Number of stems	Height of tallest stem (cm)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Biological control agent:

Count location	# insects per 3 min. count
1	
2	
3	
4	
5	
6	