



INVENTORY AND MAPPING of Invasive and Non-Native Plants 2008



WALNUT CANYON NATIONAL MONUMENT

United States
Department of
Interior

**National Park
Service**

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Resource Management
Division

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Report FLAG-002-2008



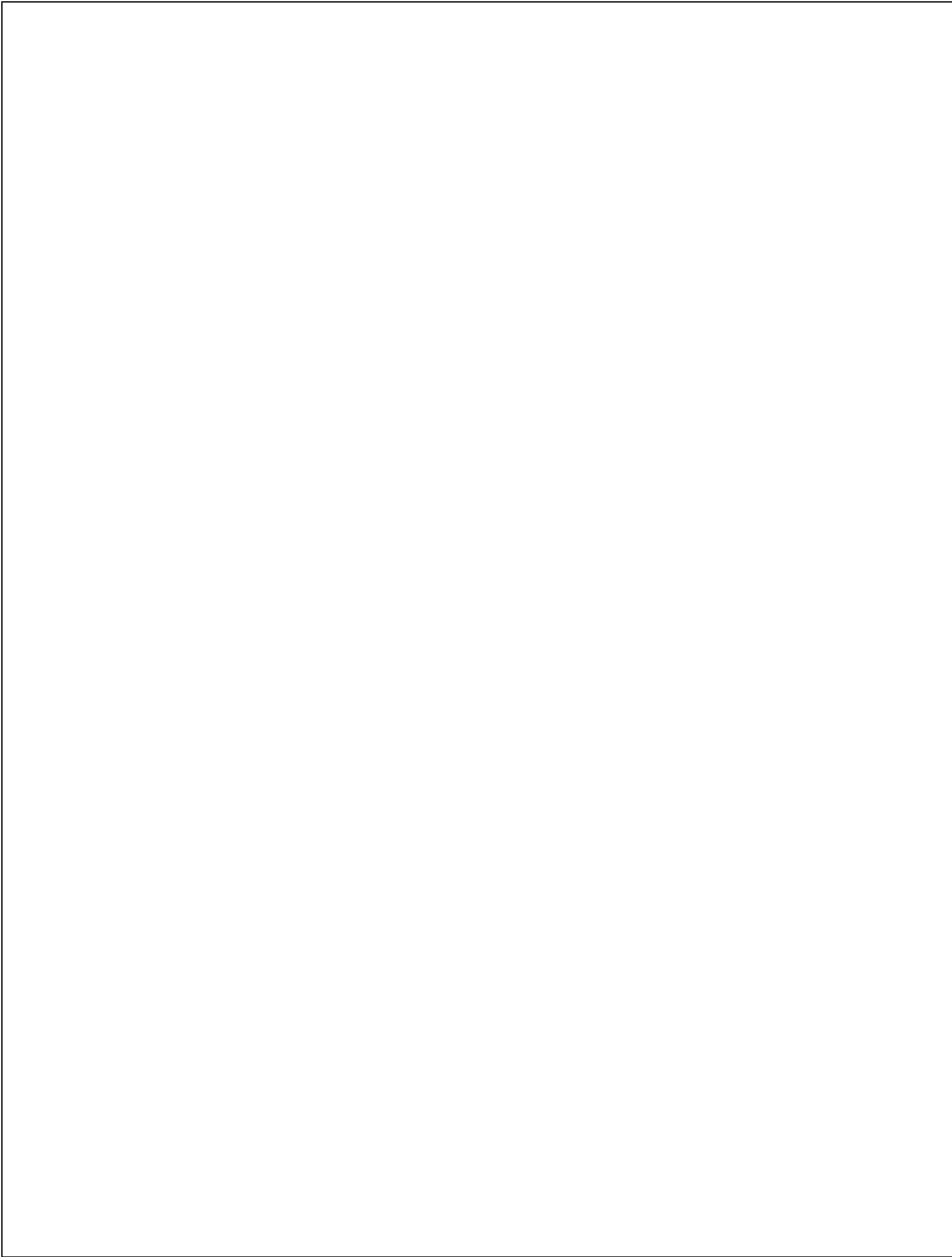
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Executive Summary

The intent of this project is to inventory and map invasive and non-native plants within targeted high impact sections of Walnut Canyon National Monument (WACA).

Invasive and nonnative plants represent one of the greatest threats to the natural and cultural resources in parks and monuments throughout the National Park System. In many habitats throughout the western United States, invasive plants have completely altered the integrity of natural ecosystems. The displacement of native plant and wildlife species and subsequent changes to natural processes, such as the alteration of fire frequency and intensity, and changes in the natural hydrological conditions and cycles, are risking native biological diversity and integrity and can cause significant impacts to park resources.

It is the goal of this project to survey, inventory, and map invasive and non-native plant clusters so that these areas can be effectively controlled by the NPS EPMT teams, volunteer groups, and park staff. The areas selected for mapping are those suspected of containing higher densities of invasive and non-native plants because of their proximity to high vehicular traffic volume, visitor use, and development within and adjacent to the Monument. Another primary goal is to curtail the establishment of these species in the areas where they are most likely to gain a foothold within monument boundaries, and prevent their spread throughout the Monument by proactive control methods.

During August-September 2008, field crews inventoried 718 acres within Walnut Canyon National Monument; an amount representing approximately 20% of the entire 3,600-acre Monument. Density of individuals was counted, although this figure is approximate because of the large amount of estimated individuals in some huge clusters. Nevertheless, the total density of invasive and non-native plants within the study area totaled approximately 65,807 individuals, almost 19% of which were manually pulled and destroyed.

The sum of all infestations of invasive plants mapped in this project was nearly 67 acres (**Table 3**), which represents 9.3% of the total area inventoried. Of the 26 initially targeted species, crews found only 20 and added 4 new species, see **Table 3**. The 9 species not found during this survey are included in **Table 5**, and the 4 new invasive species are listed in **Table 6**.

The following recommendations are born out of the results of this project and observations in the field at Walnut Canyon National Monument.

- 1) Invasive and non-native plants appear to develop initial footholds by first becoming established along roads leading into the Monument. It is highly recommended that law enforcement and interpretive rangers be trained in recognizing the various species and actively control them, by simply pulling them out of the ground, along the roadsides during regular patrols. This will contribute greatly to thwarting invasions and infestations before they have a chance to spread. This activity need not be done every day and shouldn't take more than 5 minutes.
- 2) The use of various volunteer and conservation groups every year to control roadside weeds and known patches will help tremendously in controlling the spread of these species throughout the Monument.

- 3) Invasive and non-native plants should be surveyed and mapped in the remainder of Walnut Canyon National Monument, so that infested areas can be identified and treated as soon as possible. Infested areas are the primary source of seed spread and infection into new areas.
- 4) The results of this mapping project should be shared with the regional NPS EPMT teams in order to expedite planning and quickly eradicate weed clusters that have not been removed. Due to rapidly changing conditions in the field, this should be done as soon as possible.
- 5) Any projects within the Monument that involve soil and surface disturbance should be monitored for at least 3 years in order to keep non-native and invasive infestations to a minimum.
- 6) The Monument is urged to develop a comprehensive written management plan for invasive plant species. Furthermore, the Monument is encouraged to review and improve it on a regular basis. An excellent reference that will aid the Park in crafting specific control methods is the "Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas" developed by The Nature Conservancy (Tu et al. 2001).
- 7) Regularly scheduled non-native and invasive plant inventories of the Monument should be an ongoing part of resource management and protection and aimed at early detection. Inventories of all high visitation areas should be performed at least annually, whereas other areas require less frequency, only once every 5 to 10 years. A rotating schedule should be developed by the FLAG Resource Management Division to inventory and map a portion of the Monuments each year, so that within a set number of years all of the area could be covered. The key is to schedule inventories often enough to detect new infestations before they become exceedingly difficult to manage.
- 8) As part of an ongoing inventory effort, the Monument should consider establishing permanent monitoring sites in order to assess the impacts and proliferation of non-native and invasive plants. Monitoring is the most effective method for evaluating the effectiveness of control and restoration efforts. Long-term studies provide invaluable data on the effectiveness of various management techniques, and provide quantitative data that can be used to determine whether management goals have been attained.
- 9) The Flagstaff Area units are encouraged to become active members of the local Cooperative Weed Management Area. Weed management objectives are much more effective when managed in cooperation with adjacent and partner organizations that have similar goals.

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2008

WALNUT CANYON NATIONAL MONUMENT

Report prepared for:

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Final Report
Inventory and Mapping of Invasive and Non-native Plants,
conducted during 2008 in portions of Walnut Canyon National Monument,
Southern Colorado Plateau Network of the National Park Service

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Walnut Canyon, East Fort, Walnut Canyon National Monument. Photo by C.Scholz

1.0 Introduction

The intent of this project is to inventory and map invasive and non-native plants within targeted high impact sections of Walnut Canyon National Monument (WACA).

Invasive and nonnative plants represent one of the greatest threats to the natural and cultural resources in parks and monuments throughout the National Park System. In many habitats throughout the western United States, invasive plants have completely altered the integrity of natural ecosystems. The displacement of native plant and wildlife species and subsequent changes to natural processes, such as the alteration of fire frequency and intensity, and changes in the natural hydrological conditions and cycles, are risking native biological diversity and integrity and can cause significant impacts to park resources.

The management and control of invasive non-native species has been identified as a high priority issue within the National Park Service (NPS). The Government Performance and Results Act of 1993 identified the control of invasive and non-native species as an important and accountable goal for all national park units. Executive Order 13112, established in 1999, further identifies and strengthens the obligations of federal agencies to address the significant economic and biological threats posed by non-native species.

The NPS, as one of the major areas of focus under the Natural Resource Challenge initiative (1999), has emphasized the importance of controlling invasive species and their associated impacts by identifying and mapping non-native species. The Natural Resource

Challenge specifically states that "Identifying, mapping and evaluating nonnative species are critical for effective management". Similarly, the development of the Exotic Plant Management Team (EPMT) initiative has further confirmed the dedication of the NPS to the management and control of invasive plant species. Unfortunately, the funding focus of the EPMT program is primarily on the actual treatment and control of weed infestations. This program was not established as a funding source for inventory and mapping of invasive weed populations, probably the most important step in effective control planning. Although the Natural Resources Challenge identifies the need for obtaining "accurate data about nonnative species distributions" as critical to meeting the goal of effective and efficient management, a specific funding source to accomplish this goal has yet to be established. This has caused consternation and confusion within the agencies because of the dire need of accurate location information in order to know where to focus the already funded control efforts.

This project was born out of the need described above, which is the necessity to know locations of infestations in order to plan effective control measures. The larger CP-CESU project contains different objectives and protocols with the intention of only taking an inventory of invasive and non-native plants within the Monument. Whereas the focus of this project, is to search targeted locations and inventory these species, but in addition, to map their locations, record density, and perform some manual control. This Flagstaff Group Technical Report presents results of this inventory, mapping and control project. The results of the larger inventory project will be presented in a separate report produced by the NPS Southern Colorado Plateau Network and the Colorado Plateau Cooperative Ecosystems Studies Unit (CP-CESU).

1.1 Background Information

"WACA was first designated as a National Monument in 1915 in a presidential proclamation designed to protect significant cultural artifacts preserved as cliff dwellings. Since WACA was established its boundary has expanded four times to today's size of approximately 3,600 ac (1,500 ha), and is currently being sought out for further expansion by a local advocacy group, Friends of Walnut Canyon. WACA is located approximately 7.5 mi (12 km) east of Flagstaff, AZ (**Figure 1**). The Monument lies adjacent to the Coconino National Forest, the city limits of Flagstaff, AZ, and Arizona State lands (**Figure 2**). In the eastern section of the National Monument boundary, a private in-holding of 290 ac (120 ha) occurs near the Santa Fe Dam" (**Figure 3**) (USGS 2004).

"WACA is located on the Colorado Plateau in northern Arizona. Access to the park can be reached on a paved road to the northern rim of Walnut Canyon via Interstate-40. The main access route to the south rim of Walnut Canyon via Interstate-40 is Cosnino road, east of the park road. Cosnino road exits Interstate-40 northeast of the project boundary and winds around the southern boundary of WACA. Various other U. S. Dept. of Agriculture - Forest Service (USDA-FS) dirt roads allow access to many other areas of WACA through the adjacent Coconino National Forest (**Figure 2**). A visitor center is maintained on the northern rim of the canyon at the end of the park road. Only two hiking trails are managed and maintained by WACA: the Island and Rim Trails. In order to protect the innumerable and invaluable cultural sites throughout the Monument, public use is limited of only these two designated trails and adjacent picnic areas. In the Coconino National Forest lands surrounding WACA, recreational hiking and biking, off-road-vehicle use, camping, and hunting occur throughout on unmaintained trails as well as on the newly developed Arizona trail" (USGS 2004).

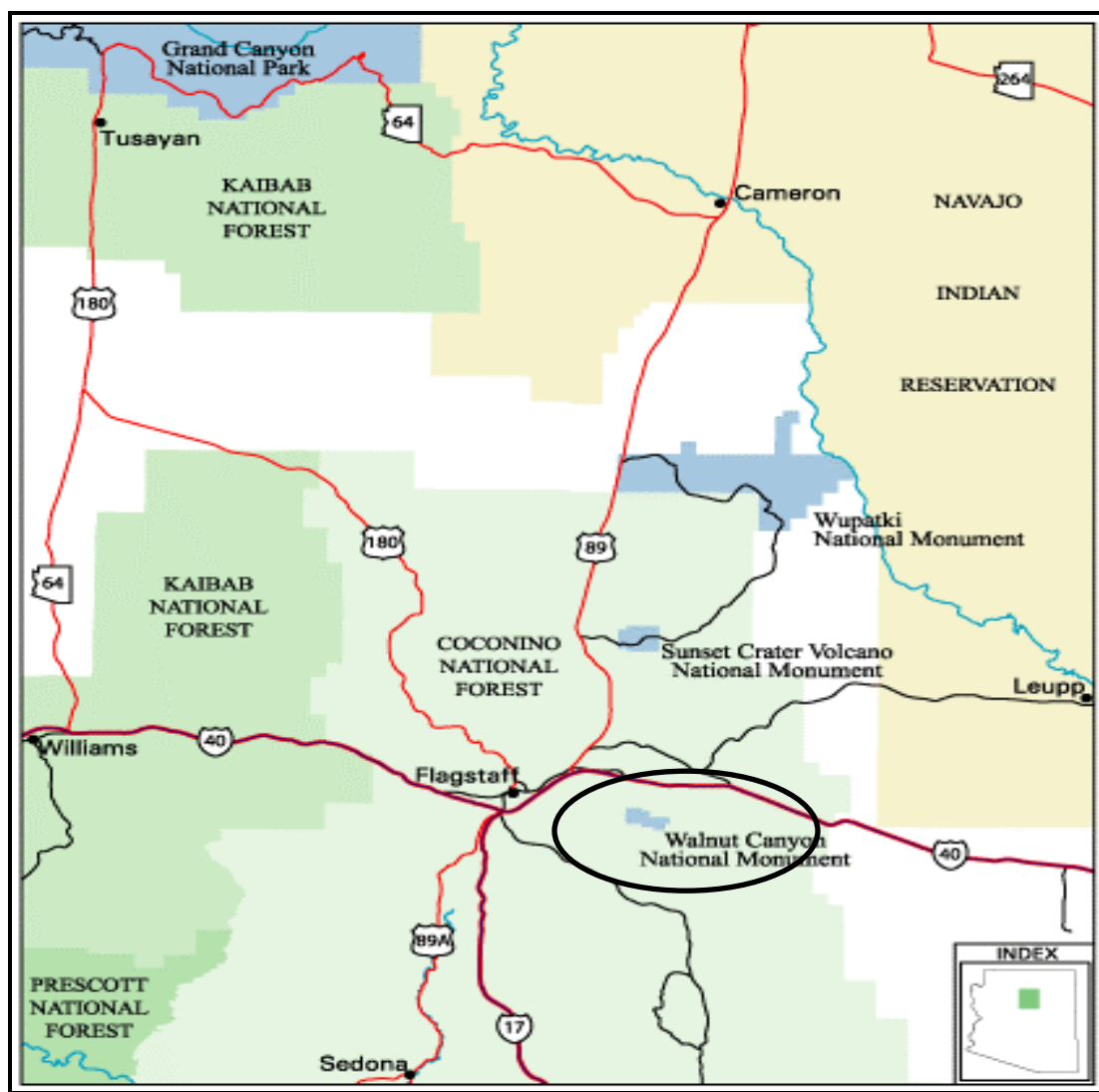


FIGURE 1. Location of Walnut Canyon National Monument within the Flagstaff, Arizona area (USGS 2004).

1.2 Management Commitment to the Control of invasive and Non-native Plants

The WACA General Management Plan (GMP) (2007) provides clear management guidance for the control of non-native species within the Monument for the next 10-20 years. The WACA GMP states that “The National Park Service will take the following kinds of actions to comply with legal and policy requirements related to native species and to manage the park “in as natural a condition as possible”:

- Inventory and catalog the plants and animals occurring in the monument.
- Regularly monitor the distribution and status of selected species that are
 - (1) indicators of healthy ecosystem function and inherent biodiversity,

- (2) rare or protected,
- (3) nonnative, and
- (4) native species capable of creating resource problems (e.g., overpopulation may result in undue competition or alter available habitat for other species).
- Nurture research that contributes relevant knowledge for conserving native species and ecosystem processes.
- Restore species populations and their habitats where feasible; in particular, protect and restore natural riparian habitat in Walnut Canyon.
- Manage native species in management zones designated for historic scenery, active recreation, operations, or other prescribed uses; plantings of nonnative species in such zones would follow NPS policies (e.g., limited use of non-invasive plants only where justified by historic scene or operational needs).
- Control or eliminate nonnative invasive plants and animals where there is a reasonable expectation of success and sustainability; control efforts would be prioritized in order of:
 - threat to visitor health or safety
 - threat to legally protected or uncommon native species and habitats
 - threat to scenic and aesthetic quality
 - threat to common native species and habitats.
- Manage diseases and pests in similar priority order to those listed above for nonnative species.
- Educate visitors and neighbors on threats to native species and ways to conserve these species.....” (USDI 2007)

1.3 Climate

The climate of Walnut Canyon National Monument is typically a semi-arid, continental climate, with a moderately hot and moist summer, cool and dry spring and fall, and cold, periodically wet, winter. Monsoon season, which arrives in July in the form of violent afternoon and evening thunderstorms, can last through September and contribute greatly to the average yearly precipitation. “From 1971-2000, an average of 5.9 in (15 cm) of rain fell from July-September out of the total 15.8 in (40 cm) of total precipitation (NOAA 2002). Average summer maximum temperatures range from 45 to 91 degrees F (7 to 33 degrees C), while average winter minimum temperatures range from 21 to 57 degrees F (-6 to 14 degrees C) (NOAA 2002). Winter snowfall average ranges from 2.5 to 4 in (6.4 to 10 cm) a month (NOAA 2002). Strong to moderate winds are commonplace within the region” (Hansen et al. 2004).

1.4 General Vegetation Description

“Vegetation of WACA ranges from low elevation grasslands to high elevation woodland and forest communities. Species that are often specific to a vegetation community more frequently intermix in WACA than other areas on the Colorado Plateau, forming a broad transition or ecotonal zone. Species that often co-dominate in the same habitat are pinyon pine (*Pinus edulis*), Gambel oak (*Quercus gambelii*), Utah juniper (*Juniperus osteosperma*), and ponderosa pine (*Pinus ponderosa*). High elevation species, riparian

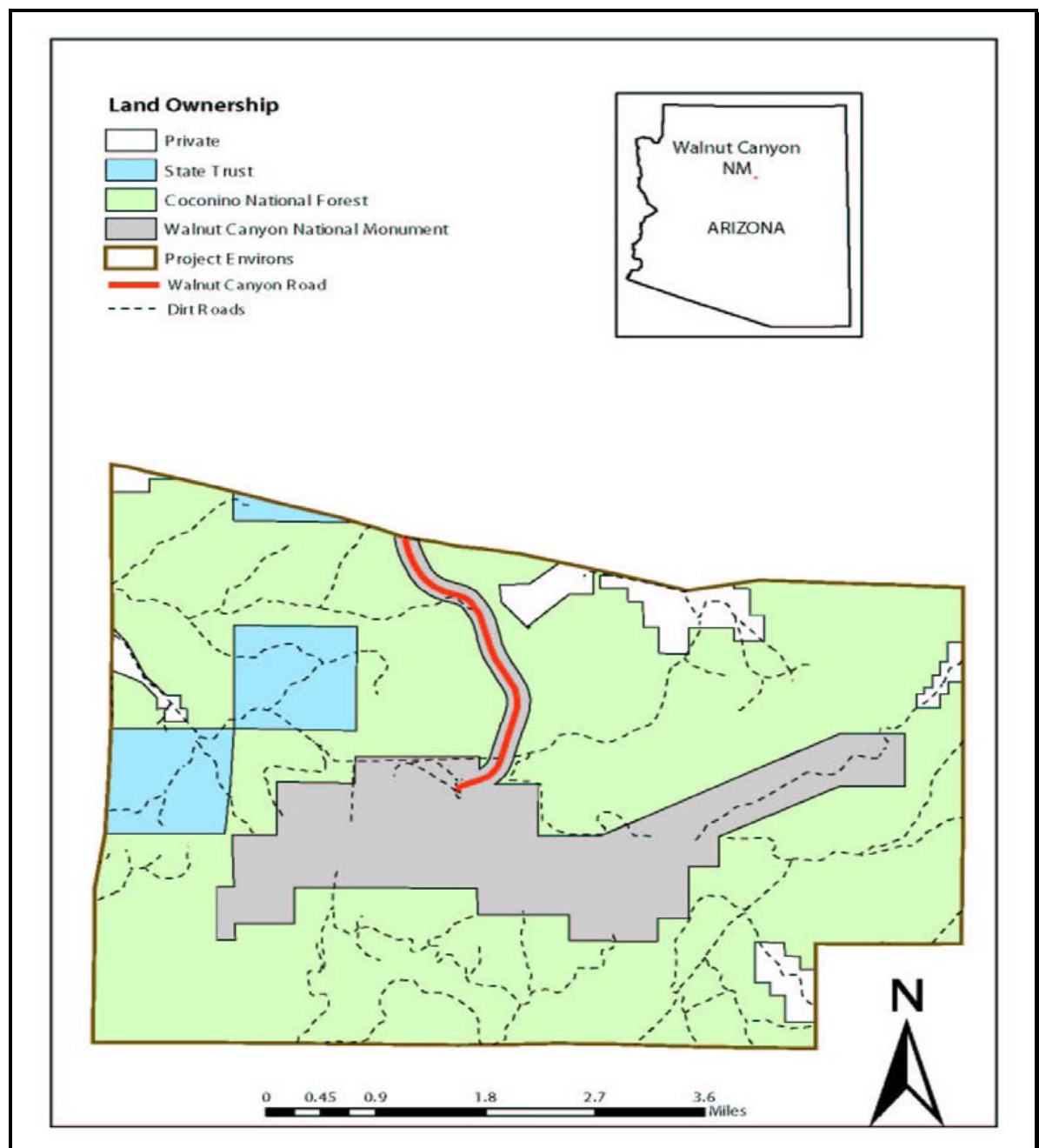


FIGURE 2. Walnut Canyon National Monument boundary and land ownership of surrounding lands (USGS 2004).

bligates, and more mesic species also occur in high abundance in WACA due to north facing slopes and mesic canyon walls and canyon bottoms. These mesic and cooler environments have species that are typically found at higher elevation such as dense patches of Rocky Mountain juniper (*Juniperus scopulorum*), Douglas-fir (*Pseudotsuga menziesii*), and New Mexican locust (*Robinia neomexicana*). The canyon floor has a rich vegetation community with an overstory composed mainly of deciduous trees and shrubs, primarily box elder (*Acer negundo*), dogwood (*Cornus stolonifera*), New Mexican olive (*Forestiera pubescens*), Arizona walnut (*Juglans major*), New Mexican locust (*Robinia*

neomexicana), Arizona rose (*Rosa arizonica*), and snowberry (*Symphoricarpos rotundifolius*)” (Hansen et al. 2004).

“Approximately 90 ac (36 ha) consists of sparsely vegetated steep canyon walls or intermittent stream channels. On the canyon walls the two main geologic formations (Kaibab Formation and Coconino Sandstone) often occur in large rock outcrops on the steep slopes of Walnut Canyon with sparse to no vegetation. Hanging garden species can occur on the steep vertical canyon walls, especially in areas of water seepage. On the canyon bottom of Walnut Canyon and in the side canyons, intermediate stream flow can limit vegetation growth by scouring the vegetation. Prior to damming, the vegetation was much sparser in Walnut Canyon due to higher stream flow (Brian 1992) and the lack of sediment that became established as a result of the dam. The sparse vegetation that often persists in the intermittent stream channel consists primarily of disturbance thriving forbs (annuals and perennials) and grasses” (Hansen et al. 2004).

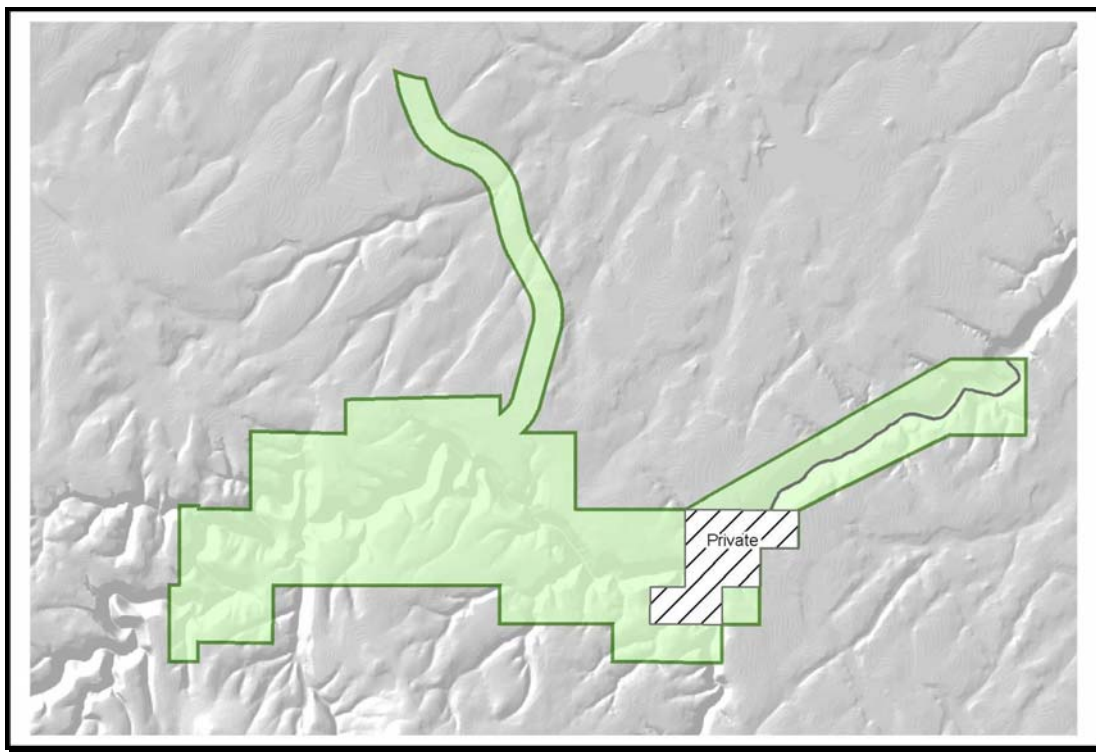


FIGURE 3. Walnut Canyon National Monument boundary with private inholding.

1.4.1 Grasslands

“Grasslands in WACA often occur only a small patches amidst woodlands or shrublands. Most of the herbaceous species in the mapping area co-occur with shrubs, forming a steppe (grasses dominant with >10% shrub cover). Blue grama and mountain muhly (*Muhlenbergia montana*) typically dominate small meadows that are often adjacent to ponderosa pine, pinyon pine, and Utah juniper woodlands. In the moister areas in the uplands, muttongrass (*Poa fendleriana*), little bluestem (*Schizachyrium scoparium*), and squirreltail (*Elymus elymoides*) commonly occur. In the mesic canyon bottoms of Walnut Canyon fringed brome (*Bromus ciliatus*) is often the main grass species. In disturbed areas in the northeastern section of the park native grasses include blue grama, Fendler’s

threeawn (*Aristida purpurea*), and black grama (*Bouteloua eriopoda*). Non-native grasses in these areas include the invasive cheatgrass (*Bromus tectorum*) and western wheatgrass (*Pascopyrum smithii*), a grass often used in reseeding efforts” (Hansen et al. 2004).

1.4.2 Shrublands

Shrublands commonly occur in disturbed areas and along the canyon bottom. Shrubs that are typical of the previously disturbed areas include rabbitbrush (*Ericameria nauseosa*) and snakeweed. These species are both native to the area; however, they thrive in areas of disturbance. Shrublands often occur on the limestone terraces on the north rim with a warm southern exposure, with common species including fernbush, barberry (*Mahonia fremontii*), banana yucca (*Yucca baccata*), cliffrose, and mountain mahogany (*Cercocarpus montanus*). Shrub species also occur in small patches that are inter-fingered as mosaics on the canyon bottom. Historical photography of the canyon bottom suggests that much of the riparian vegetation has increased substantially over the last 50 years, due to dams eliminating the natural water flow through the canyon (Brian 1992). Common species on the canyon bottom include riparian obligates such as dogwood and willows (*Salix* spp.) as well as species that prefer mesic habitats such as gambel oak, New Mexico locust, New Mexico olive, chokecherry (*Prunus virginiana*) and roundleaf snowberry” (Hansen et al. 2004).

1.4.3 Woodlands

“Woodlands are the most common vegetation type in WACA and range from dense stands of trees on north-facing canyon walls, canyon bottoms, and in fire-suppressed areas to open stands of sparse trees in meadow-like areas. The most common trees in the upland environments are ponderosa pine, ranging from mid to high elevation areas in the park and pinyon pine and Utah juniper occurring mainly in the mid to low elevation areas. In the early 1900’s large ponderosa pines were logged and the natural fire regime was altered, allowing for ponderosa pine to regenerate quickly and change the vegetation community from open meadows with low densities of ponderosa pine to areas of high density of ponderosa pine with a sparse understory community (Covington and Moore 1994). Much of WACA has a dense ponderosa pine stand structure due to these activities; however, some of WACA has larger ponderosa pines that have withstood these management activities. In the more mesic areas, Douglas-fir (*Pseudotsuga menziesii*) and Rocky Mountain juniper are the most common species, occurring in vegetation types with higher densities than woodlands, and are considered a forest vegetation type. A wide range of tree species occur in smaller patches in the linear corridors of the canyon bottom, including willow, box elder, narrow leaf cottonwood (*Populus angustifolia*) and Arizona walnut. Many of these species are restricted to mesic sites and require intermittent water flow. These community types typically have high cover and diversity of shrubs and understory species due to the additional water flow in these areas. Riparian obligate species include sedges (*Carex* sp.) and willows” (Hansen et al. 2004).

1.4.4 Species of Special Concern

“Four plant species of special concern also are suspected to occur in the park. These species include Arizona bugbane (*Cimicifuga arizonica*), Arizona leatherflower (*Clematis hirsutissima* var. *arizonica*), Flagstaff pennyroyal (*Hedeoma diffusa*) and Chiricahua dock (*Rumex orthoneurus*)” (Hansen et al. 2004).

2.0 Objectives and Goals



Area infested with Scotch Thistle (*Onopordum acanthium*) Walnut Canyon National Monument. Photo C.Scholz

This invasive and non-native plant inventory and mapping project was primarily designed to detect, manually destroy, and map occurrences of invasive and non-native plants throughout specific areas within Walnut Canyon National Monument. The areas selected were agreed upon by representatives from the NPS Southern Colorado Plateau Network, Walnut Canyon National Monument, and the Colorado Plateau Cooperative Ecosystem Studies Unit (CP-CESU). It was determined that these areas had the highest likelihood of containing invasive species due to the proximity to roads, vehicles, and visitor impacts; which are the primary sources of non-native plant infiltration.

2.1 Objectives

The following are specific objectives:

- 1) Conduct targeted field surveys to document and map distribution and abundance of invasive non-native plant species across the range of habitats represented in the designated areas of Walnut Canyon National Monument.
- 2) Manually destroy most invasive or non-native plants encountered during normal inventory and mapping activities.
- 3) Enter project data into a MS Access database provided by the NPS Southern Colorado Plateau Network data manager and verify data.
- 4) Provide detailed maps of invasive and non-native plant clusters to EPMT teams in order to facilitate effective control methods.

- 5) Collect voucher specimens for any target invasive non-native plants encountered that presently lack vouchers. Process the specimens for deposit in herbaria at the WACA herbarium and Northern Arizona University herbarium.
- 6) Provide high quality scientific data that can be used in additional local, regional, and national population studies, and will be invaluable in planning future control projects.
- 7) Based on inventory results, identify significant sources of weed introductions and vectors involved in weed spread in each area surveyed.
- 8) Write a final project technical report to include background, methods, results and discussion sections.

2.2 Project Goals

It is the goal of this project to survey, inventory, and map invasive and non-native plant clusters so that these areas can be effectively controlled by the NPS EPMT teams, volunteer groups, and park staff. The areas selected for mapping are those suspected of containing higher densities of invasive and non-native plants because of their proximity to high vehicular traffic volume, visitor use, and development within and adjacent to the Monument. Another primary goal is to curtail the establishment of these species in the areas where they are most likely to gain a foothold within monument boundaries, and prevent their spread throughout the Monument by proactive control methods.

3.0 Methods

3.1 Project Locations within WACA

Planned survey routes included areas of likely weed seed introduction and other areas identified as significant known or potential source or vector areas. The park natural resource staff provided assistance in identifying important areas to include.

For this project, the areas inventoried included: **1)** those that are adjacent to the main entrance road from the Visitor Center north to Interstate 40; **2)** around the Visitor Center and residences, and the area between the residences and the old ranger cabin; **3)** the Island Trail, the Rim Trail; **4)** and the section of the bottom of Walnut Canyon on the east side of the Monument. **Figure 4** depicts areas that were surveyed and mapped.

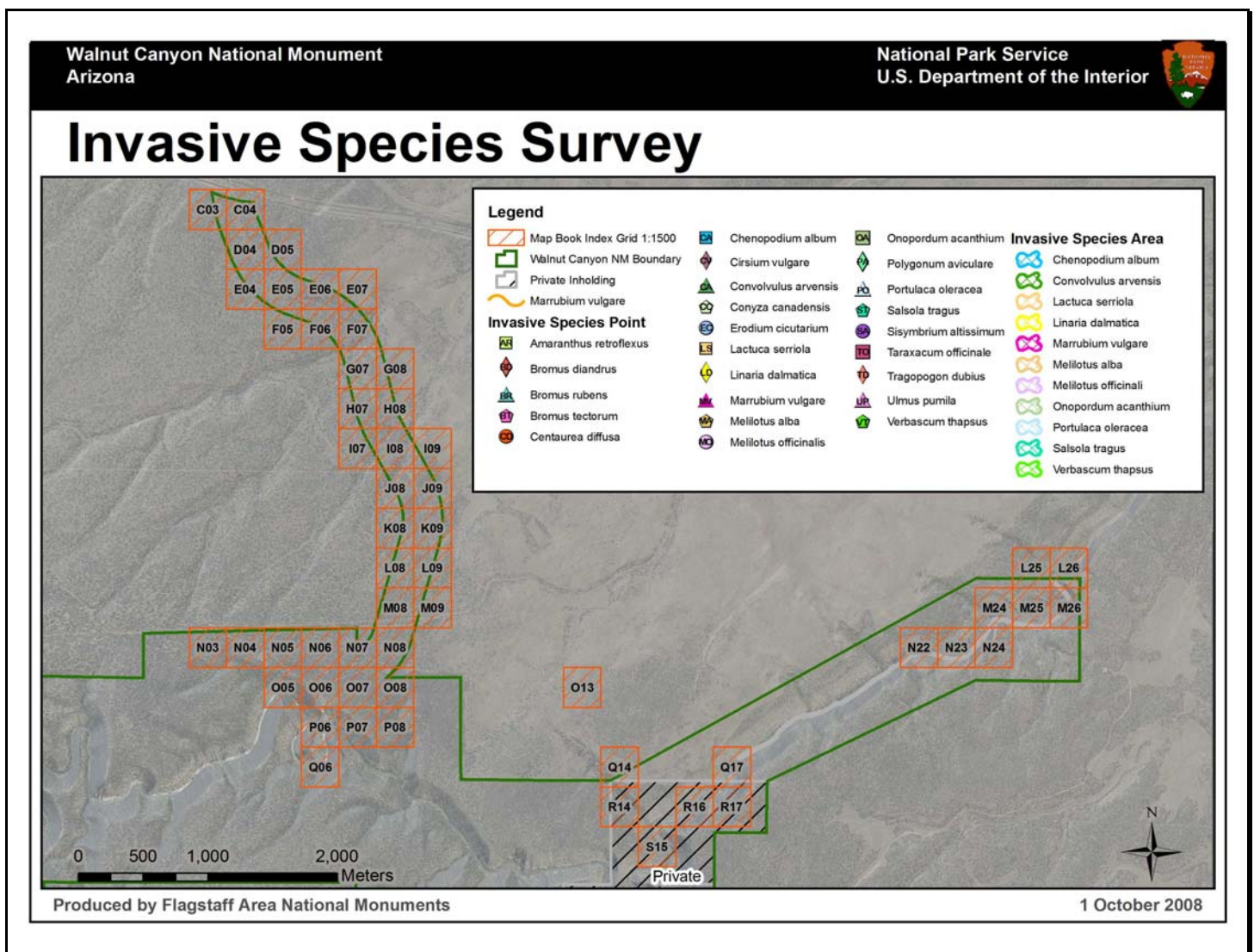


FIGURE 4. Location of survey areas on aerial photo of Walnut Canyon National Monument. Red boxes indicate survey locations. All surveys were within WACA boundaries only.

