Five-Year Invasive Plant Management Plan for the Central Reserve of the Nature Reserve of Orange County and Adjacent Lands

Report for the Natural Communities Coalition, 2019

www.calflora.net/recentfieldtrips/whitingranch09.html

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Note: In addition to this report, see GIS geodatabase provided.

CONTENTS

EXECUTIVE SUMMARY

This 5-year Invasive Plant Management Plan (Plan) lays out an approach for effectively controlling invasive plants in the Central Reserve portion of Orange County's Central/Coastal NCCP/HCP Reserve. The plan is designed to provide land managers with guidance on setting priorities and goals for invasive plant management and tracking progress toward meeting goals. It is based on the overall conceptual framework for invasive plant management—including early detection and rapid response (EDRR)—laid out in the prior management plan developed for the Coastal Reserve. The plan includes recommendations for annual management strategy, a proactive EDRR approach, and protocol of tracking and reporting progress. This document is complemented by an associated GIS dataset which provides spatial and other details for all known invasive plant locations.

We developed the Plan in coordination with NCC and the Core Management Team (CMT), comprising Jutta Burger of Irvine Ranch Conservancy (now with Cal-IPC), Jennifer Naegele of Orange County Parks, and Lana Nguyen of California State Parks. This involved prioritization of both invasive plant species and geographic areas.

For this management plan we consider not just the lands that are officially within the NCCP. We consider the full watersheds within which they lie because effective invasive plant management requires a landscape-level approach. We refer to the overall natural lands region comprising these watersheds as the Central Reserve Management Area (CRMA). The lands in the CRMA are owned by, and managed by, a range of entities. We broke the reserve into 11 Invasive Plant Management Units (IPMUs) and identified core areas (interior areas less impacted by invasive plants) and investment areas (areas where significant invasive plant management has been performed in the past). We used GIS to analyze how much of each invasive plant is in each Management Unit, and how much is the responsibility of each management entity.

There are 41 top-tier invasive plant species found in the CRMA. We compiled data on all known populations of these plants as of 2017 — totaling nearly 5,000 — in the reserve. The net area covered by these populations totals 120 net acres, found over 1,789 gross acres. The geodatabase serves as a baseline for the Plan does not include any observations made since 2017, including EDRR surveys conducted in 2018.

Using net area (the total amount of an invasive plant present), gross area (the total area over which the invasive plant is spread out over), the number of populations, and the number of times per year that a given invasive plant species needs to be controlled we estimate the amount of staff time required. We calculated current needs at 1,000 person-days per year to control all top-tier invasive plant populations on the CRMA, with 70% of this spent implementing on-the-ground control activities and 30% spent on oversight. Control of additional lower-tier plants would take an additional 6,000 person-days. As weed populations are eradicated over time this need could decrease, but factors such as recreation, fire and other disturbances are likely to continue introducing and spreading invasive plants.

For EDRR, we specify the most vulnerable locations, roads and trails to survey each year in order to catch any new introduction that spread quickly. We also describe the type of response capability needed to eliminate these new threats once they are found. We estimate an additional 36 person-days per year to survey all EDRR locations, plus additional time to respond to new finds.

Tracking management actions requires attention on a day to day basis, and we specify what this should include. Because multiple management entities are cooperating on management over the CRMA, it is essential that data be compiled in a shared system so that tracking and reporting can be done across entire Management Units and the entire reserve. Annual reporting and analysis are critical to gauge the progress being made and to adjust management approaches for improved effectiveness. We describe metrics that can be used by land managers and governing decision makers.

Partnership is the key to success in managing a complicated landscape like the CRMA. To make sure that the core managers—primarily Orange County Parks and Irvine Ranch Conservancy—are on the same page with management strategies, we recommend that NCC and the CMT work together to set an annual work plan each year based on the priorities in this document. Though the area managed by other entities is small by comparison, full local eradication will require coordination with them as well.

Land managers should communicate about any new invasive plant species detected in the region to ensure that management recommendations are shared with partners across the broader region. The Orange County Chapter of the California Native Plant Society is a valuable ally in this work. We recommend that the CMT conduct annual trainings to help field staff identify target species and prevent the inadvertent spread of invasive plants. Regional collaboration with other land management entities is important for controlling invasive plants before they spread to the reserve. Across the state, Weed Management Areas (WMAs) are the structure for such regional collaboration. CMT partners should engage actively in the existing Santa Ana River/Orange County WMA or develop a new WMA geography that better serves their needs.

To summarize, our recommendations for NCC and the CMT are:

1. Prepare and implement a management plan based on the criteria in this report.
2. Each year implement EDRR surveys based on the criteria in this report.
3. Use Calflora as a shared database for mapping and tracking invasive plant populations.
4. Conduct prevention trainings each year.
5. Prepare a simple annual report documenting progress made toward stated goals.
6. Consider a reserve-wide helicopter survey every 5 years to check progress at a broad scale.
7. Collaborate with regional partners through active participation in a Weed Management Area.

Details for each of these are described in the report.

In a separate analysis, we are comparing changes in weed distribution on the CRMA from 2011 to distribution in 2016/2017 based on helicopter surveys done in these time periods. This will help assess how useful such surveys can be for providing an overview of landscape-level progress.

1. MANAGEMENT FRAMEWORK

This Plan updates the strategic approach to invasive plant management in the NCCP/HCP Coastal Reserve. The goal is to provide guidance for making the best investments in preventing native habitat degradation caused by the colonization and spread of invasive plants. The strategy includes ongoing management work (detailed in the Annual Management Plan) and a strengthened focus on proactive early detection/rapid response (detailed in the EDRR Plan). Cal-IPC advocates for early eradication of emerging weed populations before they become widespread. Our assessments, and those of the Orange County Chapter of the California Native Plant Society (OC-CNPS) help determine which species present the greatest risk.

This section describes the overarching conceptual framework for managing invasive plants in the Central (and Coastal) Reserve. Land managers who treat invasive plants in the reserves need a consistent, structured approach for prioritizing which invasive species and populations should be targeted for eradication and control. Our approach provides a foundation for transparent decision-making and assessment and helps ensure coordination and effectiveness of efforts across the reserve.

1.1 Management Approach

Because land managers cannot remove all invasive plants in all locations, an invasive plant management strategy is based on prioritizing species and areas. There are multiple approaches for prioritizing where to best invest invasive plant management resources. We recommend integrating a mix of the following approaches, which are presented in rough order of declining priority. (Note that prevention of inadvertent invasive plant introduction and spread is a high priority as well, and establishing best practices is discussed in section 2.6).

Regional eradication – when possible, eliminating all populations of a given species in a region is very cost-effective, assuming the potential for reintroduction is also addressed. This requires:

- Species assessment - determining which species are most harmful
- Feasibility assessment - weighing costs and challenges to determine which species are most feasible to eradicate over the entire region

Eradication is difficult to attain. When spread of a target species outpaces treatment, or it proves impossible to halt all replenishment of the soil seed bank, an eradication target devolves to a containment target.

EDRR surveillance and treatment – actively scouting for new detections, vetting observations to determine which species and locations are actionable and implementing timely control measures aimed at eradication. This does not result in a high number of “acres treated” but does potentially result in a high number of “acres protected” from potential future spread. This requires:

- Detection - designing and implementing a regular search protocol for locations that are high-risk for introduction of weed propagules. These locations include trailheads, fuel modification areas, and

areas with heavy equipment use. Having a system for field staff and citizen science volunteers to report new finds is important.

- Response - determining in advance how each management entity will respond to a report of new infestations, or a disturbance event like a wildfire that creates immediate management needs.

Protect "Core Areas" – removing invasive plants from areas that are relatively less impacted by invasive plants and that have significant native habitat deserving protection.

Protect "Investment Areas" – areas where substantial prior work (invasive plant management and restoration) has been done and continued attention is needed until site goals are met.

Containment – when a weed species is too widespread to eradicate fully from a region, it can be effective to eradicate outlier populations and leading-edge populations that are most likely to spread into un-infested areas.

Aesthetic maintenance – invasive plants in iconic areas that receive high visitation may be important to treat for the visitor experience (as well as for their potential to spread). This may be an aesthetic issue or a comfort issue depending on the type of plant. Treatment in these areas also provides an excellent educational opportunity, and due to ease of access, may be good areas for volunteer work parties.

The management recommendations in this plan are based on this hierarchy of approaches.

There are many tools in the Integrated Pest Management (IPM) toolbox for controlling invasive plants. Invasive plant management typically involves multiple techniques, with physical and chemical being most common, and other techniques such as grazing, mowing, or prescribed fire being more unusual. Physical and chemical techniques are often used together for optimal effectiveness. The definition of IPM does not exclude the use of pesticides; it specifies appropriate caution, with safe use based on legal and scientific guidelines. Herbicides used in invasive plant management are low-risk, and the amounts used are typically minor relative to amounts used on residential and commercial landscaping. For more information on how herbicides are used safely in invasive plant management refer to Cal-IPC's Best Management Practices manual on "Protecting Wildlife When Using Herbicides for Invasive Plant Management" available online at www.cal-ipc.org/ip/management/BMPs. The manual includes toxicology risk charts for the herbicides used in wildland weed control.

1.2 Budgeting

Successful invasive plant management requires consistent long-term follow-through. A detailed work plan for invasive plant management will dictate budget needs. Each effort has a particular cost curve. For instance, eradication efforts can stretch over many years but is expected to be of finite duration and may cost less in later years. Other costs are steady and ongoing, such as the cost of active surveillance for EDRR, while some costs are unpredictable. For example, when rapid response is necessary, a new expense may arise virtually overnight. Below is a summary of cost trends by treatment categories that is based on the strategic management approaches outlined above.

Regional eradication	Annual cost over finite time frame to eradicate all populations. May diminish over time but may not—efforts to find the last few plants may cost as much as treating many plants earlier in the process.
EDRR	Steady annual cost to perform active scouting in high-risk areas. New costs for responding to critical detections.
Protect Core Areas	Annual cost over finite time frame to eradicate key populations. Ongoing annual cost to scout for new populations.
Protect Investment Areas	Annual cost over finite time frame to eradicate key populations. Ongoing annual cost to scout for new populations.
Containment	Steady annual cost to eradicate outlier and leading-edge populations, treat other populations, and scout for new populations.
Aesthetic maintenance	Steady annual cost for treatment in priority areas.

Costs are associated with (1) treatment to eradicate priority populations, (2) treatment to contain other selected populations, and (3) surveillance costs to scout for new populations. In addition to field costs for treatment and surveillance, there is an office cost for the significant coordination needed to plan and track field work.

In this 5-year Plan, specific populations are recommended as targets for eradication and containment, and search areas are recommended for early detection. For each of these targets we estimate the labor required and the duration of the effort. These estimates include both direct field hours as well as planning and oversight hours. These estimated costs can be revised in future updates of this Plan using the data from actual expenses incurred over the previous 5 years. Managers may find that some eradication efforts take shorter or longer than originally estimated. New approaches may be developed to make control more feasible for well-established (or “entrenched”) weed infestations that are now intractable, such as exotic annual grasses or mustard.

There are choices to be made about how to stage investment. Addressing invasive plant infestations now requires immediate capacity, but it has the benefit of not letting populations spread further before control is initiated. Basically, front-loading investment in order to address current infestations could result in decreased needs in future years as populations are eradicated. However, it should be recognized that increasing recreational use, increasing fuels management, rising fire risk and other factors associated with greater population pressure mean that we should not assume that invasive plant management needs will necessarily decrease in the future, even as we make progress on today’s invasive plant populations. The introductions and spread may keep pace with treatment efforts.