3.2 Field Data Collection

These methods meet the minimum mapping standards established by the North American Weed Management Association (NAWMA) and most of the core elements identified by the NPS Intermountain Region Weed Mapping Committee.

All weed mapping activities were performed using a Trimble GeoXT 2005 global positioning system (GPS) unit. The GeoExplorer is a small, handheld unit with high accuracy. Field location data was differentially corrected in the production of final digital products.

All invasive plant infestations .05 acre or less in size were recorded as single point features. This is called the **Patch Separation Resolution (PSR)**. Infestations above .05 acres were recorded as either an area or line feature in the field. Individual plants or infestations separated by more than 25 meters of weed-free area were considered separate infestations. Accompanying data collected included density of targeted species within each infested area or at each point.

3.3 Mapping

Mapping activities were conducted at as fine a scale as required to achieve 90 percent or greater confidence that all invasive plant infestations within each survey area are detected. In heavy cover and/or for very difficult-to-see species this meant slowly walking detection swath widths as narrow as 20 meters. In very open terrain effective swath widths may be as great as 50 meters. The width of the survey swath, **Effective Detection Swath Width (EDSW)**, required was determined and adjusted in the field by each surveyor based on variations in terrain, walking speed, associated vegetation, target species, and observer confidence.

Daily routes were recorded using the “breadcrumb feature” position recording option or **Between-Feature Positions (BFP)** of the Trimble Geoexplorer GPS units. This function automatically records the surveyor’s route of travel.

Survey team members searched for targeted invasive and non-native plants selected from a list of regionally recognized species that are determined to either be in or have a high probability of occurring in WACA (see **Table 1**). Any other new non-native species recognized as potentially invasive will be noted if found. Target invasive non-native plant species were identified in consultation with WACA botanists and other knowledgeable sources. The list includes approximately 26 taxa. Field crews must become familiar with target taxa and their potential habitats, and plan survey dates and routes to maximize chances of encountering the target species. Surveys were conducted from August through September, 2008.

Invasive plant species and representative habitats were photographed using digital photography. Voucher specimens were collected when no historical voucher exists.

Potential habitat within each section will be reviewed prior to planning each day's travel route by studying aerial photographs, topographic maps, or the WACA Vegetation Mapping Report (Hansen et al. 2004). Field crews consisted of 2 or 3 people walking planned survey routes each day. More time was spent in priority areas, areas of high vegetation cover, and areas of concentrated invasive plant habitat. Priority areas were

identified in consultation with the park botanists and natural resource managers. Survey crews were equipped with a list of vouchered invasive plant taxa occurring in WACA. Voucher specimens were collected for invasive plant taxa that are not represented by voucher specimens collected in the WACA or NAU herbarium.

TABLE 1. List of Known Exotic Plants at Walnut Canyon National Monument and the surrounding area.

#	Latin Name	Common Name	Family
1)	<i>Cirsium vulgare</i>	Bull thistle	Asteraceae
2)	<i>Lactuca serriola</i>	Prickly lettuce	Asteraceae
3)	<i>Tragopogon dubius</i>	Common salsify	Asteraceae
4)	<i>Onopordum acanthium</i>	Scotch Thistle	Asteraceae
5)	<i>Centaurea diffusa</i>	Diffuse knapweed	Asteraceae
6)	<i>Sisymbrium altissimum</i>	Tumble mustard	Brassicaceae
7)	<i>Erysimum repandum</i>	Spreading wallflower	Brassicaceae
8)	<i>Chenopodium album</i>	Lambsquarters	Chenopodiaceae
9)	<i>Convolvulus arvensis</i>	Field bindweed	Convolvulaceae
10)	<i>Melilotus alba</i>	White sweetclover	Fabaceae
11)	<i>Melilotus officinalis</i>	Yellow sweetclover	Fabaceae
12)	<i>Erodium cicutarium</i>	Storksbill	Geraniaceae
13)	<i>Leonurus cardiaca</i>	Motherwort	Lamiaceae
14)	<i>Marrubium vulgare</i>	Horehound	Lamiaceae
15)	<i>Plantago lanceolata</i>	Lanceleaf plantain	Plantaginaceae
16)	<i>Bromus tectorum</i>	Cheatgrass	Poaceae
17)	<i>Bromus diandrus</i>	Ripgut brome	Poaceae
18)	<i>Bromus rubens</i>	Red Brome	Poaceae
19)	<i>Poa pratensis</i>	Kentucky bluegrass	Poaceae
20)	<i>Rumex crispus</i>	Curly dock	Polygonaceae
21)	<i>Malus pumila</i>	Paradise apple	Rosaceae
22)	<i>Potentilla norvegica</i>	Norwegian cinquefoil	Rosaceae
23)	<i>Galium aparine</i>	Bedstraw	Rubiaceae
24)	<i>Linaria dalmatica</i>	Dalmatian toadflax	Scrophulariaceae
25)	<i>Verbascum thapsus</i>	Common mullein	Scrophulariaceae
26)	<i>Tamarix ramosissima</i>	Tamarisk	Tamaracaceae

3.4 Data Categories

The data categories included in this inventory were discussed at length and agreed upon by NPS and CP-CESU representatives prior to initiation of the project. The GPS data dictionary developed to electronically capture data elements while in the field is presented in **Appendix 1**. Data collection categories and definitions comply with the minimum mapping data standards established by North American Weed Management Association (NAWMA 2003) and include most of the core elements contained in the NPS Intermountain Region Weed Mapping Guidelines (Benjamin 2001, USDI-NPS 1995).

Data elements were entered into GPS units in the field. GIS-entered data included the location and size of each infestation, density, phenology of the weedy species, woody growth stage (if a woody species), presence of site disturbance, dominant native species present, date, time, and any additional pertinent notes about the site. Data entered in the office during post-processing included ecological status, Park code, record numbers, detection confidence for inventory area polygons, scientific name, ITIS code, lifeform of species, county, state, and country. Additional data elements (e.g. datum, UTM zone, source of data) that pertain to the spatial data set as a whole are provided as metadata files (e.g., datum, UTM zone).

3.5 Field Procedures

Some of the terms used in this and subsequent sections of the report are used to describe new methods and standards developed for conducting invasive weed inventories on natural areas. Terms unique to this report are defined as follows:

Search Target (ST): Refers to invasive plants that are the object of a field search. ST descriptions must always include species, growth stage, and MDTs.

Minimum Detection Target Size (MDTS): The smallest infestation size (single plant or patch) of the least-visible targeted invasive species that searchers are confident of detecting and identifying at a stated level of probability under actual field conditions using their stated protocols. In this project the MDTs was set at 0.01 acre.

Effective Detection Swath Width (EDSW): The maximum width of a linear walking search pattern in which an on-the-ground searcher is confident of visually detecting at least 90 percent of all invasive plant infestations of the stated minimum target size. EDSW must be adjusted according to factors influencing target visibility, such as species, stage of growth, topography, and associated vegetative cover, in order to maintain the 90 percent minimum detection standard. Data dictionary choices for effective detection swath widths in this project were 25, 50, 100, 150, 200, 250, and 300 meters.

Patch Separation Resolution (PSR): The minimum distance between single weeds or patches of weeds that are considered to be separate infestations. Plants separated by the PSR distance or more are mapped as separate infestations. Plants separated by less than the stated PSR are usually mapped as a single infestation. The PSR for this project was 25 meters.

Detection Confidence (DC): The percentage of the total number of infestations that crew members estimate they were able to find in a searched area, based on the probability of seeing patches of the established minimum detection target size of the least visible target species in that terrain. Detection confidence is essentially meaningless without also stating the search target associated with that DC. The minimum required DC set for this project was 90 percent based on a MDTs of 0.01 acre for plants of the least visible target species in a mature or flowering stage of growth.

Between-Feature Positions (BFP): A series of location points recorded automatically by Trimble GPS units indicating the daily search routes traveled by each crew member. The distance interval for collecting BFP's in this project was set to correspond to the average effective detection swath width for each area inventoried.

Potential invasive plant habitat within each targeted inventory area was considered prior to planning each day's travel route. Field crew members were expected to search along the planned inventory routes, spending more time in priority areas and areas of concentrated invasive plant habitat.

When arriving at a site, crews would discuss what they determined to be the best method for searching that area to achieve the required level of detection confidence for the established minimum target size. Consideration of terrain, vegetation cover, expected visibility of target weed species, and crew size were all factored into setting effective detection swath widths and other mapping techniques and standards used for each site. If areas were found to be open and visibility was generally good, systematic coverage of the area was done using the **EDSW** method. When inventorying areas wider than a single swath width, multiple parallel passes of a lone crew member (or multiple crew members walking parallel transects or contours) were searched as contiguous or slightly overlapping strips to avoid coverage gaps. Most areas within Walnut Canyon were narrow in width and vegetation cover was heavy. In such situations crews searched in parallel passes up and/or down the length of the canyon, penetrating as far as possible into even the thickest vegetation areas. Daily inventory routes of each crew member were recorded and mapped using the **BFP** tracking function of the GeoXT 2005 GPS units.

Field searches were conducted at as fine of a scale as required to be confident that 90 to 100 percent of all invasive plant infestations 0.01 acre or larger within each inventory area were detected. Search swath widths were adjusted as needed based on variations in terrain, walking speed, associated vegetation, and target species. In heavy cover and/or for difficult-to-see species this required slowly walking swath widths as narrow as 25 meters. In very open terrain and/or for highly visible species, some effective swath widths were 40 meters or greater. Inventorying steep terrain using the standard search swath method was not always possible; in which case crew members used binoculars to visually scan the open but inaccessible hillsides for suspected target species. Binoculars were also used to search flats and wash bottoms for suspected weeds in any openings surrounded by impenetrable woody vegetation.

As inventory units were traversed, locations of all target species were documented by the crew using Trimble GeoXT 2005 global positioning system (GPS) units with 2- to 5-meter accuracy. Crews also recorded the location and documented the identity of any other non-target species they encountered if that species has a known history of invasiveness or if it appears to be a species of interest.

Additional equipment used by crew members included compasses, binoculars, topographic maps, calculators, and radios. Also below is a complete list of equipment used in this study. Field locations were recorded by GPS as UTM coordinates, and were later differentially corrected in the production of final digital products.

Invasive plant infestations .05 acre or less in size were typically recorded as point features. Crew members were given the option to record infestations between .05 and 1 acre in size as points, polygons (actual areas or gross-areas), or line features, depending on which feature they felt would best represent the situation. However, most occurrences within this size range were recorded as point features.

The number of plants, or density, was recorded at each point, line and area feature. As a general rule, clustered plants with individuals separated by less than 25 meters were considered a single infestation and were mapped as a single feature (point, line, or polygon). Plants or groups of plants separated by more than 25 meters were mapped as separate infestations (Refer to definition of PSR). Percent cover was estimated within a defined area and entered in the GPS, see Data Dictionary in **Appendix 1**.

In deciding on the dominant vegetation cover, crews identified the two most prevalent or most dominant native species in the overstory in which the weedy infestation was found growing. Native species were coded with a code which was entered into the data dictionary. The most common dominant vegetation types were either Ponderosa pine forest (PINPON), or Pinyon- Juniper Woodland (PJ).

3.6 Voucher Specimens

Specimens were to be collected to document new or otherwise unique occurrences of invasive and some native species encountered within WACA. The voucher specimens collected in 2008 will be processed for deposit in herbaria at WACA and Northern Arizona State University (NAU). The specimen deposited at NAU is considered “on loan” from NPS and documented in a loan agreement. Both specimens were curated and managed following NPS service-wide protocols. The specimens collected as part of this project are affixed with labels containing information on species, collector, collection date, collection site, and NPS record number. Specimen data also is provided in electronic format.

3.7 Field Equipment

- Trimble GeoXT 2005 Geoplotter GPS
- Binoculars
- Compass
- Calculator
- Park Radio
- Cellular Phone
- Field notebook
- Field Sheets
- Flora and other plant taxonomic keys
- Plant dissection kits
- Hand lens
- Collection bags
- Topographic maps
- Digital Camera
- Surveyor marking ribbon
- Saw and sharp knife
- Hand trowel

4.0 Results

4.1 Location of Surveys within Walnut Canyon National Monument

Surveys were conducted within the red boxes in **Figures 4 and 5**. All surveys were within the boundaries of WACA only, except for box #'s O13 and Q14 where scotch thistle (*Onopordum acanthium*) was found outside the Monument. Due to this species' serious negative impacts as an invasive weed, it was determined that it should also be mapped outside of WACA wherever it was encountered.

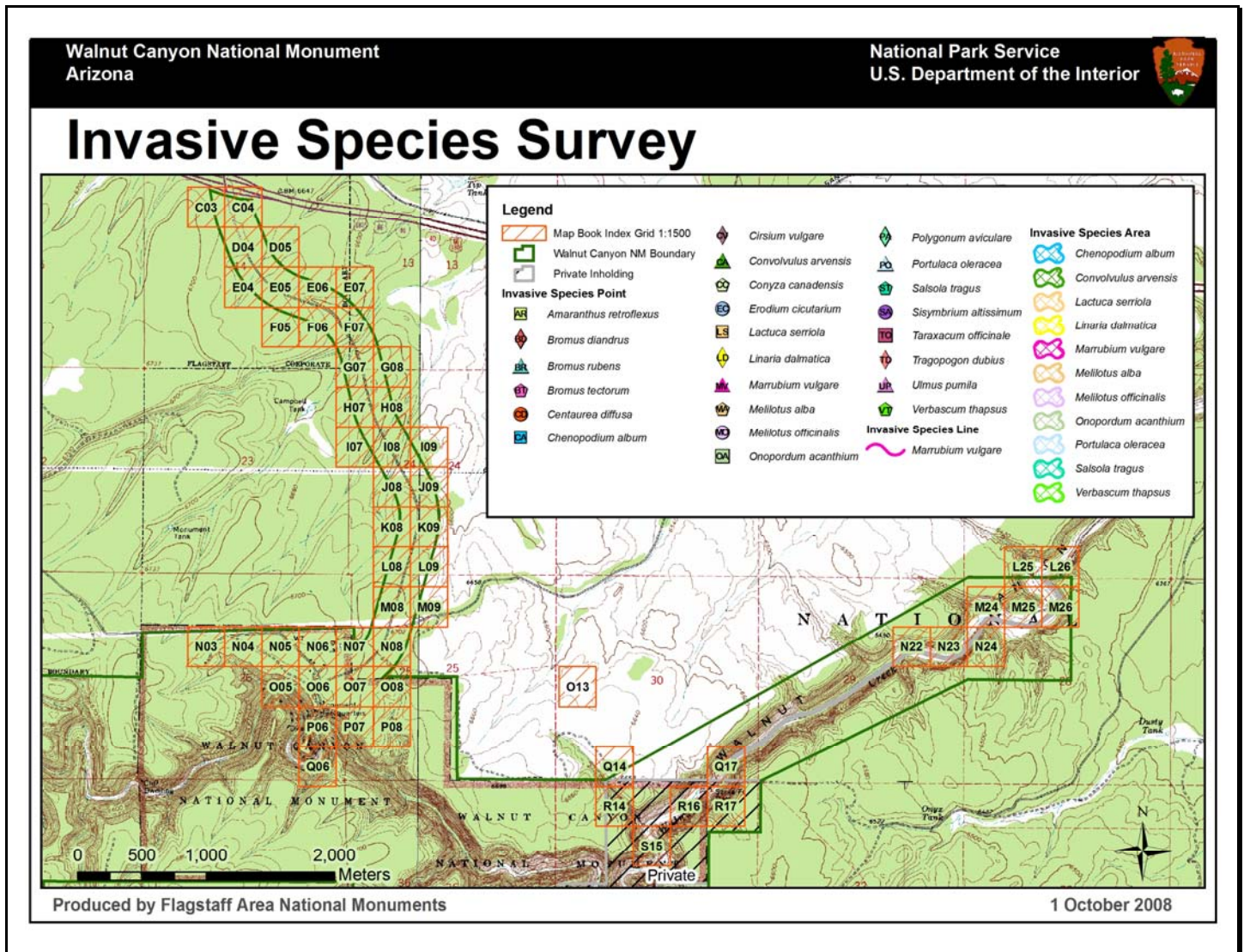


FIGURE 5. Areas within Walnut Canyon National Monument where invasive and non-native plants were surveyed and mapped. Red boxes indicate survey locations. All surveys were within WACA boundaries only.

4.2 Results of Surveys within Walnut Canyon National Monument

Surveys were conducted from the end of August through September 2008. Twenty four invasive and non-native plant species were located and mapped. **Table 2** contains which species were found, which were expected but not found, how many points were located, and the approximate total acreage of each species.

TABLE 2. List of Invasive and Non-native Plants, organized by family, found at Walnut Canyon National Monument During August and September 2008.

#	Latin Name	Common Name	Family	# Occurrences	Approx. Acres
1)	<i>Centaurea diffusa</i>	Diffuse knapweed	Asteraceae	1	0.01
2)	<i>Cirsium vulgare</i>	Bull thistle	Asteraceae	0	0.00
3)	<i>Conyza canadensis</i>	Canada horseweed	Asteraceae	29	0.46
4)	<i>Lactuca serriola</i>	Prickly lettuce	Asteraceae	67	0.55
5)	<i>Onopordum acanthium</i>	Scotch Thistle	Asteraceae	3	0.05
6)	<i>Taraxicum officinale</i>	Dandelion	Asteraceae	6	0.05
7)	<i>Tragopogon dubius</i>	Common salsify	Asteraceae	33	0.99
8)	<i>Amaranthus retroflexus</i>	Pigweed	Amaranthaceae	15	0.37
9)	<i>Erysimum repandum</i>	Spreading wallflower	Brassicaceae	0	0.00
10)	<i>Sisymbrium altissimum</i>	Tumble mustard	Brassicaceae	1	0.01
11)	<i>Chenopodium album</i>	Lambsquarters	Chenopodiaceae	41	1.87
12)	<i>Salsola tragus</i>	Tumbleweed	Chenopodiaceae	15	1.14
13)	<i>Convolvulus arvensis</i>	Field bindweed	Convolvulaceae	3	0.60
14)	<i>Melilotus alba</i>	White sweetclover	Fabaceae	14	6.16
15)	<i>Melilotus officinalis</i>	Yellow sweetclover	Fabaceae	15	1.37
16)	<i>Erodium cicutarium</i>	Storksbill	Geraniaceae	2	0.11
17)	<i>Leonurus cardiaca</i>	Motherwort	Lamiaceae	0	0
18)	<i>Marrubium vulgare</i>	Horehound	Lamiaceae	62	2.82
19)	<i>Plantago lanceolata</i>	Lanceleaf plantain	Plantaginaceae	0	0
20)	<i>Bromus diandrus</i>	Ripgut brome	Poaceae	5	0.05
21)	<i>Bromus rubens</i>	Red Brome	Poaceae	1	0.01
22)	<i>Bromus tectorum</i>	Cheatgrass	Poaceae	3	0.12
23)	<i>Poa pratensis</i>	Kentucky bluegrass	Poaceae	0	0
24)	<i>Polygonum aviculare</i>	Prostrate knotweed	Polygonaceae	1	0.01
25)	<i>Rumex crispus</i>	Curly dock	Polygonaceae	0	0
26)	<i>Portulaca oleracea</i>	Little hogweed	Portulacaceae	101	9.41
27)	<i>Malus pumila</i>	Paradise apple	Rosaceae	0	0
28)	<i>Potentilla norvegica</i>	Norwegian cinquefoil	Rosaceae	0	0
29)	<i>Galium aparine</i>	Bedstraw	Rubiaceae	0	0
30)	<i>Linaria dalmatica</i>	Dalmatian toadflax	Scrophulariaceae	335	22.10
31)	<i>Verbascum thapsus</i>	Common mullein	Scrophulariaceae	266	18.33
32)	<i>Tamarix ramosissima</i>	Tamarisk	Tamaracaceae	0	0
33)	<i>Ulmus pumila</i>	Siberian elm	Ulmaceae	1	0.01

4.3 Maps of Survey Results within Walnut Canyon National Monument

The following pages contain maps with the location of the points, lines, and areas where invasive and non-native plants were located within targeted survey locations in Walnut Canyon National Monument. Each map is labeled with a unique site number which can be precisely located on either **Figure 4** on page 9, or **Figure 5** on page 15. Numbers within the maps refer to database records which can be found in **Appendix 2**. Each database record contains multiple fields which contain important information for future management, including: density, approximate area of infestation, and UTM location coordinates, etc.

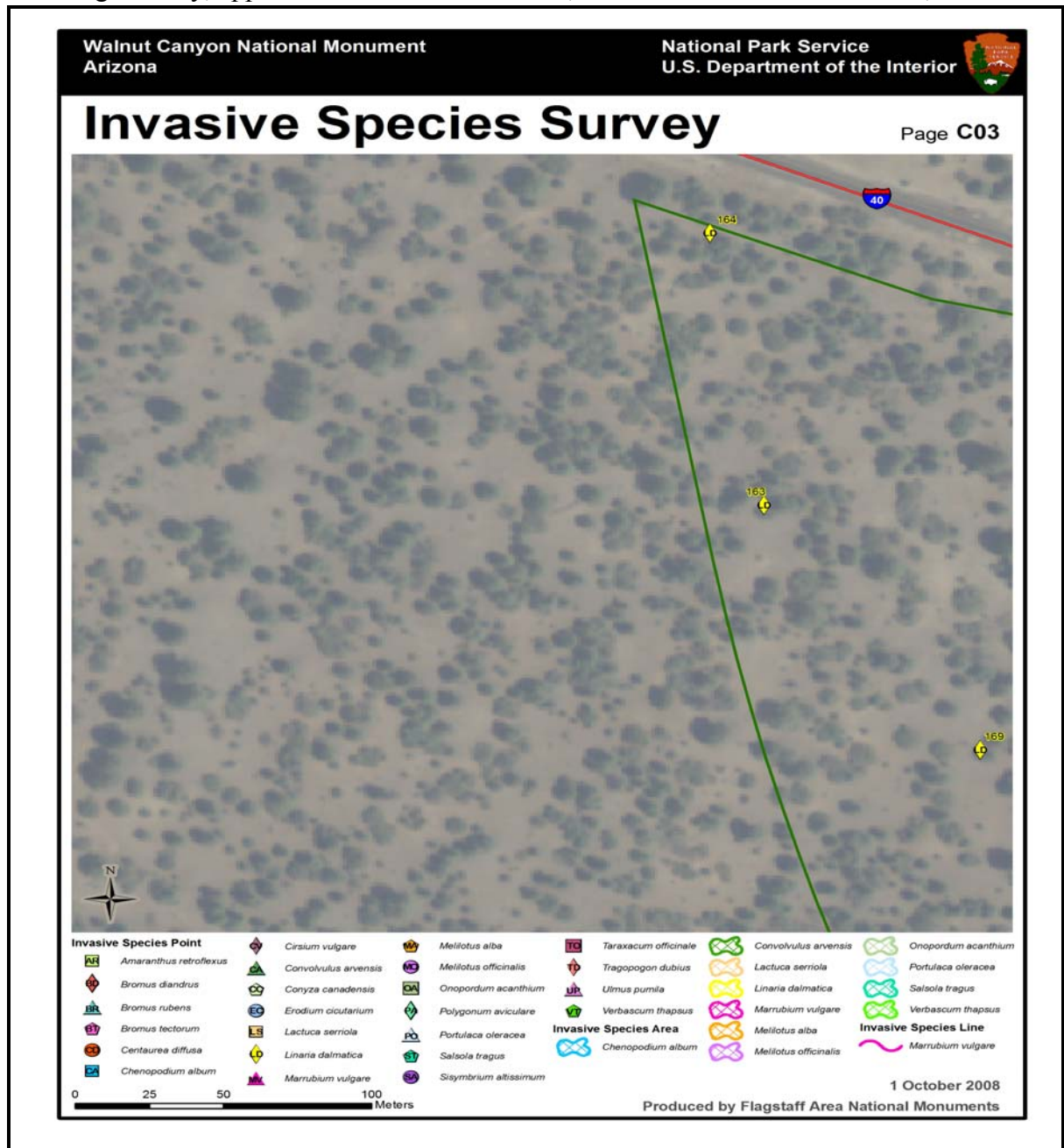


FIGURE 6. Map Book Index Grid # C03 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

Page C04

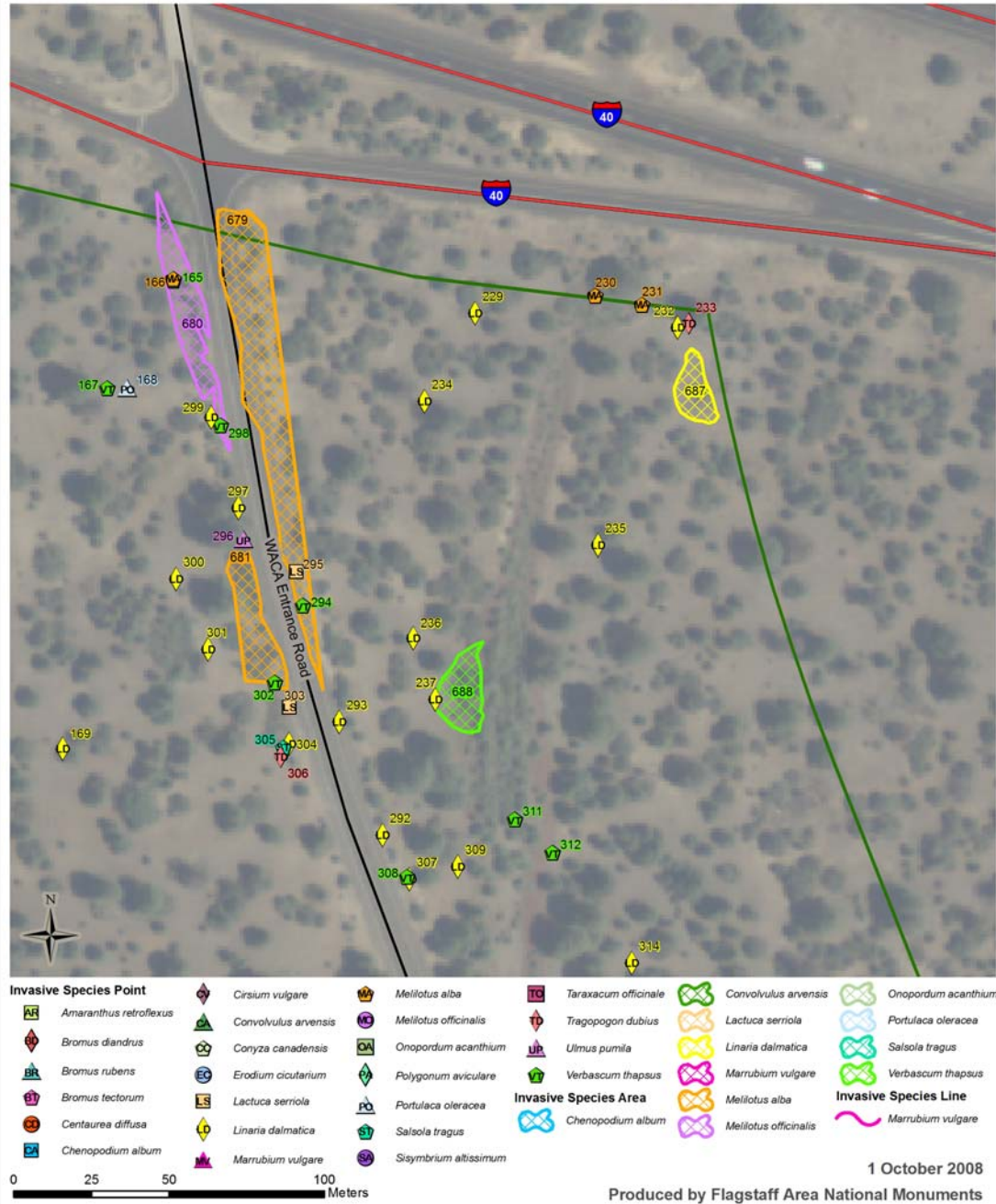


FIGURE 7. Map Book Index Grid # C04 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

Page D04

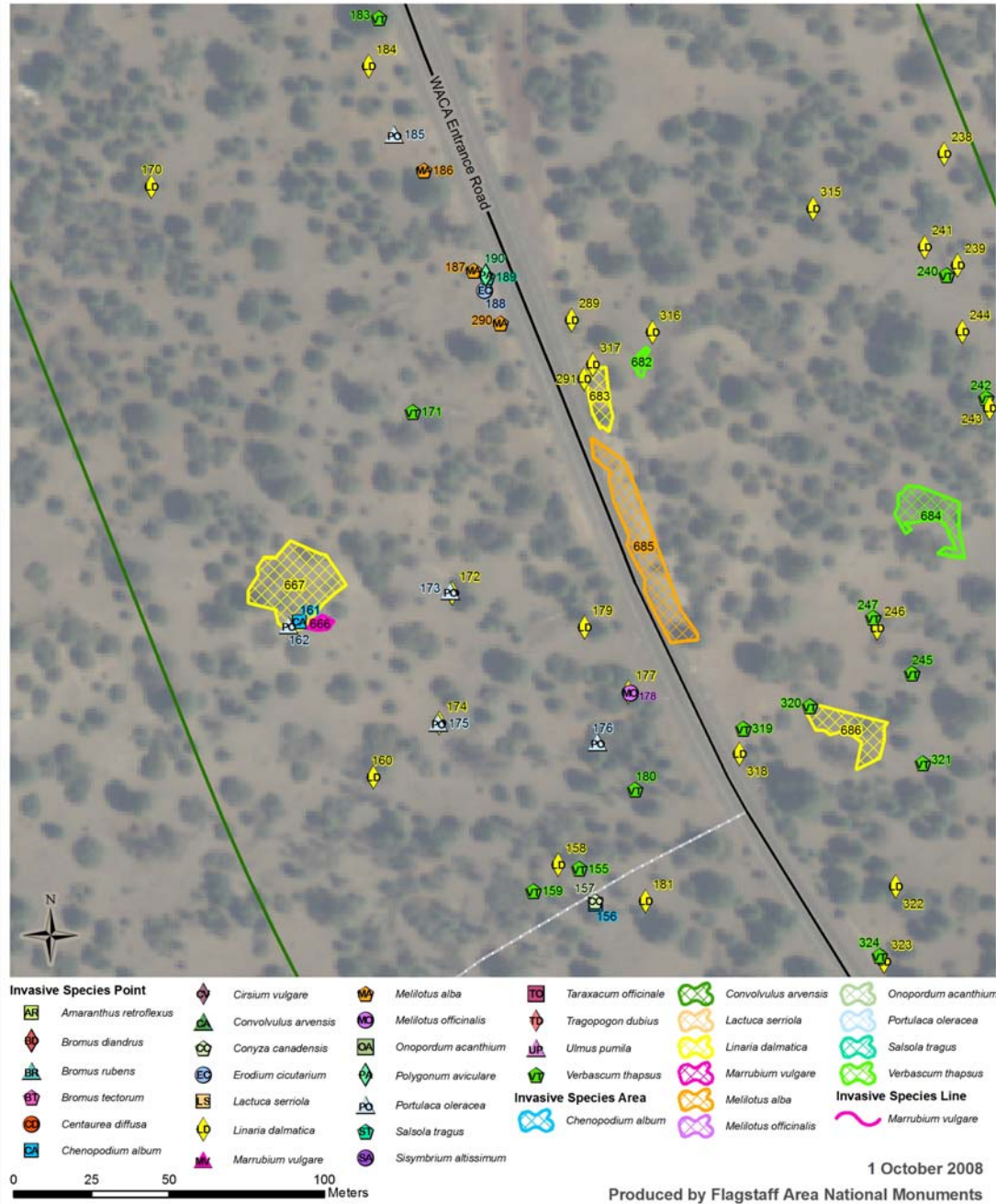


FIGURE 8. Map Book Index Grid # D04 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

Page D05

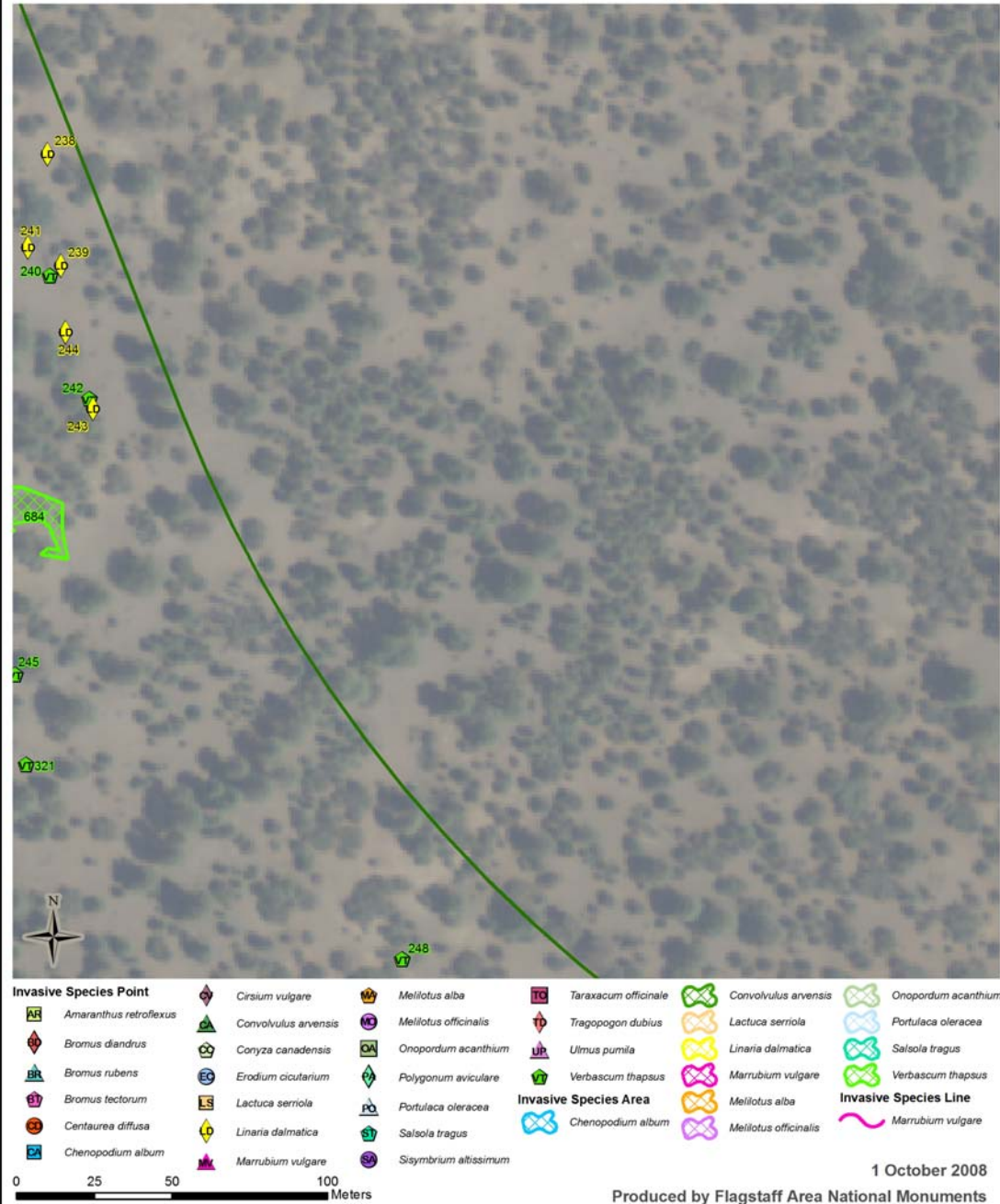


FIGURE 9. Map Book Index Grid # D05 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

Page E04



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Page E05



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Invasive Species Survey

Page E06

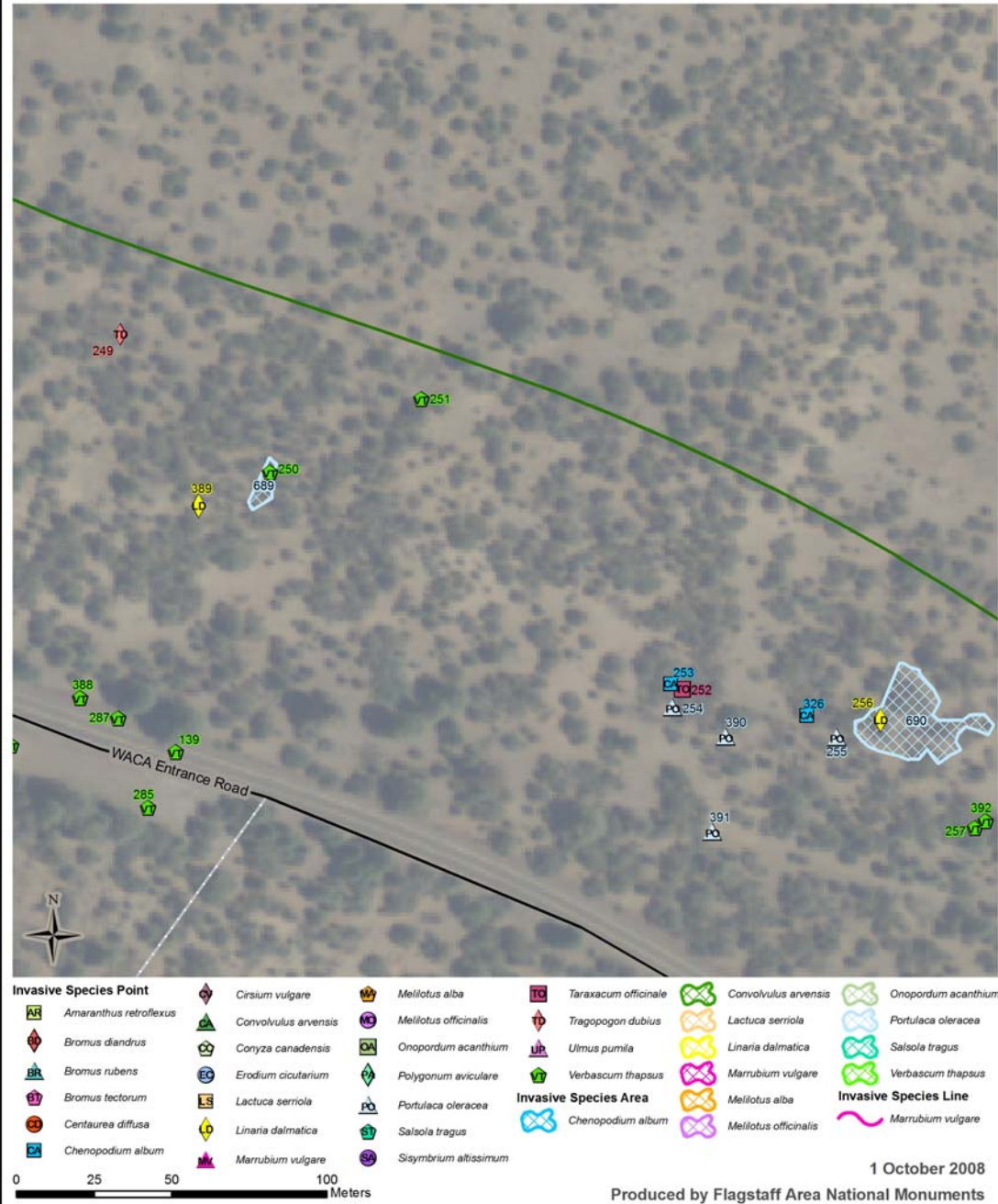


FIGURE 12. Map Book Index Grid # E06 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

Page E07



Flagstaff Group Resource Management Division, Charles Schelz / Ecologist



Invasive Species Survey

Page F05

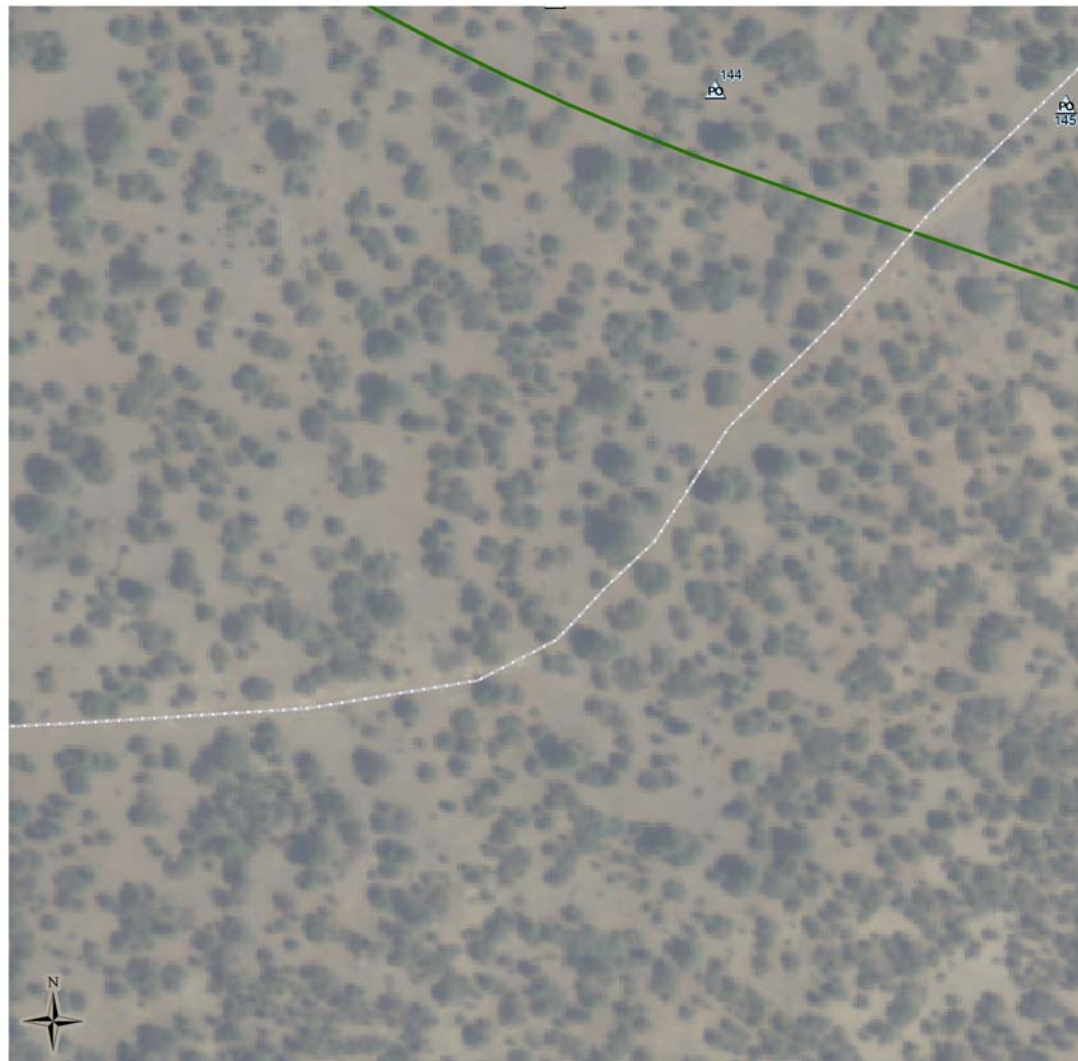


FIGURE 14. Map Book Index Grid # F05 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

Page F06

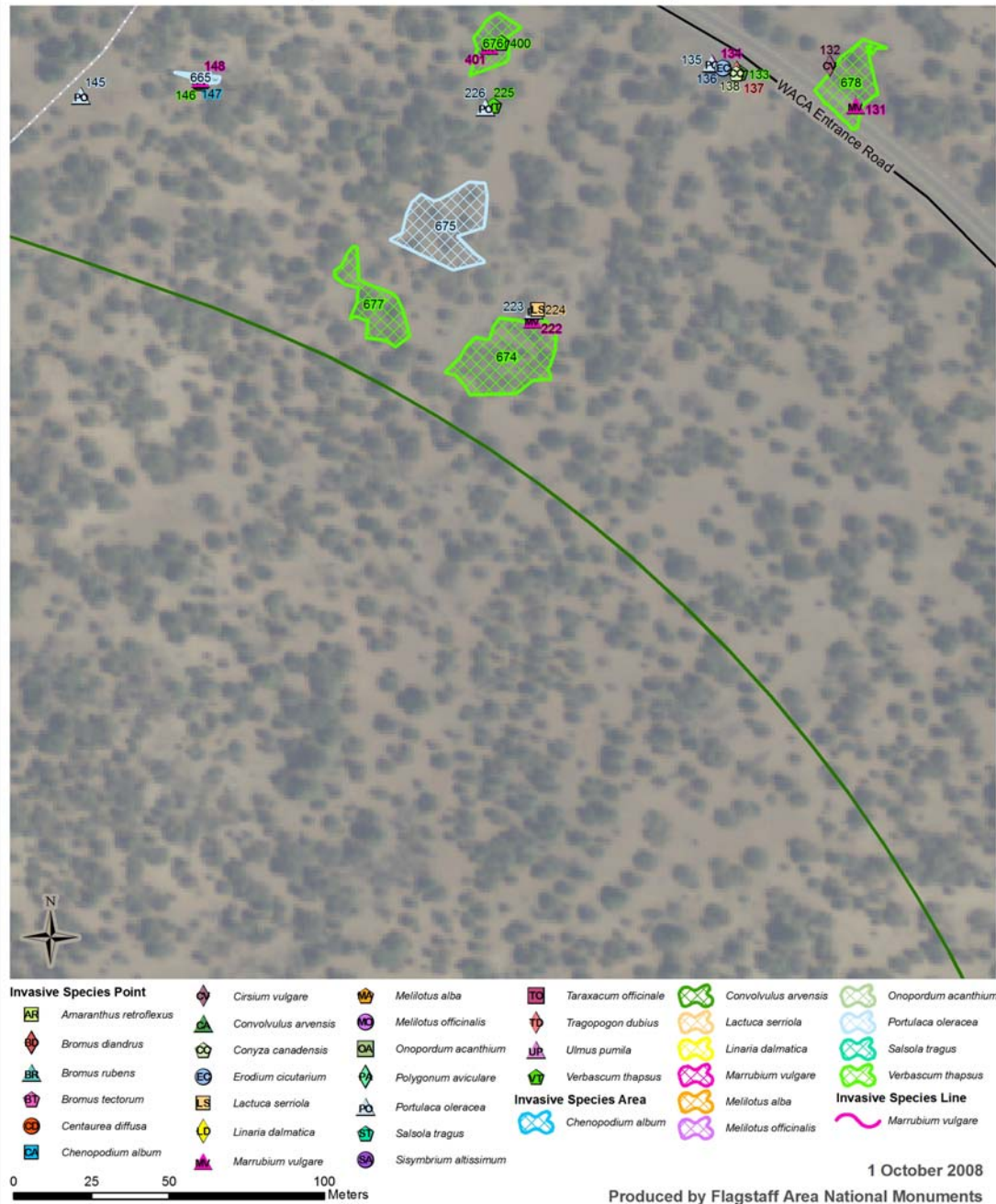


FIGURE 15. Map Book Index Grid # F06 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

Page F07

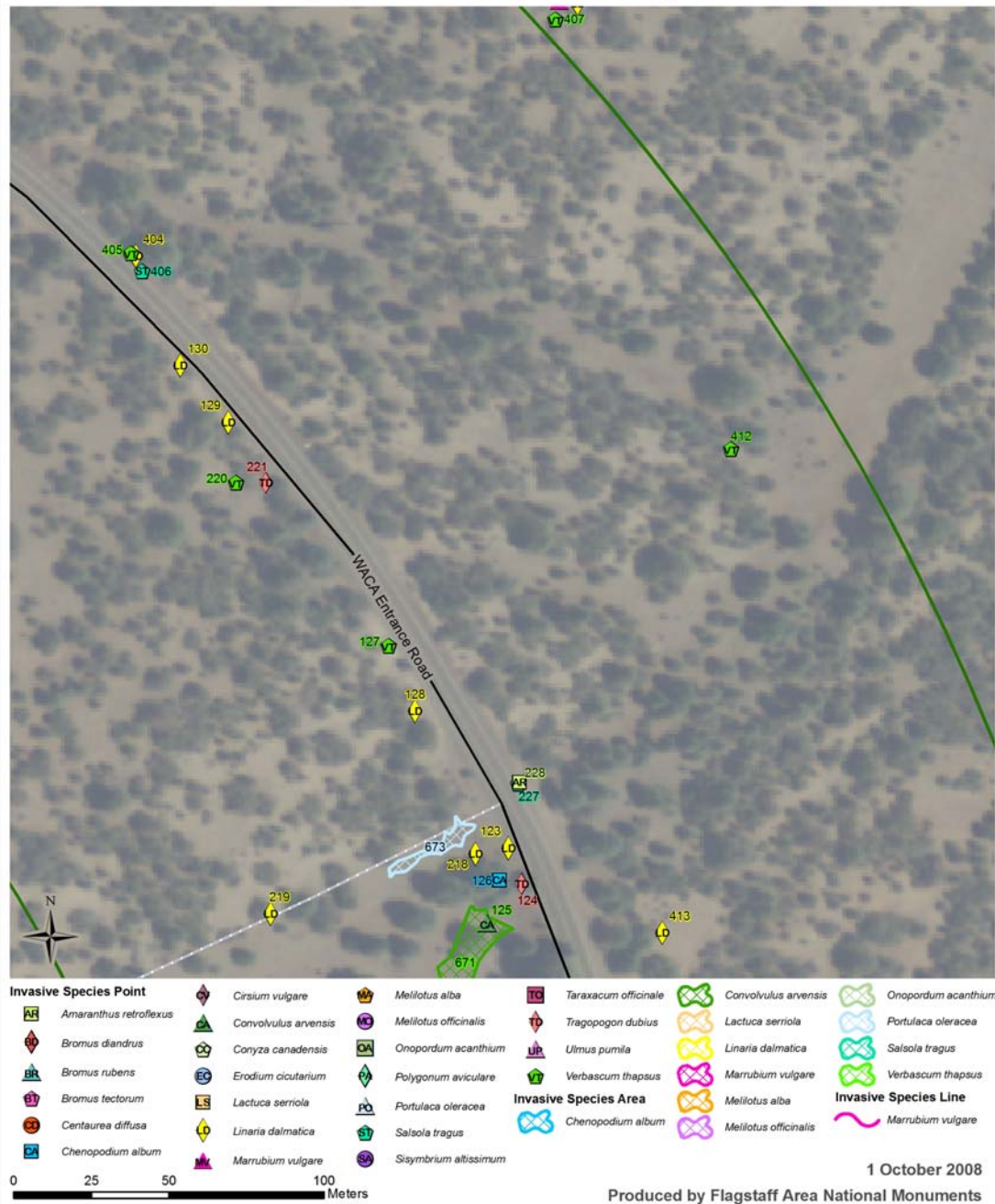


FIGURE 16. Map Book Index Grid # F07 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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Invasive Species Survey

Page G08

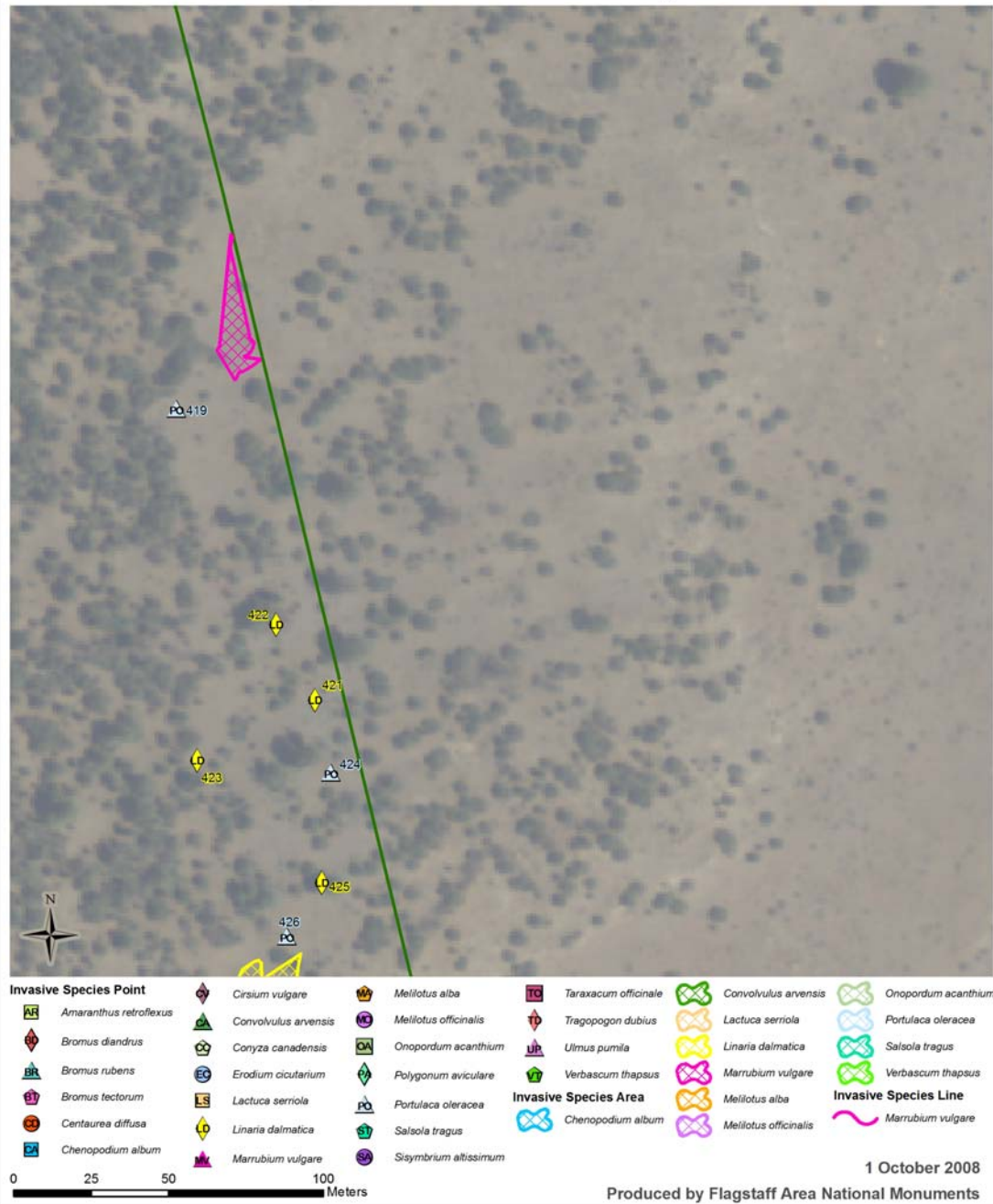


FIGURE 18. Map Book Index Grid # G08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

Page H07



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Invasive Species Survey

Page H08

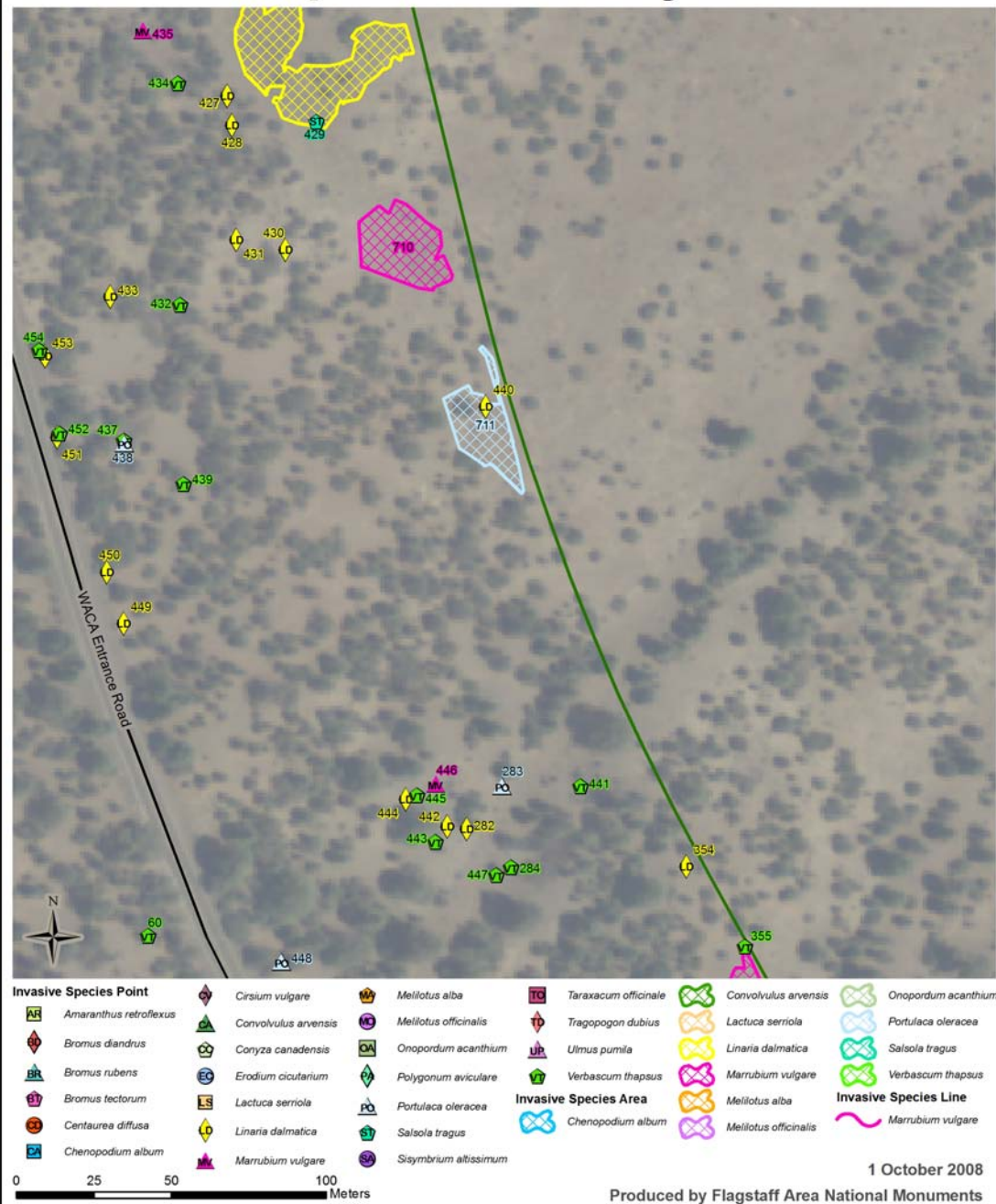


FIGURE 20. Map Book Index Grid # H08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



Invasive Species Survey

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Invasive Species Point	<i>Cirsium vulgare</i>	<i>Melilotus alba</i>	<i>Taraxacum officinale</i>	<i>Convolvulus arvensis</i>	<i>Onopordum acanthium</i>
<i>Amaranthus retroflexus</i>	<i>Convolvulus arvensis</i>	<i>Melilotus officinalis</i>	<i>Tragopogon dubius</i>	<i>Lactuca serriola</i>	<i>Portulaca oleracea</i>
<i>Bromus diandrus</i>	<i>Conyza canadensis</i>	<i>Onopordum acanthium</i>	<i>Ulmus pumila</i>	<i>Linaria dalmatica</i>	<i>Salsola tragus</i>
<i>Bromus rubens</i>	<i>Erodium cicutarium</i>	<i>Polygonum aviculare</i>	<i>Verbascum thapsus</i>	<i>Marrubium vulgare</i>	<i>Verbascum thapsus</i>
<i>Bromus tectorum</i>	<i>Lactuca serriola</i>	<i>Portulaca oleracea</i>	Invasive Species Area	<i>Melilotus alba</i>	Invasive Species Line
<i>Centaurea diffusa</i>	<i>Linaria dalmatica</i>	<i>Salsola tragus</i>	<i>Chenopodium album</i>	<i>Melilotus officinalis</i>	<i>Marrubium vulgare</i>
<i>Chenopodium album</i>	<i>Marrubium vulgare</i>	<i>Sisymbrium altissimum</i>			

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FIGURE 21. Map Book Index Grid # I07 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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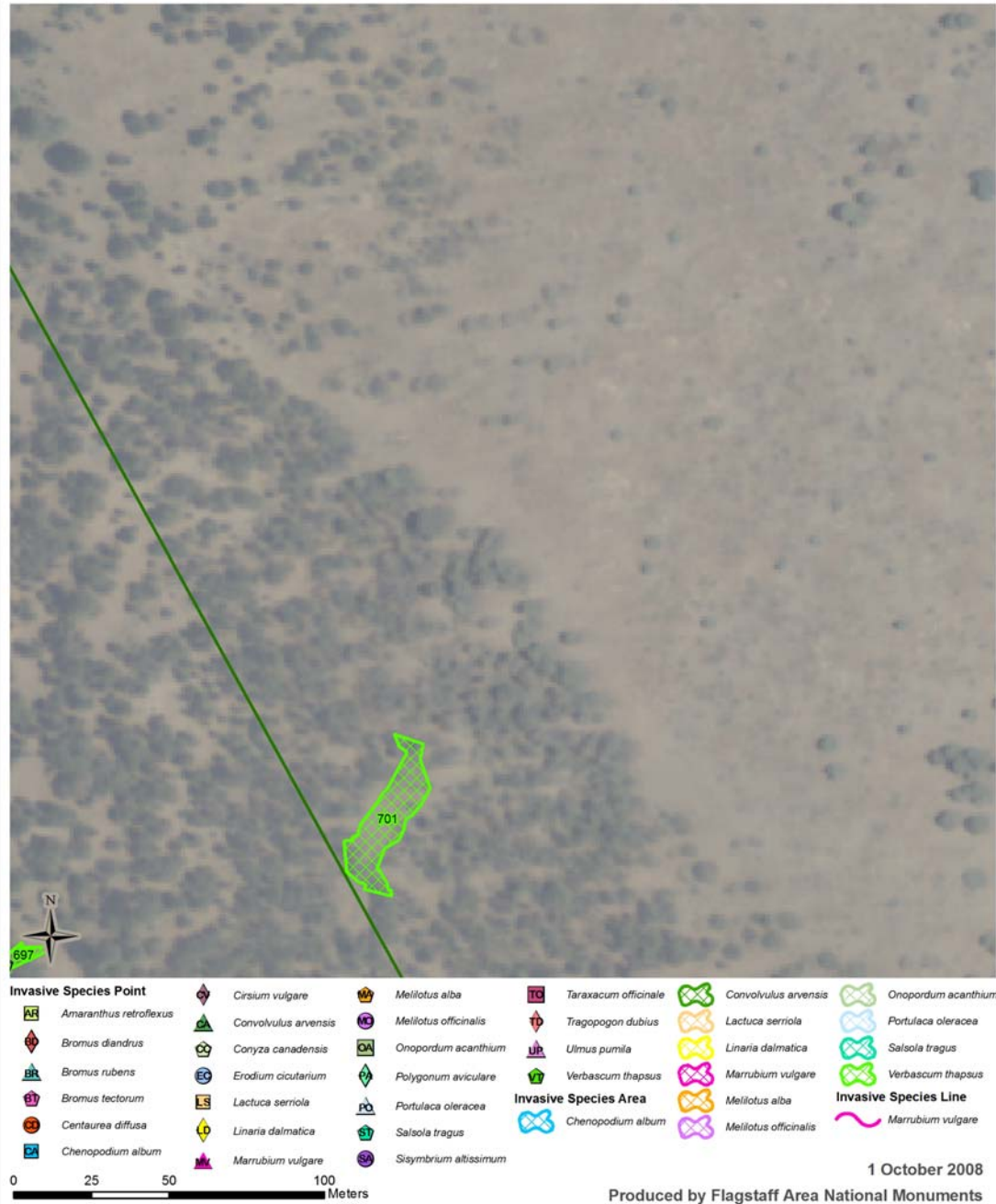


FIGURE 23. Map Book Index Grid # 109 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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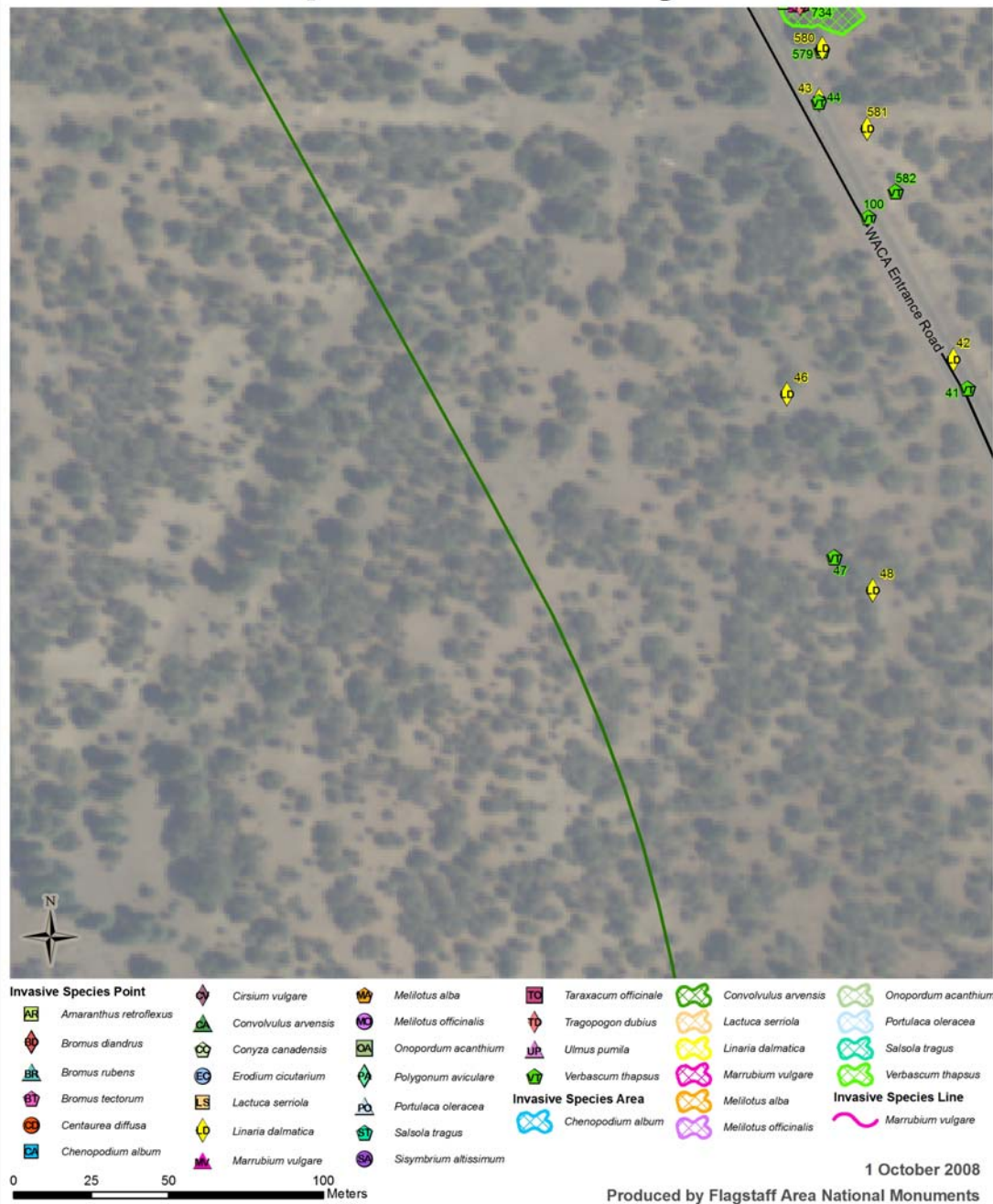


FIGURE 24. Map Book Index Grid # J08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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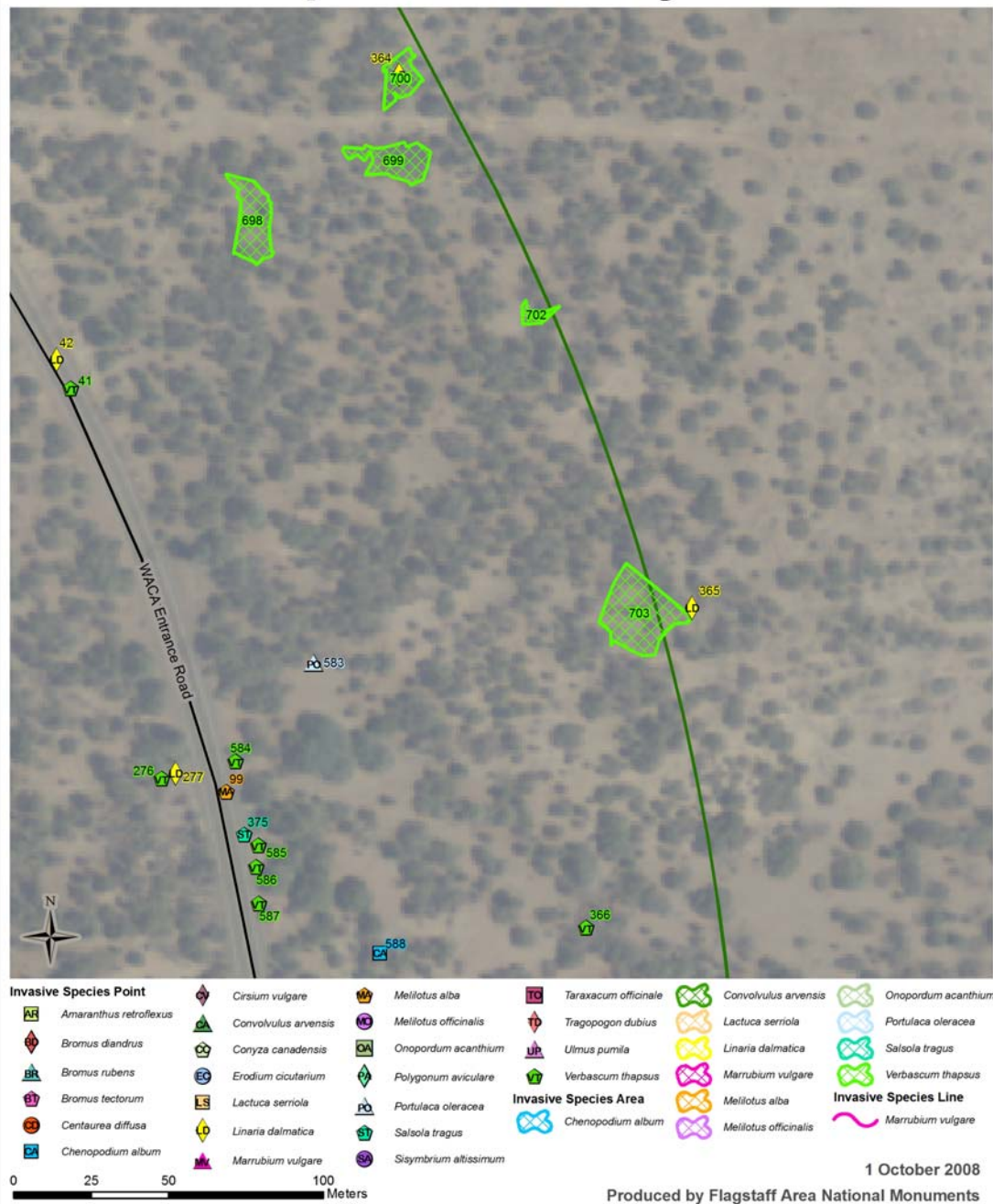


FIGURE 25. Map Book Index Grid # J09 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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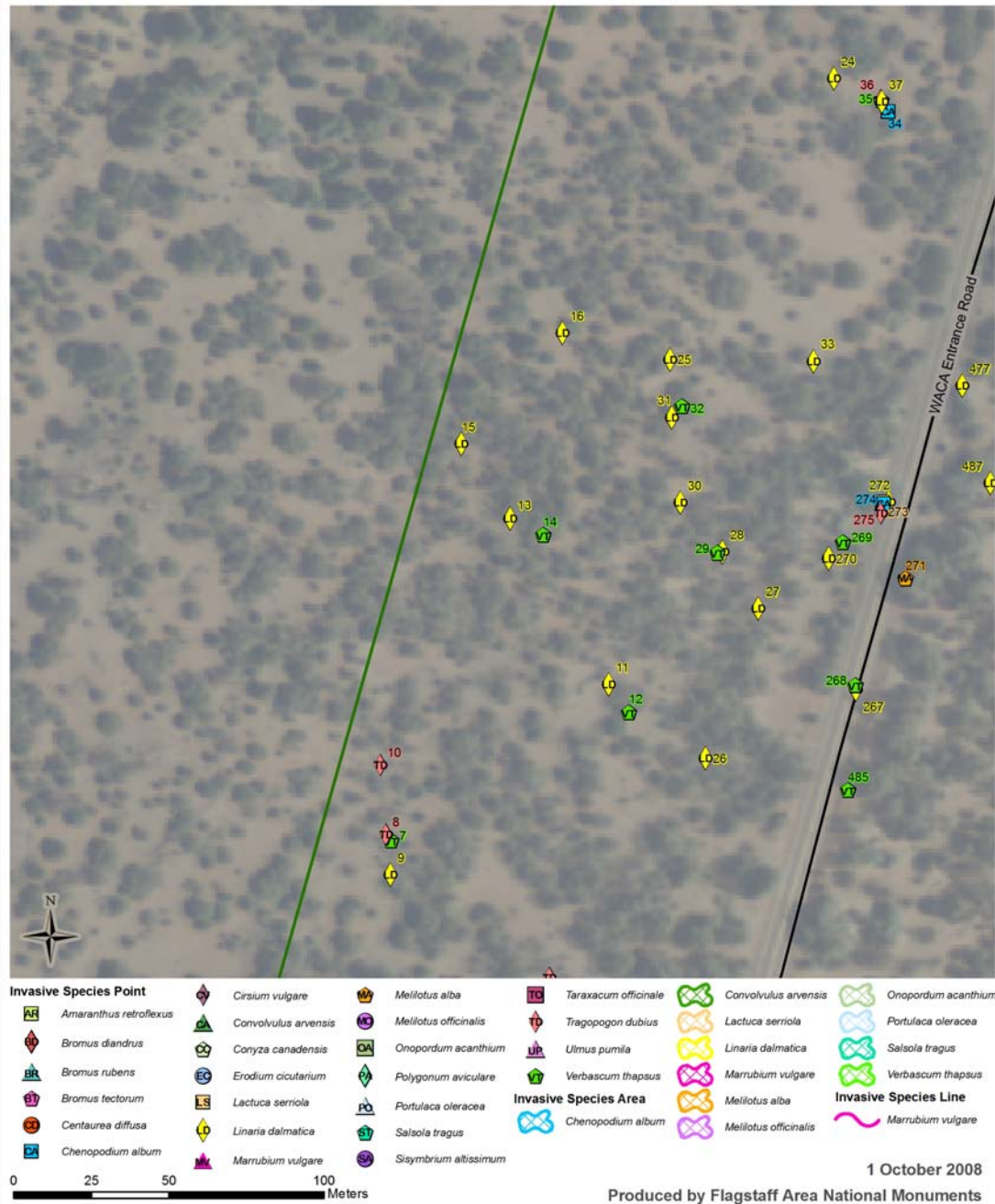