There may be a rationale for having a variable budget depending on rainfall, since years with favorable rainfall may enable land managers to make significant progress in depleting the soil seed bank for invasive plants (since a higher percentage of seeds will germinate). Higher rainfall years may also require

a greater labor investment to maintain progress. Increased funding in these years could be advantageous.

Reserve partners have already seen how steady investment can make significant progress over time on a widespread weed like artichoke thistle. The rate of progress depends on the biology of each weed species and the extent of its soil seed bank, but partners are committed to stewardship in perpetuity and can finish projects they start. Steady funding, smart coordination, consistent reporting, and periodic assessment will allow partners to meet their invasive plant management goals.

1.3 Oversight Structure

It is critical that the CMT, which comprises knowledgeable land management representatives from each major landowner in the reserve, meet on a regular basis. This team will be central to designing and implementing the invasive plant management program throughout the reserve. Their role includes: developing collaborative annual work plans based on this 5-Year Management Plan; evaluating new early detection finds and implementing appropriate management response; and reporting on progress made over time.

Composition – The CMT and representatives during development of this plan were:

- Orange County Parks – (Jennifer Naegele, Restoration Ecologist)
- Irvine Ranch Conservancy (IRC) – (Jutta Burger, Managing Director of Science and Stewardship; moved to Cal-IPC in October 2018)
- California State Parks – (Lana Nguyen, Resource Ecologist, Crystal Cove State Park)

This group could grow in the future to include representatives from other entities, but it should maintain representation from land managers from the management entities above (and of course NCC should also remain intimately involved with the CMT). More recently, The Nature Conservancy (TNC), represented by Zach Principe, has – as Conservation Easement rights holder of some lands in the CRMA – become actively involved both through coordination and through investment of resources. Together, OC Parks and IRC manage 98% of the NCCP lands in the CRMA (57% OC Parks, 41% IRC) so their representation is essential. State Parks is more involved in the Coastal Reserve, but does have property in the management area described here, and they retain an interest in management at the landscape level throughout the region and bring special expertise and resources. Other entities manage significant portions of the watersheds comprising the CRMA, including the US Forest Service and the California Dept. of Fish & Wildlife. The Nature Conservancy is engaged with the management of extensive easement lands that adjoin NCCP lands in the CRMA.

Annual work plans – An annual workplan is needed for each Management Unit and for each management entity with responsibility for specific areas of the Management Unit. Tables showing the breakdown of invasive plant species found in each Management Unit, and the amount that each management entity is responsible for, area found in the back of this report. This 5-Year Management Plan does not spell out the specifics of each landowner's annual work plan. Rather, it provides the raw materials and logical framework for selecting targets for annual work plans. Substantial site-specific

knowledge is required for this selection, and landowner managers are the only ones with this knowledge.

A work plan should be developed for each Management Unit. For those Management Units where OC Parks and IRC each bear responsibility for part of the unit, annual work plans should be designed collaboratively. For some units it will be necessary to engage other partners, such as Cal. State Parks, the Cal. Dept. of Fish & Wildlife for Coal Canyon/Chino Hills, and CalTrans. Annual work plans will build on the previous year's work, but they may deviate if adaptive management suggests a shift in priorities.

Drafting a work plan requires integrating several sources of information: (1) the priority of each species in that Management Unit, (2) the spatial distribution of populations of each species in the unit based on the GIS layer, and (3) budget and resources available. Goals should be set for each species—eradication, containment, or no treatment. (The goal may not the same for all populations of a given species; flexibility is required to account for factors such as lack of accessibility, planned future restoration, etc.)

The selected goals will dictate treatment approach, treatment cost, and progress reporting. Ideally, once the managers have drafted work plans for all areas under their jurisdiction, the CMT would review them across the entire reserve.

Timing – Each winter, results from the mapping and treatment season should be compiled and evaluated by the CMT. Treatment for most species begins in March, though some species may be treated earlier (e.g., treatment for Saharan mustard begins in January). Using this analysis, the CMT should draft a proposed work plan for the upcoming treatment season. This plan should be coordinated with NCC before finalizing. Because external treatment contractors may need to be engaged, the timeline should be:

October – all treatment and mapping data are brought up to date in Calflora;

November – management entities draft reports (based on the metrics template provided later in this report); CMT meets to analyze and integrate reports for annual NCCP reports and draft coming year's work plans;

December-January – Reports are finalized and submitted to o NCC for compilation; d work plans are finalized and contractors are engaged;

January-March –treatment begins;

March-September – main mapping and treatment season.

Additional CMT communication during the year may be needed to coordinate efforts or to address challenges that arise in treatment. The CMT will also need to communicate when a potential new EDRR find is reported so that response options can be discussed. If a response is agreed upon, this will then need to be communicated to all relevant management entities so they are aware of the action and can contribute to surveillance, as appropriate. Communicating externally to, e.g., a Weed Management Area (WMA), on a quarterly or semi-annual basis would be useful to maintain regional familiarity with the work going on and the rationale behind it.

Coordination – Coordinated planning and tracking is critical to successful implementation of this plan. This coordination will rely on strong engagement from CMT partners and NCC. Adopting common data protocol using the online Calflora database will make collaborative planning and tracking easier. NCC and the CMT may find it useful to designate an individual to serve as a coordination lead to help drive the process.

Metrics – Tracking progress toward management goals (both treatment and EDRR) is essential for helping decision makers and stakeholders assess the impact of investments and adjust approaches as necessary. Eradication, in particular, requires clear delineation of extent using thorough mapping data. To enable straightforward assessment of mapping and treatment efforts undertaken by multiple entities, work needs to be documented in consistent ways. Net area is proposed as the main measure of extent. Reductions in net area over time show progress. For very small infestations, the number of plants may be a more useful metric. Net area can be estimated both from number of individuals (with appropriate plant size estimates) and from percent cover of an infestation across a gross area. For EDRR, completion of prescribed search areas serves as a useful metric of success.

Each landowner has its own in-house requirements for tracking. The goal is to fulfill each agency's in-house requirements while also using a common shared format for tracking progress collectively. Details of reporting are discussed in section 2.5. Progress should be clearly illustrated in a concise dashboard format designed for decision-makers, using graphic representations to show progress relative to projected goals. Because invasive plant management may not result in linear progress, care must be taken to convey long-term trends and to explain annual variations.

Assessment of progress over time can be tracked using the annual NCCP reporting tool, and from additional periodic evaluations, such as that provided by helicopter surveys every 5 years. (A separate report examines the change detected between the 2011 and the 2016/2017 helicopter surveys of the CRMA.)

1.4 Regional collaboration

Protecting the CRMA from invasive plants requires collaboration not only on the reserve, but also with regional partners managing lands beyond reserve borders. Other landowners, like the US Forest Service, and Easement holders, such as TNC, have a strong stake in preventing the spread of wildland weeds. Communication with colleagues managing adjacent lands is essential for keeping current on new weeds that have the potential to colonize the reserve. For immediately adjoining landowners, control of particular invasive plant populations may even require joint efforts.

Fostering regular communication and coordination across a broader regions would be productive. South County partners like Audubon Starr Ranch and Rancho Mission Viejo can be important allies. Orange County is currently part of the Santa Ana River/Orange County Weed Management Area (WMA) led by the Riverside-Corona Resource Conservation District. We recommend that partners working on the reserve engage as active participants in the WMA, or start their own Orange County WMA, with regular meetings (quarterly seems to work well for many WMAs).

Volunteer groups, especially OC-CNPS, are important for detecting new weeds across jurisdictions. Several reputable botanists are actively publicizing new weeds on the chapter's website and encouraging chapter members to look for them. This information is often new for landowner agencies as well. Cultivating a partnership with OC-CNPS will provide a range of benefits and is recommended. However, scouting by expert botanists is a critical need, and we recommend hiring such experts under formal agreement as necessary to ensure that this key function is covered.

Much of what OC-CNPS finds locally (such as bitou bush or desert knapweed) may not yet be on reserve lands. It is recommended that the NCC and CMT communicate with the County Agricultural Department (the agency that typically takes the lead on eradicating new weeds in other counties) about eradication of these weeds. In the absence of a response, it is recommended that NCC or other organization whose mandate is regional take a lead in addressing these new weeds. It is also recommended that NCC continue to provide support as needed where local land managers and/or land owners do not have sufficient resources to support the implementation of the Invasive Plant Management Plan within the CRMA.

Collaboration farther afield is also productive. Communicating with the Weed Management Areas in Los Angeles, Riverside, and San Diego counties on a regular basis will help maintain awareness of invasive plant species in the greater region. For example, San Diego has created a detailed assessment of invasive plant species for the coastal region of the county.

Collaborative work at the regional level will benefit from adopting a shared mapping platform. Across the state, we recommend that land managers post their data to the online Calflora database. NCC is currently paying for OC Parks, IRC, and State Parks to use Calflora's Weed Manager system, which includes custom-built menus for the Observer Pro smartphone mapping app. IRC has had greater ability to implement these tools. IRC is available to help guide other CMT partners as they begin to integrate these new tools into their field practice. Using a shared system facilitates collective reporting at the scale of Management Units and the CRMA itself, which is critical for tracing progress.

1.5 Plan integration

As NCC works with partners to develop other management plans identified in the NCCP/HCP, it is important that the plans integrate effectively with each other. Regular meetings among experts and stakeholders in all areas are important for identifying coordination needs.

The "Invasive Plant Management" focus area touches on all the others, but the strongest connection is with the "Restoration" focus area. Removing invasive plants, planting native plants, and other habitat restoration activities form a spectrum of approaches that should not be isolated. Some efforts involve removing a few individual invasive plants from an otherwise intact habitat, while other efforts may involve significant modification of existing vegetation (and even terrain) in an effort to re-establish native habitat.

Periodic meetings between those working on invasive plant management and those working on restoration can ensure that planning and implementation are well coordinated. There is a history of

work to build on. As described in a 2014 UC Berkeley report by Suding and Dickens, not all sites where weeds have been removed have progressed to high native cover (though native species richness has increased). Much of this relates to historic agricultural disturbance, with the proliferation of exotic annual grasses and forbs being one key factor that has been shown to limit native cover on CRMA sites. Working together to find approaches that reduce annual exotic cover would be of great benefit.

The “Invasive Plant Management” focus area also intersects with the “Recreation Management” and “Fire Management” areas. Recreation and wildfire both serve as vectors for invasive plant spread. For recreation, prevention best practices like boot cleaning stations at trailheads can reduce the risk of spread. Active surveillance for early detection will prioritize areas most impacted by recreation. Such efforts should be coordinated with those working on the “Recreation Management” focus area.

Wildfire provides a disturbance that can greatly facilitate the spread of invasive plants. Veldt grass is of particular concern, since it is known to spread vigorously after fire. As with recreation, prevention best practices in fire suppression and firefighting efforts can reduce the risk of spread. After a fire, active surveillance in the burn area is critical, and treatment activities will need to be preplanned. These efforts should be coordinated with those working on the “Fire Management” focus area.

2. MANAGEMENT PLAN

The management framework in the previous section provides the guiding principles for long-term management. Using the framework as a blueprint, this 5-Year Management Plan specifies goals and activities for invasive plant management in the CRMA for 2019-2023. Priorities are set based on species factors and spatial factors, as described in the following sections.

We defined 11 Invasive Plant Management Units (IPMUs) based on sub-watersheds and jurisdictional boundaries. These Management Units are shown in Fig. 2 below and in more detail in Appendix C.