FIGURE 28. Map Book Index Grid # L08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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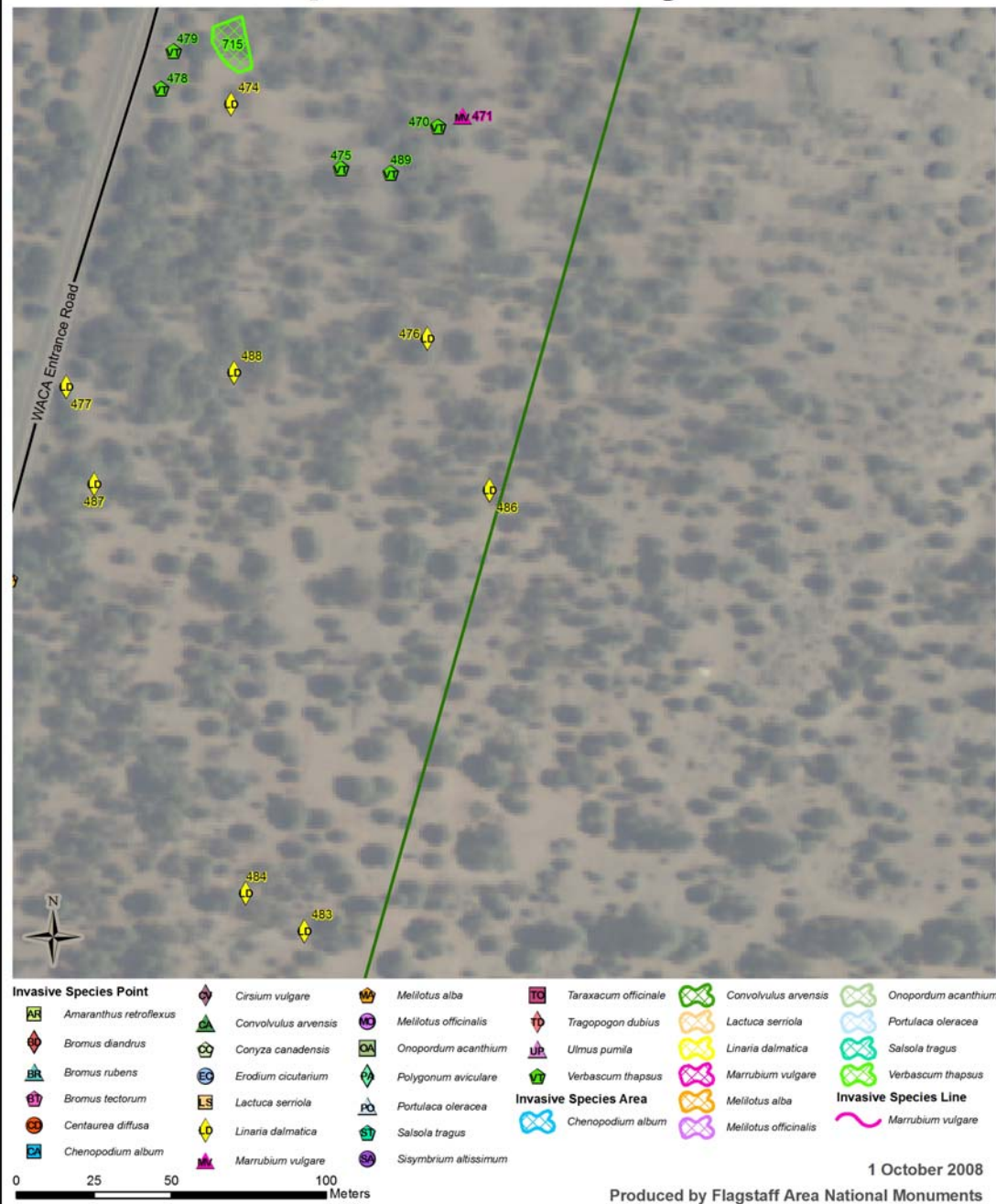


FIGURE 29. Map Book Index Grid # L09 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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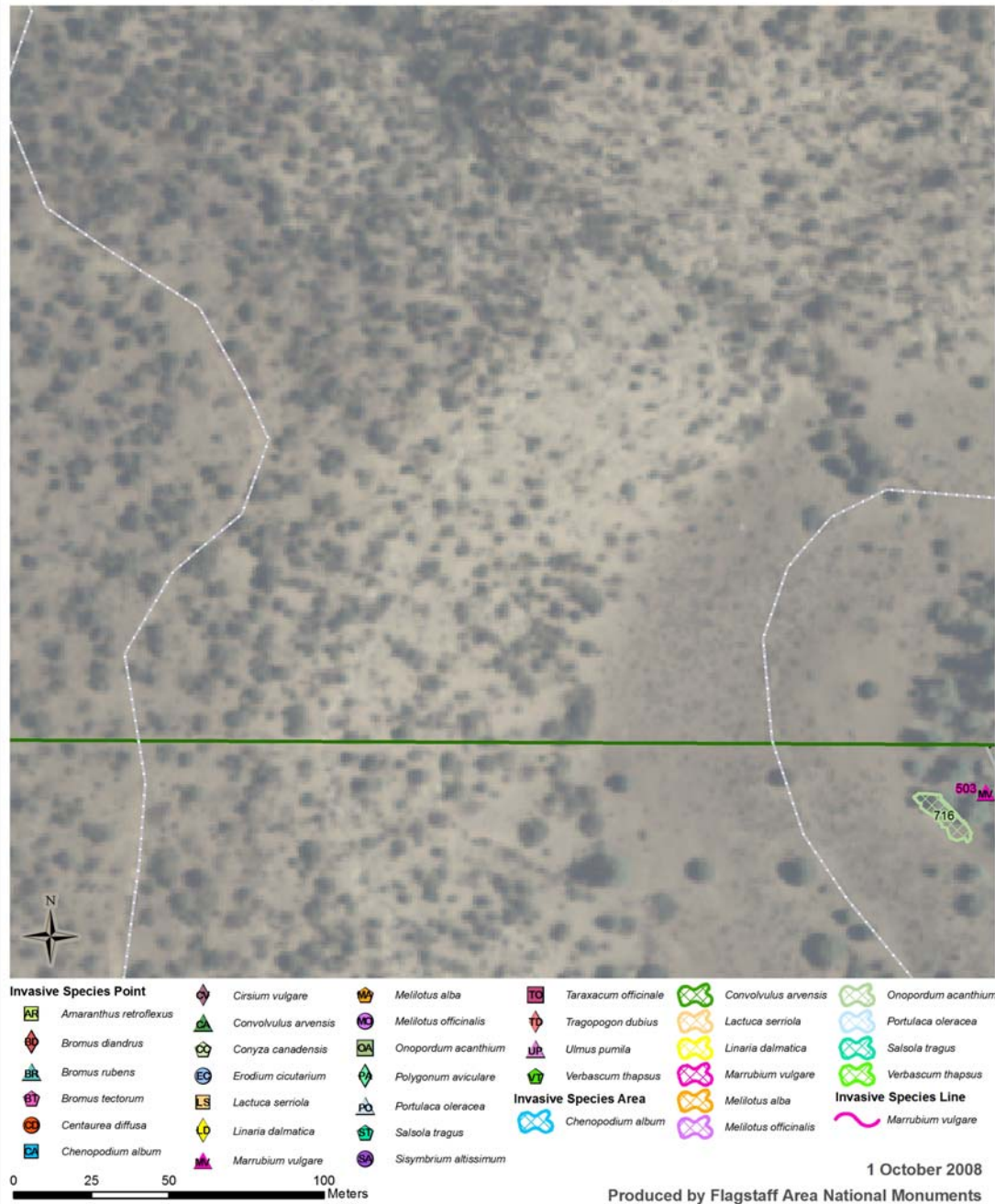


FIGURE 30. Map Book Index Grid # L25 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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FIGURE 31. Map Book Index Grid # L26 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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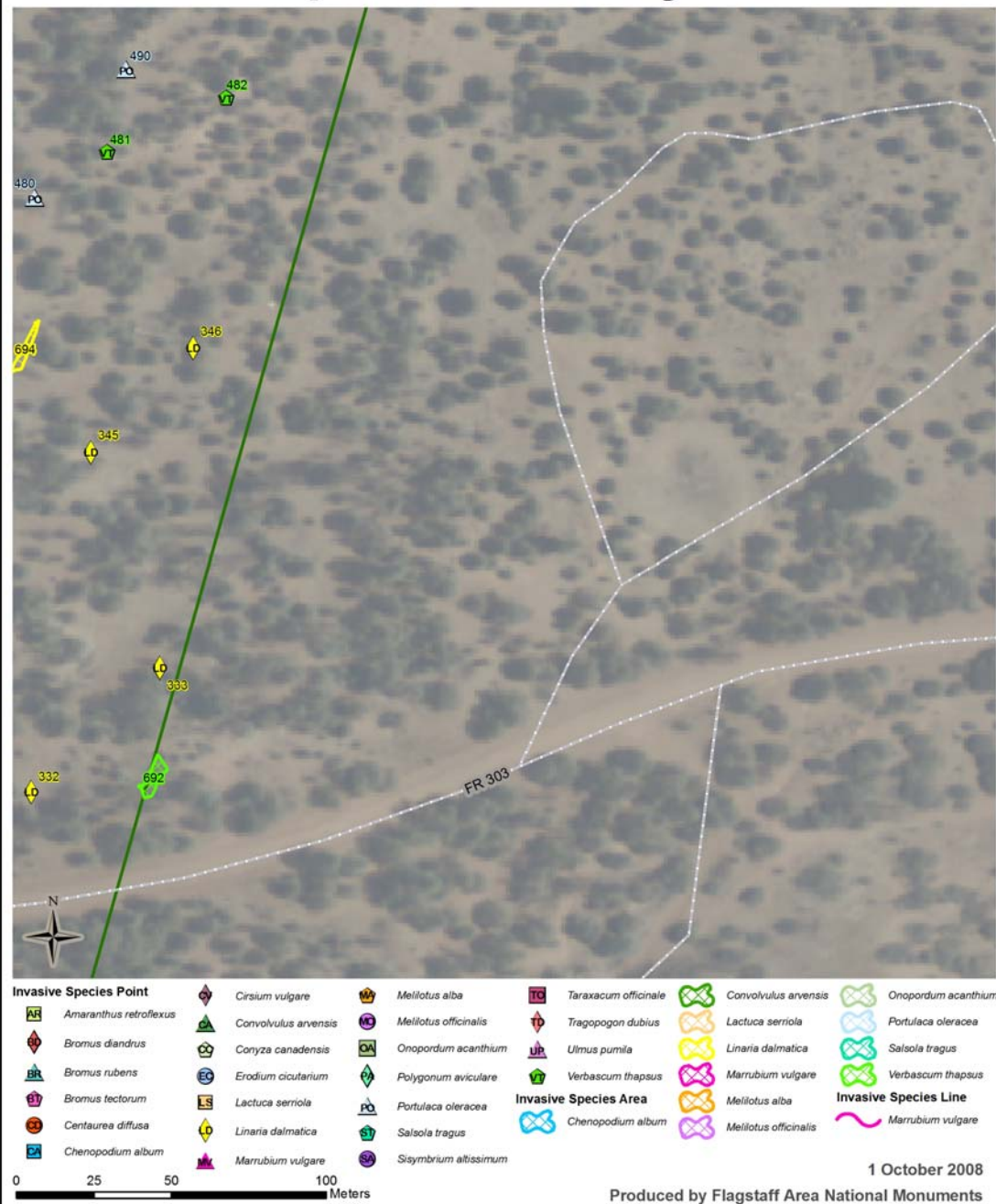


FIGURE 33. Map Book Index Grid # M09 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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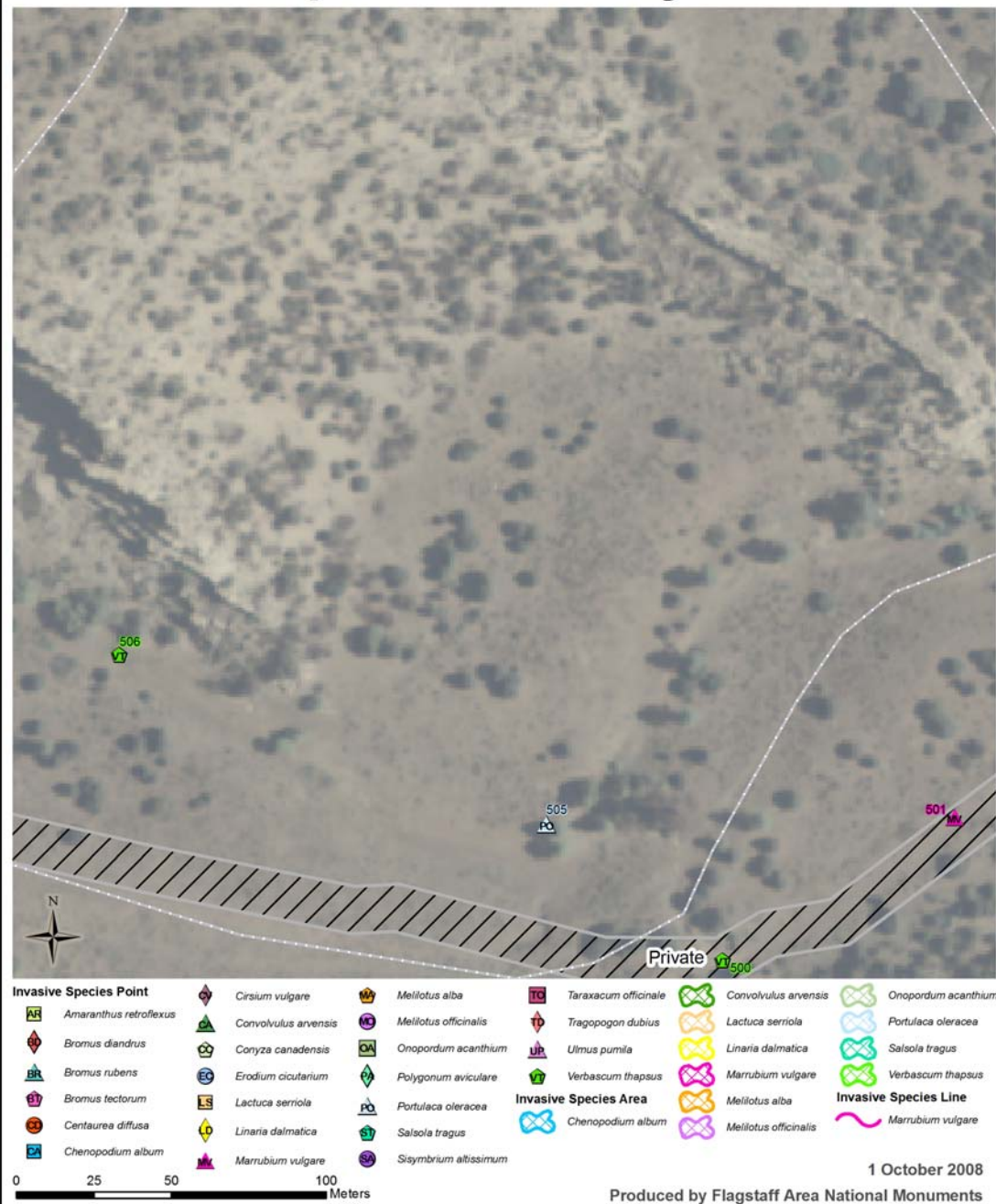


FIGURE 35. Map Book Index Grid # M25 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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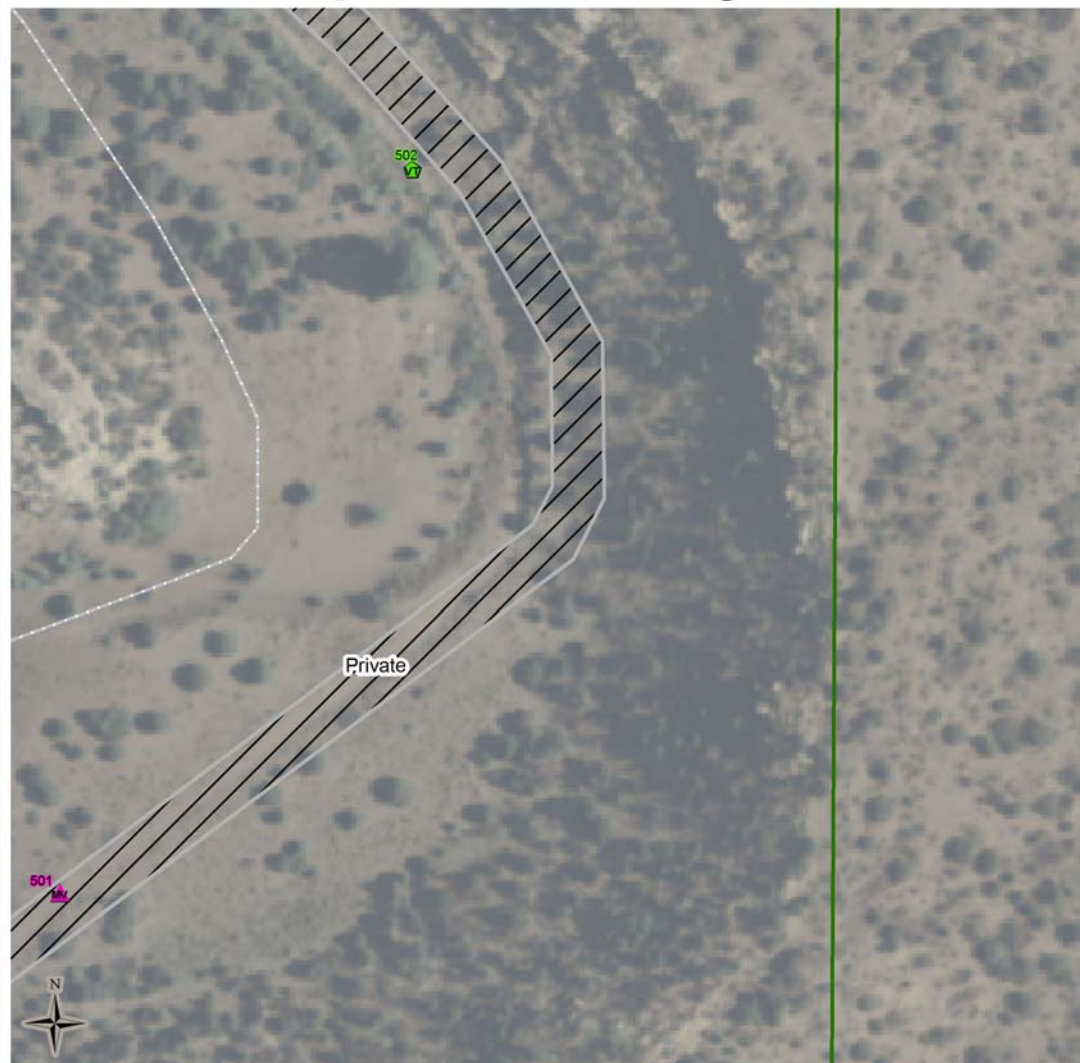


FIGURE 36. Map Book Index Grid # M26 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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Invasive Species Point			Invasive Species Area		
<i>Amaranthus retroflexus</i>	<i>Convolvulus arvensis</i>	<i>Melilotus alba</i>	<i>Taraxacum officinale</i>	<i>Convolvulus arvensis</i>	<i>Onopordum acanthium</i>
<i>Bromus diandrus</i>	<i>Conyza canadensis</i>	<i>Melilotus officinalis</i>	<i>Tragopogon dubius</i>	<i>Lactuca serriola</i>	<i>Portulaca oleracea</i>
<i>Bromus rubens</i>	<i>Erodium cicutarium</i>	<i>Onopordum acanthium</i>	<i>Ulmus pumila</i>	<i>Linaria dalmatica</i>	<i>Salsola tragus</i>
<i>Bromus tectorum</i>	<i>Lactuca serriola</i>	<i>Polygonum aviculare</i>	<i>Verbascum thapsus</i>	<i>Marrubium vulgare</i>	<i>Verbascum thapsus</i>
<i>Centaurea diffusa</i>	<i>Linaria dalmatica</i>	<i>Portulaca oleracea</i>	<i>Chenopodium album</i>	<i>Melilotus alba</i>	<i>Melilotus officinalis</i>
<i>Chenopodium album</i>	<i>Marrubium vulgare</i>	<i>Salsola tragus</i>			
		<i>Sisymbrium altissimum</i>			

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FIGURE 37. Map Book Index Grid # N03 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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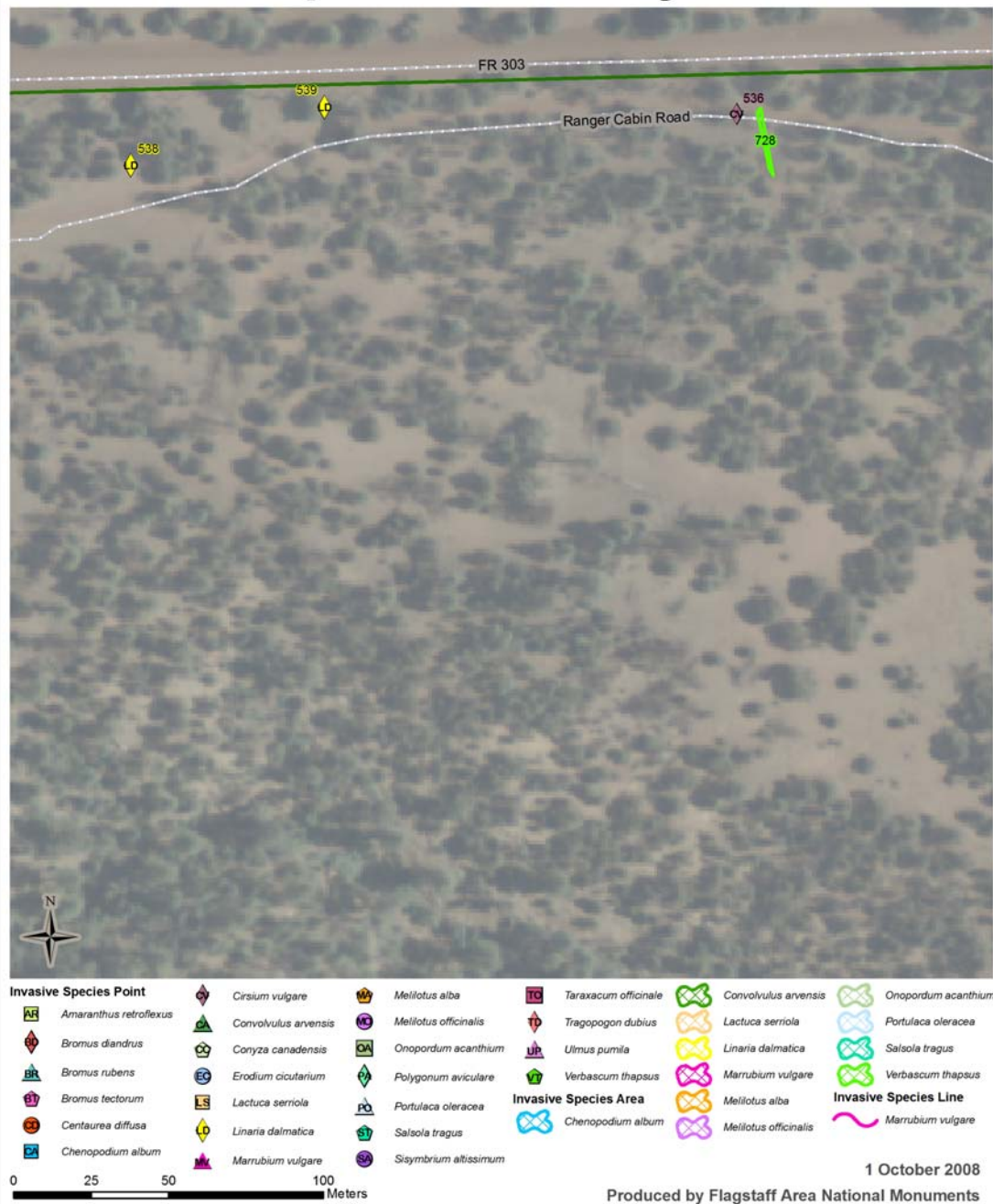


FIGURE 38. Map Book Index Grid # N04 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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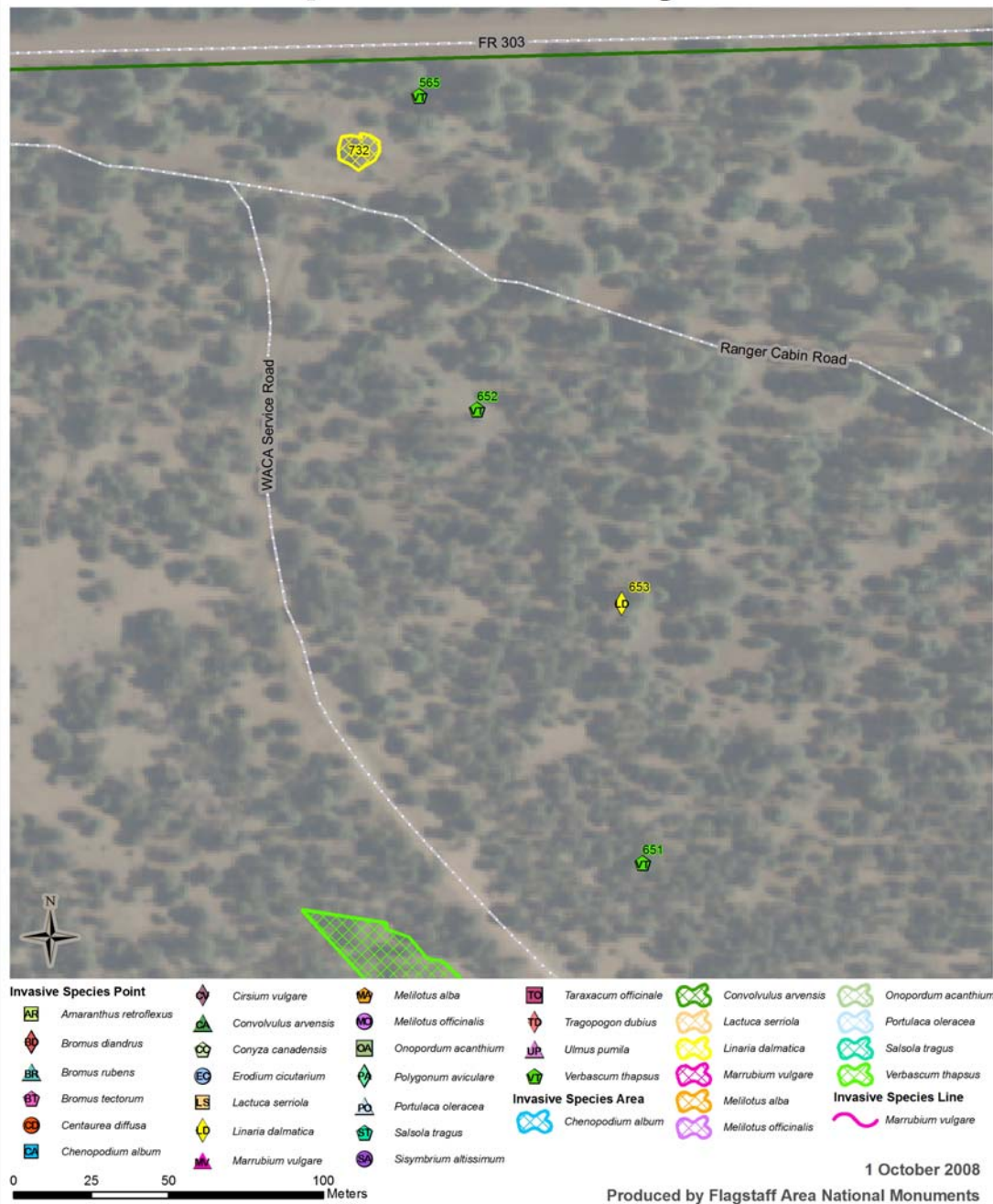


FIGURE 39. Map Book Index Grid # N05 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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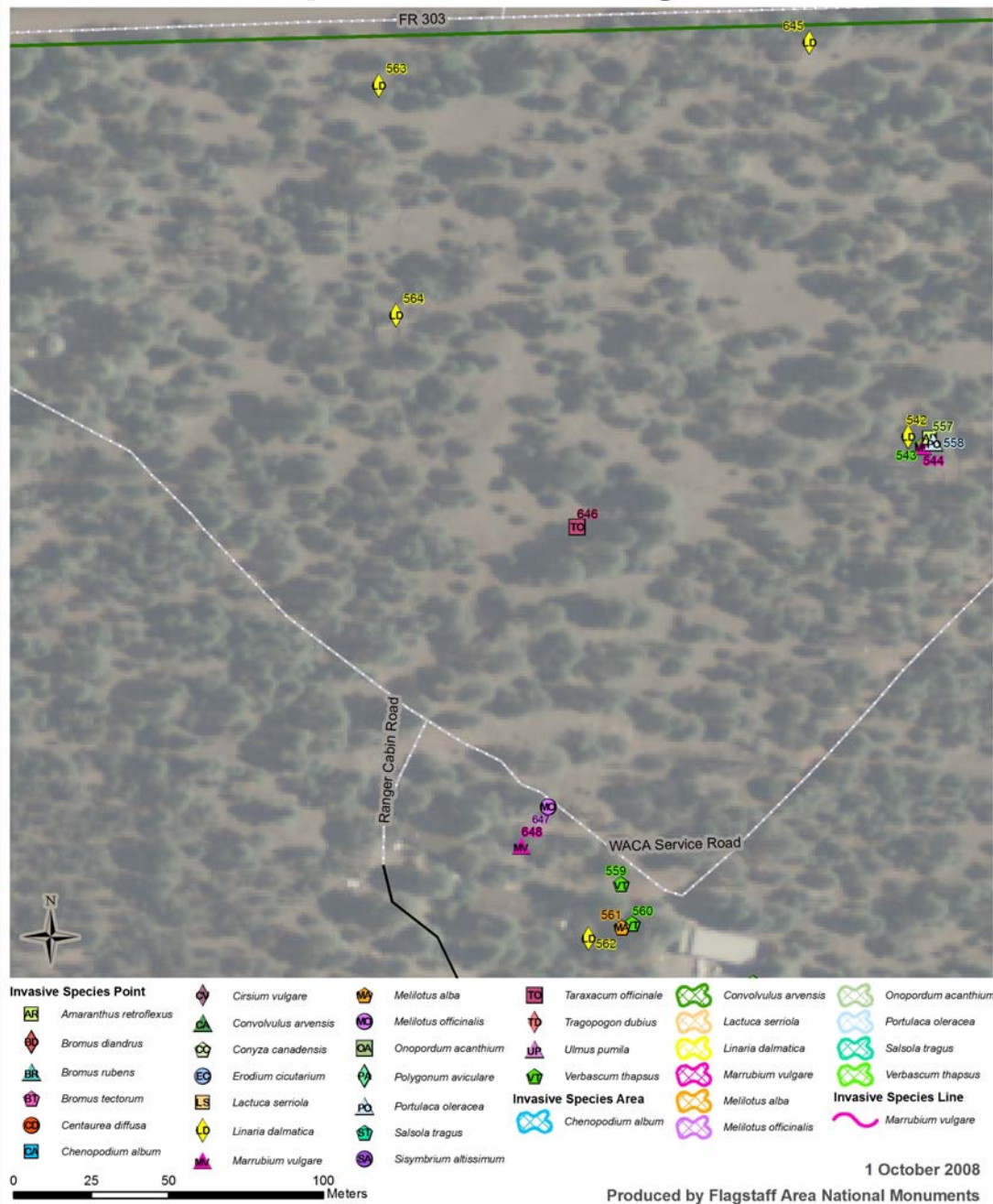


FIGURE 40. Map Book Index Grid # N06 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

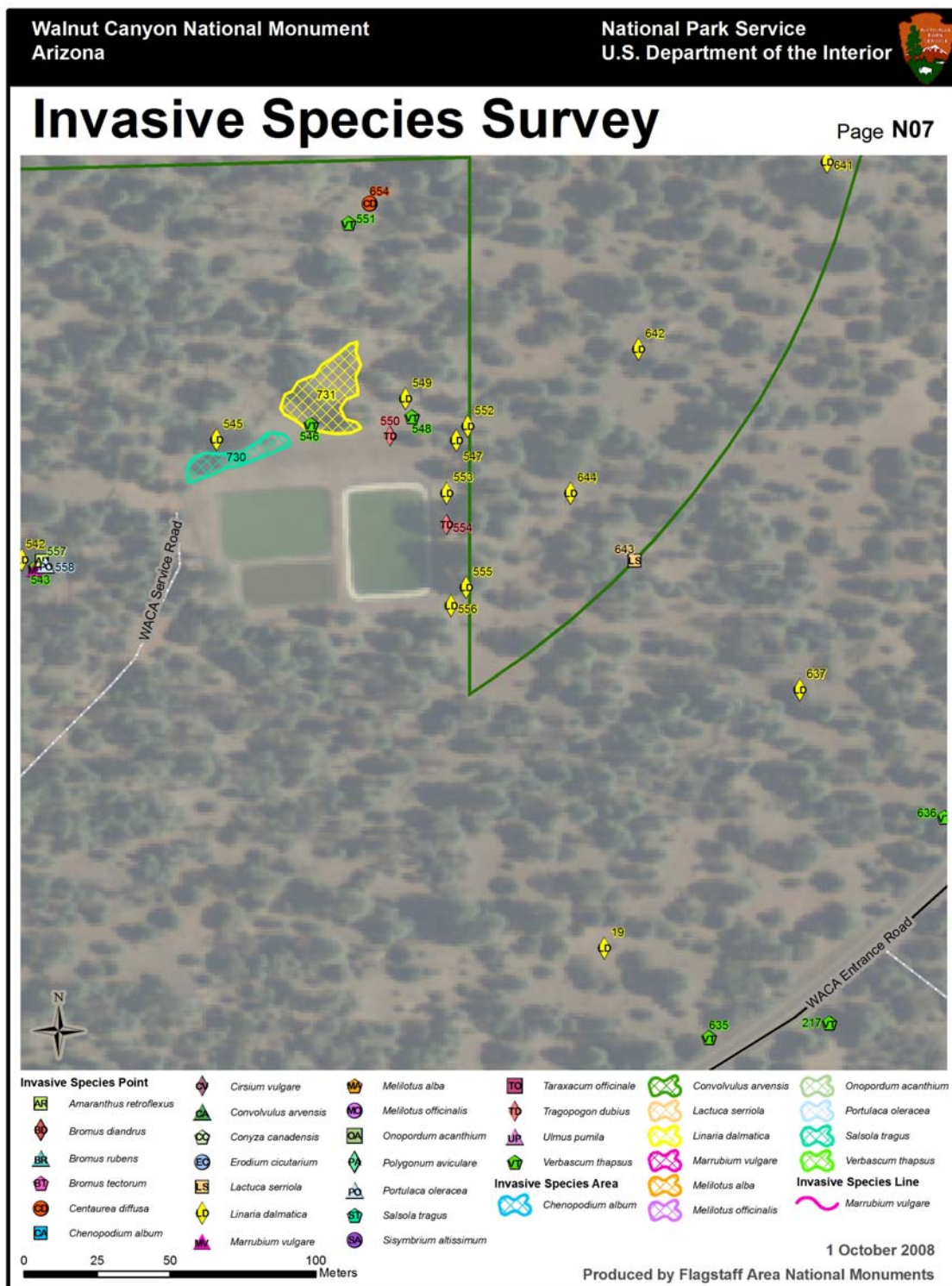


FIGURE 41. Map Book Index Grid # N07 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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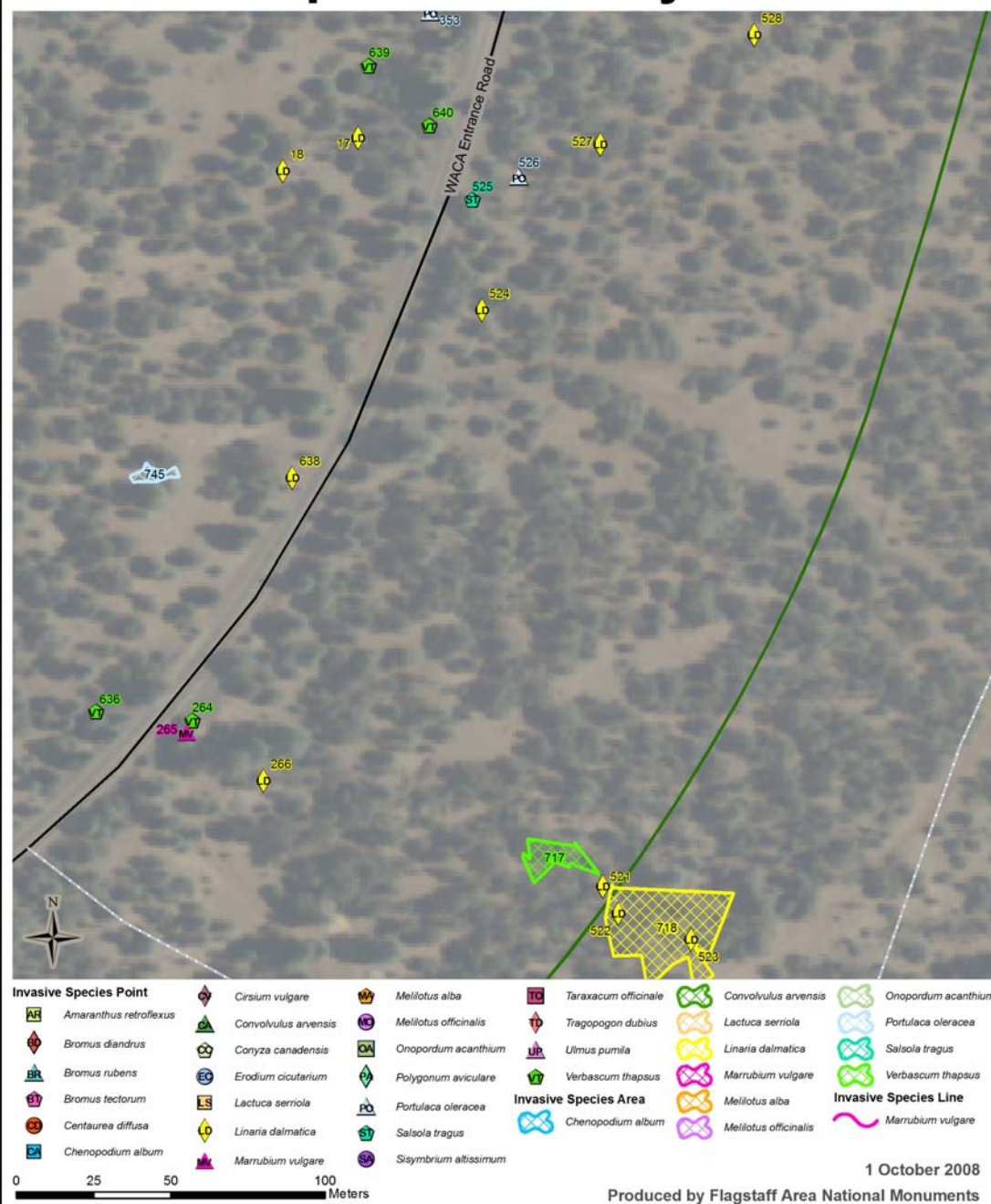


FIGURE 42. Map Book Index Grid # N08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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Invasive Species Point			Invasive Species Area			Invasive Species Line					
	<i>Amaranthus retroflexus</i>		<i>Cirsium vulgare</i>		<i>Melilotus alba</i>		<i>Taraxacum officinale</i>		<i>Convolvulus arvensis</i>		<i>Onopordum acanthium</i>
	<i>Bromus diandrus</i>		<i>Convolvulus arvensis</i>		<i>Melilotus officinalis</i>		<i>Tragopogon dubius</i>		<i>Lactuca serriola</i>		<i>Portulaca oleracea</i>
	<i>Bromus rubens</i>		<i>Coryza canadensis</i>		<i>Onopordum acanthium</i>		<i>Ulmus pumila</i>		<i>Linaria dalmatica</i>		<i>Salsola tragus</i>
	<i>Erodium cicutarium</i>		<i>Polygonum aviculare</i>		<i>Verbascum thapsus</i>		<i>Marrubium vulgare</i>		<i>Marrubium vulgare</i>		<i>Verbascum thapsus</i>
	<i>Lactuca serriola</i>		<i>Portulaca oleracea</i>		<i>Salsola tragus</i>		<i>Melilotus alba</i>		<i>Melilotus officinalis</i>		<i>Marrubium vulgare</i>
	<i>Centaurea diffusa</i>		<i>Marrubium vulgare</i>		<i>Sisymbrium altissimum</i>		<i>Chenopodium album</i>				
	<i>Chenopodium album</i>										
02550100 Meters											
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1 October 2008											



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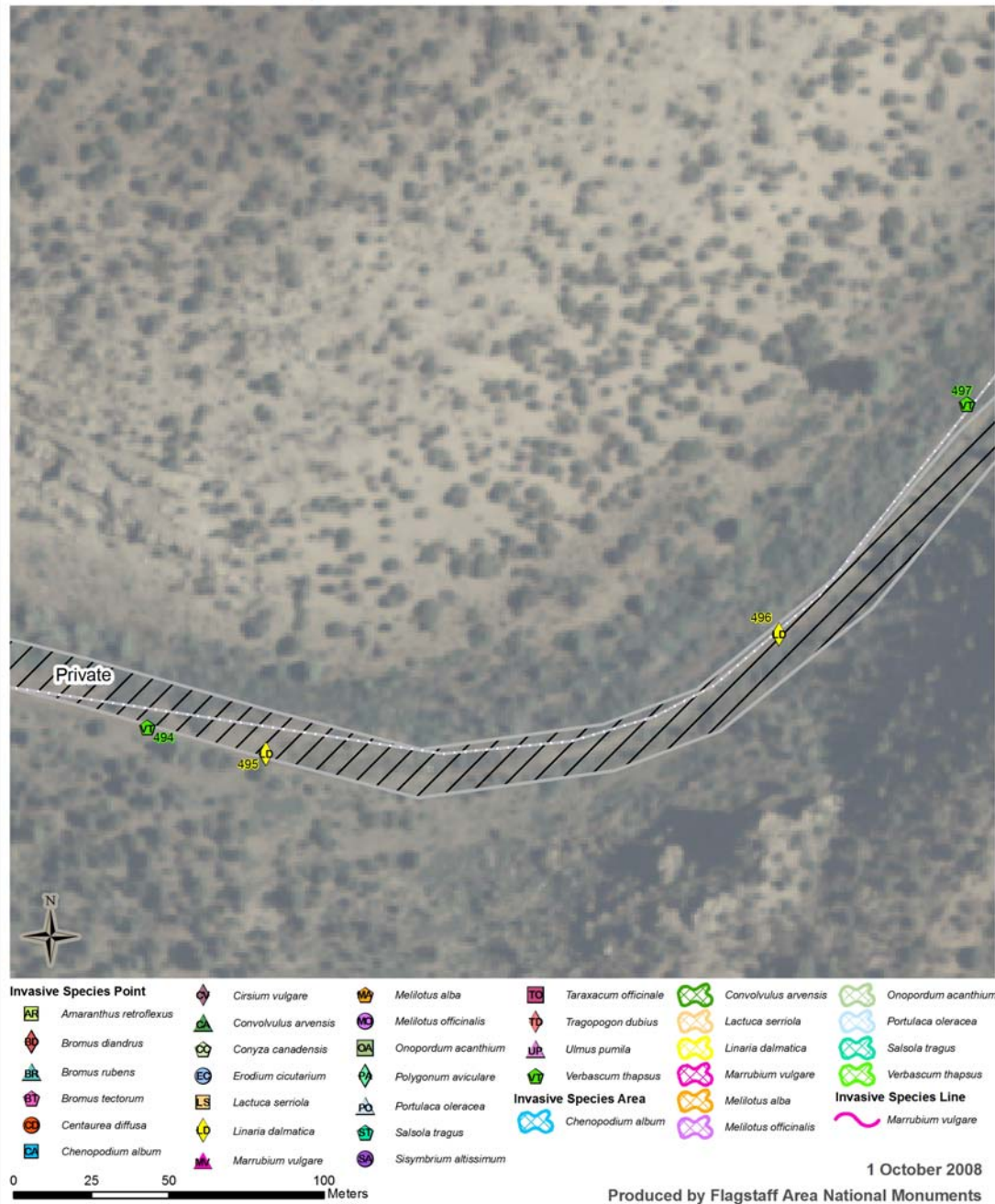


FIGURE 44. Map Book Index Grid # N23 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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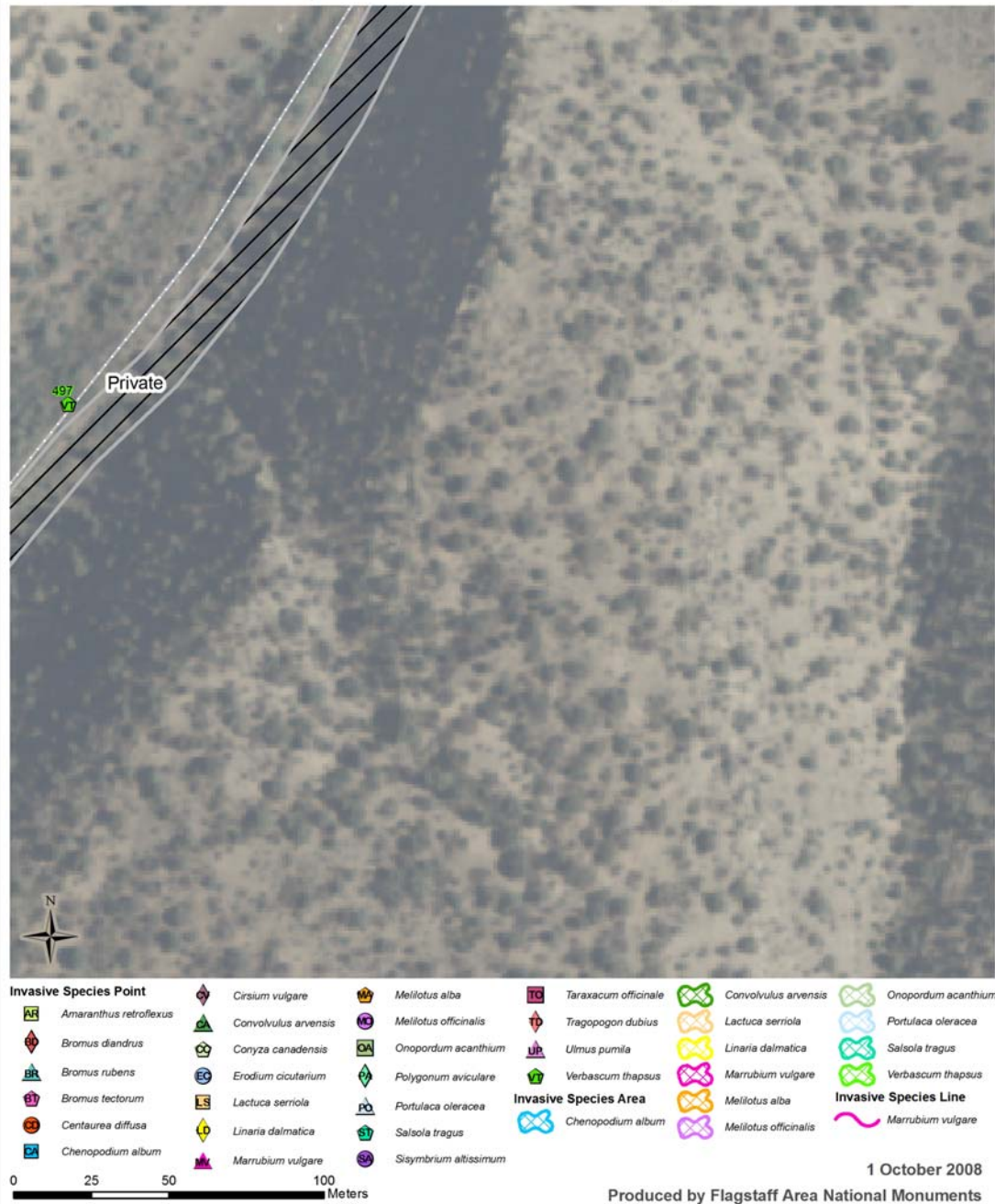


FIGURE 45. Map Book Index Grid # N24 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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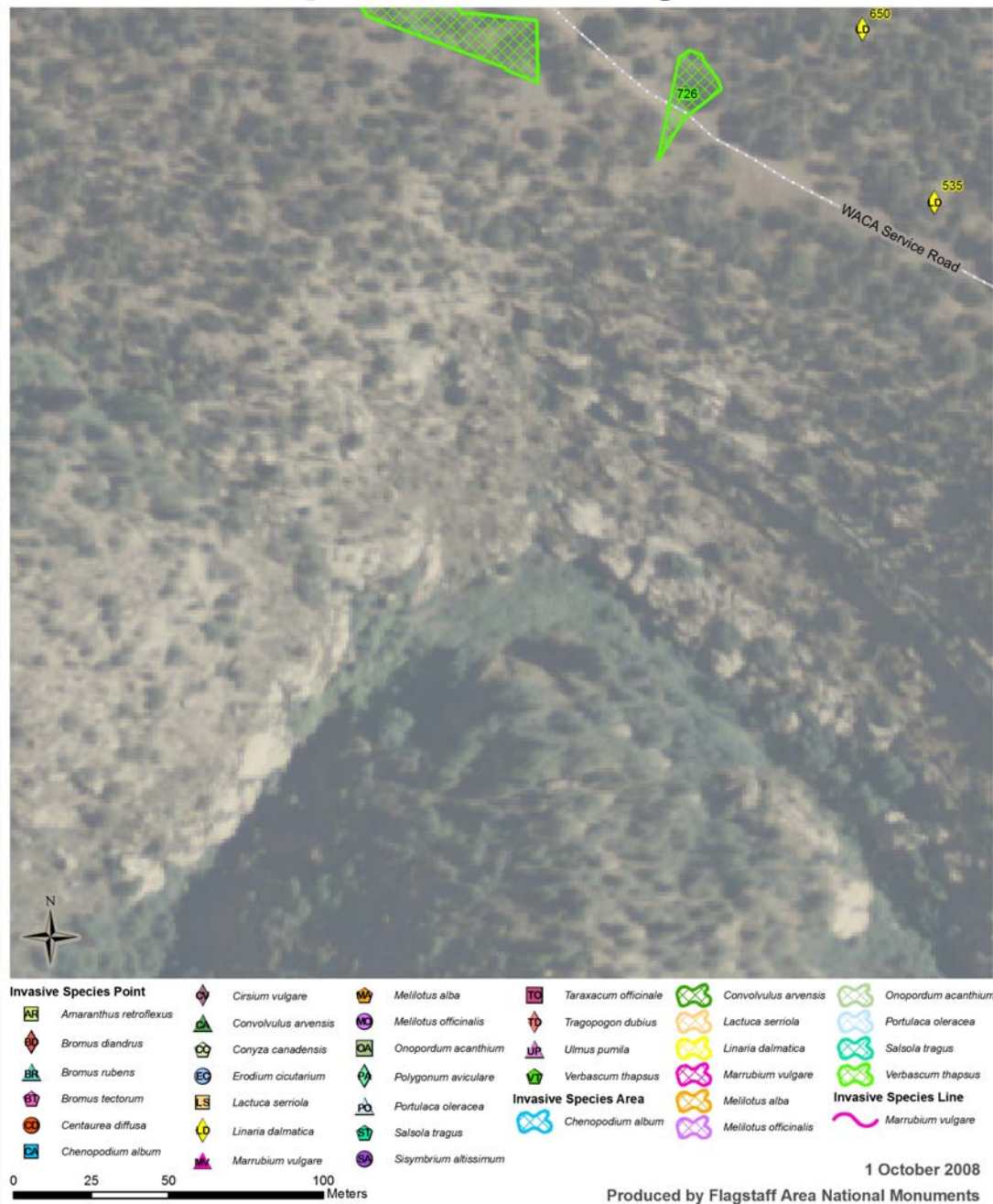


FIGURE 46. Map Book Index Grid # 005 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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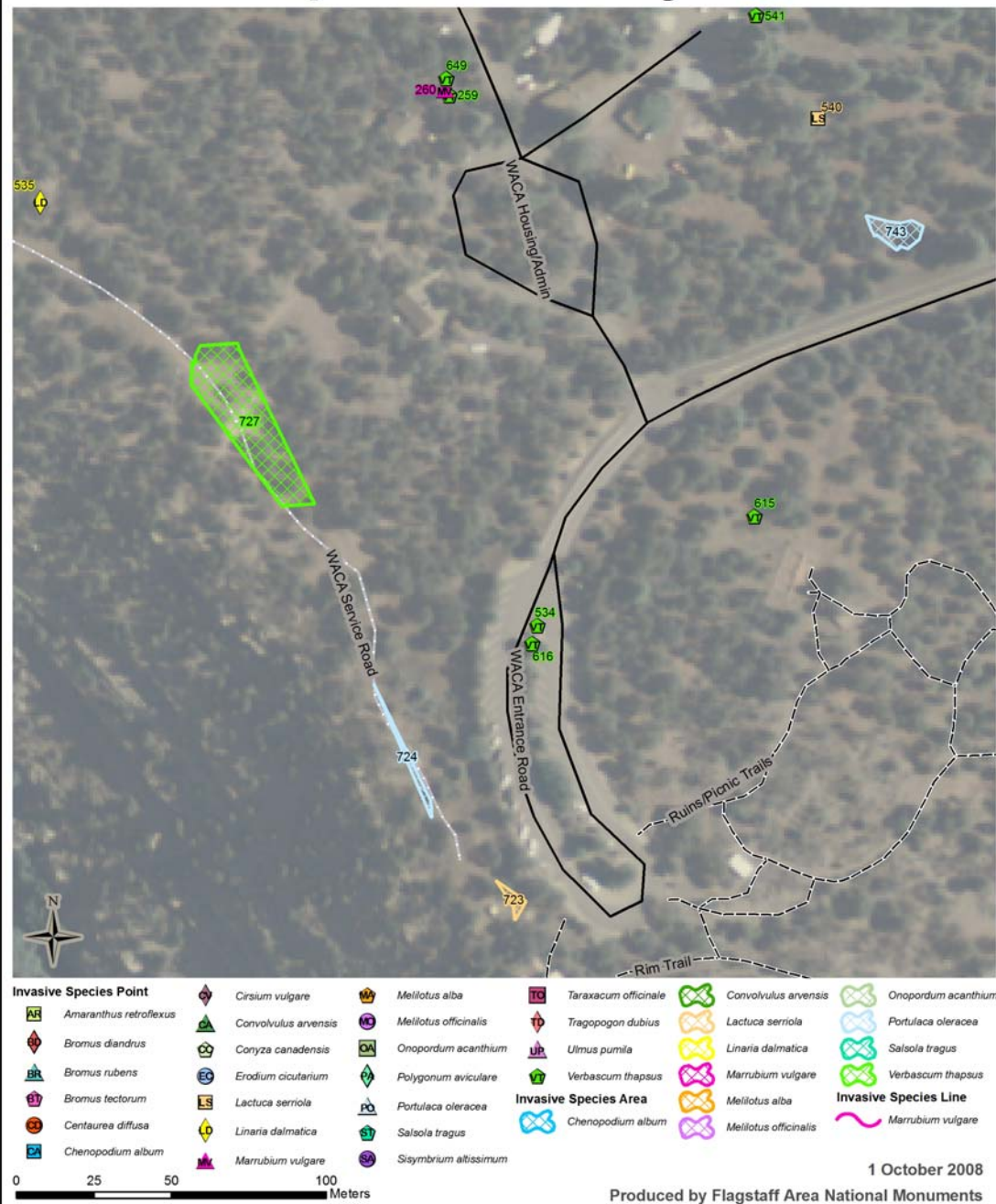


FIGURE 47. Map Book Index Grid # O06 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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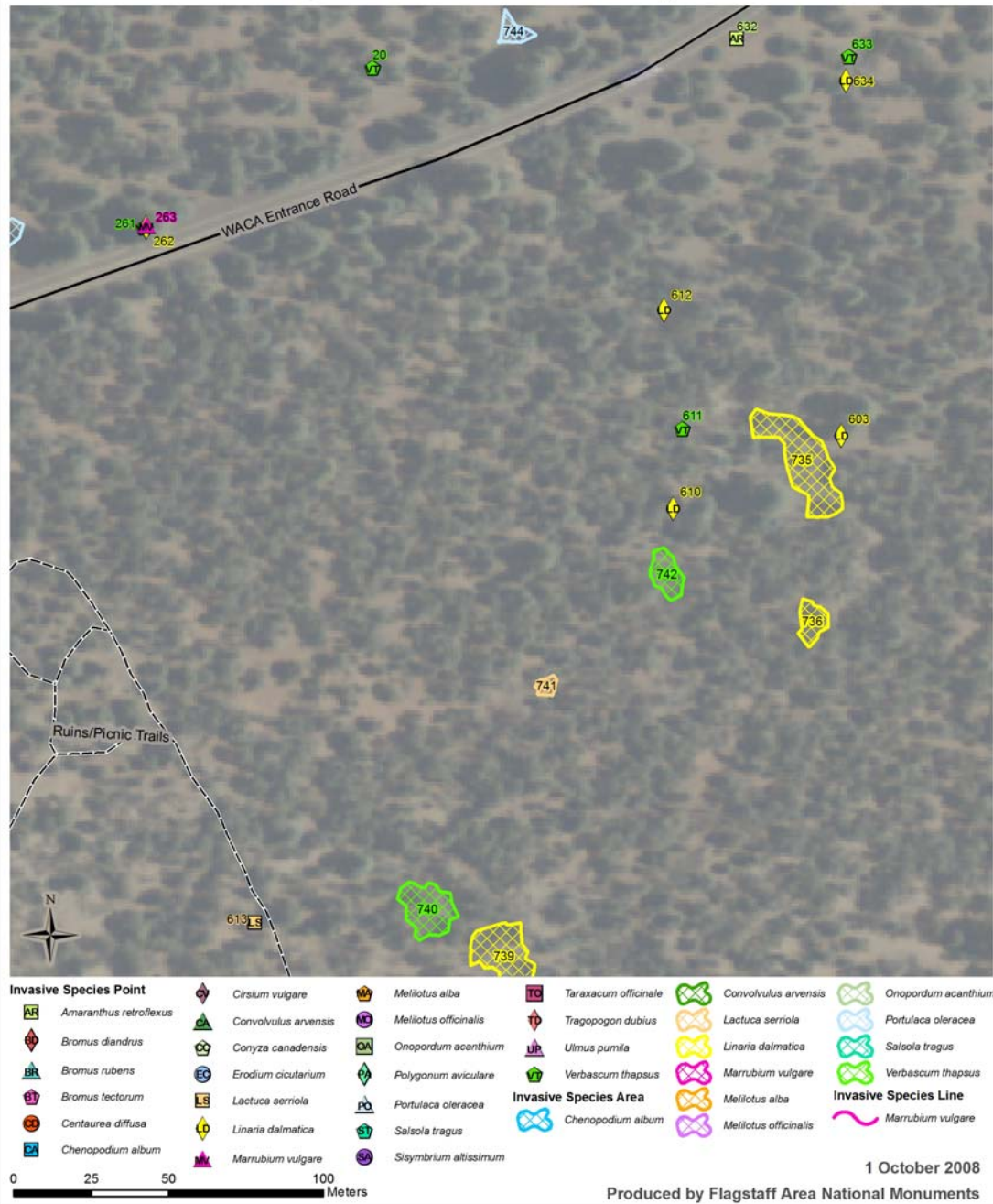


FIGURE 48. Map Book Index Grid # O07 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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FIGURE 50. Map Book Index Grid # O13 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

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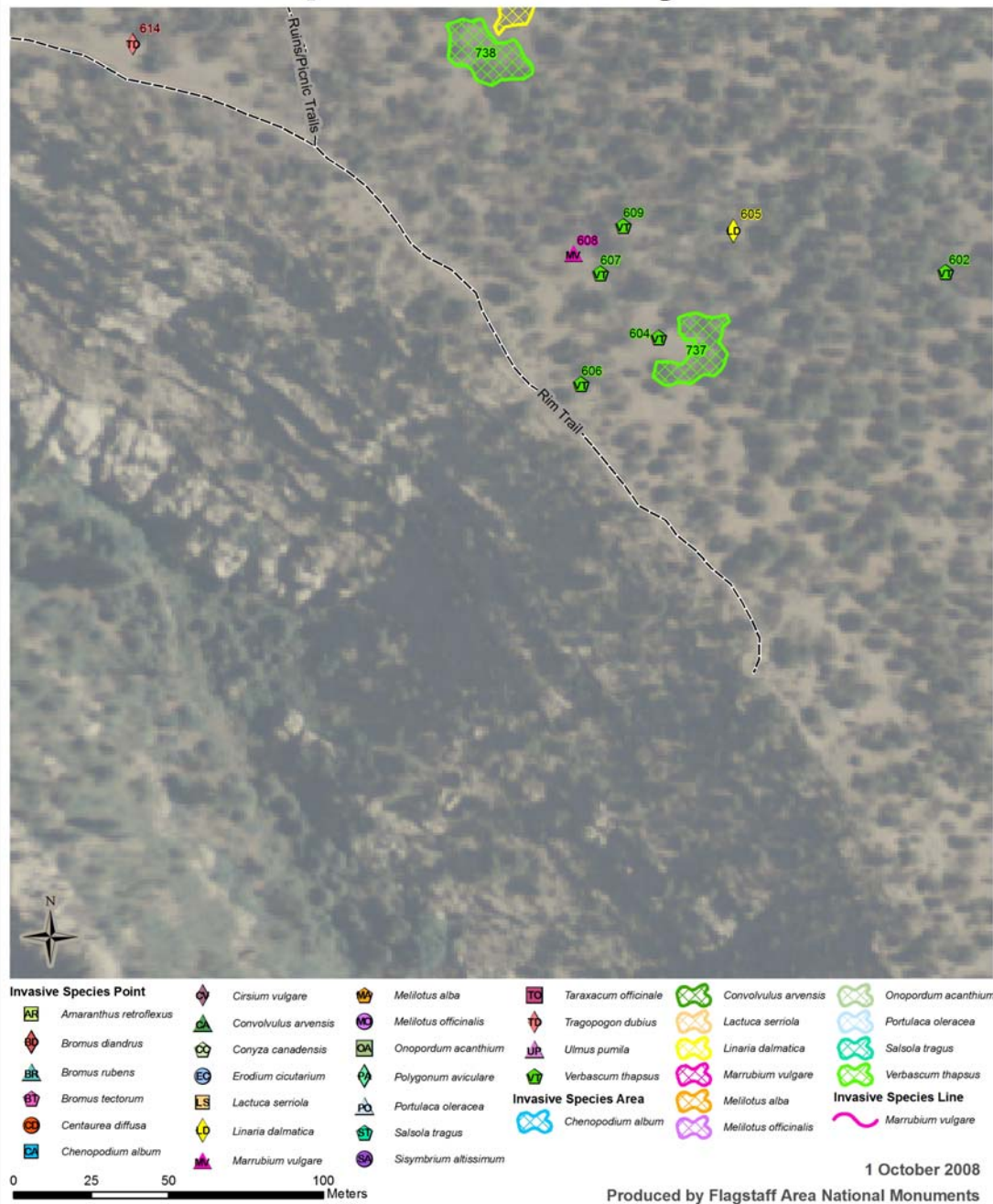


FIGURE 52. Map Book Index Grid # P07 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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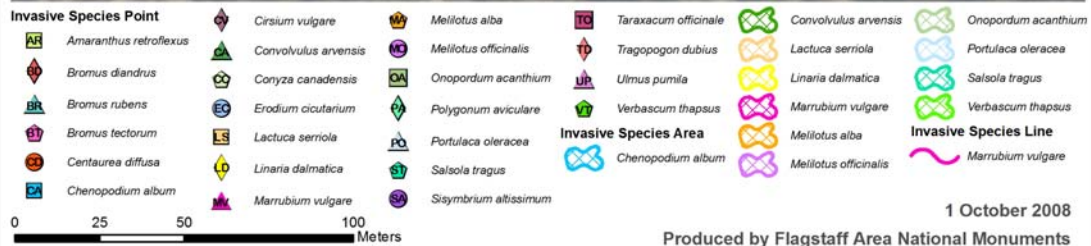


FIGURE 53. Map Book Index Grid # P08 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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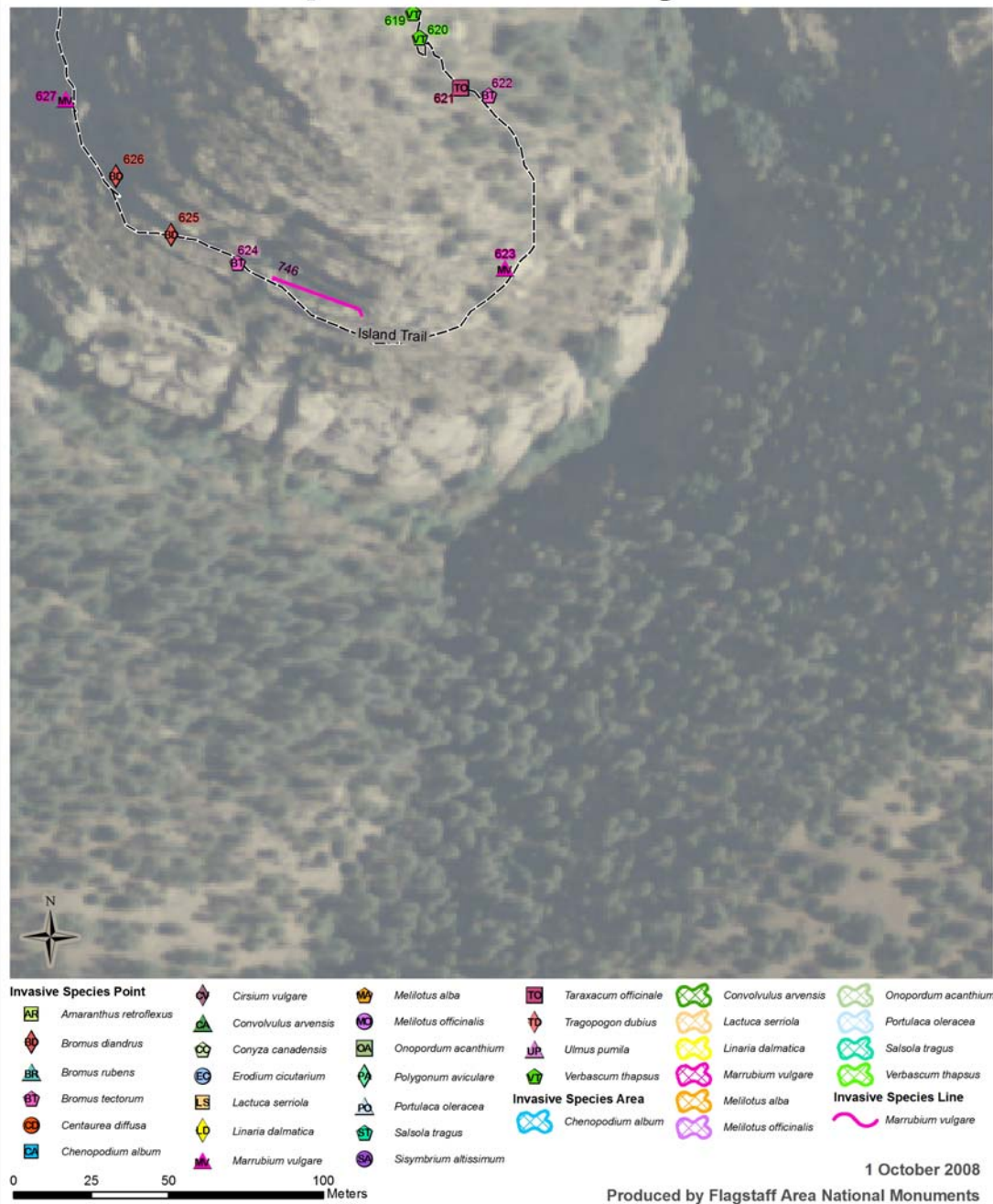


FIGURE 54. Map Book Index Grid # Q06 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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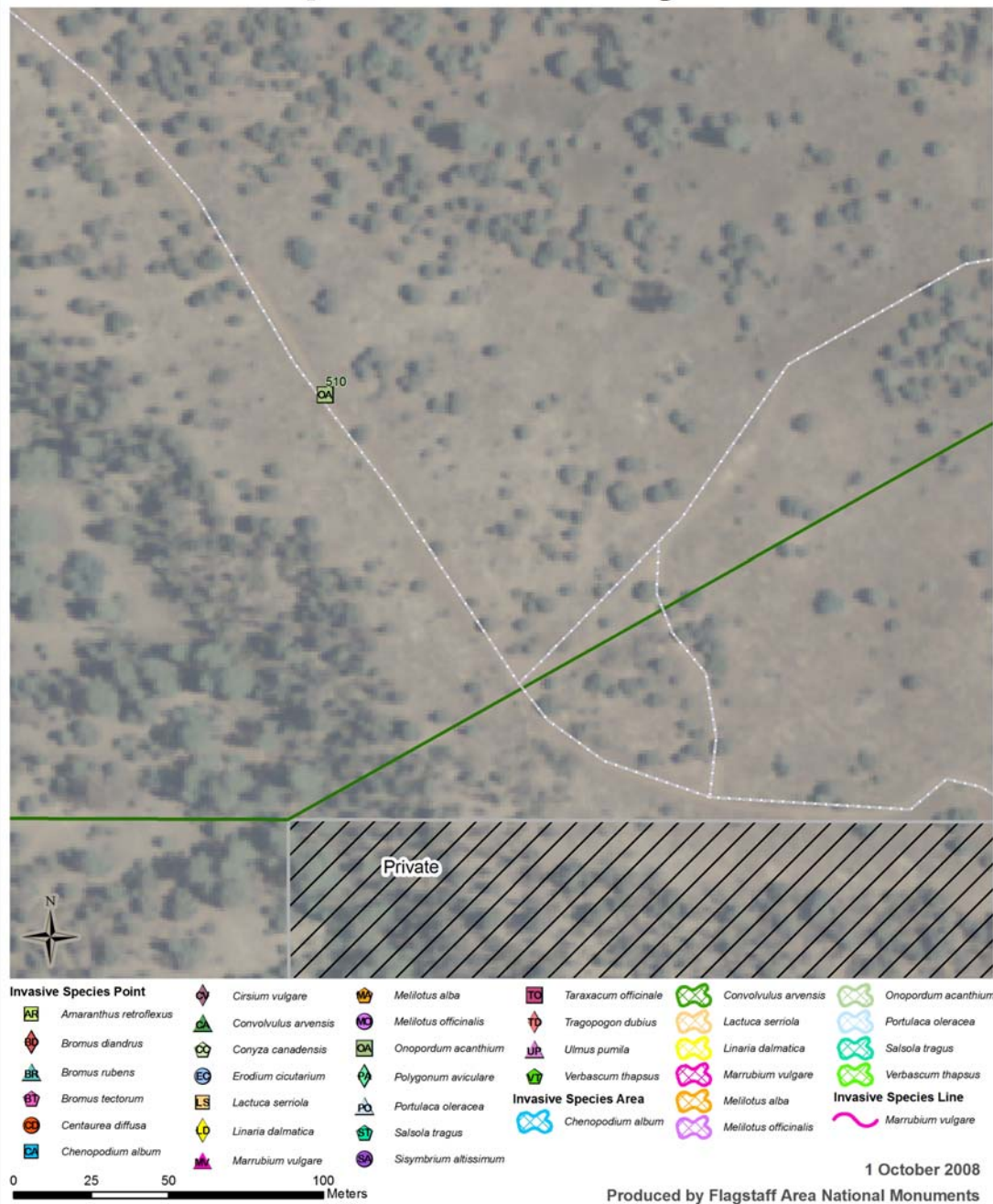


FIGURE 55. Map Book Index Grid # Q14 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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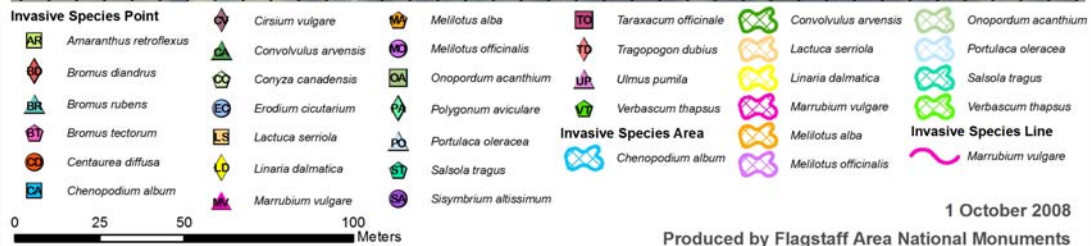
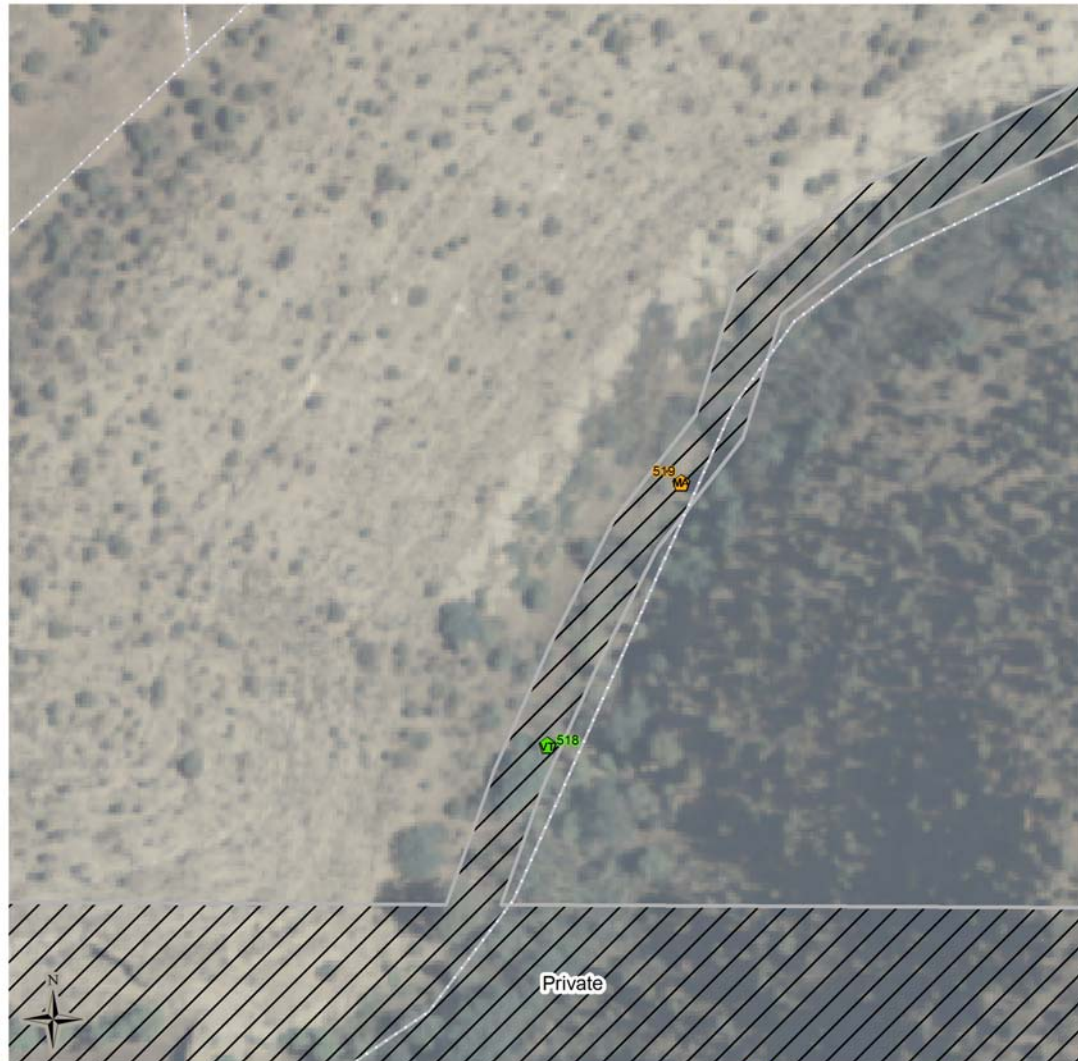