Fig. 1 Size of CRMA Invasive Plant Management Units

19,522	Acres total	Acres in NCCP
Agua Chinon / Loma Ridge	12,790	6,373
Black Star Canyon	5,623	512
Coal Canyon / Chino Hills	1,385	493
Fremont Canyon	5,160	301
Gypsum Canyon	5,192	1,263
Limestone Canyon	5,111	2,957
Santiago Creek	2,743	1,173
Silverado Canyon	1,109	0
Weir / Blind Canyon	6,634	2,720
West Loma Ridge / Peters Canyon	7,612	2,134
Whiting Ranch	3,476	1,596
TOTALS	56,835	19,522

The IPMUs extend beyond the boundaries of the HCP/NCCP. Altogether, 34% of the area covered by the IPMUs is within the HCP/NCCP boundary (additional area is under conservation easement). The land within the IPMUs is owned by several entities. Orange County Parks (OCP) owns 50%. A mix of other owners (Boy Scouts of America, Caltrans, City of Irvine, Federal Aviation Authority, US Forest Service, Irvine Water District, Orange County Public Works, Orange County Sheriff, Orange County Waste, Serrano Water District/Irvine Ranch Water District, Southern California Edison, State of California, and The Irvine Company) collectively own 18% of the area, and a portion is developed The remaining 32% is either developed or classified as “unknown.” Management responsibility can therefore also be partitioned out across land ownership. For instance, fountaingrass (*Pennisetum setaceum*), accounts for 76% of the total net area of invasive plants in the Agua Chinon/Loma Ridge IPMU. The Irvine Ranch Conservancy is responsible for management of 84% of the net area, Orange County Parks manages 62%, and the Irvine Company manages 22%, and the Irvine Water District manages the remaining 16%. This type of analysis provides a clear picture of responsibility and resources needed.

Management is conducted largely by the Irvine Ranch Conservancy (IRC), which is responsible for 59% of the area, and OCP (14%). (These figures leave out areas that are developed.) Management responsibility for each IPMU is shown below. Other entities with smaller portions of responsibility are not included.

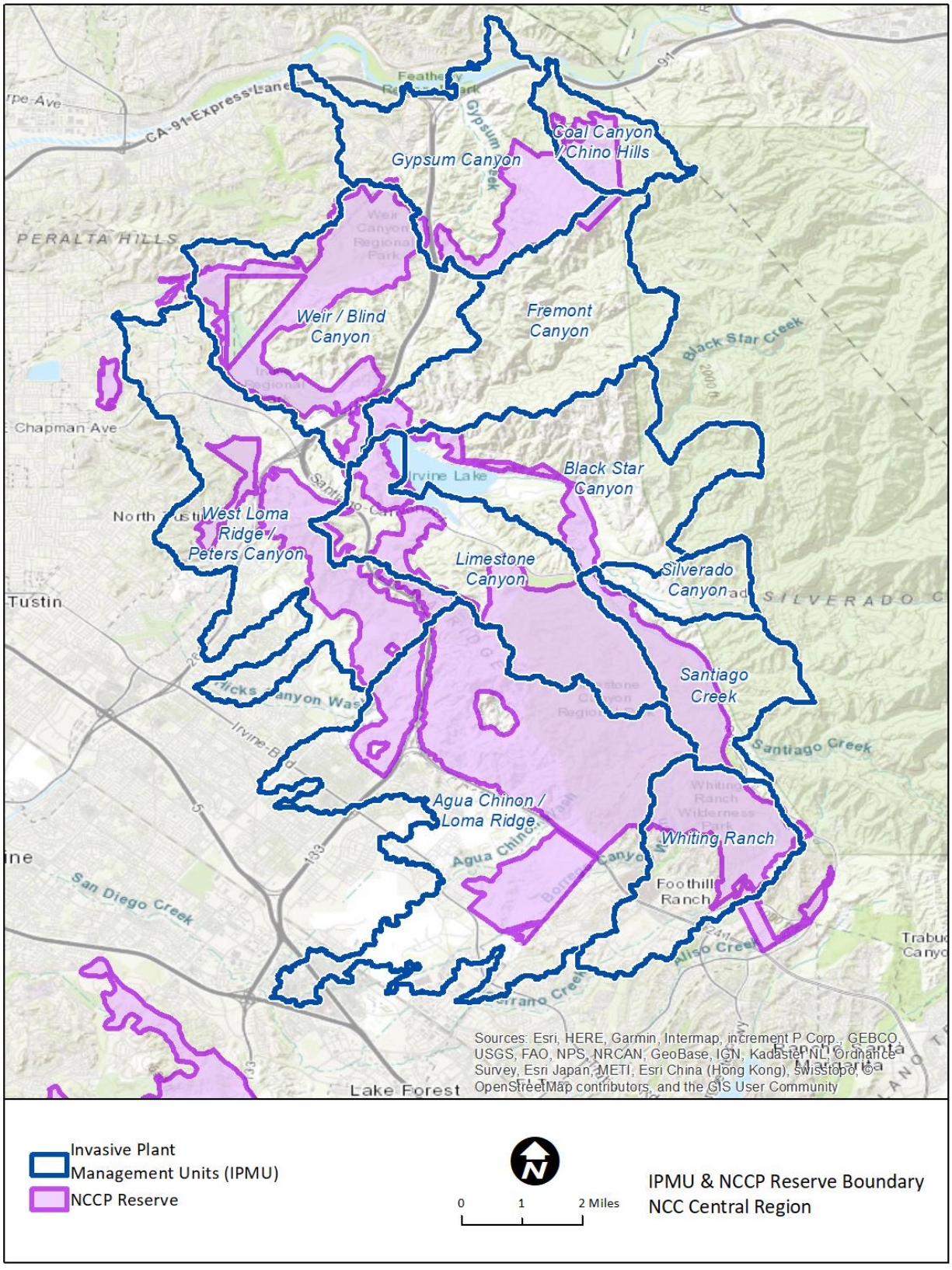


Figure. 2 CRMA Management Units

Fig. 3 Management of CRMA Management Units by Core Entities

Management Unit	IRC	OCP	CDFW	St Parks
Agua Chinon / Loma Ridge	67%			
Black Star Canyon	57%	4%		
Coal Canyon / Chino Hills	1%		36%	26%
Fremont Canyon	84%		2%	
Gypsum Canyon	50%	29%	9%	6%
Limestone Canyon	77%	14%		
Santiago Creek	47%	3%		
Silverado Canyon	38%			
Weir / Blind Canyon	58%	30%		
West Loma Ridge / Peters Canyon	66%	19%		
Whiting Ranch	8%	89%		

[OCP=Orange County Parks; IRC=Irvine Ranch Conservancy; CDFW=Cal. Dept. of Fish and Wildlife]

2.1 Species prioritization

We worked with the CMT to generate a comprehensive species list for the CRMA, starting from the list we previously generated for the Coastal Reserve. That list integrated all known previous lists, including those from the Habitat Restoration and Enhancement Plan (2003), the Back Country Council agreement (2013), Harmsworth & Associates annual reports (2013-2015), The Irvine Ranch Conservancy's Landscape-Wide Invasive Control Program (2016), Wildland Conservation Science (2015) aerial weed survey, California State Parks' EDRR list for Orange Coast District parks (2016), and the Orange County Chapter of the California Native Plant Society's list of high-priority invasive plants (2016).

Species are prioritized in two ways. The first is in terms of impact, which is scored based on the impact assessments of multiple organizations, including Cal-IPC, OC-CNPS and the San Diego Weed Management Area. Impact scores are listed in Appendix A with the plant list and are included in the tables in Appendix B to help set management priorities.

The second way species are prioritized integrates the amount of the species present on the reserve and the feasibility of eradication at the local and reserve-wide scale:

- Category 1 = eradicate all populations of the species found on the CRMA
- Category 2 = eradicate all populations of the species in those parts of the reserve where it is feasible, but for other areas simply eradicate some populations of the species to contain spread of the species in that area
- Category 3 = only treat populations of the species opportunistically, when they are found next to other priority populations and there is extra time and resources available
- Category 4 – not treating at this time (outside of active restoration areas), low priority because of either ubiquity or lack of impact.

Species are listed by category below. Note that several have not yet been observed within the CRMA. For more details on species, see Appendix A.

Category 1 – Eradicate reserve-wide

Aegilops triuncialis	barbed goatgrass
Ageratina adenophora	sticky eupatorium
Arctotheca calendula (fertile)	fertile capeweed
Cenchrus longispinus	Sandbur
Cenchrus echinatus	Sandbur
Centaurea solstitialis	yellow starthistle
Chrysanthemoides monilifera	bitou bush
Delairea odorata	Cape-ivy
Dittrichia graveolens	Stinkwort
Ehrharta longiflora	longflowered veldtgrass
Euphorbia terracina	carnation spurge
Euphorbia virgata (= Euphorbia esula)	leafy spurge
Galenia pubescens	coastal galenia
Hypericum canariense	Canary Island St. Johnswort
Iris pseudacorus	yellow flag iris
Kochia scoparia	summer cypress
Ligustrum japonicum	Japanese privet
Limonium ramosissimum	Algerian sea lavender
Melinis repens	Natalgrass
Oncosiphon piluliferum	Stinknet
Parthenium hysterophorus	Santa Maria feverfew
Rubus armeniacus	Himalayan blackberry
Senecio linearifolius v. linearifolius	Linear-leaved Australian fireweed
Verbesina encelioides	golden crownbeard
Volutaria tubuliflora	Moroccan knapweed

Category 2 – Eradicate or contain

Ailanthus altissima	tree-of-heaven
Araujia sericifera	bladderflower
Arundo donax	giant reed
Asphodelus fistulosus	onionweed
Brassica tournefortii	Saharan mustard
Centaurea diluta	North African knapweed
Cirsium vulgare	bull thistle
Cortaderia selloana	pampas grass
Cynara cardunculus	artichoke thistle
Echium candicans	pride of madeira
Ehrharta calycina	perennial veldt grass
Emex spinosa	spiny emex
Ficus carica	common fig

Gazania linearis	gazania
Glebionis coronaria	garland chrysanthemum
Lepidium appelianum	hairy whitetop
Lepidium draba	whitetop
Lepidium latifolium	perennial pepperweed
Leucanthemum vulgare	ox-eye daisy
Lonicera japonica	Japanese honeysuckle
Nassella tenuissima	Mexican feather grass
Pennisetum setaceum	fountain grass
Phalaris aquatica	hardinggrass
Plantago arenaria	Indian plantain
Robinia pseudoacacia	black locust
Salpichroa origanifolia	lily-of-the-valley vine
Spartium junceum	Spanish broom
Tamarix ramosissima	tamarisk
Ulmus parvifolia	Chinese elm

Category 3 – Control opportunistically

Acacia cyclops	cyclops acacia
Acacia redolens	coastal wattle
Agave americana	century lant
Albizia lophantha	stink bean
Atriplex semibaccata	Australian saltbush
Brachypodium distachyon	purple false brome
Carduus pycnocephalus	Italian thistle
Conium maculatum	poison hemlock
Encelia farinosa	brittlebush
Eucalyptus camaldulensis	red gum
Eucalyptus sp.	eucalyptus
Foeniculum vulgare	fennel
Limonium perezii	statice
Malephora crocea	coppery mesembryanthemum
Marrubium vulgare	horehound
Melia azedarach	chinaberry tree
Myoporum laetum	lollypop tree
Nerium oleander	oleander
Nicotiana glauca	tree tobacco
Olea europaea	olive
Parkinsonia aculeata	Jerusalem thorn
Parthenocissus quinquefolia	Virginia creeper
Phoenix canariensis	Canary Island date palm
Ricinus communis	castor bean
Schinus molle	Peruvian pepper tree
Schinus terebinthifolius	Brazilian pepper tree

Silybum marianum	milk thistle
Tragopogon porrifolius	purple salsify
Tropaeolum majus	garden nasturtium
Vinca major	periwinkle
Washingtonia filifera	California fan palm
Washingtonia robusta	Mexican fan palm

Category 4 – Not treated at this time

Avena sp.	wild oat
Brassica juncea	India mustard
Brassica nigra	black mustard
Bromus sp.	brome
Centaurea melitensis	tocalote
Cyperus papyrus	papyrus
Eriodium sp.	filaree
Hedypnois cretica	Crete weed
Hirschfeldia incana	summer mustard
Hordeum sp.	barley
Lactuca serriola	wild lettuce
Lolium sp.	wild rye
Malva parviflora	cheeseweed
Medicago polymorpha	bur clover
Melilotus indicus	yellow sweet clover
Opuntia ficus-indica	Mission cactus
Pennisetum clandestinum	kikiyu grass
Picris echioides	prickly sowthistle
Salsola tragus	Russian thistle
Sonchus sp.	sow thistle
Stipa miliacea	smilo grass
Tribulus terrestris	puncturevine

2.2 Area prioritization

The CMT identified three Core Areas (areas with lower amounts of invasive plants) and four Investment Areas (areas that have been the focus of substantial restoration work already). See Fig. 4 below. Invasive plant populations in these areas are prioritized for management, per the tables for each Management Unit in Appendix C.