FIGURE 56. Map Book Index Grid # Q17 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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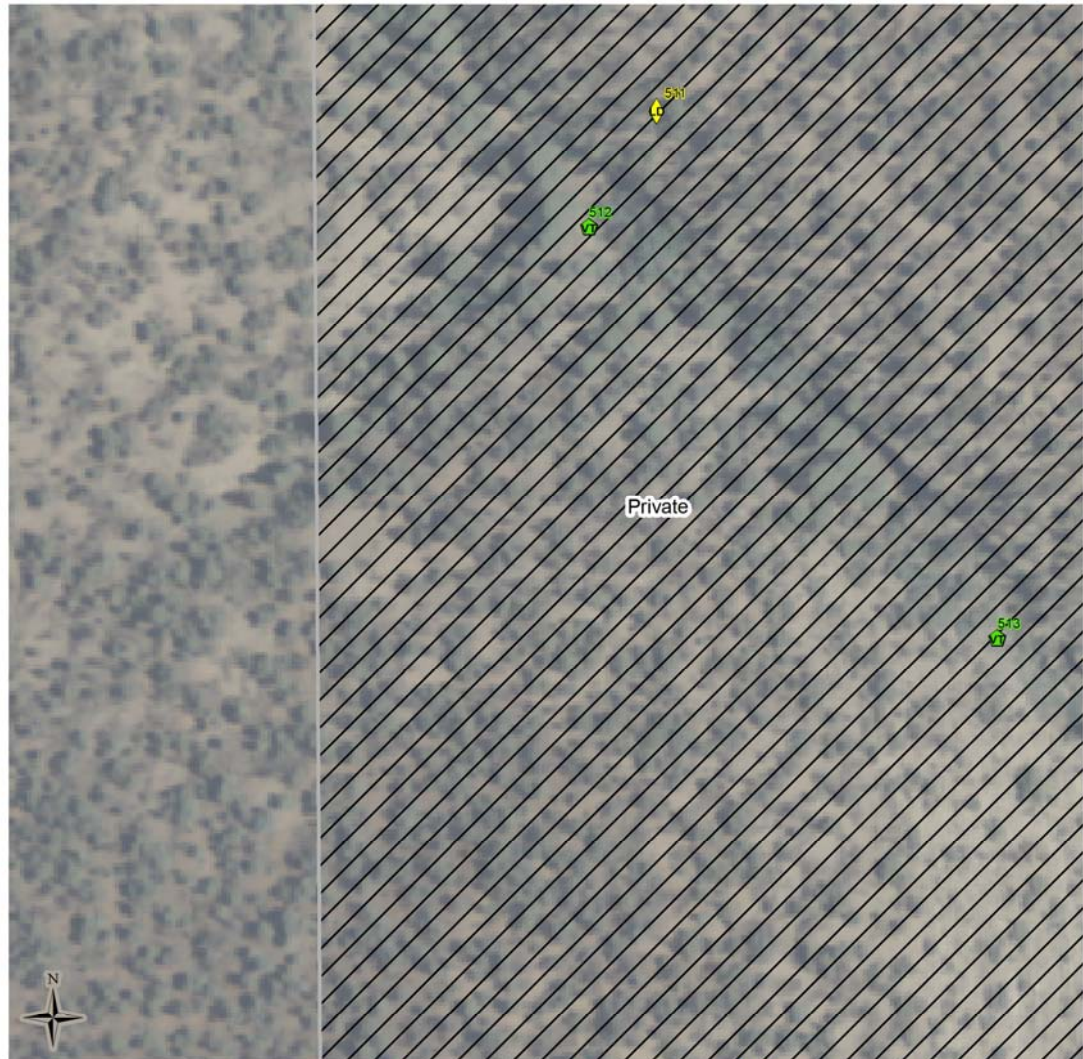


FIGURE 57. Map Book Index Grid # R14 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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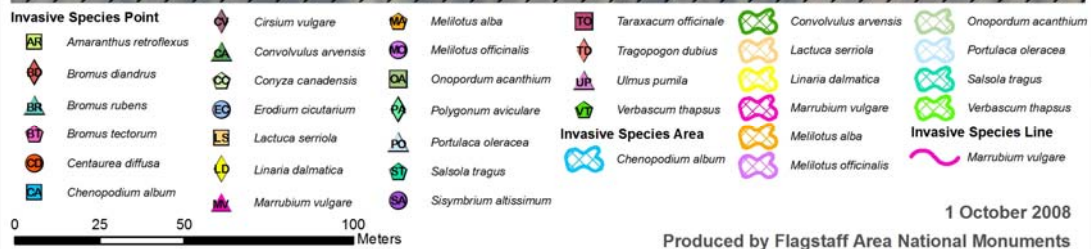
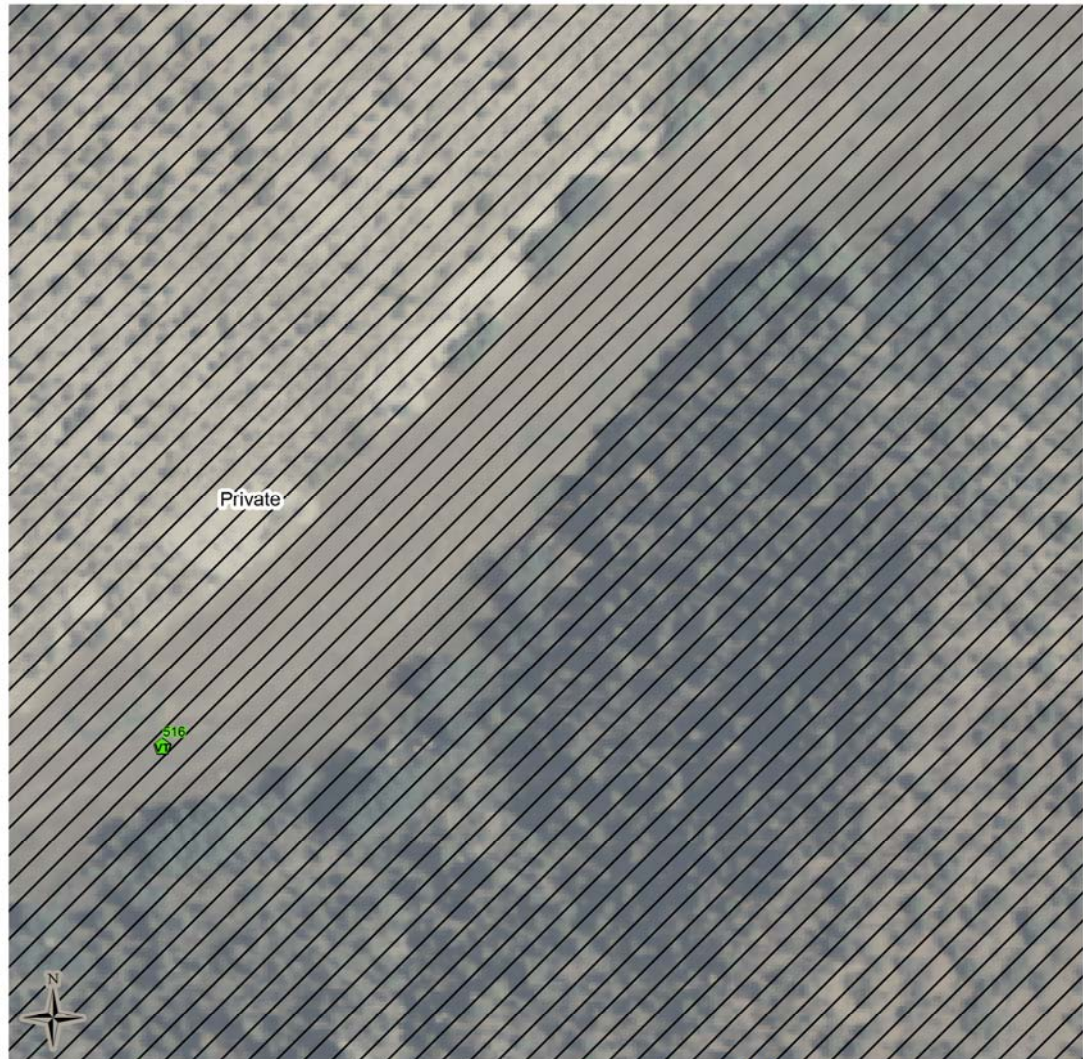


FIGURE 58. Map Book Index Grid # R16 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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Page R17

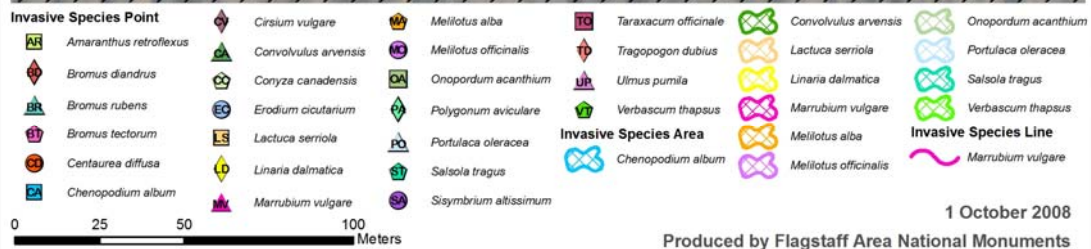


FIGURE 59. Map Book Index Grid # R17 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.



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FIGURE 60. Map Book Index Grid # S15 with location of invasive and non-native plants. See Figures 4 or 5 for exact location. Walnut Canyon National Monument, Arizona.

5.0 Discussion



Area infested with toadflax (*Linaria dalmatica*) Walnut Canyon National Monument

5.1 General Discussion of Findings:

During August-September 2008, field crews inventoried 718 acres within Walnut Canyon National Monument; an amount representing approximately 20% of the entire 3,600-acre Monument. Density of individuals was counted, although this figure is approximate because of the large amount of estimated individuals in some huge clusters. Nevertheless, the total density of invasive and non-native plants within the study area totaled approximately 65,807 individuals, almost 19% of which were manually pulled and destroyed.

The sum of all infestations of invasive plants mapped in this project was nearly 67 acres (**Table 3**), which represents 9.3% of the total area inventoried. Of the 26 initially targeted species, crews found only 20 and added 4 new species, see **Table 3**. The 9 species not found during this survey are included in **Table 5**, and the 4 new invasive species are listed in **Table 6**.

TABLE 3. Invasive and Non-native Plants found within the WACA Study Area with Count, Density, Area, and Total Removed Estimates.

Scientific Name	Common Name	Total Count *	% Total Count of all	Total Density	% of Total Density	Total Acres	% of Total Acres
1) <i>Linaria dalmatica</i>	Toadflax	335	32.75	11529	18	22.10	33
2) <i>Verbascum thapsus</i>	Mullein	266	26.00	11729	18	18.33	27
3) <i>Portulaca oleracea</i>	Purslane	101	9.87	32373	49	9.41	14
4) <i>Lactuca serriola</i>	Wild lettuce	67	6.55	204	0	0.55	1
5) <i>Marrubium vulgare</i>	Horehound	62	6.06	3054	5	2.82	4
6) <i>Chenopodium album</i>	Goosefoot	41	4.01	435	1	1.87	3
7) <i>Tragopogon dubius</i>	Salsify	33	3.23	133	0	0.99	1
8) <i>Conyza canadensis</i>	Horseweed	29	2.83	56	0	0.46	1
9) <i>Amaranthus retroflexus</i>	Pigweed	15	1.47	230	0	0.37	1
10) <i>Salsola tragus</i>	Tumbleweed	15	1.47	319	0	1.14	2
11) <i>Melilotus officinali</i>	Yellow sweetclover	15	1.47	1114	2	1.37	2
12) <i>Melilotus alba</i>	White sweetclover	14	1.37	2348	4	6.16	9
13) <i>Taraxacum officinale</i>	Dandelion	6	0.59	29	0	0.05	0
14) <i>Bromus diandrus</i>	Ripgut brome	5	0.49	74	0	0.05	0
15) <i>Convolvulus arvensis</i>	Bindweed	3	0.29	1235	2	0.60	1
16) <i>Bromus tectorum</i>	Cheatgrass	3	0.29	600	1	0.12	0
17) <i>Cirsium vulgare</i>	Bull thistle	3	0.29	50	0	0.02	0
18) <i>Onopordum acanthium**</i>	Scotch thistle	3	0.29	74	0	0.05	0
19) <i>Erodium cicutarium</i>	Storksbill	2	0.20	203	0	0.11	0
20) <i>Centaurea diffusa**</i>	Diffuse knapweed	1	0.10	5	0	0.01	0
21) <i>Ulmus pumila**</i>	Siberian elm	1	0.10	5	0	0.10	0
22) <i>Bromus rubens**</i>	Red brome	1	0.10	4	0	0.01	0
23) <i>Sisymbrium altissimu</i>	Tumble mustard	1	0.10	4	0	0.01	0
24) <i>Polygonum aviculare</i>	Knotweed	1	0.10	2	0	0.01	0
TOTAL		1023	100%	65807	100%	66.79	100%

* Total Count = Total number of points and areas mapped via GPS.

** New Species for WACA

5.2 Density of Invasive and Non-native Plants Found and Amount Removed

Of the total density of invasive and non-native plants found (65,807), a total of 12,309 individuals were pulled and destroyed. This represents almost 19% of all weeds encountered. **Table 4** lists, in order of the highest density of species to the lowest, the density and total number removed for each individual species. Also provided is a percent removed and percent remaining. This table will be useful in planning future control efforts and targets.

TABLE 4. Density of Invasive and Non-native Plants found, and Percent Removed and Remaining after 2008.

Scientific Name	Common Name	Total Density	% of Total Density	Approx. Total Removed	% Removed	% Remaining
1) <i>Portulaca oleracea</i>	Purslane	32373	49.19	1367	4.02	95.98
2) <i>Verbascum thapsus</i>	Mullein	11729	17.82	2870	12.81	87.19
3) <i>Linaria dalmatica</i>	Toadflax	11529	17.52	5884	16.39	83.61
4) <i>Marrubium vulgare</i>	Horehound	3054	4.64	1523	11.64	88.36
5) <i>Melilotus alba</i>	White sweetclover	2348	3.57	19	0.13	99.87
6) <i>Convolvulus arvensis</i>	Bindweed	1235	1.88	35	0.60	99.40
7) <i>Melilotus officinalis</i>	Yellow sweetclover	1114	1.69	77	2.16	97.84
8) <i>Bromus tectorum</i>	Cheatgrass	600	0.91	0	0.00	100.00
9) <i>Chenopodium album</i>	Goosefoot	435	0.66	139	2.98	97.02
10) <i>Salsola tragus</i>	Tumbleweed	319	0.48	80	2.35	97.65
11) <i>Amaranthus retroflex</i>	Pigweed	230	0.35	41	1.72	98.28
12) <i>Lactuca serriola</i>	Wild Lettuce	204	0.31	104	4.25	95.75
13) <i>Erodium cicutarium</i>	Filliree	203	0.31	3	1.59	98.41
14) <i>Tragopogon dubius</i>	Salsify	133	0.20	109	81.95	18.05
15) <i>Bromus diandrus</i>	Ripgut brome	74	0.11	12	0.97	99.03
16) <i>Onopordum acanthium</i>	Scotch thistle	72	0.11	0	0.00	100.00
17) <i>Conyza canadensis</i>	Horseweed	56	0.09	20	25.64	74.36
18) <i>Cirsium vulgare</i>	Bull thistle	50	0.08	2	2.78	97.22
19) <i>Taraxacum officinale</i>	Dandelion	29	0.04	17	8.37	91.63
20) <i>Centaurea diffusa</i>	Diffuse knapweed	5	0.01	0	0.00	100.00
21) <i>Ulmus pumila</i>	Siberian elm	5	0.01	0	0.00	100.00
22) <i>Bromus rubens</i>	Red brome	4	0.01	0	0.00	100.00
23) <i>Sisymbrium altissimum</i>	Tumble mustard	4	0.01	4	100.00	0.00
24) <i>Polygonum aviculare</i>	Knotweed	2	0.00	2	100.00	0.00
TOTAL		65,807	100%	12308	18.70%	81.30%

TABLE 5. Invasive and Non-native Plants on WACA Plant List not found during this Survey.

Scientific Name	Common Name	Family
1) <i>Erysimum repandum</i>	Spreading wallflower	Brassicaceae
2) <i>Leonurus cardiaca</i>	Motherwort	Lamiaceae
3) <i>Plantago lanceolata</i>	Lanceleaf plantain	Plantaginaceae
4) <i>Poa pratensis</i>	Kentucky bluegrass	Poaceae
5) <i>Rumex crispus</i>	Curly dock	Polygonaceae
6) <i>Tamarix ramosissima</i>	Tamarisk	Tamaracaceae
7) <i>Malus pumila</i>	Paradise apple	Rosaceae
8) <i>Potentilla norvegica</i>	Norwegian cinquefoil	Rosaceae
9) <i>Galium aparine</i>	Bedstraw	Rubiaceae

Species listed in **Table 5** may be in other un-inventoried sectors of WACA or at the bottom of Walnut Canyon, which was not extensively surveyed. Actually, during a field trip for another project in October, 2008, motherwort (*Leonurus cardiaca*) was found to occur

extensively along the bottom of Walnut Canyon from near the Visitor Center and west to the Monument boundary.

Four new species, previously unknown in WACA were inventoried and mapped. These are included in **Table 6**. The red brome (*Bromus rubens*) sighting has not been confirmed, and it is recommended that the island trail be inventoried for the next 2 years in order to collect a specimen and confirm this species. Siberian elm (*Ulmus pumila*) was found at only one spot along the north side of the entrance highway near Interstate 40. There is a single clump of 3-4 stems that can be easily controlled.

TABLE 6. Invasive and Non-native Plants found during this Survey and not on the WACA Plant List.

Scientific Name	Common Name	Family
1) <i>Centaurea diffusa</i>	Diffuse knapweed	Asteraceae
2) <i>Bromus rubens</i>	Red Brome	Poaceae
3) <i>Ulmus pumila</i>	Siberian elm	Ulmaceae
4) <i>Onopordum acanthium</i>	Scotch Thistle	Asteraceae

5.3 Most Prevalent Invasive Species

Toadflax (*Linaria dalmatica*), mullien (*Verbascum thapsus*), purslane (*Portulaca oleracea*), wild lettuce (*Lactuca serriola*), horehound (*Marrubium vulgare*), and goosefoot (*Chenopodium album*) together made up over 80% of the infested acres, see **Table 3**. The remaining infestations consisted of 18 non-native species, at least some of which are potentially invasive and which should be targeted for immediate eradication.

5.4 Species Prioritization

Prioritizing which non-native and invasive plant species to control is an important part of strategic weed management planning. As a general rule, when the density and/or cover of a particular species exceeds the budgetary ability to control it, species that are less widespread should be given higher priority. More abundant species should be controlled as aggressively as possible, with containment being the initial goal, followed by a significant reduction in acreage, and finally eradication. Populations of invasive or undesirable non-native species presently beyond the hope of containment or reduction in acreage should not be ignored, but control efforts should focus on limiting its spread into adjacent vulnerable areas. Minimizing further spread, the release of biological control agents, or the use of cultural or chemical methods are generally recommended for weed species in this category.

Applying this strategy to Walnut Canyon National Monument, the first priority category includes the species listed in **Table 6**, which should be given the highest control priority of the species mapped, and should be targeted for prompt Monument-wide eradication. It would take very little time and effort to completely eradicate these species. This would accomplish two important goals: 1) Eradicating a potentially invasive species early before it

can spread; and 2) Freeing up time and effort so that that control programs can concentrate on just a few species.

TABLE 7. Invasive and Non-native Plants that Should be the Highest Control Priority within WACA and Adjacent Areas.

Scientific Name	Common Name
1) <i>Onopordum acanthium</i>	Scotch thistle
2) <i>Centaurea diffusa</i>	Diffuse knapweed
3) <i>Cirsium vulgare</i>	Bull thistle
4) <i>Ulmus pumila</i>	Siberian elm
5) <i>Salsola tragus</i>	Tumbleweed
6) <i>Melilotus officinali</i>	Yellow sweetclover
7) <i>Melilotus alba</i>	White sweetclover
8) <i>Erodium cicutarium</i>	Storksbill
9) <i>Bromus diandrus</i>	Ripgut brome
10) <i>Bromus rubens</i>	Red brome
11) <i>Sisymbrium altissimu</i>	Tumble mustard
12) <i>Polygonum aviculare</i>	Knotweed

The second priority category includes species that should be "contained and reduced" in some portions of the Monument, and eliminated in other areas, see **Table 8**. For example, toadflax, mullein, and horehound can all be eliminated in some areas of the Monument, but in most areas the prime realistic objective should be to "contain and reduce". If effective prevention, early detection, and rapid response strategies are implemented, managers should be able to keep most of the Monument free from many of the impacts of these species. **Table 8** lists the "contain and reduce" target species for Walnut Canyon National Monument.

TABLE 8. Invasive and Non-native Plants that should be a High Control Priority for a "Contain and Reduce" Strategy within WACA.

Scientific Name	Common Name
1) <i>Linaria dalmatica</i>	Toadflax
2) <i>Verbascum thapsus</i>	Mullein
3) <i>Portulaca oleracea</i>	Purslane
4) <i>Lactuca serriola</i>	Wild lettuce
5) <i>Marrubium vulgare</i>	Horehound
6) <i>Chenopodium album</i>	Goosefoot
7) <i>Tragopogon dubius</i>	Salsify
8) <i>Conyza canadensis</i>	Horseweed
9) <i>Amaranthus retroflexus</i>	Pigweed
10) <i>Convolvulus arvensis</i>	Bindweed
11) <i>Bromus tectorum</i>	Cheatgrass

5.5 Sources of Invasive and Non-native Plant Introduction

There are many human caused and natural sources of invasive and non-native plant introductions into Walnut Canyon National Monument. Human caused sources are of primary interest because they can be minimized and controlled, and because they probably account for the most significant proportion of successful invasions.

The most important factor in successful introductions of non-native species is the availability of newly disturbed ground surface. Thus, whenever a project that involves ground disturbance occurs, or whenever a visitor or staff vehicle wanders off the pavement disturbing the soil, these events can set the stage for the introduction of invasive and non-native species.

Ground disturbance is the first event that sets the stage, the second event involves the transportation and inoculation of viable seed on the disturbed ground site. This occurs through many mechanisms including wind and wildlife movements, but is primarily driven by the use of vehicles, which carry seeds from outside to within the Monument. The third event is a lack of monitoring and active control. If high probability areas are not monitored regularly by park staff, the probability of infestation increases many-fold.

All ground disturbing activities within and adjacent to the Monument must be monitored for invasive and non-native plants every year for at least three years after the project has been completed.

5.6 Areas Identified as Having a High Probability for the Introduction of Invasive and Non-native Plants.

The following areas in Walnut Canyon National Monument have been identified as having a high probability for the establishment of invasive and non-native plants.

1. Both sides of entrance road from Interstate 40 south to the Visitor Center
2. Along all trails open to the public and staff.
3. Around the Maintenance Area and the housing area.
4. At the bottom of Walnut Canyon in the riparian zone.
5. Along Forest Service Road 303 where it runs along the boundary.
6. Any area where ground disturbance has occurred in and near the Monument boundary.

These areas should be monitored regularly in order to prevent additional invasion and establishment of non-native plants.

6.0 Recommendations

The primary objective of this project was to document, manually control, and map the distribution and relative abundance of targeted invasive non-native plant species at highly susceptible areas within Walnut Canyon National Monument. It is anticipated that the information obtained from this inventory will be useful in the Monuments' ongoing efforts to improve strategic planning and to increase the efficiency and effectiveness of all field operations associated with invasive plant management.

The following recommendations are born out of the results of this project and observations in the field at Walnut Canyon National Monument.

- 1) Invasive and non-native plants appear to develop initial footholds by first becoming established along roads leading into the Monument. It is highly recommended that law enforcement and interpretive rangers be trained in recognizing the various species and actively control them, by simply pulling them out of the ground, along the roadsides during regular patrols. This will contribute greatly to thwarting invasions and infestations before they have a chance to spread. This activity need not be done every day and shouldn't take more than 5 minutes.
- 2) The use of various volunteer and conservation groups every year to control roadside weeds and known patches will help tremendously in controlling the spread of these species throughout the Monument.
- 3) Invasive and non-native plants should be surveyed and mapped in the remainder of Walnut Canyon National Monument, so that infested areas can be identified and treated as soon as possible. Infested areas are the primary source of seed spread and infection into new areas.
- 4) The results of this mapping project should be shared with the regional NPS EPMT teams in order to expedite planning and quickly eradicate weed clusters that have not been removed. Due to rapidly changing conditions in the field, this should be done as soon as possible.
- 5) Any projects within the Monument that involve soil and surface disturbance should be monitored for at least 3 years in order to keep non-native and invasive infestations to a minimum.
- 6) The Monument is urged to develop a comprehensive written management plan for invasive plant species. Furthermore, the Monument is encouraged to review and improve it on a regular basis. An excellent reference that will aid the Park in crafting specific control methods is the "Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas" developed by The Nature Conservancy (Tu et al. 2001).
- 7) Regularly scheduled non-native and invasive plant inventories of the Monument should be an ongoing part of resource management and protection and aimed at early detection. Inventories of all high visitation areas should be performed at least

annually, whereas other areas require less frequency, only once every 5 to 10 years. A rotating schedule should be developed by the FLAG Resource Management Division to inventory and map a portion of the Monuments each year, so that within a set number of years all of the area could be covered. The key is to schedule inventories often enough to detect new infestations before they become exceedingly difficult to manage.

- 8) As part of an ongoing inventory effort, the Monument should consider establishing permanent monitoring sites in order to assess the impacts and proliferation of non-native and invasive plants. Monitoring is the most effective method for evaluating the effectiveness of control and restoration efforts. Long-term studies provide invaluable data on the effectiveness of various management techniques, and provide quantitative data that can be used to determine whether management goals have been attained.
- 9) The Flagstaff Area units are encouraged to become active members of the local Cooperative Weed Management Area. Weed management objectives are much more effective when managed in cooperation with adjacent and partner organizations that have similar goals.

7.0 Literature

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Appendix 1: Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

WEED_SURVEY

Data Dictionary

2008 Invasive Non-native Plant Inventory

Pt-weed, point, , 5, seconds, 4, Code
Species, menu, required, scientific name, normal, Label1
Amaranthus retroflex, [20745], [AMARET]
Bromus diandrus, [40498], [BRODIA]
Bromus tectorum, [40524], [BROTEC]
Centaurea sp.
Chenopodium album, [20592], [CHEALB]
Cirsium vulgare, [36428], [CIRVUL]
Convolvulus arvensis, [30705], [CONARV]
Conyza canadensis, [37113], [CONCAD]
Erodium cicutarium, [29147], [EROCIC]
Erysimum repandum, [22947], [ERYREP]
Galium aparine, [34797], [GALAPA]
Lactuca serriola, [36608], [LACSER]
Leonurus cardiaca, [32548], [LEOCAR]
Linaria dalmatica, [503474], [LINDAL]
Malus pumila, [25262], [MALPUM]
Marrubium vulgare, [32561], [MARVUL]
Melilotus alba, [26149], [MELALB]
Melilotus officinali, [26150], [MELOFF]
Plantago lanceolata, [32874], [PLALAN]
Poa pratensis, [41088], [POAPRA]
Polygonum aviculare, [20876], [POLAVI]
Portulaca oleracea, [20422], [POROLE]
Potentilla norvegica, [24730], [POTNOR]
Rumex crispus, [20937], [RUMCRI]
Salsola tragus, [520948], [SALTRA]
Sisymbrium altissimu, [23312], [SISALT]
Tamarix ramisissima, [22310], [TAMRAM]
Taraxacum officinale, [36213], [TAROFF]
Tragopogon dubius, [38564], [TRADUB]
Verbascum thapsus, [33394], [VERTHA]
Other
Park, menu, normal, Park Code, normal
WACA, default
WUPA
SUCR
Density, numeric, 0, 0, 10000, 0, normal, # of individual species, normal, Label2
%Cover, menu, normal, weed canopy within infested area, normal
Trace: <1%
Low: 1-5%
Mod: 6-25%
High: 26-50 %
Majority: 51-100%
Size, menu, normal, based on average perimeter diameter, normal
0.01 acres
0.1 acres
0.25 acres
0.5 acres

Appendix 1 (cont.): Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

1.0 acres
 2.5 acres
 5.0 acres
 Phenology, menu, required, weed growth stage, normal
 Vegetative
 Bud
 Flower
 Fruit-immature
 Fruit-mature
 Seed dispersing
 Dormant/senesced
 Various
 Woody Growth, menu, normal, growth stage of woody species, normal
 Seedling
 Sapling
 Mature
 Dormant/senesced
 Dominant Native Spp., text, 30, normal, normal
 Disturbance, menu, normal, normal
 None
 Low-Mod, default
 High
 Hydrology, menu, normal, normal
 Upland, default
 Rip-perennial
 Rip-intermittent
 Rip-ephemeral
 Wetland
 Playa-lakebed
 Notes, text, 100, normal, normal
 Date, date, auto, mdy, manual, normal, normal
 Time, time, auto, 24, manual, normal, normal

 Ln-weed, line, , 5, seconds, 1, Code
 Species, menu, required, scientific name, normal
 Amaranthus retroflex, [20745], [AMARET]
 Bromus diandrus, [40498], [BRODIA]
 Bromus tectorum, [40524], [BROTEC]
 Centaurea sp.
 Chenopodium album, [20592], [CHEALB]
 Cirsium vulgare, [36428], [CIRVUL]
 Convolvulus arvensis, [30705], [CONARV]
 Conyza canadensis, [37113], [CONCAD]
 Erodium cicutarium, [29147], [EROCIC]
 Erysimum repandum, [22947], [ERYREP]
 Galium aparine, [34797], [GALAPA]
 Lactuca serriola, [36608], [LACSER]
 Leonurus cardiaca, [32548], [LEOCAR]
 Linaria dalmatica, [503474], [LINDAL]
 Malus pumila, [25262], [MALPUM]
 Marrubium vulgare, [32561], [MARVUL]
 Melilotus alba, [26149], [MELALB]
 Melilotus officinali, [26150], [MELOFF]
 Plantago lanceolata, [32874], [PLALAN]

Appendix 1 (cont.): Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

Poa pratensis, [41088], [POAPRA]
Polygonum aviculare, [20876], [POLAVI]
Portulaca oleracea, [20422], [POROLE]
Potentilla norvegica, [24730], [POTNOR]
Rumex crispus, [20937], [RUMCRI]
Salsola tragus, [520948], [SALTRA]
Sisymbrium altissimu, [23312], [SISALT]
Tamarix ramisissima, [22310], [TAMRAM]
Taraxacum officinale, [36213], [TAROFF]
Tragopogon dubius, [38564], [TRADUB]
Verbascum thapsus, [33394], [VERTHA]
 Other
 Line Width (ft), numeric, 0, 5, 500, 20, required, average width of linear area, normal
 Notes, text, 100, normal, normal
 Time, time, auto, 24, manual, normal, normal, Label1
 Date, date, auto, mdy, manual, normal, normal

 Ar-weed, area, GPS-generated polygon, 5, seconds, 1, Code
 Species, menu, required, scientific name, normal
Amaranthus retroflex, [20745], [AMARET]
Bromus diandrus, [40498], [BRODIA]
Bromus tectorum, [40524], [BROTEC]
Centaurea sp.
Chenopodium album, [20592], [CHEALB]
Cirsium vulgare, [36428], [CIRVUL]
Convolvulus arvensis, [30705], [CONARV]
Conyza canadensis, [37113], [CONCAD]
Erodium cicutarium, [29147], [EROCIC]
Erysimum repandum, [22947], [ERYREP]
Galium aparine, [34797], [GALAPA]
Lactuca serriola, [36608], [LACSER]
Leonurus cardiaca, [32548], [LEOCAR]
Linaria dalmatica, [503474], [LINDAL]
Malus pumila, [25262], [MALPUM]
Marrubium vulgare, [32561], [MARVUL]
Melilotus alba, [26149], [MELALB]
Melilotus officinali, [26150], [MELOFF]
Plantago lanceolata, [32874], [PLALAN]
Poa pratensis, [41088], [POAPRA]
Polygonum aviculare, [20876], [POLAVI]
Portulaca oleracea, [20422], [POROLE]
Potentilla norvegica, [24730], [POTNOR]
Rumex crispus, [20937], [RUMCRI]
Salsola tragus, [520948], [SALTRA]
Sisymbrium altissimu, [23312], [SISALT]
Tamarix ramisissima, [22310], [TAMRAM]
Taraxacum officinale, [36213], [TAROFF]
Tragopogon dubius, [38564], [TRADUB]
Verbascum thapsus, [33394], [VERTHA]
 Other
 Notes, text, 100, normal, normal
 Density, numeric, 0, 0, 10000, 0, normal, # of individual species, normal
 %Cover, menu, required, weed canopy within infested area, normal

Appendix 1 (cont.): Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

Trace: <1%
Low: 1-5%
Mod: 6-25%
High: 26-50 %
Majority: 51-100%
Time, time, auto, 24, manual, normal, normal, Label1
Date, date, auto, mdy, manual, normal, normal

Gross-weed, point, Office-generated polygon, 5, seconds, 4, Code
Species, menu, required, scientific name, normal
Amaranthus retroflex, [20745], [AMARET]
Bromus diandrus, [40498], [BRODIA]
Bromus tectorum, [40524], [BROTEC]
Centaurea sp.
Chenopodium album, [20592], [CHEALB]
Cirsium vulgare, [36428], [CIRVUL]
Convolvulus arvensis, [30705], [CONARV]
Conyza canadensis, [37113], [CONCAD]
Erodium cicutarium, [29147], [EROCIC]
Erysimum repandum, [22947], [ERYREP]
Galium aparine, [34797], [GALAPA]
Lactuca serriola, [36608], [LACSER]
Leonurus cardiaca, [32548], [LEOCAR]
Linaria dalmatica, [503474], [LINDAL]
Malus pumila, [25262], [MALPUM]
Marrubium vulgare, [32561], [MARVUL]
Melilotus alba, [26149], [MELALB]
Melilotus officinali, [26150], [MELOFF]
Plantago lanceolata, [32874], [PLALAN]
Poa pratensis, [41088], [POAPRA]
Polygonum aviculare, [20876], [POLAVI]
Portulaca oleracea, [20422], [POROLE]
Potentilla norvegica, [24730], [POTNOR]
Rumex crispus, [20937], [RUMCRI]
Salsola tragus, [520948], [SALTRA]
Sisymbrium altissimu, [23312], [SISALT]
Tamarix ramisissima, [22310], [TAMRAM]
Taraxacum officinale, [36213], [TAROFF]
Tragopogon dubius, [38564], [TRADUB]
Verbascum thapsus, [33394], [VERTHA]
Other
Infested, numeric, 0, 1, 100, 1, required, % of gross area actually
infested, normal
%Cover, menu, required, % weed cover in typical infestations, normal
Trace: <1%
Low: 1-5%
Mod: 6-25%
High: 26-50 %
Majority: 51-100%
Area ID, numeric, 0, 1, 100, 1, normal, From infestation ID # noted on
field map, normal
Notes, text, 100, normal, normal, Label2
Date, date, auto, mdy, manual, normal, normal
Time, time, auto, 24, manual, normal, normal, Label1

Appendix 1 (cont.): Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

Photo, point, , 5, seconds, 4, Code

Species, menu, required, scientific name, normal

Amaranthus retroflex, [20745], [AMARET]

Bromus diandrus, [40498], [BRODIA]

Bromus tectorum, [40524], [BROTEC]

Centaurea sp.

Chenopodium album, [20592], [CHEALB]

Cirsium vulgare, [36428], [CIRVUL]

Convolvulus arvensis, [30705], [CONARV]

Conyza canadensis, [37113], [CONCAD]

Erodium cicutarium, [29147], [EROCIC]

Erysimum repandum, [22947], [ERYREP]

Galium aparine, [34797], [GALAPA]

Lactuca serriola, [36608], [LACSER]

Leonurus cardiaca, [32548], [LEOCAR]

Linaria dalmatica, [503474], [LINDAL]

Malus pumila, [25262], [MALPUM]

Marrubium vulgare, [32561], [MARVUL]

Melilotus alba, [26149], [MELALB]

Melilotus officinali, [26150], [MELOFF]

Plantago lanceolata, [32874], [PLALAN]

Poa pratensis, [41088], [POAPRA]

Polygonum aviculare, [20876], [POLAVI]

Portulaca oleracea, [20422], [POROLE]

Potentilla norvegica, [24730], [POTNOR]

Rumex crispus, [20937], [RUMCRI]

Salsola tragus, [520948], [SALTRA]

Sisymbrium altissimu, [23312], [SISALT]

Tamarix ramisissima, [22310], [TAMRAM]

Taraxacum officinale, [36213], [TAROFF]

Tragopogon dubius, [38564], [TRADUB]

Verbascum thapsus, [33394], [VERTHA]

Other

Bearing (MN), numeric, 0, 0, 360, 0, normal, normal, Label1

Notes, text, 100, normal, normal, Label2

Date, date, auto, mdy, manual, normal, normal

Time, time, auto, 24, manual, normal, normal

Voucher, point, Species, 5, seconds, 4, Code

Species, menu, required, scientific name, normal

Amaranthus retroflex, [20745], [AMARET]

Bromus diandrus, [40498], [BRODIA]

Bromus tectorum, [40524], [BROTEC]

Centaurea sp.