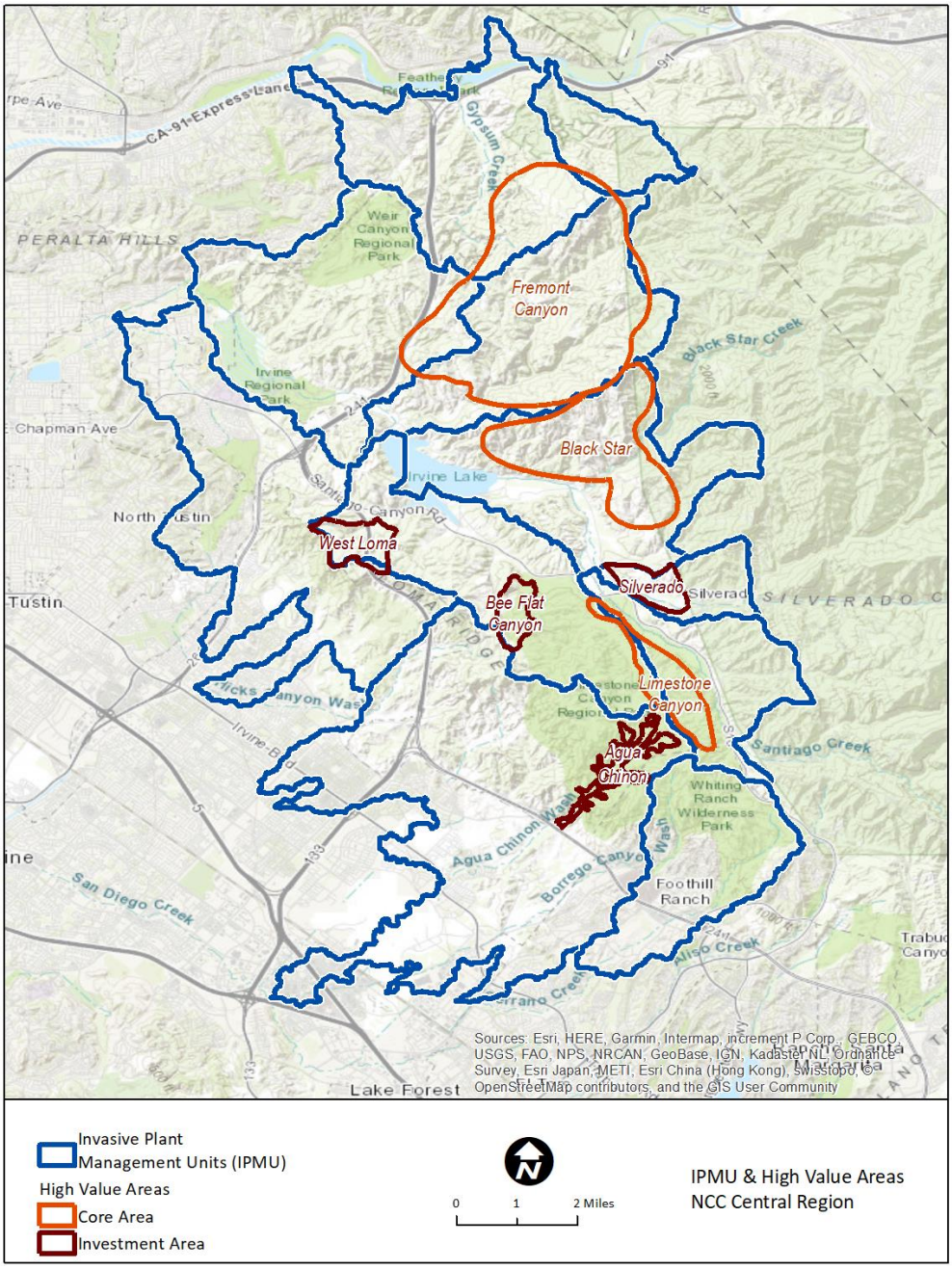


Fig. 4 CRMA Core Areas and Investment Areas

2.3 Management goals

This Plan recommends goals for each Management Unit based on a combination of species prioritization and area prioritization. The table below provides an overview of where each Category 1-3 species is found on the reserve. Area estimates are the result of aggregated management and observation data from IRC and the 2016/17 helicopter survey. We uploaded this aggregate 2017 dataset to Calflora. Not all plant species were mapped by the helicopter surveys and species marked with a '*' were only partially mapped because they were so widespread.

Net Area by Management Unit (m^2)											
	Agua	**Black**	**Coal**	**Frem**	**Gyps**	**Lime**	**Sant**	**Silv**	**Weir**	**West**	**Whit**
Ailanthus altissima	-	-	-	-	15	2	1	11	422	-	-
Albizia lophantha	-	-	-	-	-	-	-	-	-	-	99
Arundo donax	-	1,266	-	-	-	28	21	326	3,017	97	-
Asphodelus fistulosus	22	-	-	-	-	-	2	1	-	-	-
Brassica tournefortii	787	7	92	77	494	271	-	-	799	8,173	-
*Carduus pycnocephalus**	1,060	-	-	-	-	412	-	18	-	-	-
Centaurea melitensis	-	-	22	-	-	-	-	-	-	-	-
Centaurea solstitialis	-	-	171	-	68	-	-	-	2	-	-
Cirsium vulgare	1	1,837	-	1	-	18	131	-	5,461	-	-
Conium maculatum	148	-	-	-	-	-	-	1	-	-	-
Cortaderia selloana	75	5	-	2	27	9	-	1	723	7,479	307
Cynara cardunculus	1,481	3,588	-	103	74	10,811	7	1	2,388	3,843	1,659
Delairea odorata	-	-	-	-	-	-	-	3	-	-	-
Encelia farinosa	29,117	-	-	530	51,237	3,391	11	-	316	-	19
Eucalyptus camaldulensis	-	2	4	-	-	-	-	1,342	-	-	-
Ficus carica	-	-	-	-	-	-	-	-	-	-	3
Foeniculum vulgare	1,110	984	-	492	123	4,802	542	241	907	3,829	356
Gazania linearis	-	-	-	-	261	-	21	-	-	-	-
Glebionis coronari	4	-	-	-	-	-	-	-	-	-	-
Lepidium latifolium	-	7,313	-	-	-	37	-	892	2,543	-	-
Marrubium vulgare	5,657	273	-	1,033	121	9,696	463	50	515	1,055	25,226
Nassella tenuissima	-	-	-	-	-	-	-	3	-	-	2
Nerium oleander	2	46	-	-	-	-	2	2	-	121	-
Nicotiana glauca	9,515	54,645	2,484	1,615	4,548	1,051	2,968	1	2,812	9,495	10,696
Olea europaea	-	395	-	-	-	-	576	36	-	-	-
Oncosiphon piluliferum	2	-	-	-	-	-	-	-	-	-	-
Opuntia ficus-indica	126	-	-	-	-	-	-	-	57	67	-
Parkinsonia aculeata	-	-	-	-	-	20	-	-	-	-	-
Pennisetum setaceum	11,910	175	1,527	2,008	16,731	205	4,629	5	41,243	1,322	97
Phoenix canariensis	-	18	-	-	-	7	-	-	170	415	-
Ricinus communis	3,471	408	-	4	18	343	1,006	79	10,969	205	1
Rumex crispus	-	-	-	-	-	1	-	-	-	-	-
Schinus molle	104	-	-	400	623	903	1,207	96	476	1,546	291
Schinus terebinthifolius	-	4	-	-	-	-	-	-	-	-	-
*Silybum marianum**	4,276	-	-	-	2	1,531	-	18	29	9	-
Spartium junceum	-	29	-	-	-	-	210	47	-	-	-
Stipa miliacea	280	-	-	-	-	1	-	4,992	-	-	-
Tamarix ramosissima	1,347	24,390	36	33	17,271	52	518	22	11,889	1,331	2,830
Tragopogon porrifolius	-	-	-	-	-	1	-	-	-	-	-
Verbesina encelioides	1	-	-	-	-	-	-	-	-	-	-
Washingtonia robusta	5	8	-	2	8	219	2	1	9	9	4
	70,502	**95,393**	**4,336**	**6,300**	**91,621**	**33,812**	**12,316**	**8,187**	**84,746**	**38,996**	**41,589**
in acres:	17	24	1	2	23	8	3	2	21	10	10
	14%	20%	1%	1%	19%	7%	3%	2%	17%	8%	9%

Appendix C contains tables for each IPMU summarizing the data for the invasive plant species found there. The tables list number of populations of each species, with gross and net area (in square meters), and how much, if any, is found in a Core Area or an Investment Area.

Most of the invasive plant populations mapped in the CRMA are species in the Category 3 ("Control opportunistically") Of 4,829 populations, 3,185 (66%) are Category 3, and of these almost half are tree tobacco. Category 2 species ("contain, eradicate where feasible") make up the remaining 34% with Category 1 species ("Eradicate across the Coastal Subregion") accounting for less than 1% (only 19 populations). These few populations, however, are of critical importance for region-wide eradiation:

- Yellow starthistle (*Centaurea solstitialis*) – nine populations in Gypsum Canyon, five in Coal Canyon/Chino Hills, and one in Weir/Blind Canyon;
- Cape-ivy (*Delairea odorata*) – one population in Silverado Canyon;
- Stinknet (*Oncosiphon piluliferum*) – two populations in Agua Chinon/Loma Ridge;
- Golden crownbeard (*Verbesina encelioides*) – one population in Agua Chinon/Loma Ridge.

The tables in Appendix B include Category 1 and Category 2 plant species. Category 3 species are a lower priority, and it is expected that land managers will determine when and where it makes sense to opportunistically control these species.

Core Areas contain only 0.7% of the invasive plant net area found in the CRMA, and Investment Areas contain only 4%. The invasive plant populations found in these areas are high-priority targets, and are integrated as top actions recommended by Management Unit in Appendix B. Management and survey data for 2018 should be added to work plans and, in some cases, may alter priorities.

Goals for each Management Unit should be based on the tables in Appendix B, the GIS layers provided, and the hierarchy below:

1. Eradicate reserve-wide targets by controlling all populations of plant species that have been identified as a target for eradication across the entire reserve. Continue controlling those populations until they are eradicated.
2. Keep Core Areas free of invasives by controlling all Category 2 and 3 invasive plant populations found in Core Areas. Continue controlling those populations until they are eradicated.
3. Protect Core and Investment Areas by controlling populations of Category 2 ("contain, eradicate where feasible") species found in the Management Unit. Prioritization can be based on:
    a. small populations
    b. outlier or leading-edge populations
    c. populations of species with the highest impact scores

4. Maintain popular volunteer efforts in locations where volunteer commitment is high, such as along popular trails. These are not specified in this Plan, but it is recognized that managers will continue to make this a component of their approach.

Note that the goal when treating an invasive plant population should almost always be eradication of that population. Containing a species in an area likely means eradicating the highest priority populations of that species in the area. (There may be circumstances where a land manager treats a population with the goal of simply limiting its expansion and spread, but managers on the CRMA have sufficient resources to eradicate populations, which is most cost-effective.)

Decisions regarding which species or populations to treat within the Management Unit will be made by the responsible land managers by weighing priority based on proximity to Core Areas, Investment Areas or other conservation resources, and feasibility/cost of control. Management for many of the units—Black Star Canyon, Gypsum Canyon, Limestone Canyon, Weir/Blind Canyon, West Loma Ridge/Peters Canyon and Whiting Ranch—are split between OC Parks and IRC and planning should be done jointly. Even for units that are managed essentially by a single entity—such as Agua Chinon/Loma Ridge, Santiago Creek and Silverado Canyon—planning should still be done jointly since all Management Units adjoin others and management needs to be coordinated across these boundaries to the reserve scale and beyond.

Estimating labor needs – We calculate generic amounts that may not be highly accurate for all species and sites, but they are designed to provide a reasonable estimate to help gauge resource needs. For treatment activities, we start with a per-population expense of 2 hours to allow for site access and to provide a minimum expense for small populations. We add a generic annual labor cost of 80 person-hours per net acre (i.e., equivalent to a 20-acre population at 5% cover). This includes 7 person-days for control activities (including preparation and access) and 3 person-days for programmatic activities (planning, oversight, tracking and reporting). This labor may represent multiple treatments during a year. For weed populations that are spread over a large area with low density (net acres divided by gross acres at less than 5%), we increase the labor required per net acre by 50%.

Annual costs can then be summed over the number of years estimated for eradication (a figure which is listed for each species in Appendix A). Though in some cases the annual cost for eradication activities for a given species may decrease over time, we maintain the estimated labor expenditure as constant throughout the life of the effort, since for many species the level of effort is not expected to decrease significantly even as the number of plants decreases.

The table below totals the amount of staff time needed to control all Category 1 and Category 2 populations on each Management Unit, broken down by responsible management entity (those other than OCP and IRC are combined). For all Management Units, the total workforce required comes to approximately 7,000 person-hours per year.

	IRC	OCP		
Agua Chinon / Loma Ridge	529	62	591	8%
Black Star Canyon	997	51	1,048	15%
Coal Canyon / Chino Hills	3	0	3	0%
Fremont Canyon	84	0	84	1%
Gypsum Canyon	390	494	884	13%
Limestone Canyon	516	517	1,033	15%
Santiago Creek	308	0	308	4%
Silverado Canyon	216	0	216	3%
Weir / Blind Canyon	313	1,482	1,795	26%
West Loma Ridge / Peters Canyon	748	56	804	11%
Whiting Ranch	0	263	263	4%
	4,104	2,925	7,029	

Fig. 5 – Person-Hours by Management Unit and Management Entity

2.4 Reporting

Record-keeping is a critical aspect of invasive plant management at multiple levels: population level, Management Unit level, and reserve level. Detailed records help land managers gauge and improve the effectiveness of treatment through adaptive management. More generalized summaries can help decision makers see that progress is being made over time. Land managers may keep detailed internal records based on their own needs, but they need to make sure basic information (e.g., management status and newly found occurrences) is shared on the online Calflora mapping database so it can be shared and aggregated for broader summaries.

Land managers at OC Parks and IRC should track their success in meeting their goals for each population. Since the goal is typically eradication of the population, the activities over the course of a treatment year are designed to remove 100% of all individual plants of that species as possible, and to eliminate new reproduction such as production of viable seed. This should be the standard for each population selected as a target as part of setting management goals. If treatment is incomplete on some populations in a given year, the duration of eradication efforts will increase due to unchecked spread and new contributions to the soil seed bank. Steady, annual treatment is the goal for each population selected as a priority target. All populations that have apparently been eradicated should be monitored for a minimum of three years after “eradication” to establish absence of the target species from the seed bank. All site visits confirming absence should be recorded on Calflora.

The CMT needs a simple way to assess progress and report progress to NCC. We suggest adapting an approach presented in several papers from New Zealand and presented at the Cal-IPC Symposium by Pete Holloran for tracking progress toward eradication. This approach tracks portions of an infestation over time in each management stage. Fig. 5 below shows variations of eradication progress charts for an idealized project, tracking progress through each management stage: mapping, treatment, and

monitoring. Tracking can focus on the total number of populations, the total amount of net area, or the percent of either of these.

Initially the infestation is found and partially mapped. In the second year, the full infestation is mapped and control work (or treatment) is begun on some of the populations. By 2023 all populations in the infestation are being controlled. After a population has been controlled for three years, it seems to be gone and enters the monitoring phase. After three years of monitoring with no observed plants, populations are classified as eradicated. In this idealized case, the entire infestation is eradicated ten years after the project began. (Note that number of populations and net area increase at the beginning as mapping delimits the entire infestation.)

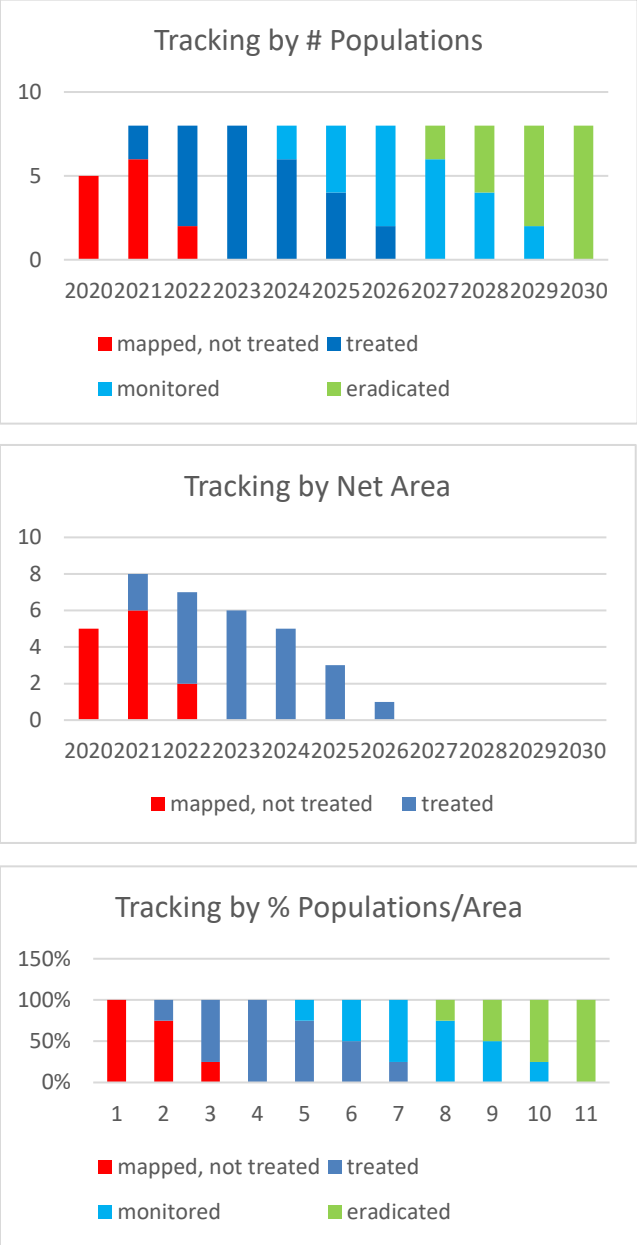


Fig. 5 – Eradication Progress Charts

Each option—tracking by number of populations, amount of net area, or percent of each—has strengths and weaknesses. If populations vary greatly by size, using net area may preferred. However, while net area is useful for showing reductions in the overall amount of an invasive plant, net area is not conducive to tracking monitoring work since that work is generally conducted over the larger gross area that was originally infested. Meanwhile, tracking by population can be challenging because land managers may redefine populations over time, for instance when a large population is reduced to smaller discrete areas.

We recommend using two complementary approaches to summarizing results. First, for any given project or an aggregate of projects, use a progress chart by percentage of populations. Second, to convey the scale of work performed, quantify the amount of invasive plants removed (for instance, by square meters) and the investment (person-days).

If progress charts are based on percent of populations as recommended, there are implications for how populations are defined. First, there should not be large variation in size of populations, so it may make sense to break up large infested areas into multiple populations. Second, it will be important to maintain the same populations over time. If it becomes necessary for organizing field work to identify smaller units as treatment progresses, you can define sub-populations.

Consider including future projections as well as documenting work to date in progress charts. Progress charts show where along the path toward eradication you are. Generic progress charts are provided for the plant eradication lengths we have designated: 5 years, 10 years, and 20 years (see Appendix C). These can be used as a template for any species with the associated eradication length.

As work progresses from year to year, a progress chart for each targeted plant in each Management Unit should be maintained based on actual work, with adjustments made for future years based on real progress being made. These charts can be combined for the Management Unit or the entire reserve by totaling the populations in each stage for each year.

To provide a metric for status of an eradication project, it may be helpful to have a single number representing progress. Options for calculating such a number include:

- Percent of time – based on an estimate of the total number of years needed to achieve eradication (e.g. “in 2025 we have accomplished 5 years towards a 10-year eradication effort so we are now 50% of the way to our goal.”)
- Percent of effort – based on an estimate of the total person-time needed to achieve eradication (e.g. “we have invested 50 person-days towards a 100-person-day eradication effort so we are now 50% of the way to our goal.” Note that our generic estimates of time needed do not change over time, but real-world estimates informed by work to date on particular efforts may differ.)
- Milestones – based on the stages (e.g. “in 2027 we have completed mapping and treatment, accomplished 50% of needed monitoring, and achieved eradication for 25% of the infestation”)

To make progress tracking possible, land managers need to note management stage for each population in Calfora each year. This is done by posting an assessment for each population and making the appropriate selection in the "management status" field:

Verified – the population is mapped, but not under treatment

Managed – the population was treated this year (include in notes field if only a portion of the population was treated)

Searched, Not Found – the population has undergone treatment and is now being monitored

Eradicated – monitoring has been completed for enough years to conclude that the population is eradicated

With polygons for Management Units set up in Calflora, data can be exported from Calflora by Management Unit and species so that it can be parsed by the management status field, providing the raw information for fashioning annual reports. See Appendix C for an annual report template.

2.5 Prevention

Prevention is the first line of defense, and it is critical that all land managers in the reserve work to prevent new weed introductions to the best of their ability. Prevention tasks include: preventing the introduction of new invasive plants onto the reserve, preventing the re-introduction of invasive plant species already on the reserve, and preventing the inadvertent spread of invasive plants around the reserve.