Chenopodium album, [20592], [CHEALB]

Cirsium vulgare, [36428], [CIRVUL]

Convolvulus arvensis, [30705], [CONARV]

Conyza canadensis, [37113], [CONCAD]

Erodium cicutarium, [29147], [EROCIC]

Erysimum repandum, [22947], [ERYREP]

Galium aparine, [34797], [GALAPA]

Lactuca serriola, [36608], [LACSER]

Leonurus cardiaca, [32548], [LEOCAR]

Linaria dalmatica, [503474], [LINDAL]

Appendix 1 (cont.): Flagstaff Group Exotic Plant Inventory and Mapping Data Dictionary

Malus pumila, [25262], [MALPUM]
Marrubium vulgare, [32561], [MARVUL]
Melilotus alba, [26149], [MELALB]
Melilotus officinali, [26150], [MELOFF]
Plantago lanceolata, [32874], [PLALAN]
Poa pratensis, [41088], [POAPRA]
Polygonum aviculare, [20876], [POLAVI]
Portulaca oleracea, [20422], [POROLE]
Potentilla norvegica, [24730], [POTNOR]
Rumex crispus, [20937], [RUMCRI]
Salsola tragus, [520948], [SALTRA]
Sisymbrium altissimu, [23312], [SISALT]
Tamarix ramisissima, [22310], [TAMRAM]
Taraxacum officinale, [36213], [TAROFF]
Tragopogon dubius, [38564], [TRADUB]
Verbascum thapsus, [33394], [VERTHA]
Other
Notes, text, 100, normal, normal, Label1

Appendix 2: Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

The following contains a portion of the database that is the result of this survey. The fields included were selected because they contain information essential to directly managing invasive and non-native species within the surveyed areas of this project. Additional information of each record can be obtained from the master database that is stored by the GIS section of the Flagstaff Group Resource Management Division.

ID #	Species	Northing	Easting	Size	Density	Cover
1	Linaria dalmatica	3893045.733	454097.5195	0.01 acres	3	Trace: <1%
2	Linaria dalmatica	3893139.045	454113.9115	0.01 acres	2	Trace: <1%
3	Verbascum thapsus	3893117.961	454163.6821	0.01 acres	1	Trace: <1%
4	Verbascum thapsus	3893138.47	454195.1923	0.25 acres	150	Low: 1-5%
5	Tragopogon dubius	3893145.308	454194.0051	0.1 acres	34	Trace: <1%
6	Lactuca serriola	3893142.145	454194.3451	0.01 acres	18	Trace: <1%
7	Verbascum thapsus	3893189.816	454142.9636	0.01 acres	1	Trace: <1%
8	Tragopogon dubius	3893191.562	454141.2564	0.01 acres	4	Trace: <1%
9	Linaria dalmatica	3893178.558	454142.6496	0.01 acres	5	Trace: <1%
10	Tragopogon dubius	3893213.957	454139.5305	0.01 acres	12	Trace: <1%
11	Linaria dalmatica	3893240.079	454212.9906	0.01 acres	11	Trace: <1%
12	Verbascum thapsus	3893231.192	454219.5084	0.01 acres	1	Trace: <1%
13	Linaria dalmatica	3893293.352	454181.3371	0.01 acres	20	Trace: <1%
14	Verbascum thapsus	3893288.193	454191.9559	0.01 acres	25	Trace: <1%
15	Linaria dalmatica	3893317.445	454165.6026	0.01 acres	2	Trace: <1%
16	Linaria dalmatica	3893353.315	454198.1888	0.01 acres	25	Trace: <1%
17	Linaria dalmatica	3892792.91	454132.0215	0.01 acres	23	Trace: <1%
18	Linaria dalmatica	3892782.149	454107.5561	0.01 acres	41	Trace: <1%
19	Linaria dalmatica	3892562.283	453930.5868	0.01 acres	14	Trace: <1%
20	Verbascum thapsus	3892501.603	453847.7334	0.01 acres	2	Trace: <1%
21	Verbascum thapsus	3893584.004	454245.341	0.01 acres	63	Trace: <1%
22	Chenopodium album	3893581.944	454240.4275	0.01 acres	1	Trace: <1%
23	Linaria dalmatica	3893512.384	454232.8448	0.01 acres	0	Trace: <1%
24	Linaria dalmatica	3893435.457	454285.5921	0.01 acres	90	Trace: <1%
25	Linaria dalmatica	3893344.656	454232.8233	0.01 acres	30	Trace: <1%
26	Linaria dalmatica	3893216.154	454244.1748	0.01 acres	24	Trace: <1%
27	Linaria dalmatica	3893264.487	454261.2737	0.1 acres	183	Trace: <1%
28	Linaria dalmatica	3893282.614	454249.6972	0.25 acres	68	Low: 1-5%
29	Verbascum thapsus	3893282.559	454248.1297	0.01 acres	9	Trace: <1%
30	Linaria dalmatica	3893298.477	454236.1682	0.01 acres	8	Trace: <1%
31	Linaria dalmatica	3893326.007	454233.3532	0.01 acres	15	Trace: <1%
32	Verbascum thapsus	3893329.726	454236.6829	0.01 acres	13	Trace: <1%
33	Linaria dalmatica	3893344.105	454279.0494	0.1 acres	49	Low: 1-5%
34	Chenopodium album	3893424.682	454303.1769	0.01 acres	32	Trace: <1%
35	Verbascum thapsus	3893428.434	454300.9041	0.01 acres	1	Trace: <1%
36	Tragopogon dubius	3893428.277	454300.676	0.01 acres	1	Trace: <1%
37	Linaria dalmatica	3893427.904	454300.9883	0.01 acres	2	Trace: <1%
38	Verbascum thapsus	3893467.056	454316.5294	0.01 acres	1	Trace: <1%
39	Lactuca serriola	3893467.681	454317.1261	0.01 acres	6	Trace: <1%
40	Tragopogon dubius	3893465.93	454319.9029	0.01 acres	7	Trace: <1%
41	Verbascum thapsus	3893960.701	454329.3782	0.1 acres	42	Low: 1-5%
42	Linaria dalmatica	3893969.938	454324.7883	0.1 acres	21	Trace: <1%
43	Linaria dalmatica	3894053.859	454281.3463	0.1 acres	8	Trace: <1%
44	Verbascum thapsus	3894053.38	454281.2677	0.1 acres	25	Trace: <1%
45	Linaria dalmatica	3894122.857	454207.4404	0.01 acres	3	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
46	Linaria dalmatica	3893958.689	454270.9212	0.01 acres	74	Trace: <1%
47	Verbascum thapsus	3893906.228	454286.3393	0.01 acres	110	Trace: <1%
48	Linaria dalmatica	3893895.523	454298.6314	0.01 acres	2	Trace: <1%
49	Verbascum thapsus	3894151.398	454207.0814	0.01 acres	73	Low: 1-5%
50	Verbascum thapsus	3894187.825	454194.0254	0.01 acres	1	Trace: <1%
51	Linaria dalmatica	3894202.065	454187.4328	0.01 acres	0	Trace: <1%
52	Verbascum thapsus	3894230.787	454172.6679	0.01 acres	22	Trace: <1%
53	Verbascum thapsus	3894250.038	454161.3634	0.01 acres	8	Trace: <1%
54	Linaria dalmatica	3894263.706	454152.709	0.01 acres	12	Trace: <1%
55	Melilotus officinali	3894261.431	454152.5255	0.01 acres	31	Trace: <1%
56	Verbascum thapsus	3894313.276	454128.8492	0.01 acres	28	Trace: <1%
57	Taraxacum officinale	3894308.575	454124.344	0.01 acres	13	Trace: <1%
58	Convolvulus arvensis	3894309.461	454121.2199	0.01 acres	35	Trace: <1%
59	Portulaca oleracea	3894312.674	454117.7125	0.01 acres	130	Trace: <1%
60	Verbascum thapsus	3894408.791	454063.8881	0.01 acres	1	Trace: <1%
61	Portulaca oleracea	3894495.978	453997.7727	0.01 acres	53	Trace: <1%
62	Verbascum thapsus	3894481.788	453959.2019	0.1 acres	120	Low: 1-5%
63	Marrubium vulgare	3894479.23	453948.7281	0.01 acres	17	Trace: <1%
64	Linaria dalmatica	3894476.383	453939.4771	0.01 acres	0	Trace: <1%
65	Verbascum thapsus	3894467.832	453946.2411	0.01 acres	60	Trace: <1%
66	Portulaca oleracea	3894522.859	453958.608	0.1 acres	200	Low: 1-5%
67	Linaria dalmatica	3894536.886	454015.8961	0.01 acres	0	Trace: <1%
68	Verbascum thapsus	3894536.682	454015.9142	0.01 acres	8	Trace: <1%
69	Linaria dalmatica	3894605.694	454009.3028	0.01 acres	18	Trace: <1%
70	Lactuca serriola	3894608.824	454010.9998	0.01 acres	3	Trace: <1%
71	Verbascum thapsus	3894612.332	454007.1606	0.01 acres	6	Trace: <1%
72	Linaria dalmatica	3894638.417	453999.9125	0.01 acres	5	Trace: <1%
73	Verbascum thapsus	3894648.875	453982.6502	0.01 acres	99	Low: 1-5%
74	Linaria dalmatica	3894648.503	453982.872	0.1 acres	200	Low: 1-5%
75	Lactuca serriola	3894647.868	453982.908	0.01 acres	5	Trace: <1%
76	Linaria dalmatica	3894681.668	453991.5887	0.1 acres	28	Trace: <1%
77	Verbascum thapsus	3894681.173	453886.0418	0.01 acres	2	Trace: <1%
78	Portulaca oleracea	3894601.02	453872.6025	0.01 acres	100	Trace: <1%
79	Linaria dalmatica	3894230.929	454090.3747	0.01 acres	35	Trace: <1%
80	Linaria dalmatica	3894266.547	454119.2947	0.01 acres	1	Trace: <1%
81	Linaria dalmatica	3894265.301	454095.5452	0.01 acres	5	Trace: <1%
82	Verbascum thapsus	3894260.309	454096.6501	0.01 acres	1	Trace: <1%
83	Linaria dalmatica	3894272.17	454085.7814	0.01 acres	100	Low: 1-5%
84	Marrubium vulgare	3894270.424	454085.1316	0.01 acres	0	Trace: <1%
85	Lactuca serriola	3894279.789	454108.6575	0.01 acres	1	Trace: <1%
86	Portulaca oleracea	3894346.119	454072.6051	0.01 acres	2	Trace: <1%
87	Verbascum thapsus	3894369.148	454022.8659	0.01 acres	1	Trace: <1%
88	Portulaca oleracea	3894373.813	454009.1082	0.01 acres	100	Trace: <1%
89	Portulaca oleracea	3894448.55	453965.3561	0.01 acres	30	Trace: <1%
90	Portulaca oleracea	3894446.628	453941.6182	0.01 acres	100	Trace: <1%
91	Portulaca oleracea	3894429.064	453921.2343	0.01 acres	1000	High: 26-50 %
92	Linaria dalmatica	3894469.033	453913.6966	0.01 acres	55	Low: 1-5%
93	Marrubium vulgare	3894465.804	453913.2507	0.01 acres	1	Trace: <1%
94	Marrubium vulgare	3894618.706	453944.6371	0.01 acres	100	High: 26-50 %
95	Portulaca oleracea	3894621.533	453940.1192	0.01 acres	100	Low: 1-5%
96	Verbascum thapsus	3894622.042	453963.1262	0.01 acres	1	Trace: <1%
97	Portulaca oleracea	3894670.224	453910.375	0.01 acres	19	Trace: <1%
98	Portulaca oleracea	3894685.908	453885.1669	0.01 acres	50	Low: 1-5%
99	Melilotus alba	3893830.536	454379.5409	0.01 acres	2	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
100	Verbascum thapsus	3894016.042	454297.3202	0.01 acres	7	Trace: <1%
101	Verbascum thapsus	3894085.579	454269.9167	0.1 acres	130	Trace: <1%
102	Marrubium vulgare	3894084.897	454274.344	0.01 acres	29	Low: 1-5%
103	Taraxacum officinale	3894085.295	454275.4551	0.01 acres	2	Trace: <1%
104	Linaria dalmatica	3894085.488	454275.382	0.1 acres	12	Trace: <1%
105	Tragopogon dubius	3894084.521	454275.2893	0.01 acres	2	Trace: <1%
106	Verbascum thapsus	3894190.096	454207.0929	0.1 acres	5	Trace: <1%
107	Linaria dalmatica	3894219.497	454191.5881	0.1 acres	34	Trace: <1%
108	Verbascum thapsus	3894200.34	454204.8761	0.1 acres	36	Trace: <1%
109	Verbascum thapsus	3894261.597	454166.4863	0.1 acres	17	Trace: <1%
110	Linaria dalmatica	3894261.979	454167.1529	0.1 acres	29	Trace: <1%
111	Linaria dalmatica	3894260.712	454166.4288	0.1 acres	25	Trace: <1%
112	Verbascum thapsus	3894325.553	454134.8471	0.1 acres	39	Trace: <1%
113	Melilotus officinali	3894316.311	454140.9471	0.01 acres	6	Trace: <1%
114	Linaria dalmatica	3894331.235	454118.4508	0.1 acres	12	Trace: <1%
115	Marrubium vulgare	3894333.068	454117.0953	0.1 acres	5	Trace: <1%
116	Linaria dalmatica	3894334.382	454115.9862	0.1 acres	5	Trace: <1%
117	Portulaca oleracea	3894330.537	454114.7696	0.1 acres	78	Trace: <1%
118	Verbascum thapsus	3894994.143	453913.2639	0.01 acres	21	Trace: <1%
119	Linaria dalmatica	3894994.017	453913.4099	0.1 acres	39	Trace: <1%
120	Melilotus officinali	3894993.639	453913.0815	0.1 acres	21	Trace: <1%
121	Lactuca serriola	3894992.157	453914.7316	0.01 acres	2	Trace: <1%
122	Conyza canadensis	3894992.171	453913.3651	0.1 acres	15	Trace: <1%
123	Linaria dalmatica	3895061.824	453891.1941	0.25 acres	63	Trace: <1%
124	Tragopogon dubius	3895050.155	453895.4595	0.01 acres	25	Trace: <1%
125	Convolvulus arvensis	3895037.557	453884.3662	0.5 acres	200	Low: 1-5%
126	Chenopodium album	3895051.414	453888.313	0.25 acres	23	Low: 1-5%
127	Verbascum thapsus	3895127.239	453852.5342	0.25 acres	30	Low: 1-5%
128	Linaria dalmatica	3895106.071	453861.0442	0.25 acres	42	Low: 1-5%
129	Linaria dalmatica	3895199.148	453800.8969	0.1 acres	105	Low: 1-5%
130	Linaria dalmatica	3895217.47	453785.4317	0.25 acres	70	Low: 1-5%
131	Marrubium vulgare	3895301.218	453713.3468	0.5 acres	25	Trace: <1%
132	Cirsium vulgare	3895314.012	453704.9189	0.01 acres	2	Trace: <1%
133	Verbascum thapsus	3895311.856	453675.9886	0.1 acres	22	Low: 1-5%
134	Marrubium vulgare	3895314.477	453667.6664	0.25 acres	1000	Mod: 6-25%
135	Portulaca oleracea	3895314.88	453666.962	0.25 acres	1000	Mod: 6-25%
136	Erodium cicutarium	3895313.299	453670.5141	0.01 acres	3	Trace: <1%
137	Tragopogon dubius	3895312.031	453674.9885	0.01 acres	3	Trace: <1%
138	Conyza canadensis	3895311.702	453674.9087	0.1 acres	23	Trace: <1%
139	Verbascum thapsus	3895404.796	453493.5142	0.01 acres	8	Trace: <1%
140	Portulaca oleracea	3895630.669	452997.2874	0.5 acres	400	Low: 1-5%
141	Linaria dalmatica	3895601.149	452989.1676	0.01 acres	25	Trace: <1%
142	Portulaca oleracea	3895335.54	453312.8329	0.25 acres	300	Low: 1-5%
143	Verbascum thapsus	3895337.371	453317.2316	0.01 acres	3	Trace: <1%
144	Portulaca oleracea	3895308.791	453360.2454	0.1 acres	40	Low: 1-5%
145	Portulaca oleracea	3895304.384	453463.9047	1.0 acres	1000	Mod: 6-25%
146	Verbascum thapsus	3895308.543	453501.9433	0.25 acres	5	Trace: <1%
147	Chenopodium album	3895308.849	453502.5467	0.1 acres	21	Low: 1-5%
148	Marrubium vulgare	3895309.727	453502.3861	0.01 acres	21	Low: 1-5%
149	Chenopodium album	3895447.401	453306.4171	0.25 acres	20	Low: 1-5%
150	Portulaca oleracea	3895447.894	453306.8042	0.25 acres	50	Trace: <1%
151	Lactuca serriola	3895448.097	453306.5328	0.01 acres	3	Trace: <1%
152	Verbascum thapsus	3895506.509	453154.5869	0.01 acres	41	Low: 1-5%
153	Linaria dalmatica	3895506.02	453154.6342	0.1 acres	5	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
154	Portulaca oleracea	3895637.237	453071.2755	0.25 acres	500	Mod: 6-25%
155	Verbascum thapsus	3895679.635	453045.1818	0.1 acres	31	Low: 1-5%
156	Chenopodium album	3895668.057	453050.5144	0.01 acres	32	Trace: <1%
157	Conyza canadensis	3895669.082	453050.2887	0.01 acres	5	Trace: <1%
158	Linaria dalmatica	3895680.827	453038.3958	0.01 acres	25	Trace: <1%
159	Verbascum thapsus	3895672.465	453030.4133	0.1 acres	71	Low: 1-5%
160	Linaria dalmatica	3895709.059	452978.8298	0.01 acres	33	Trace: <1%
161	Chenopodium album	3895759.137	452955.0858	0.1 acres	30	Low: 1-5%
162	Portulaca oleracea	3895758.047	452951.5613	0.25 acres	1000	Mod: 6-25%
163	Linaria dalmatica	3896129.119	452805.9599	0.01 acres	3	Trace: <1%
164	Linaria dalmatica	3896238.892	452787.6178	0.1 acres	9	Trace: <1%
165	Verbascum thapsus	3896181.459	452914.594	0.01 acres	3	Trace: <1%
166	Melilotus alba	3896182.067	452914.5666	2.5 acres	100	Mod: 6-25%
167	Verbascum thapsus	3896146.762	452893.2032	0.01 acres	3	Trace: <1%
168	Portulaca oleracea	3896146.864	452899.6874	0.1 acres	60	Trace: <1%
169	Linaria dalmatica	3896030.631	452878.8492	0.01 acres	9	Trace: <1%
170	Linaria dalmatica	3895899.315	452907.4822	0.01 acres	21	Trace: <1%
171	Verbascum thapsus	3895826.773	452991.5844	0.1 acres	4	Trace: <1%
172	Linaria dalmatica	3895768.387	453004.2657	0.1 acres	18	Trace: <1%
173	Portulaca oleracea	3895769.038	453003.628	0.1 acres	25	Trace: <1%
174	Linaria dalmatica	3895726.47	453000.0073	0.1 acres	140	Low: 1-5%
175	Portulaca oleracea	3895726.535	452999.7324	0.1 acres	200	Low: 1-5%
176	Portulaca oleracea	3895720.331	453051.0477	0.01 acres	300	Mod: 6-25%
177	Linaria dalmatica	3895736.543	453060.8875	0.1 acres	20	Low: 1-5%
178	Melilotus officinali	3895736.131	453061.5642	0.01 acres	4	Trace: <1%
179	Linaria dalmatica	3895757.32	453046.7791	0.25 acres	14	Low: 1-5%
180	Verbascum thapsus	3895705.104	453063.1708	0.01 acres	2	Trace: <1%
181	Linaria dalmatica	3895669.045	453066.546	0.25 acres	34	Low: 1-5%
182	Portulaca oleracea	3895628.692	453126.0821	0.1 acres	300	Mod: 6-25%
183	Verbascum thapsus	3895953.682	452980.6873	0.01 acres	2	Trace: <1%
184	Linaria dalmatica	3895938.21	452977.3943	0.25 acres	300	Mod: 6-25%
185	Portulaca oleracea	3895916.174	452985.5409	0.1 acres	500	Mod: 6-25%
186	Melilotus alba	3895904.649	452995.2026	0.25 acres	42	Low: 1-5%
187	Melilotus alba	3895872.327	453011.2168	0.25 acres	15	Trace: <1%
188	Erodium cicutarium	3895865.849	453014.705	0.1 acres	200	Low: 1-5%
189	Salsola tragus	3895870.222	453015.5408	0.01 acres	3	Trace: <1%
190	Polygonum aviculare	3895870.724	453015.0665	0.01 acres	2	Trace: <1%
191	Verbascum thapsus	3894782.63	453927.5842	0.1 acres	200	Trace: <1%
192	Linaria dalmatica	3894783.337	453927.8351	0.25 acres	55	Low: 1-5%
193	Marrubium vulgare	3894783.925	453927.9082	0.25 acres	12	Trace: <1%
194	Chenopodium album	3894785.636	453928.9174	0.25 acres	33	Low: 1-5%
195	Linaria dalmatica	3894748.18	453887.5236	0.01 acres	8	Trace: <1%
196	Portulaca oleracea	3894748.106	453887.6165	0.01 acres	3	Trace: <1%
197	Portulaca oleracea	3894723.175	453898.932	0.1 acres	100	Trace: <1%
198	Chenopodium album	3894702.322	453897.9231	0.25 acres	50	Low: 1-5%
199	Marrubium vulgare	3894699.526	453891.9421	0.25 acres	25	Low: 1-5%
200	Verbascum thapsus	3894699.244	453891.3014	0.1 acres	26	Low: 1-5%
201	Portulaca oleracea	3894687.825	453893.5596	0.01 acres	50	Trace: <1%
202	Linaria dalmatica	3894699.332	453841.3421	0.1 acres	17	Trace: <1%
203	Portulaca oleracea	3894698.302	453842.215	0.01 acres	4	Trace: <1%
204	Verbascum thapsus	3894727.738	453833.3716	0.1 acres	3	Trace: <1%
205	Linaria dalmatica	3894727.76	453832.7915	0.1 acres	6	Trace: <1%
206	Linaria dalmatica	3894774.262	453858.805	0.25 acres	14	Trace: <1%
207	Verbascum thapsus	3894800.08	453909.7163	0.25 acres	23	Low: 1-5%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
208	Portulaca oleracea	3894845.097	453920.8943	0.1 acres	1000	Low: 1-5%
209	Linaria dalmatica	3894952.714	453850.9016	0.1 acres	35	Trace: <1%
210	Portulaca oleracea	3894952.334	453850.483	0.1 acres	22	Trace: <1%
211	Verbascum thapsus	3894936.697	453855.6176	0.1 acres	23	Trace: <1%
212	Linaria dalmatica	3894936.445	453855.2766	0.1 acres	13	Trace: <1%
213	Linaria dalmatica	3894927.323	453838.8114	0.25 acres	9	Trace: <1%
214	Linaria dalmatica	3894924.797	453822.1674	0.1 acres	58	Low: 1-5%
215	Linaria dalmatica	3894909.994	453801.7509	0.1 acres	55	Low: 1-5%
216	Linaria dalmatica	3894869.847	453802.575	0.1 acres	12	Trace: <1%
217	Verbascum thapsus	3892536.696	454007.7894	0.1 acres	9	Trace: <1%
218	Linaria dalmatica	3895059.958	453880.5058	0.25 acres	10	Low: 1-5%
219	Linaria dalmatica	3895040.553	453814.5584	0.1 acres	7	Trace: <1%
220	Verbascum thapsus	3895179.797	453803.35	0.1 acres	5	Trace: <1%
221	Tragopogon dubius	3895179.631	453812.993	0.01 acres	4	Trace: <1%
222	Marrubium vulgare	3895232.091	453609.209	0.01 acres	20	Mod: 6-25%
223	Portulaca oleracea	3895235.169	453609.7182	0.1 acres	1000	Mod: 6-25%
224	Lactuca serriola	3895235.396	453610.9111	0.01 acres	3	Trace: <1%
225	Verbascum thapsus	3895301.268	453596.6851	0.1 acres	22	Low: 1-5%
226	Portulaca oleracea	3895300.649	453594.0814	0.1 acres	15	Trace: <1%
227	Salsola tragus	3895082.663	453894.3845	0.1 acres	40	Trace: <1%
228	Amaranthus retroflex	3895083.063	453894.8261	0.25 acres	100	Mod: 6-25%
229	Linaria dalmatica	3896170.84	453011.5637	0.01 acres	1	Trace: <1%
230	Melilotus alba	3896176.617	453050.2604	0.01 acres	3	Trace: <1%
231	Melilotus alba	3896173.741	453065.3504	0.01 acres	1	Trace: <1%
232	Linaria dalmatica	3896166.267	453076.7298	0.01 acres	14	Trace: <1%
233	Tragopogon dubius	3896167.573	453080.4155	0.01 acres	1	Trace: <1%
234	Linaria dalmatica	3896142.503	452995.2609	0.01 acres	27	Trace: <1%
235	Linaria dalmatica	3896096.138	453051.1869	0.01 acres	8	Trace: <1%
236	Linaria dalmatica	3896066.304	452991.6406	0.01 acres	11	Trace: <1%
237	Linaria dalmatica	3896046.506	452998.7425	0.01 acres	44	Trace: <1%
238	Linaria dalmatica	3895909.846	453162.6428	0.01 acres	1	Trace: <1%
239	Linaria dalmatica	3895873.904	453166.9221	0.01 acres	250	Mod: 6-25%
240	Verbascum thapsus	3895870.924	453163.4091	0.01 acres	8	Trace: <1%
241	Linaria dalmatica	3895879.74	453156.353	0.01 acres	9	Trace: <1%
242	Verbascum thapsus	3895831.171	453176.0733	0.01 acres	60	Trace: <1%
243	Linaria dalmatica	3895827.858	453177.1688	0.01 acres	21	Trace: <1%
244	Linaria dalmatica	3895852.478	453168.4242	0.01 acres	18	Trace: <1%
245	Verbascum thapsus	3895742.656	453152.2724	0.01 acres	25	Trace: <1%
246	Linaria dalmatica	3895757.092	453140.9552	0.01 acres	13	Trace: <1%
247	Verbascum thapsus	3895760.553	453139.7765	0.01 acres	5	Trace: <1%
248	Verbascum thapsus	3895650.969	453276.6508	0.01 acres	10	Trace: <1%
249	Tragopogon dubius	3895539.201	453475.6818	0.01 acres	1	Trace: <1%
250	Verbascum thapsus	3895494.802	453523.8422	0.01 acres	100	Trace: <1%
251	Verbascum thapsus	3895518.461	453572.6693	0.01 acres	6	Trace: <1%
252	Taraxacum officinale	3895425.009	453656.7689	0.01 acres	2	Trace: <1%
253	Chenopodium album	3895426.757	453652.9279	0.01 acres	2	Trace: <1%
254	Portulaca oleracea	3895419.249	453653.485	0.01 acres	50	Trace: <1%
255	Portulaca oleracea	3895409.526	453706.4201	0.01 acres	100	Trace: <1%
256	Linaria dalmatica	3895415.033	453720.5562	0.01 acres	3	Trace: <1%
257	Verbascum thapsus	3895380.353	453750.8771	0.01 acres	8	Trace: <1%
258	Verbascum thapsus	3895370.089	453765.7413	0.01 acres	0	Trace: <1%
259	Verbascum thapsus	3892493.318	453581.9029	0.1 acres	120	Trace: <1%
260	Marrubium vulgare	3892495.177	453580.739	0.01 acres	5	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
261	Verbascum thapsus	3892450.002	453773.894	0.01 acres	2	Trace: <1%
262	Linaria dalmatica	3892450	453774.5737	0.01 acres	2	Trace: <1%
263	Marrubium vulgare	3892450.748	453774.7777	0.01 acres	5	Trace: <1%
264	Verbascum thapsus	3892604.357	454078.3017	0.1 acres	8	Trace: <1%
265	Marrubium vulgare	3892600.39	454076.5953	0.01 acres	6	Trace: <1%
266	Linaria dalmatica	3892584.725	454101.3815	0.1 acres	140	Low: 1-5%
267	Linaria dalmatica	3893238.381	454292.6887	0.01 acres	3	Trace: <1%
268	Verbascum thapsus	3893239.865	454292.5454	0.01 acres	3	Trace: <1%
269	Verbascum thapsus	3893285.859	454288.5491	0.01 acres	5	Trace: <1%
270	Linaria dalmatica	3893280.544	454283.897	0.25 acres	200	Low: 1-5%
271	Melilotus alba	3893274.258	454308.6927	0.01 acres	6	Trace: <1%
272	Linaria dalmatica	3893298.676	454303.2426	0.1 acres	15	Trace: <1%
273	Lactuca serriola	3893298.639	454301.3529	0.01 acres	6	Trace: <1%
274	Chenopodium album	3893298.069	454301.7936	0.01 acres	10	Trace: <1%
275	Tragopogon dubius	3893295.035	454300.7922	0.25 acres	20	Trace: <1%
276	Verbascum thapsus	3893834.732	454358.6961	0.1 acres	12	Trace: <1%
277	Linaria dalmatica	3893836.311	454363.1255	0.25 acres	5	Trace: <1%
278	Melilotus officinali	3894336.922	454132.9762	0.25 acres	3	Trace: <1%
279	Verbascum thapsus	3894338.874	454130.201	0.25 acres	12	Trace: <1%
280	Conyza canadensis	3894341.624	454131.2754	0.25 acres	13	Trace: <1%
281	Linaria dalmatica	3894355.245	454135.7668	0.1 acres	29	Trace: <1%
282	Linaria dalmatica	3894443.214	454166.7047	0.25 acres	43	Trace: <1%
283	Portulaca oleracea	3894457.194	454178.114	0.25 acres	1000	Mod: 6-25%
284	Verbascum thapsus	3894430.895	454181.036	0.1 acres	32	Trace: <1%
285	Verbascum thapsus	3895386.892	453484.6707	0.01 acres	2	Trace: <1%
286	Verbascum thapsus	3895406.877	453440.4662	0.1 acres	6	Trace: <1%
287	Verbascum thapsus	3895415.769	453475.0104	0.01 acres	5	Trace: <1%
288	Verbascum thapsus	3895507.288	453280.2691	0.01 acres	6	Trace: <1%
289	Linaria dalmatica	3895856.191	453042.6966	0.25 acres	300	Trace: <1%
290	Melilotus alba	3895855.259	453019.8323	2.5 acres	1000	Mod: 6-25%
291	Linaria dalmatica	3895837.342	453046.6399	1.0 acres	300	Low: 1-5%
292	Linaria dalmatica	3896002.734	452981.7834	2.5 acres	56	Low: 1-5%
293	Linaria dalmatica	3896039.226	452967.9306	0.25 acres	42	Low: 1-5%
294	Verbascum thapsus	3896076.856	452956.1576	0.5 acres	23	Low: 1-5%
295	Lactuca serriola	3896087.819	452954.0511	0.1 acres	4	Trace: <1%
296	Ulmus pumila	3896098.049	452937.1104	0.1 acres	5	Trace: <1%
297	Linaria dalmatica	3896108.036	452935.401	0.25 acres	25	Low: 1-5%
298	Verbascum thapsus	3896134.772	452929.7676	0.5 acres	9	Low: 1-5%
299	Linaria dalmatica	3896137.325	452926.7072	0.25 acres	21	Low: 1-5%
300	Linaria dalmatica	3896085.328	452915.3776	0.1 acres	12	Trace: <1%
301	Linaria dalmatica	3896062.633	452925.6901	0.01 acres	9	Trace: <1%
302	Verbascum thapsus	3896052.149	452947.0572	0.1 acres	26	Low: 1-5%
303	Lactuca serriola	3896044.023	452951.7999	0.1 acres	26	Low: 1-5%
304	Linaria dalmatica	3896032.143	452951.7685	0.01 acres	35	Low: 1-5%
305	Salsola tragus	3896031.125	452949.956	0.01 acres	3	Trace: <1%
306	Tragopogon dubius	3896027.953	452949.0886	0.5 acres	8	Trace: <1%
307	Linaria dalmatica	3895988.533	452990.4699	0.1 acres	24	Low: 1-5%
308	Verbascum thapsus	3895989.489	452989.7397	0.01 acres	5	Low: 1-5%
309	Linaria dalmatica	3895992.643	453005.9914	0.25 acres	7	Low: 1-5%
310	Agastache pallidiflo	3895986.243	453011.519	0.01 acres	22	Trace: <1%
311	Verbascum thapsus	3896007.962	453024.4589	0.1 acres	63	Low: 1-5%
312	Verbascum thapsus	3895997.189	453036.5875	0.1 acres	11	Low: 1-5%
313	Agastache pallidiflo	3896000.575	453035.8425	0.01 acres	30	Low: 1-5%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
314	Linaria dalmatica	3895961.641	453062.0691	0.1 acres	18	Trace: <1%
315	Linaria dalmatica	3895892.164	453120.4469	0.5 acres	15	Trace: <1%
316	Linaria dalmatica	3895852.372	453068.6901	0.1 acres	4	Trace: <1%
317	Linaria dalmatica	3895841.921	453049.4265	0.25 acres	50	Low: 1-5%
318	Linaria dalmatica	3895716.529	453096.7636	0.1 acres	6	Trace: <1%
319	Verbascum thapsus	3895724.814	453097.9779	0.01 acres	3	Trace: <1%
320	Verbascum thapsus	3895732.008	453119.3441	0.5 acres	26	Low: 1-5%
321	Verbascum thapsus	3895713.663	453155.7404	0.1 acres	5	Trace: <1%
322	Linaria dalmatica	3895673.753	453147.0154	0.01 acres	3	Trace: <1%
323	Linaria dalmatica	3895649.54	453143.1913	0.25 acres	26	Low: 1-5%
324	Verbascum thapsus	3895651.529	453141.8973	0.01 acres	3	Trace: <1%
325	Linaria dalmatica	3895581.178	453199.4733	0.1 acres	25	Trace: <1%
326	Chenopodium album	3895416.485	453696.8703	0.25 acres	10	Trace: <1%
327	Linaria dalmatica	3892867.386	454195.1106	0.01 acres	21	Trace: <1%
328	Melilotus officinali	3892888.918	454207.7996	0.25 acres	7	Trace: <1%
329	Melilotus officinali	3892861.027	454248.7255	0.5 acres	26	Low: 1-5%
330	Verbascum thapsus	3892883.64	454279.8263	0.25 acres	4	Trace: <1%
331	Linaria dalmatica	3892894.595	454285.6393	0.25 acres	46	Trace: <1%
332	Linaria dalmatica	3892893.14	454315.7095	0.1 acres	6	Trace: <1%
333	Linaria dalmatica	3892933.173	454357.2081	0.1 acres	51	Trace: <1%
334	Linaria dalmatica	3892954.783	454306.7725	0.25 acres	18	Trace: <1%
335	Amaranthus retroflex	3892953.444	454294.9502	0.01 acres	21	Trace: <1%
336	Linaria dalmatica	3892933.188	454279.9949	1.0 acres	35	Mod: 6-25%
337	Linaria dalmatica	3892952.46	454261.4234	0.1 acres	12	Low: 1-5%
338	Linaria dalmatica	3892980.515	454266.9107	0.25 acres	8	Low: 1-5%
339	Linaria dalmatica	3892977.039	454288.7558	0.01 acres	32	Trace: <1%
340	Linaria dalmatica	3892931.614	454211.446	0.01 acres	6	Trace: <1%
341	Linaria dalmatica	3892909.775	454272.2079	0.01 acres	18	Trace: <1%
342	Portulaca oleracea	3892914.399	454282.781	0.01 acres	6	Trace: <1%
343	Linaria dalmatica	3892907.913	454295.1584	0.01 acres	46	Low: 1-5%
344	Linaria dalmatica	3892983.102	454307.2299	0.01 acres	12	Trace: <1%
345	Linaria dalmatica	3893002.721	454334.8604	0.01 acres	9	Trace: <1%
346	Linaria dalmatica	3893036.381	454367.9755	0.01 acres	22	Trace: <1%
347	Linaria dalmatica	3893015.78	454270.8725	0.01 acres	48	Trace: <1%
348	Linaria dalmatica	3893010.335	454258.9304	0.01 acres	68	Trace: <1%
349	Linaria dalmatica	3893031.593	454242.1347	0.01 acres	12	Trace: <1%
350	Verbascum thapsus	3893006.404	454239.5821	0.01 acres	4	Trace: <1%
351	Linaria dalmatica	3892991.838	454246.25	0.01 acres	2	Trace: <1%
352	Melilotus officinali	3892891.817	454201.6392	0.01 acres	6	Trace: <1%
353	Portulaca oleracea	3892833.777	454155.3713	0.5 acres	500	Low: 1-5%
354	Linaria dalmatica	3894431.039	454237.4952	0.1 acres	8	Trace: <1%
355	Verbascum thapsus	3894405.284	454256.4825	0.1 acres	22	Low: 1-5%
356	Linaria dalmatica	3894364.377	454272.5949	0.1 acres	18	Trace: <1%
357	Linaria dalmatica	3894329.549	454263.761	0.1 acres	59	Low: 1-5%
358	Linaria dalmatica	3894320.681	454268.2203	0.01 acres	46	Low: 1-5%
359	Verbascum thapsus	3894158.525	454234.6047	0.1 acres	43	Low: 1-5%
360	Verbascum thapsus	3894122.434	454280.2338	0.01 acres	2	Trace: <1%
361	Linaria dalmatica	3894127.886	454280.5736	0.01 acres	5	Trace: <1%
362	Portulaca oleracea	3894092.753	454292.6664	0.01 acres	200	Mod: 6-25%
363	Verbascum thapsus	3894086.963	454308.0005	0.1 acres	80	Majority: 51-100%
364	Linaria dalmatica	3894061.961	454435.3168	0.1 acres	6	Trace: <1%
365	Linaria dalmatica	3893889.878	454529.846	0.01 acres	72	Mod: 6-25%
366	Verbascum thapsus	3893786.641	454495.7798	0.1 acres	23	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
367	Linaria dalmatica	3893729.682	454513.3764	0.01 acres	5	Trace: <1%
368	Portulaca oleracea	3893739.677	454543.2151	0.01 acres	42	Trace: <1%
369	Linaria dalmatica	3893745.412	454542.2846	0.01 acres	28	Trace: <1%
370	Portulaca oleracea	3893743.057	454512.8099		300	Low: 1-5%
371	Linaria dalmatica	3893638.697	454525.8221	0.01 acres	17	Trace: <1%
372	Verbascum thapsus	3893637.271	454525.869	0.01 acres	2	Trace: <1%
373	Linaria dalmatica	3893649.33	454500.3723	0.01 acres	6	Trace: <1%
374	Verbascum thapsus	3893656.733	454470.7237	0.01 acres	21	Trace: <1%
375	Salsola tragus	3893816.689	454385.3365	0.01 acres	3	Trace: <1%
376	Chenopodium album	3895525.903	453291.1739	0.01 acres	5	Trace: <1%
377	Verbascum thapsus	3895525.814	453285.237	0.1 acres	12	Trace: <1%
378	Lactuca serriola	3895528.449	453284.0641	0.1 acres	6	Trace: <1%
379	Verbascum thapsus	3895482.746	453378.4731	0.01 acres	15	Trace: <1%
380	Portulaca oleracea	3895474.768	453379.5912	0.25 acres	500	Low: 1-5%
381	Verbascum thapsus	3895474.453	453383.1043	0.5 acres	58	Low: 1-5%
382	Chenopodium album	3895473.587	453383.062	0.25 acres	18	Trace: <1%
383	Tragopogon dubius	3895482.331	453383.4116	0.01 acres	5	Trace: <1%
384	Verbascum thapsus	3895482.363	453403.7717	0.25 acres	3	Trace: <1%
385	Linaria dalmatica	3895488.799	453408.5341	0.01 acres	5	Trace: <1%
386	Linaria dalmatica	3895455.352	453388.6788	0.1 acres	63	Trace: <1%
387	Linaria dalmatica	3895454.395	453376.7475	0.1 acres	59	Trace: <1%
388	Verbascum thapsus	3895422.237	453462.7288	0.01 acres	3	Trace: <1%
389	Linaria dalmatica	3895483.972	453500.8889	0.01 acres	6	Trace: <1%
390	Portulaca oleracea	3895409.711	453670.6227	0.1 acres	35	Low: 1-5%
391	Portulaca oleracea	3895379.077	453666.3393	0.01 acres	13	Trace: <1%
392	Verbascum thapsus	3895382.565	453754.3809	0.01 acres	3	Trace: <1%
393	Linaria dalmatica	3895459.938	453792.4879	0.01 acres	4	Trace: <1%
394	Verbascum thapsus	3895460.179	453791.526	0.01 acres	2	Trace: <1%
395	Marrubium vulgare	3895457.551	453804.7834	0.01 acres	5	Trace: <1%
396	Linaria dalmatica	3895449.447	453810.205	0.01 acres	16	Trace: <1%
397	Marrubium vulgare	3895445.853	453841.8822	0.01 acres	3	Trace: <1%
398	Salsola tragus	3895445.013	453846.1588	0.01 acres	3	Trace: <1%
399	Verbascum thapsus	3895451.65	453825.6972	0.01 acres	2	Trace: <1%
400	Verbascum thapsus	3895321.559	453599.2584	0.1 acres	62	Mod: 6-25%
401	Marrubium vulgare	3895320.439	453595.3509	0.01 acres	26	Trace: <1%
402	Linaria dalmatica	3895461.829	453360.3106	0.1 acres	0	Trace: <1%
403	Verbascum thapsus	3895461.85	453359.352	0.01 acres	6	Trace: <1%
404	Linaria dalmatica	3895252.909	453771.1183	0.01 acres	4	Trace: <1%
405	Verbascum thapsus	3895253.836	453769.5857	0.01 acres	8	Trace: <1%
406	Salsola tragus	3895247.937	453773.2177	0.25 acres	56	Low: 1-5%
407	Verbascum thapsus	3895329.381	453906.3686	0.01 acres	21	Trace: <1%
408	Linaria dalmatica	3895334.389	453913.4755	0.01 acres	44	Trace: <1%
409	Marrubium vulgare	3895335.233	453907.5249	0.01 acres	9	Trace: <1%
410	Verbascum thapsus	3895395.702	453920.3277	0.01 acres	2	Trace: <1%
411	Salsola tragus	3895397.016	453920.9452	0.25 acres	30	Trace: <1%
412	Verbascum thapsus	3895190.589	453962.8298	0.25 acres	24	Low: 1-5%
413	Linaria dalmatica	3895034.467	453940.7684	0.01 acres	16	Trace: <1%
414	Linaria dalmatica	3894953.865	453941.7477	0.01 acres	36	Trace: <1%
415	Verbascum thapsus	3894945.856	453943.4944	0.01 acres	9	Trace: <1%
416	Lactuca serriola	3894938.843	453944.6644	0.1 acres	10	Trace: <1%
417	Portulaca oleracea	3894942.517	453947.8946	0.1 acres	36	Low: 1-5%
418	Verbascum thapsus	3894933.707	453967.4525	0.01 acres	9	Trace: <1%
419	Portulaca oleracea	3894890.716	454073.8719	0.25 acres	560	Mod: 6-25%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
420	Linaria dalmatica	3894835.222	453969.2218	0.01 acres	4	Trace: <1%
421	Linaria dalmatica	3894796.673	454118.6281	0.25 acres	14	Trace: <1%
422	Linaria dalmatica	3894821.04	454106.0224	0.1 acres	64	Low: 1-5%
423	Linaria dalmatica	3894777.209	454080.5468	0.01 acres	17	Trace: <1%
424	Portulaca oleracea	3894773.293	454123.7134	0.25 acres	83	Low: 1-5%
425	Linaria dalmatica	3894737.595	454120.877	0.01 acres	31	Trace: <1%
426	Portulaca oleracea	3894720.371	454109.5004	0.25 acres	53	Low: 1-5%
427	Linaria dalmatica	3894679.941	454089.3274	0.01 acres	155	Trace: <1%
428	Linaria dalmatica	3894670.468	454090.939	0.25 acres	0	Low: 1-5%
429	Salsola tragus	3894671.777	454118.2246	0.25 acres	50	Mod: 6-25%
430	Linaria dalmatica	3894630.196	454108.1952	0.01 acres	16	Trace: <1%
431	Linaria dalmatica	3894633.408	454092.3209	0.25 acres	153	Low: 1-5%
432	Verbascum thapsus	3894612.502	454074.1229	0.1 acres	13	Trace: <1%
433	Linaria dalmatica	3894615.085	454051.6645	0.1 acres	89	Low: 1-5%
434	Verbascum thapsus	3894684.22	454073.4635	0.1 acres	58	Mod: 6-25%
435	Marrubium vulgare	3894701.172	454062.2388	0.25 acres	26	Low: 1-5%
436	Linaria dalmatica	3894650.262	454014.3161	0.01 acres	9	Trace: <1%
437	Verbascum thapsus	3894568.699	454056.0614	0.1 acres	36	Low: 1-5%
438	Portulaca oleracea	3894567.718	454056.1787	0.1 acres	40	Trace: <1%
439	Verbascum thapsus	3894554.674	454075.3477	0.1 acres	29	Trace: <1%
440	Linaria dalmatica	3894579.624	454172.8445	0.01 acres	19	Trace: <1%
441	Verbascum thapsus	3894457.119	454203.4639	0.1 acres	23	Trace: <1%
442	Linaria dalmatica	3894444.008	454160.4466	0.01 acres	16	Trace: <1%
443	Verbascum thapsus	3894439.112	454156.6662	0.1 acres	11	Trace: <1%
444	Linaria dalmatica	3894452.826	454147.0499	0.1 acres	38	Trace: <1%
445	Verbascum thapsus	3894454.234	454150.6405	0.1 acres	8	Trace: <1%
446	Marrubium vulgare	3894457.882	454156.7979	0.01 acres	9	Trace: <1%
447	Verbascum thapsus	3894428.463	454176.3029	0.1 acres	5	Trace: <1%
448	Portulaca oleracea	3894400.36	454106.8727	0.01 acres	13	Trace: <1%
449	Linaria dalmatica	3894509.615	454055.8679	0.01 acres	3	Trace: <1%
450	Linaria dalmatica	3894526.186	454050.5424	0.01 acres	16	Trace: <1%
451	Linaria dalmatica	3894569.666	454034.4927	0.01 acres	48	Low: 1-5%
452	Verbascum thapsus	3894570.887	454035.3711	0.01 acres	4	Trace: <1%
453	Linaria dalmatica	3894595.857	454030.617	0.01 acres	45	Trace: <1%
454	Verbascum thapsus	3894597.829	454028.7085	0.01 acres	8	Trace: <1%
455	Linaria dalmatica	3893560.329	454394.1314	0.01 acres	8	Trace: <1%
456	Verbascum thapsus	3893564.259	454399.9459	0.01 acres	7	Trace: <1%
457	Portulaca oleracea	3893736.282	454410.1882	0.1 acres	500	Low: 1-5%
458	Linaria dalmatica	3893744.851	454451.0058	0.01 acres	5	Trace: <1%
459	Portulaca oleracea	3893640.15	454533.8629	0.1 acres	235	Trace: <1%
460	Portulaca oleracea	3893680.73	454547.3982	0.25 acres	354	Trace: <1%
461	Verbascum thapsus	3893710.601	454527.2736	0.25 acres	37	Trace: <1%
462	Linaria dalmatica	3893638.254	454505.0187	0.25 acres	6	Trace: <1%
463	Linaria dalmatica	3893608.325	454504.3701	0.01 acres	8	Trace: <1%
464	Marrubium vulgare	3893606.06	454517.5974	0.01 acres	3	Trace: <1%
465	Portulaca oleracea	3893595.325	454532.8241	0.1 acres	26	Trace: <1%
466	Verbascum thapsus	3893523.178	454437.2768	0.1 acres	18	Low: 1-5%
467	Verbascum thapsus	3893525.57	454502.8795	0.01 acres	2	Trace: <1%
468	Salsola tragus	3893507.8	454524.495	0.1 acres	3	Trace: <1%
469	Verbascum thapsus	3893466.628	454474.9284	0.01 acres	15	Trace: <1%
470	Verbascum thapsus	3893420.562	454447.0015	0.1 acres	37	Low: 1-5%
471	Marrubium vulgare	3893423.915	454454.9689	0.1 acres	46	Low: 1-5%
472	Linaria dalmatica	3893468.457	454408.0918	0.1 acres	49	Low: 1-5%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
473	Portulaca oleracea	3893500.88	454381.884	0.1 acres	65	Low: 1-5%
474	Linaria dalmatica	3893427.642	454380.1476		39	Low: 1-5%
475	Verbascum thapsus	3893406.974	454415.6694	0.1 acres	4	Trace: <1%
476	Linaria dalmatica	3893351.841	454443.5544	0.01 acres	56	Trace: <1%
477	Linaria dalmatica	3893336.252	454327.0201	0.01 acres	3	Trace: <1%
478	Verbascum thapsus	3893432.73	454357.5728	0.01 acres	3	Trace: <1%
479	Verbascum thapsus	3893444.848	454361.6924	0.01 acres	17	Trace: <1%
480	Portulaca oleracea	3893084.961	454316.7251	0.1 acres	148	Low: 1-5%
481	Verbascum thapsus	3893099.842	454340.1284	0.01 acres	2	Trace: <1%
482	Verbascum thapsus	3893117.402	454378.654	0.01 acres	14	Trace: <1%
483	Linaria dalmatica	3893160.522	454403.8177	0.01 acres	85	Low: 1-5%
484	Linaria dalmatica	3893172.705	454384.9634	0.01 acres	48	Trace: <1%
485	Verbascum thapsus	3893205.999	454290.1336	0.01 acres	3	Trace: <1%
486	Linaria dalmatica	3893302.871	454463.5907	0.01 acres	8	Trace: <1%
487	Linaria dalmatica	3893304.827	454336.0684	0.01 acres	55	Trace: <1%
488	Linaria dalmatica	3893340.862	454381.1992	0.01 acres	16	Trace: <1%
489	Verbascum thapsus	3893405.469	454431.7071	0.01 acres	5	Trace: <1%
490	Portulaca oleracea	3893126.483	454346.342	0.25 acres	456	Mod: 6-25%
491	Verbascum thapsus	3892625.532	458147.443	0.01 acres	14	Trace: <1%
492	Sisymbrium altissimu	3892627.245	458211.9132	0.01 acres	4	Trace: <1%
493	Portulaca oleracea	3892640.625	458267.7243	0.25 acres	53	Low: 1-5%
494	Verbascum thapsus	3892601.474	458407.8265	0.01 acres	7	Trace: <1%
495	Linaria dalmatica	3892592.708	458445.9337	0.01 acres	16	Low: 1-5%
496	Linaria dalmatica	3892631.332	458611.3462	0.01 acres	3	Trace: <1%
497	Verbascum thapsus	3892705.577	458671.8526	0.5 acres	56	Low: 1-5%
498	Verbascum thapsus	3892885.449	458796.4794	0.1 acres	26	Low: 1-5%
499	Verbascum thapsus	3892828.815	459105.5441	1.0 acres	153	Low: 1-5%
500	Verbascum thapsus	3892838.737	459171.7713	0.25 acres	23	Trace: <1%
501	Marrubium vulgare	3892884.917	459246.8238	0.01 acres	25	Trace: <1%
502	Verbascum thapsus	3893098.799	459350.8138	0.5 acres	28	Low: 1-5%
503	Marrubium vulgare	3893205.276	459257.2101	0.1 acres	10	Trace: <1%
504	Marrubium vulgare	3893175.274	459275.831	0.25 acres	100	Mod: 6-25%
505	Portulaca oleracea	3892882.668	459114.9114	0.5 acres	200	Low: 1-5%
506	Verbascum thapsus	3892937.509	458977.1274	0.25 acres	25	Low: 1-5%
507	Verbascum thapsus	3892896.328	458792.4291	0.1 acres	18	Low: 1-5%
508	Verbascum thapsus	3892844.244	458742.8155	0.1 acres	12	Low: 1-5%
509	Onopordum acanthium	3892381.514	455619.752	0.01 acres	7	Trace: <1%
510	Onopordum acanthium	3891771.636	455859.3274	0.1 acres	42	Low: 1-5%
511	Linaria dalmatica	3891552.764	455948.8916	0.01 acres	62	Trace: <1%
512	Verbascum thapsus	3891518.578	455928.8888	0.01 acres	22	Low: 1-5%
513	Verbascum thapsus	3891396.864	456049.5933	1.0 acres	100	Low: 1-5%
514	Verbascum thapsus	3891162.356	456183.6163	0.1 acres	110	Trace: <1%
515	Verbascum thapsus	3891277.86	456187.9775	1.0 acres	11	Trace: <1%
516	Verbascum thapsus	3891364.734	456382.0809	0.01 acres	6	Trace: <1%
517	Linaria dalmatica	3891548.417	456670.2314	0.1 acres	48	Low: 1-5%
518	Verbascum thapsus	3891677.749	456785.3348	0.1 acres	36	Trace: <1%
519	Melilotus alba	3891755.269	456824.9863	0.01 acres	5	Trace: <1%
520	Verbascum thapsus	3891902.746	457021.4018	0.01 acres	8	Trace: <1%
521	Linaria dalmatica	3892550.395	454211.2534	0.1 acres	68	Low: 1-5%
522	Linaria dalmatica	3892541.595	454216.2729	0.1 acres	83	Mod: 6-25%
523	Linaria dalmatica	3892533.132	454239.7939	0.25 acres	53	Mod: 6-25%
524	Linaria dalmatica	3892737.022	454172.0992	0.1 acres	21	Low: 1-5%
525	Salsola tragus	3892772.977	454168.9777	0.1 acres	28	Low: 1-5%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
526	Portulaca oleracea	3892780.393	454184.0729	0.1 acres	43	Low: 1-5%
527	Linaria dalmatica	3892790.805	454210.3996	0.01 acres	25	Trace: <1%
528	Linaria dalmatica	3892826.405	454260.2652	0.01 acres	91	Low: 1-5%
529	Verbascum thapsus	3892455.838	454194.7809	0.1 acres	17	Low: 1-5%
530	Verbascum thapsus	3892455.218	454179.8905	0.01 acres	8	Low: 1-5%
531	Linaria dalmatica	3892334.941	454271.4587	0.1 acres	15	Trace: <1%
532	Linaria dalmatica	3892129.838	454166.6764	0.01 acres	3	Trace: <1%
533	Verbascum thapsus	3892256.554	454108.3565	0.01 acres	5	Trace: <1%
534	Verbascum thapsus	3892322.197	453610.3798	0.01 acres	5	Low: 1-5%
535	Linaria dalmatica	3892458.667	453449.9853	0.1 acres	14	Trace: <1%
536	Cirsium vulgare	3892799.558	453096.5411	0.01 acres	48	Low: 1-5%
537	Linaria dalmatica	3892599.464	452687.8205	0.1 acres	26	Trace: <1%
538	Linaria dalmatica	3892783.023	452900.8693	0.1 acres	121	Trace: <1%
539	Linaria dalmatica	3892801.856	452963.3805	0.01 acres	129	Trace: <1%
540	Lactuca serriola	3892485.761	453701.0597	0.01 acres	1	Trace: <1%
541	Verbascum thapsus	3892519.155	453681.044	0.01 acres	2	Trace: <1%
542	Linaria dalmatica	3892695.267	453730.9344	0.01 acres	1	Trace: <1%
543	Verbascum thapsus	3892692.731	453735.6899	0.01 acres	4	Trace: <1%
544	Marrubium vulgare	3892692.171	453735.7844	0.01 acres	2	Trace: <1%
545	Linaria dalmatica	3892736.484	453797.667	0.01 acres	1	Trace: <1%
546	Verbascum thapsus	3892741.801	453830.0906	0.01 acres	2	Trace: <1%
547	Linaria dalmatica	3892736.28	453879.9261	0.01 acres	16	Trace: <1%
548	Verbascum thapsus	3892744.476	453864.6831	0.01 acres	4	Trace: <1%
549	Linaria dalmatica	3892750.576	453862.4085	0.01 acres	3	Trace: <1%
550	Tragopogon dubius	3892737.763	453857.1144	0.01 acres	2	Trace: <1%
551	Verbascum thapsus	3892810.825	453842.8967	0.01 acres	1	Trace: <1%
552	Linaria dalmatica	3892741.093	453883.7775	0.01 acres	4	Trace: <1%
553	Linaria dalmatica	3892718.172	453876.5086	0.01 acres	12	Trace: <1%
554	Tragopogon dubius	3892707.388	453876.5525	0.01 acres	1	Trace: <1%
555	Linaria dalmatica	3892685.783	453883.2681	0.01 acres	1	Trace: <1%
556	Linaria dalmatica	3892679.559	453878.0367	0.01 acres	1	Trace: <1%
557	Amaranthus retroflex	3892695.022	453737.9627	0.01 acres	20	Trace: <1%
558	Portulaca oleracea	3892693.51	453739.2085	0.01 acres	15	Trace: <1%
559	Verbascum thapsus	3892551.035	453638.3972	0.01 acres	32	Trace: <1%
560	Verbascum thapsus	3892538.109	453641.9211	0.01 acres	17	Trace: <1%
561	Melilotus alba	3892536.862	453638.5939	0.01 acres	2	Trace: <1%
562	Linaria dalmatica	3892533.368	453627.7605	0.01 acres	6	Trace: <1%
563	Linaria dalmatica	3892808.85	453560.096	0.01 acres	1	Trace: <1%
564	Linaria dalmatica	3892734.505	453565.6	0.01 acres	1	Trace: <1%
565	Verbascum thapsus	3892805.609	453283.6193	0.01 acres	2	Trace: <1%
566	Verbascum thapsus	3894334.859	454169.1059	0.01 acres	1	Trace: <1%
567	Portulaca oleracea	3894334.955	454185.3469	0.01 acres	2	Trace: <1%
568	Linaria dalmatica	3894291.406	454154.715	0.01 acres	11	Trace: <1%
569	Melilotus officinali	3894284.927	454155.9282	0.01 acres	2	Trace: <1%
570	Verbascum thapsus	3894284.881	454158.261	0.01 acres	1	Trace: <1%
571	Portulaca oleracea	3894272.168	454163.1971	0.01 acres	4	Trace: <1%
572	Verbascum thapsus	3894270.538	454165.347	0.01 acres	5	Trace: <1%
573	Verbascum thapsus	3894266.466	454168.0622	0.01 acres	2	Trace: <1%
574	Portulaca oleracea	3894265.97	454166.2426	0.01 acres	0	Trace: <1%
575	Verbascum thapsus	3894242.481	454182.945	0.01 acres	47	Trace: <1%
576	Linaria dalmatica	3894245.157	454179.3648	0.01 acres	5	Trace: <1%
577	Verbascum thapsus	3894229.112	454186.1516	0.01 acres	13	Trace: <1%
578	Verbascum thapsus	3894217.478	454194.0505	0.01 acres	11	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size	Density	Cover
579	Verbascum thapsus	3894069.839	454282.2206	0.01 acres	2	Trace: <1%
580	Linaria dalmatica	3894070.654	454282.3529	0.01 acres	1	Trace: <1%
581	Linaria dalmatica	3894044.531	454296.8404	0.01 acres	15	Trace: <1%
582	Verbascum thapsus	3894024.365	454305.9971	0.01 acres	1	Trace: <1%
583	Portulaca oleracea	3893872.094	454407.7044	0.01 acres	100	Low: 1-5%
584	Verbascum thapsus	3893840.369	454382.5218	0.01 acres	3	Trace: <1%
585	Verbascum thapsus	3893813.265	454389.9125	0.01 acres	0	Trace: <1%
586	Verbascum thapsus	3893806.219	454389.2404	0.01 acres	18	Trace: <1%
587	Verbascum thapsus	3893794.433	454390.0897	0.01 acres	3	Trace: <1%
588	Chenopodium album	3893778.231	454429.2202	0.01 acres	6	Trace: <1%
589	Verbascum thapsus	3893708.052	454402.3345	0.01 acres	1	Trace: <1%
590	Chenopodium album	3893709.467	454401.3442	0.01 acres	1	Trace: <1%
591	Chenopodium album	3893681.218	454426.049	0.01 acres	100	Trace: <1%
592	Linaria dalmatica	3893656.55	454460.8398	0.01 acres	2	Trace: <1%
593	Verbascum thapsus	3893654.961	454466.5216	0.01 acres	4	Trace: <1%
594	Portulaca oleracea	3893602.026	454395.6951	0.01 acres	100	Low: 1-5%
595	Verbascum thapsus	3893599.656	454393.6232	0.01 acres	3	Trace: <1%
596	Verbascum thapsus	3893565.401	454407.9817	0.01 acres	75	Trace: <1%
597	Linaria dalmatica	3893563.3	454410.0592	0.01 acres	21	Trace: <1%
598	Verbascum thapsus	3893512.306	454376.4974	0.01 acres	1	Trace: <1%
599	Chenopodium album	3893507.738	454381.366	0.01 acres	11	Trace: <1%
600	Lactuca serriola	3892196.687	453707.6494	0.01 acres	1	Trace: <1%
601	Linaria dalmatica	3892201.433	453726.8524	0.01 acres	12	Trace: <1%
602	Verbascum thapsus	3892123.749	454032.7249	0.01 acres	1	Trace: <1%
603	Linaria dalmatica	3892382.57	453998.9886	0.01 acres	1	Trace: <1%
604	Verbascum thapsus	3892102.611	453939.9909	0.01 acres	2	Trace: <1%
605	Linaria dalmatica	3892137.024	453964.1928	0.01 acres	70	Low: 1-5%
606	Verbascum thapsus	3892087.567	453915.0181	0.01 acres	100	Trace: <1%
607	Verbascum thapsus	3892123.345	453921.1885	0.01 acres	17	Low: 1-5%
608	Marrubium vulgare	3892129.704	453912.6061	0.01 acres	50	Trace: <1%
609	Verbascum thapsus	3892138.753	453928.5848	0.01 acres	1	Trace: <1%
610	Linaria dalmatica	3892359.084	453944.6321	0.01 acres	1	Trace: <1%
611	Verbascum thapsus	3892384.953	453947.7453	0.01 acres	1	Trace: <1%
612	Linaria dalmatica	3892423.204	453941.7798	0.01 acres	1	Trace: <1%
613	Lactuca serriola	3892225.5	453809.6171	0.01 acres	1	Trace: <1%
614	Tragopogon dubius	3892197.368	453770.3013	0.01 acres	3	Trace: <1%
615	Verbascum thapsus	3892357.191	453680.4115	0.01 acres	75	Low: 1-5%
616	Verbascum thapsus	3892316.345	453608.7315	0.01 acres	50	Trace: <1%
617	Verbascum thapsus	3892162.715	453622.8293	0.01 acres	4	Trace: <1%
618	Bromus tectorum	3892031.374	453586.3941	0.01 acres	200	Trace: <1%
619	Verbascum thapsus	3891895.066	453571.28	0.1 acres	8	Trace: <1%
620	Verbascum thapsus	3891887.198	453573.3378	0.01 acres	7	Trace: <1%
621	Taraxacum officinale	3891870.897	453586.5118	0.01 acres	3	Trace: <1%
622	Bromus tectorum	3891868.447	453595.5787	0.1 acres	200	Low: 1-5%
623	Marrubium vulgare	3891812.683	453600.9572	0.01 acres	4	Trace: <1%
624	Bromus tectorum	3891814.224	453514.5077	0.01 acres	200	Trace: <1%
625	Bromus diandrus	3891823.384	453493.0534	0.01 acres	12	Trace: <1%
626	Bromus diandrus	3891842.25	453475.2162	0.01 acres	23	Trace: <1%
627	Marrubium vulgare	3891867.17	453459.151	0.01 acres	20	Low: 1-5%
628	Bromus diandrus	3891914.57	453461.8874	0.01 acres	20	Trace: <1%
629	Bromus diandrus	3891957.068	453516.46	0.01 acres	4	Trace: <1%
630	Bromus diandrus	3891993.01	453526.8084	0.01 acres	15	Trace: <1%
631	Bromus rubens	3892152.615	453630.158	0.01 acres	4	Trace: <1%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size (Acres)	Density	Cover
632	Amaranthus retroflex	3892511.044	453965.2527	0.1 acres	89	Mod: 6-25%
633	Verbascum thapsus	3892505.273	454001.4511	0.1 acres	17	Trace: <1%
634	Linaria dalmatica	3892497.318	454000.4494	0.01 acres	18	Trace: <1%
635	Verbascum thapsus	3892531.699	453966.5095	0.01 acres	2	Trace: <1%
636	Verbascum thapsus	3892607.241	454047.1852	0.1 acres	9	Trace: <1%
637	Linaria dalmatica	3892650.914	453997.6246	0.01 acres	2	Trace: <1%
638	Linaria dalmatica	3892682.703	454110.6916	0.01 acres	5	Trace: <1%
639	Verbascum thapsus	3892816.475	454135.4887	0.01 acres	2	Trace: <1%
640	Verbascum thapsus	3892797.141	454155.1528	0.01 acres	6	Trace: <1%
641	Linaria dalmatica	3892831.799	454006.8437	0.01 acres	37	Trace: <1%
642	Linaria dalmatica	3892767.547	453942.2611	0.1 acres	187	Low: 1-5%
643	Lactuca serriola	3892695.043	453940.9628	0.01 acres	3	Trace: <1%
644	Linaria dalmatica	3892718.057	453918.9774	0.01 acres	34	Trace: <1%
645	Linaria dalmatica	3892822.702	453699.1561	0.1 acres	104	Low: 1-5%
646	Taraxacum officinale	3892666.204	453624.1253	0.01 acres	9	Trace: <1%
647	Melilotus officinali	3892575.868	453614.8354	0.1 acres	8	Low: 1-5%
648	Marrubium vulgare	3892563.286	453606.1353	0.1 acres	200	High: 26-50 %
649	Verbascum thapsus	3892498.7	453580.923	0.01 acres	28	Trace: <1%
650	Linaria dalmatica	3892514.68	453426.59	0.1 acres	34	Trace: <1%
651	Verbascum thapsus	3892557.879	453355.7267	0.01 acres	3	Trace: <1%
652	Verbascum thapsus	3892704.217	453302.263	0.25 acres	8	Trace: <1%
653	Linaria dalmatica	3892641.471	453348.8853	0.01 acres	72	Low: 1-5%
654	Centaurea diffusa	3892817.606	453850.1565	0.01 acres	5	Trace: <1%
655	Linaria dalmatica	3893469.066	454312.6578	0.02	125	Low: 1-5%
656	Linaria dalmatica	3894260.894	454085.7915	0.35	100	Mod: 6-25%
657	Linaria dalmatica	3894544.575	453878.4538	0.03	200	Mod: 6-25%
658	Verbascum thapsus	3894490.127	453893.1604	0.03	100	Mod: 6-25%
659	Portulaca oleracea	3894365.541	454019.832	0.02	500	Low: 1-5%
660	Marrubium vulgare	3894445.537	453910.4439	0.11	1000	Majority: 51-100%
661	Linaria dalmatica	3894482.925	453934.4039	0.11	100	Mod: 6-25%
662	Verbascum thapsus	3894590.744	453911.0453	0.13	100	Mod: 6-25%
663	Linaria dalmatica	3894643.402	453974.4526	0.10	0	Mod: 6-25%
664	Linaria dalmatica	3894593.23	453875.7201	0.17	100	High: 26-50 %
665	Portulaca oleracea	3895310.163	453502.9922	0.00	1000	High: 26-50 %
666	Marrubium vulgare	3895758.588	452961.8426	0.01	43	Mod: 6-25%
667	Linaria dalmatica	3895771.029	452953.6357	0.13	300	Low: 1-5%
668	Portulaca oleracea	3894789.176	453917.1025	0.03	2000	High: 26-50 %
669	Portulaca oleracea	3894758.215	453866.0928	0.04	1000	High: 26-50 %
670	Chenopodium album	3894871.174	453897.253	0.06	30	Low: 1-5%
671	Convolvulus arvensis	3895025.036	453877.0384	0.09	1000	Mod: 6-25%
672	Portulaca oleracea	3894906.404	453828.3138	0.15	0	Mod: 6-25%
673	Portulaca oleracea	3895062.134	453867.6424	0.02	0	Mod: 6-25%
674	Verbascum thapsus	3895219.949	453601.0216	0.15	1000	Majority: 51-100%
675	Portulaca oleracea	3895262.47	453581.2754	0.13	1000	High: 26-50 %
676	Verbascum thapsus	3895321.416	453596.5098	0.04	0	High: 26-50 %
677	Verbascum thapsus	3895236.998	453558.2948	0.08	1000	High: 26-50 %
678	Verbascum thapsus	3895308.386	453711.576	0.08	1000	Majority: 51-100%
679	Melilotus alba	3896146.687	452944.4584	0.37	1000	High: 26-50 %
680	Melilotus officinali	3896170.745	452919.3344	0.12	1000	Mod: 6-25%
681	Melilotus alba	3896069.38	452940.7288	0.10	86	Low: 1-5%
682	Verbascum thapsus	3895842.819	453065.1971	0.01	100	Majority: 51-100%
683	Linaria dalmatica	3895831.702	453051.6816	0.03	100	Mod: 6-25%
684	Verbascum thapsus	3895793.881	453158.2325	0.06	200	High: 26-50 %