It is important to monitor areas on the perimeter of the reserve for new invasive plant introductions. New introductions can come from neighboring landscaping or edge-associated disturbance, and perimeter areas of the reserve often include fuel modification zones that are vulnerable to invasive plants. Many invasive plants have seeds that can attach themselves to animals, people, and vehicles, helping them colonize new areas. Other seeds can be moved in soil, for instance on hiking boots or tires. And ground disturbance, such as fuel breaks, can provide suitable places for weeds to grow.

Cal-IPC has prepared two manuals on Best Management Practices (BMPs) for preventing the spread of invasive plants. One manual is for land managers and includes information regarding fire suppression and fire-fighting activities. The other manual is for entities that manage transportation and utility corridors. These manuals provide a foundation for institutionalized best practices so that inadvertent spread of invasive plants is reduced. (The manuals are available online at www.cal-ipc.org/ip/prevention. A training video is also available, which includes content from both manuals.) Best Management Practices should be integrated into all relevant land management activities, and staff should be regularly trained on these practices. Relevant activities include weed management, trail maintenance, road maintenance, fuel modification zone maintenance, and fire-fighting. Not only those working in the field, but those planning activities and procuring materials have a role in prevention and should be trained. Such training should be completed annually, and completion of annual training can be a report item.

3. Early Detection/Rapid Response (EDRR) Plan

EDRR is the best approach to managing invasive plants in that it identifies new problems *before* they have a chance to spread and become significant threats to species, habitats and, potentially, fire cycles. There are a several angles: EDRR includes finding brand new invasive plant species to a region as well as finding new populations of known invasive plant species. EDRR includes both incidental efforts—where those who spend time in the field are asked to report sightings made in the course of other work—as well as targeted search efforts with EDRR as the focus. OC-CNPS works to identify new non-native plants in the region's natural areas and publicizing what they find. Their members and others with basic botanical expertise can serve as an excellent resource for incidental EDRR. Landowners in the Coastal Reserve are recommended to implement routine active EDRR search efforts, as described below. EDRR is important to implement not only at the scale of the entire reserve, but for each Management Unit.

3.1 Species prioritization

New species found on the reserve or in the neighboring region are a top priority. Incidental observations and active scouting should put a premium on identifying anything new, and risk assessment for any new finds should be completed promptly to gauge their ability to spread and have a negative impact. Information on identifying the new species should be shared widely with all reserve landowners and partners.

Finding new populations of known species can also be important for stopping their spread. The CMT ranked invasive plant species compiled for the Management Plan as listed in the table below. In addition to the species on the reserve, we also include important species not found on the reserve at the current time, since these could appear on the reserve in the future. The full list is provided, but a search list for EDRR surveying may be shortened to be practical and to match the botanical knowledge of the surveyors, but modifications should be tracked and attached to survey data to ensure complete knowledge of presence and absence of species targeted for survey. This list will constantly evolve as new species are found and added and others, if too abundant, are removed. See Appendix A for a species list with full details.

High Priority for Survey	
Aegilops triuncialis	barbed goatgrass
Ageratina adenophora	sticky eupatorium
Ailanthus altissima	tree-of-heaven
Araujia sericifera	bladderflower
Arctotheca calendula (fertile)	fertile capeweed
Arundo donax	giant reed
Asphodelus fistulosus	onionweed
Brassica tournefortii	Saharan mustard
Cenchrus longispinus	sandbur

Cenchrus echinatus	sandbur
Centaurea diluta	North African knapweed
Centaurea solstitialis	yellow starthistle
Chrysanthemoides monilifera	bitou bush
Cirsium vulgare	bull thistle
Delairea odorata	Cape-ivy
Dittrichia graveolens	stinkwort
Ehrharta calycina	perennial veldt grass
Ehrharta longiflora	longflowered veldtgrass
Emex spinosa	spiny emex
Euphorbia terracina	carnation spurge
Euphorbia virgata	leafy spurge
Galenia pubescens	coastal galenia
Glebionis coronaria	garland chrysanthemum
Hypericum canariense	Canary Island St. Johnswort
Iris pseudacorus	yellow flag iris
Kochia scoparia	summer cypress
Lepidium appelianum	hairy whitetop
Lepidium draba	whitetop
Lepidium latifolium	perennial pepperweed
Ligustrum japonicum	Japanese privet
Limonium ramosissimum	Algerian sea lavender
Lonicera japonica	Japanese honeysuckle
Melinis repens	natalgrass
Nassella tenuissima	Mexican feather grass
Oncosiphon piluliferum	Stinknet
Parthenium hysterophorus	Santa Maria feverfew
Rubus armeniacus	Himalayan blackberry
Senecio linearifolius	linear-leaved Australian fireweed
Spartium junceum	Spanish broom
Tamarix ramosissima	Tamarisk
Verbesina encelioides	golden crownbeard
Volutaria tubuliflora	Moroccan knapweed

Moderate Priority for Survey

Acacia cyclops	cyclops acacia
Acacia redolens	coastal wattle
Albizia lophantha	stink bean
Conium maculatum	poison hemlock
Cortaderia selloana	pampas grass
Cynara cardunculus	artichoke thistle
Echium candicans	pride of madeira
Ficus carica	common fig
Foeniculum vulgare	fennel
Gazania linearis	gazania

Leucanthemum vulgare	ox-eye daisy
Malephora crocea	coppery mesembryanthemum
Melia azedarach	Chinaberry tree
Olea europaea	olive
Parkinsonia aculeata	Jerusalem thorn
Parthenocissus quinquefolia	Virginia creeper
Pennisetum setaceum	fountain grass
Phalaris aquatica	hardinggrass
Plantago arenaria	Indian plantain
Ricinus communis	castor bean
Robinia pseudoacacia	black locust
Salpichroa origanifolia	lily-of-the-valley vine
Schinus molle	Peruvian pepper tree
Schinus terebinthifolius	Brazilian pepper tree
Tropaeolum majus	garden nasturtium
Ulmus parvifolia	Chinese elm
Vinca major	periwinkle
Washingtonia filifera	California fan palm
Washingtonia robusta	Mexican fan palm

Low Priority for Survey

Agave americana	century plant
Atriplex semibaccata	Australian saltbush
Brachypodium distachyon	purple false brome
Carduus pycnocephalus	Italian thistle
Encelia farinosa	Brittlebush
Eucalyptus camaldulensis	red gum
Eucalyptus sp.	Eucalyptus
Limonium perezii	statice
Marrubium vulgare	horehound
Myoporum laetum	lollypop tree
Nerium oleander	oleander
Nicotiana glauca	tree tobacco
Phoenix canariensis	Canary Island date palm
Silybum marianum	milk thistle
Tragopogon porrifolius	purple salsify

3.2 Spatial prioritization

Several types of survey areas are important for EDRR because of the way many weeds spread. For instance, where the edge of the reserve abuts the developed landscape, landscaping may contain known invasive plants or plants that will become a problem in the future. These edge areas may also have ground and vegetation disturbance from fuel modification, which can provide fertile ground for invasive plants to become established.

Other areas of importance for EDRR are those places that have high human traffic (foot, equestrian, or vehicle) because invasive plants often establish in the disturbed areas and can be spread from there. These include parking lots, trail heads, visitor centers, and maintenance facilities. Working with the CMT, we identified these feature in the CRMA, and determined the appropriate search frequency (every year, every 2 years, or every 3 years) depending on the perceived risk of new introductions or spread in those areas. Maps for each of the Management Units are included in Appendix D. The labor needed is summarized in the table below, based on assumptions for the time needed per facility site two hours per five acres) and for roads and trails (2 hours per mile). These figures include travel time and tracking time. Note that EDRR search areas have only been defined for the most actively managed Management Units.

Management Unit	**Labor***
Agua Chinon / Loma Ridge	2
Black Star Canyon	2
Coal Canyon / Chino Hills	1
Fremont Canyon	1
Gypsum Canyon	1
Limestone Canyon	3
Santiago Creek	1
Silverado Canyon	1
Weir/Blind Canyon	3
West Loma Ridge/Peters Canyon	2
Whiting Ranch	2
TOTAL	18

*in person-days/year

3.3 EDRR Action

Land managers should search the areas identified on maps in Appendix D at the interval specified, with the goal being to identify new populations of priority species. If particular invasive plant species are already widespread in an area, there may be no need to record new populations. The goal is to identify populations unknown to land managers that have the potential to spread and increase long-term management costs. In addition to the listed priority species, surveyors should also always be looking for new invasive species.

If the newly detected population is small and the species can be removed by hand, the surveyor may control the plants immediately upon detection and record removal in Calflora. If the population is larger, however, the surveyor's report will inform future treatment approaches. Depending on the species and the location, this may become a high priority for control or a lesser priority for control. Finally, if a new non-native species is found, an assessment needs to be conducted quickly to ascertain the potential risk, and control action should typically be initiated immediately. In situations where a significant need arises that cannot be met with existing land management capacity, a special request should be directed to NCC for emergency support.

Each year the CMT should identify a responsible entity to survey each of the locations specified for that year. The land management entities may conduct these surveys themselves, or they may work with NCC

to hire a skilled contractor to conduct these surveys. In addition, committed stewardship volunteers could be trained to identify a set of priority species and directed to survey particular areas of the reserve. Strict protocols for EDRR should be followed to maintain consistency of data.

These include:

1. Clearly define the EDRR list for the surveyor;
2. Clearly define populations (e.g., using a 30m separation rule);
3. Clearly define survey timeframe;
4. Communicate that any new species not on the list should be reported to the CMT;
5. Define a survey search width (e.g., 30' for large, apparent plants, 10' for small ones);
6. Set a survey speed that encourages careful searching (e.g., 1 mile/hr);
7. Ensure that surveyors are familiar or can identify species on the EDRR list;
8. Designate a maximum stopping time (e.g., 5 minutes) for removal of any EDRR species;
9. Require that surveyors have bags for collection of any species that are in seed.

Supplemental passive EDRR should be supported as much as possible. Hikers and other recreationists can provide eyes and ears on the ground, though most will only be able to recognize a handful of plants. Making sure that more botanically reputable partners like OC-CNPS members are encouraged to report any sightings would leverage an excellent resource. Incidental third-party observations provide an early warning system for invasive plants that can be addressed before they get to the reserve, and NCC support for response should be considering for such populations. All reports should be documented in Calflora and moved or copied into the appropriate Calflora group managing the area where a new population was found.

Annual reporting for EDRR activities should capture whether the active survey routes in each Management Unit were completed for that year, what was found, what was determined to be actionable, and what actions were performed.

3.4 EDRR communications

Streamlined communication is critical for effective EDRR. For an early detection to result in a rapid response, a series of things must happen.

First, information on the detection needs to be communicated to a land manager who can confirm identification and determine how important the species and location make the detection. Cal-IPC has funded Calflora to develop a customizable email alert system, which is now a useful tool for receiving updates on high priority species. CMT partners should set up their own Calflora alert to receive emails reporting any new observations made on the CRMA.

Next, an appropriate response action needs to be designed. This may be straightforward, if the landowner is already treating the plant elsewhere in the reserve, but it could be more complicated if this is not the case. A new weed may require research to determine a treatment approach, using experts

from University of California Cooperative Extension and the land manager community at large through Cal-IPC's network (e.g., CalWeedTalk listserv). Implementing response action may require acquiring additional short-term treatment capacity or shifting existing treatment plans to accommodate a new treatment. Keeping a flexible contractor on retainer for as-needed work may be ideal if possible. Sometimes volunteer labor may be the best option.