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size (Acres)	Density	Cover
685	Melilotus alba	3895782.971	453066.1718	0.13	86	Mod: 6-25%
686	Linaria dalmatica	3895724.357	453132.633	0.06	78	Mod: 6-25%
687	Linaria dalmatica	3896145.771	453082.3293	0.05	110	Mod: 6-25%
688	Verbascum thapsus	3896048.817	453007.459	0.08	220	Low: 1-5%
689	Portulaca oleracea	3895490.394	453521.8714	0.02	500	Mod: 6-25%
690	Portulaca oleracea	3895414.824	453731.317	0.16	2000	Mod: 6-25%
691	Portulaca oleracea	3895453.964	453798.2558	0.04	2000	Majority: 51-100%
692	Verbascum thapsus	3892897.777	454355.1586	0.01	42	Mod: 6-25%
693	Linaria dalmatica	3892932.441	454276.6158	0.00	200	Mod: 6-25%
694	Linaria dalmatica	3893035.628	454313.5666	0.01	92	Mod: 6-25%
695	Marrubium vulgare	3894392.221	454253.478	0.05	43	Mod: 6-25%
696	Verbascum thapsus	3894342.628	454269.4068	0.05	123	Mod: 6-25%
697	Verbascum thapsus	3894089.866	454314.0869	0.01	159	Mod: 6-25%
698	Verbascum thapsus	3894014.742	454388.0714	0.06	160	Mod: 6-25%
699	Verbascum thapsus	3894034.247	454434.2102	0.05	143	Mod: 6-25%
700	Verbascum thapsus	3894061.025	454435.699	0.03	76	High: 26-50 %
701	Verbascum thapsus	3894133.668	454431.2669	0.14	1000	Mod: 6-25%
702	Verbascum thapsus	3893984.231	454479.3802	0.01	45	Low: 1-5%
703	Verbascum thapsus	3893888.2	454512.8747	0.12	400	High: 26-50 %
704	Verbascum thapsus	3895463.325	453391.2725	0.02	51	Mod: 6-25%
705	Portulaca oleracea	3895444.214	453838.7211	0.02	150	Mod: 6-25%
706	Portulaca oleracea	3895405.277	453915.0124	0.19	2000	High: 26-50 %
707	Portulaca oleracea	3895385.737	453954.9509	0.16	1000	High: 26-50 %
708	Marrubium vulgare	3894917.211	454092.7142	0.06	43	Mod: 6-25%
709	Linaria dalmatica	3894691.403	454116.3789	0.28	100	Mod: 6-25%
710	Marrubium vulgare	3894631.109	454146.0981	0.14	62	Mod: 6-25%
711	Portulaca oleracea	3894572.312	454172.4202	0.11	60	Low: 1-5%
712	Marrubium vulgare	3893525.39	454445.6355	0.09	54	Mod: 6-25%
713	Verbascum thapsus	3893556.817	454417.0674	0.06	68	Mod: 6-25%
714	Linaria dalmatica	3893563.573	454522.1487	0.31	0	Mod: 6-25%
715	Verbascum thapsus	3893447.076	454380.741	0.04	124	Mod: 6-25%
716	Onopordum acanthium	3893197.726	459243.7657	0.03	23	Low: 1-5%
717	Verbascum thapsus	3892559.951	454195.3271	0.04	73	Mod: 6-25%
718	Linaria dalmatica	3892537.246	454231.5471	0.22	200	Mod: 6-25%
719	Verbascum thapsus	3892479.045	454215.6656	0.01	42	Low: 1-5%
720	Verbascum thapsus	3892482.919	454135.272	0.41	51	Mod: 6-25%
721	Linaria dalmatica	3892420.982	454224.8726	0.02	68	Mod: 6-25%
722	Linaria dalmatica	3892250.19	454274.7134	0.00	426	Mod: 6-25%
723	Lactuca serriola	3892233.398	453602.7748	0.01	5	Low: 1-5%
724	Portulaca oleracea	3892276.153	453569.8925	0.01	1000	High: 26-50 %
725	Verbascum thapsus	3892520.658	453287.0044	0.28	93	Mod: 6-25%
726	Verbascum thapsus	3892494.304	453370.471	0.07	29	Low: 1-5%
727	Verbascum thapsus	3892388.474	453516.7929	0.21	42	Low: 1-5%
728	Verbascum thapsus	3892791.779	453105.5723	0.01	28	Low: 1-5%
729	Linaria dalmatica	3892536.931	452773.1553	0.00	245	Low: 1-5%
730	Salsola tragus	3892730.642	453803.9224	0.05	100	High: 26-50 %
731	Linaria dalmatica	3892751.894	453835.2408	0.12	100	Mod: 6-25%
732	Linaria dalmatica	3892787.966	453264.0336	0.03	200	Low: 1-5%
733	Verbascum thapsus	3894257.911	454231.985	0.07	100	Low: 1-5%
734	Verbascum thapsus	3894082.229	454282.3673	0.06	100	Low: 1-5%
735	Linaria dalmatica	3892374.579	453986.4228	0.11	200	Mod: 6-25%
736	Linaria dalmatica	3892322.826	453989.5467	0.02	300	High: 26-50 %
737	Verbascum thapsus	3892098.35	453952.2345	0.08	200	Low: 1-5%

Appendix 2 (cont.): Walnut Canyon National Monument Exotic Plant Inventory and Mapping Results Database

ID #	Species	Northing	Easting	Size (Acres)	Density	Cover
738	Verbascum thapsus	3892194.451	453884.2973	0.09	200	Mod: 6-25%
739	Linaria dalmatica	3892214.702	453889.9173	0.08	200	Mod: 6-25%
740	Verbascum thapsus	3892229.91	453865.4102	0.06	200	Mod: 6-25%
741	Lactuca serriola	3892302.003	453903.8556	0.01	100	Low: 1-5%
742	Verbascum thapsus	3892338.044	453942.5986	0.03	100	Mod: 6-25%
743	Portulaca oleracea	3892449.093	453726.1955	0.03	1000	High: 26-50 %
744	Portulaca oleracea	3892513.375	453893.3133	0.01	1000	High: 26-50 %
745	Portulaca oleracea	3892683.822	454065.6023	0.01	500	Mod: 6-25%
746	Marrubium vulgare	3891804.207	453540.1928			Line Attribute