In some cases, depending on the species and the location, it will be important to communicate with other landowners so that they are aware of a potential threat and be on the lookout. This is especially important for new invasive plant species, since it may be in other places than where it was first identified. Delineating the full extent of a new weed is important for gauging the level of effort that will be needed to treat it successfully.

Several structures can facilitate the needed communication. CMT members provide needed central communication and coordination. Having regular meetings (quarterly is suggested) with interim communications as needed will make sure that all agencies are up-to-speed with each other's detections. Continued communication with OC-CNPS will also be helpful both to support the Chapter's support of EDRR and to facilitate communication about problematic local invasive species.

CMT members will benefit from participating in the Santa Ana River/Orange County Weed Management Area in order to share information with other regional partners. If this existing WMA is not active or does not serve the regional interests of the reserve well, there may be benefit in creating a new Orange County WMA.

3.5 EDRR training

It is essential that land managers and anyone conducting EDRR surveys are well trained on the identification of the priority weed species. Regular trainings, at least once a year, should be held with specimens (fresh ideally, pressed otherwise) of each plant and should focus on Priority 1 and select Priority 2 species identified in this Plan as well as on any newly discovered high risk species. A slide show and printed materials should be prepared showing each plant in the wild and at different life stages. These materials can also help train passive detectors. An outside third party like Cal-IPC may be useful in organizing such trainings, using local expertise for peer-to-peer training and bringing in outside expertise as needed. Curriculum has been developed, and a network of expert instructors is available for such courses, which include a course on Biology and Identification of Invasive Plants and another on Wildland Weed Mapping.

Beyond identification, land managers and surveyors need training on how to map and report observations. As Weed Manager subscribers, the CMT organizations have access to Calflora's Observer Pro application for smartphones, which takes a GPS reading and provides room for photos and notes. This information is then uploaded to the online Calflora database. Care must be taken not to create brand new observations if the population has already been noted in the past. Where a previous record exists, new observations of the same population should be added to the history stack as a new assessment record.

Appendix A: Invasive Plant List

For this plan we worked with the CMT to modify the list we had generated for the Coastal Reserve. We removed species or downgraded species that would not be found/less problematic inland and added species that are not found on the coast. The table below lists invasive plants identified with information on treatment category and survey priority as determined by the CMT, as well as presence in the Coastal Reserve and broader region. It is not a comprehensive list of all invasive plants on the reserve, in that many ubiquitous or less impactful species are missing. This list is intended to be reviewed and updated annually, based on new species that have been identified, though care should be taken not to substantially change priorities for the five-year plan. For those species in treatment category 1 or 2, we also have an impact score and years-to-eradication. Impact score is determined by combining Cal-IPC rating, OC CNPS rating, and San Diego Weed Management Area rating. Year to eradication categories are 5 years, 10 years, and 20 years, depending on the plant species.

Treatment categories are:

1=eradicate across the entire subregion

2=eradicate in those watersheds where feasible and otherwise contain

3=control opportunistically

4=not treated at this time.

Survey priorities are:

1=high priority to survey

2=moderate priority to survey

3=low priority to survey.

Presence on the reserve is based on CMT knowledge. Presence in the region is based on CMT knowledge and Calflora records. Whether there is any mapping data is based on having data in the GIS we have compiled.

Impact scores are based on assessments from Cal-IPC, OC-CNPS and the San Diego Weed Management Area. Years to eradication is estimated based on the life history of each plant and its responsiveness to treatment.

Species	Common Name	Impact	Erad Time	Trmt Cat	Srvy Priority	On Reserve
Acacia cyclops	cyclops acacia			3	2	
Acacia redolens	coastal wattle			3	2	Yes
Aegilops triuncialis	barbed goatgrass	3	10	1	1	
Agave americana	century plant			3	3	Yes
Ageratina adephora	sticky eupatorium	1.25	10	1	1	

Ailanthus altissima	tree-of-heaven	3	10	2	1	Yes
Albizia lophantha	stink bean			3	2	Yes
Araujia sericifera	bladderflower	1.5	10	2	1	Yes
Arctotheca calendula (fertile)	fertile capeweed	2	10	1	1	
Arundo donax	giant reed	3	5	2	1	Yes
Asphodelus fistulosus	onionweed	2	10	2	1	Yes
Atriplex semibaccata	Australian saltbush			3	3	Yes
Avena sp.	Wild oats		5	4	4	Yes
Brachypodium distachyon	purple false brome		5	3	3	Yes
Brassica juncea	India mustard			4	4	Yes
Brassica nigra	black mustard		20	4	4	Yes
Brassica tournefortii	Saharan mustard	2	10	2	1	Yes
Bromus spp.	Brome			4	4	Yes
Carduus pycnocephalus	Italian thistle			3	3	Yes
Cenchrus longispinus	sandbur	2.75	10	1	1	
Cenchrus echinatus	sandbur	2.75	10	1	1	
Centaurea diluta	North African knapweed	2.5	10	2	1	Yes
Centaurea melitensis	tocalote			4	4	Yes
Centaurea solstitialis	yellow starthistle	2.5	10	1	1	Yes
Chrysanthemoides monilifera	bitou bush	1.75	10	1	1	
Cirsium vulgare	bull thistle	2	10	2	1	Yes
Conium maculatum	poison hemlock	1	10	3	2	Yes
Cortaderia selloana	pampas grass	3	5	2	2	Yes
Cynara cardunculus	artichoke thistle	3	10	2	2	Yes
Cyperus papyrus	papyrus			4	4	Yes
Delairea odorata	cape ivy	2.5	5	1	1	Yes
Dittrichia graveolens	stinkwort	2.25	10	1	1	Yes
Echium candicans	pride of madeira	1	10	2	2	Yes
Ehrharta calycina	perennial veldt grass	3	20	2	1	
Ehrharta longiflora	longflowered veldtgrass	1.25	20	1	1	
Emex spinosa	spiny emex	1.75	10	2	1	Yes
Encelia farinosa	brittlebush			3	3	Yes
Eriodium spp.	filaree			4	4	Yes
Eucalyptus camaldulensis	red gum			3	3	Yes
Eucalyptus sp.	eucalyptus			3	3	Yes
Euphorbia terracina	carnation spurge	2	10	1	1	
Euphorbia virgata	leafy spurge	2	10	1	1	
Ficus carica	common fig	2	10	2	2	Yes
Foeniculum vulgare	fennel	3	10	3	2	Yes
Galenia pubescens	coastal galenia	2.75	10	1	1	Yes
Gazania linearis	gazania	2	10	2	2	Yes
Glebionis coronaria	garland chrysanthemum	2	10	2	1	Yes
Hedypnois cretica	Crete weed			4	4	Yes

Hirschfeldia incana	summer IPMUstard		20	4	4	Yes
Hordeum sp.	barley			4	4	Yes
Hypericum canariensis	Canary Island St. Johnswort	2.5	10	1	1	
Iris pseudacorus	yellow flag iris	1.25	10	1	1	
Kochia scoparia	summer cypress	1.25	10	1	1	
Lactuca serriola	wild lettuce			4	4	Yes
Lepidium appelianum	hairy whitetop	1	10	2	1	
Lepidium draba	whitetop	1.5	10	2	1	
Lepidium latifolium	perennial pepperweed	2	10	2	1	Yes
Leucanthemum vulgare	ox-eye daisy	2	10	2	2	
Ligustrum japonicum	Japanese privet	1	10	1	1	
Limonium perezii	statice			3	3	Yes
Limonium ramosissimum	Algerian sea lavender	0.5	10	1	1	Yes
Lolium sp.	rye			4	4	Yes
Lonicera japonica	Japanese honeysuckle	1	10	2	1	
Malephora crocea	coppery mesembryanthemum			3	2	
Malva parviflora	cheeseweed			4	4	Yes
Marrubium vulgare	horehound			3	3	Yes
Medicago polymorpha	bur clover			4	4	Yes
Melia azedarach	Chinaberry tree			3	2	Yes
Melilotus indicus	yellow sweet clover			4	4	Yes
Melinis repens	natalgrass	3	10	1	1	
Myoporum laetum	ngaio tree			3	3	Yes
Nassella tenuissima	Mexican feather grass	2	5	2	1	Yes
Nerium oleander	oleander			3	3	Yes
Nicotiana glauca	tree tobacco			3	3	Yes
Olea europaea	olive	1.75		3	2	Yes
Oncosiphon piluliferum	stinknet	2.25	10	1	1	Yes
Opuntia ficus-indica	Mission cactus			4	4	Yes
Parkinsonia aculeata	Jerusalem thorn			3	2	Yes
Parthenium hysterophorus	Santa Maria feverfew	3	10	1	1	
*Parthenocissus quinquefolia**	Virginia creeper			3	2	Yes
Pennisetum clandestinum	kikiyu grass			4	4	Yes
Pennisetum setaceum	fountain grass	2	5	2	2	Yes
Phalaris aquatica	hardinggrass	3	5	2	2	
Phoenix canariensis	Canary Island date palm			3	3	Yes
Picris echioides	prickly sowthistle			4	4	Yes
Plantago arenaria	Indian plantain	2.5	5	2	2	
Ricinus communis	castor bean	2	20	3	2	Yes
Robinia pseudoacacia	black locust	1.25	10	2	2	Yes
Rubus armeniacus	Himalayan blackberry	3	10	1	1	Yes
Salpichroa origanifolia	lily-of-the-valley vine	2.5	10	2	2	

Salsola tragus	Russian thistle			4	4	Yes
Schinus molle	Peruvian pepper tree			3	2	Yes
Schinus terebinthifolius	Brazilian pepper tree	2	5	3	2	Yes
Senecio linearifolius v. linearifolius	Linear-leaved Australian fireweed	2.5	10	1	1	
Silybum marianum	milk thistle			3	3	Yes
Sonchus sp.	sow thistle			4	4	Yes
Spartium junceum	Spanish broom	2	20	2	1	Yes
Stipa miliacea	smilo grass			4	4	Yes
Tamarix ramosissima	Tamarisk	3	10	2	1	Yes
Tragopogon porrifolius	purple salsify			3	3	
Tropaeolum majus	garden nasturtium			3	2	Yes
Ulmus parvifolia	Chinese elm	2	10	2	2	Yes
Verbesina encelioides	golden crownbeard	1	10	1	1	Yes
Vinca major	Periwinkle			3	2	Yes
Volutaria tubuliflora	Moroccan knapweed	2	10	1	1	
Washingtonia filifera	California fan palm			3	2	Yes
Washingtonia robusta	Mexican fan palm			3	2	Yes

*Need to field verify. May be mis-identified.

Appendix B: Annual Report Template

Tracking invasive plant management activities and their progress is challenging. Given that there is often insufficient time available to achieve on-the-ground control activities it can be difficult to make time for such tracking. However, tracking progress is critical for assessing effectiveness of current strategy and adjusting approaches for the future. Likewise, communicating results to decision-makers such as park directors, the NCC board, and federal and state agencies is critical to guiding decisions about future priorities and funding.

Below is a template for summarizing work performed and progress made. Our goal is to make tracking and reporting systematic, streamlined and informative. The data for this template come primarily from Calflora, assuming that management entities are maintaining records there regarding control efforts on each population. (It would be ideal to automate such reports in Calflora. This is something that Cal-IPC is interested in working on.) Additional information on person-hours comes from organizations like IRC and OCP. Note that this template can be used at multiple scales. IRC and OCP can use it internally for particular sites, then they can roll information up and present a report to NCC, which can then aggregate those reports into a single overall report.

We recommend tracking over time based on both the percent of populations and the net area that is in a particular stage of management (see chart and table on next page). In following this approach it will be helpful to continue revisiting populations that have been identified for control. If new populations are found, they should be added to annual reports and a note of their inclusion should be made. Ideally, there should not be large variation in size of populations, so it may make sense to break up large infested areas into multiple populations at the start of control activities. And it is important to maintain the same population definitions over time. If you need to name smaller subsets of populations as treatment progresses, define them as sub-populations of the original population that you have been tracking. A population definition of a minimum 30m spacing to the nearest next population can be helpful to delimit a population.

We calculate an aggregate “Percent to Eradication” for Category 1 and 2 species by assuming the annual effort for 5-year-to-eradication species moves managers 20% closer to eradication and so on for 10-year- and 20-year-to-eradication species. Overall progress is then calculated using a weighted average based on the number of populations in each length of eradication.

The example graphs and charts in the following template are based on a spreadsheet that documents the portion of populations in each management stage. The template can be adjusted to fit within the current NCCP reporting framework. Currently they are using idealized timelines for 5-year-, 10-year- and 20-year-to-eradicaton species, but when in use these values will be adjusted based on real-world data. The portion of populations in each management stage can be pulled from Calflora records for the populations in question based on that year’s entry for the “management status” field for each population.

Annual Report for Invasive Plant Management

Entity reporting: _____

Timeframe covered: _____

Invasive Plant Management Unit(s) covered: _____

_____

Total time invested: _____ person-hours *(counting field, office and travel time)*

Brief background: *[mention how much rainfall, any fires, key organizational changes, etc.]*

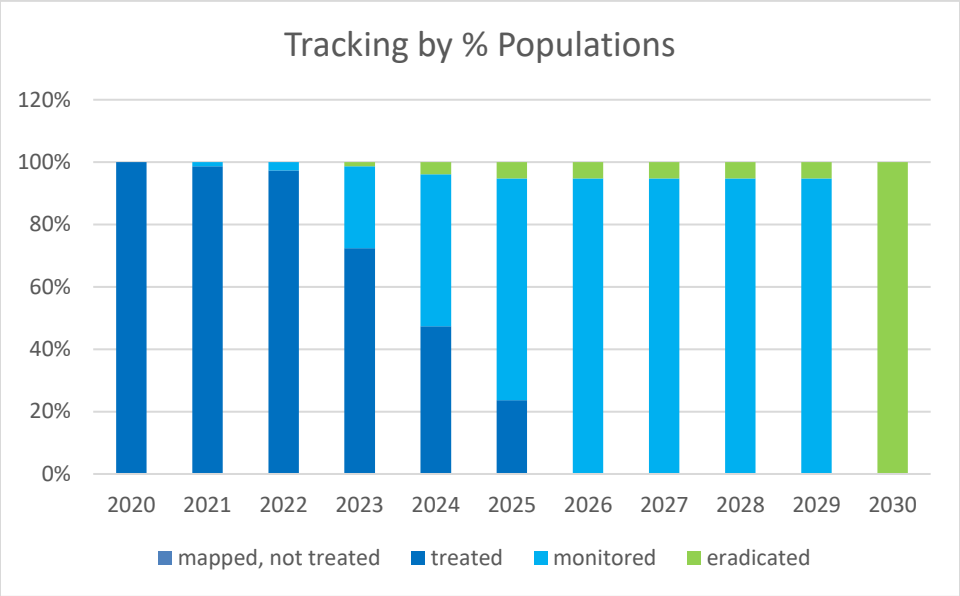
Summary of work performed:

	Populations	Net area	% to eradication	% last year
Category 1 plants				
Category 2 plants				
Category 3 plants			n/a	n/a

Top ten invasive plants by investment:

	Category	Net Area	Person-hours
Species 1			
Species 2			
Species 3			
Species 4			
Species 5			
Species 6			
Species 7			
Species 8			
Species 9			
Species 10			

Management Progress for Category 1 species:



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
treated	100%	99%	97%	72%	47%	24%	0%	0%	0%	0%	0%
monitored	0%	1%	3%	26%	49%	71%	95%	95%	95%	95%	0%
eradicated	0%	0%	0%	1%	4%	5%	5%	5%	5%	5%	100%
progress	11%	21%	32%	42%	53%	63%	74%	84%	95%	100%	100%

This includes 18 populations rated as 10-years-to-eradication (nine of yellow starthistle, two of stinknet and one of golden crownbeard) and one population rated as 5-years-to-eradication (Cape-ivy). We completed planned treatment on all Category 1 species this year. We also began treatment on one additional population of species X identified in this year's detection surveys. *[Add narrative of highlights.]*

[A similar graph can be presented for net area treated that presents actual acreage]

Progress for Category 2 species:

[Follow same approach as above for Category 1 species.]

Early Detection/Rapid Response work:

Miles surveyed:

	Total Miles surveyed 20XX	Miles planned 20XX	High (every yr) 20XX	Moderate (every 2 yr) 20XX	Low (every 3 yr) 20XX
Agua Chinon/Loma Ridge					
Black Star Canyon					
Coal Canyon/Chino Hills					
Fremont Canyon					
Gypsum Canyon					
Limestone Canyon					
Santiago Creek					
Silverado Canyon					
Weir/Blind Canyon					
West Loma Ridge/Peters Canyon					
Whiting Ranch					
TOTALS					

Invasive plants detected:

Species	# Populations	Net Area	Category

Of these detections, ## populations were determined by land managers to be a high priority for immediate action. (The other populations were integrated into the management plan for that property.)

Rapid response results:

MU	Species	Action	Status

Appendix C: Invasive Plant Management Unit Profiles

The following Profiles summarize control recommendations for each of the Invasive Plant Management Units (IPMUs). In each, tables show populations for each Category 1, 2 and 3 species found in the IPMU. They are divided up by land ownership and responsible land management entity based on where they are located. Tables detail any net area that falls within a Core Area or Investment Area. They also show the person hours needed to control these species each year, again divided by the land ownership and responsible land management entity.

The Profiles are designed to be used by the CMT to select management priorities and design a workplan. To do so, the Profiles should be used in conjunction with (1) the management hierarchy presented in section 2.3 of this report and (2) the associated GIS that allows a detailed examination of each population. Species within each IPMU are sorted by Treatment Category and impact score within Treatment Category. Some Category 3 species do not have impact scores because they were not scored by the CMT during development of this plan and the Coastal Plan.

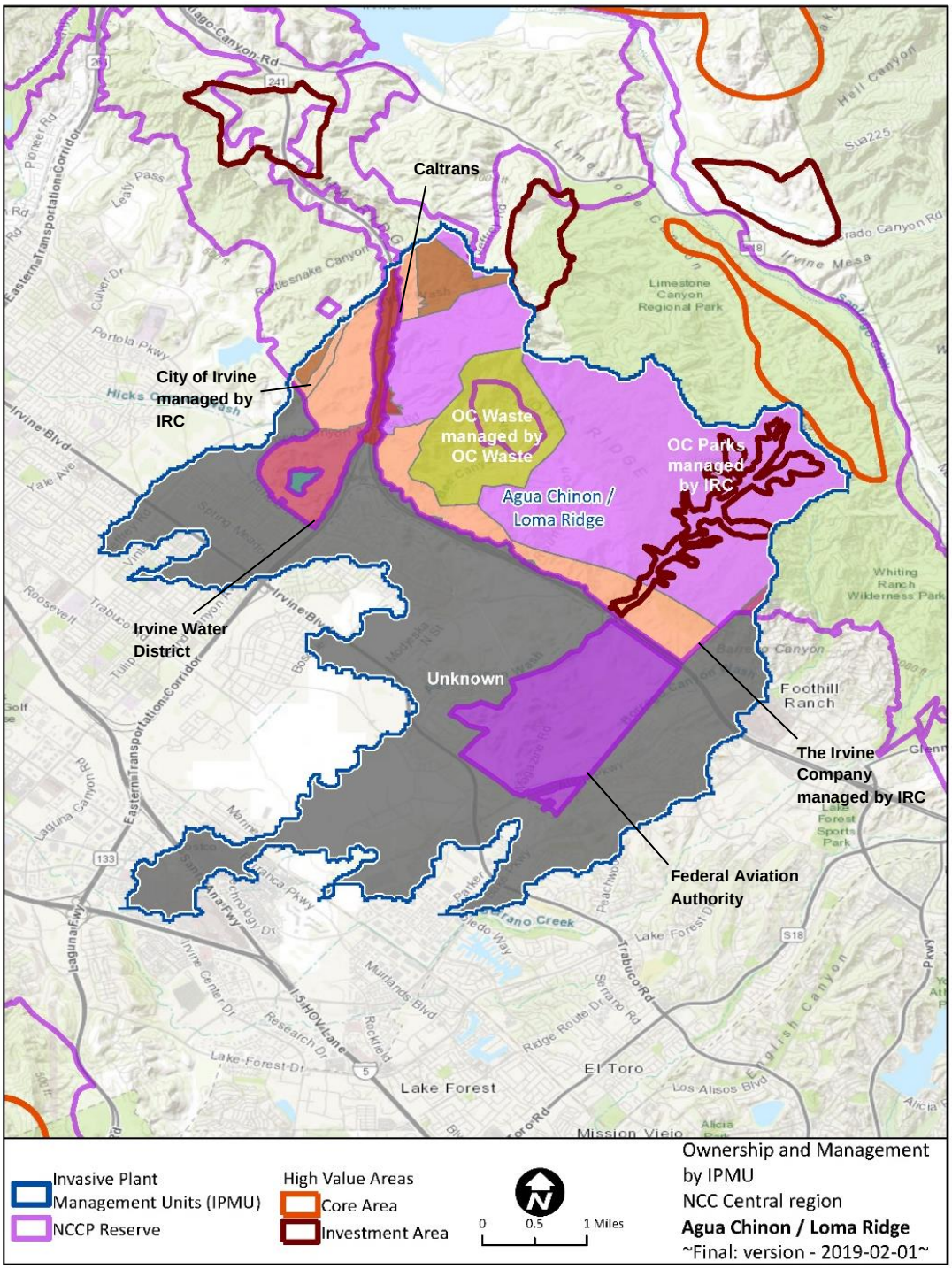
The tables and maps in each Profile are based on the best available distribution data, but these data are imperfect. The following should be kept in mind:

- The data reflect a snapshot in time using the best available data. The NCC 2017 baseline dataset for the CRMA was an aggregation of helicopter survey data (conducted between 21-29 June 2016 and 9-11 August 2017) and IRC treatment data from 2016 and 2017. Where IRC data and helicopter data overlap, we use IRC data. In locations where IRC had treatment data from both 2016 and 2017 we used 2017 data. We did not use any existing Calflora data prior to 2017 in this baseline dataset. (Note that the Coal Canyon/Chino Hills Management Unit was not fully included in the 2016/2017 helicopter survey.)
- The data represent the mapped populations of invasive plants. Other population may be undetected or unmapped by helicopter and/or land managers on the ground. Some areas are inaccessible on foot, and helicopter survey is limited by what the observer sees and where routes are flown. Areas where removal work has been undertaken have generally been mapped more thoroughly than other areas.
- The determination of separate populations of a given invasive plant species may be inconsistent between different mapping entities. The general rule used in the helicopter mapping was that a population ends when there are no other plants of that species within 100 feet (30m).
- A given invasive plant population, which may straddle multiple IPMUs, is attributed to the Management Unit within which its centroid lies.

Invasive Plant Management Unit Profile:

Agua Chinon / Loma Ridge

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

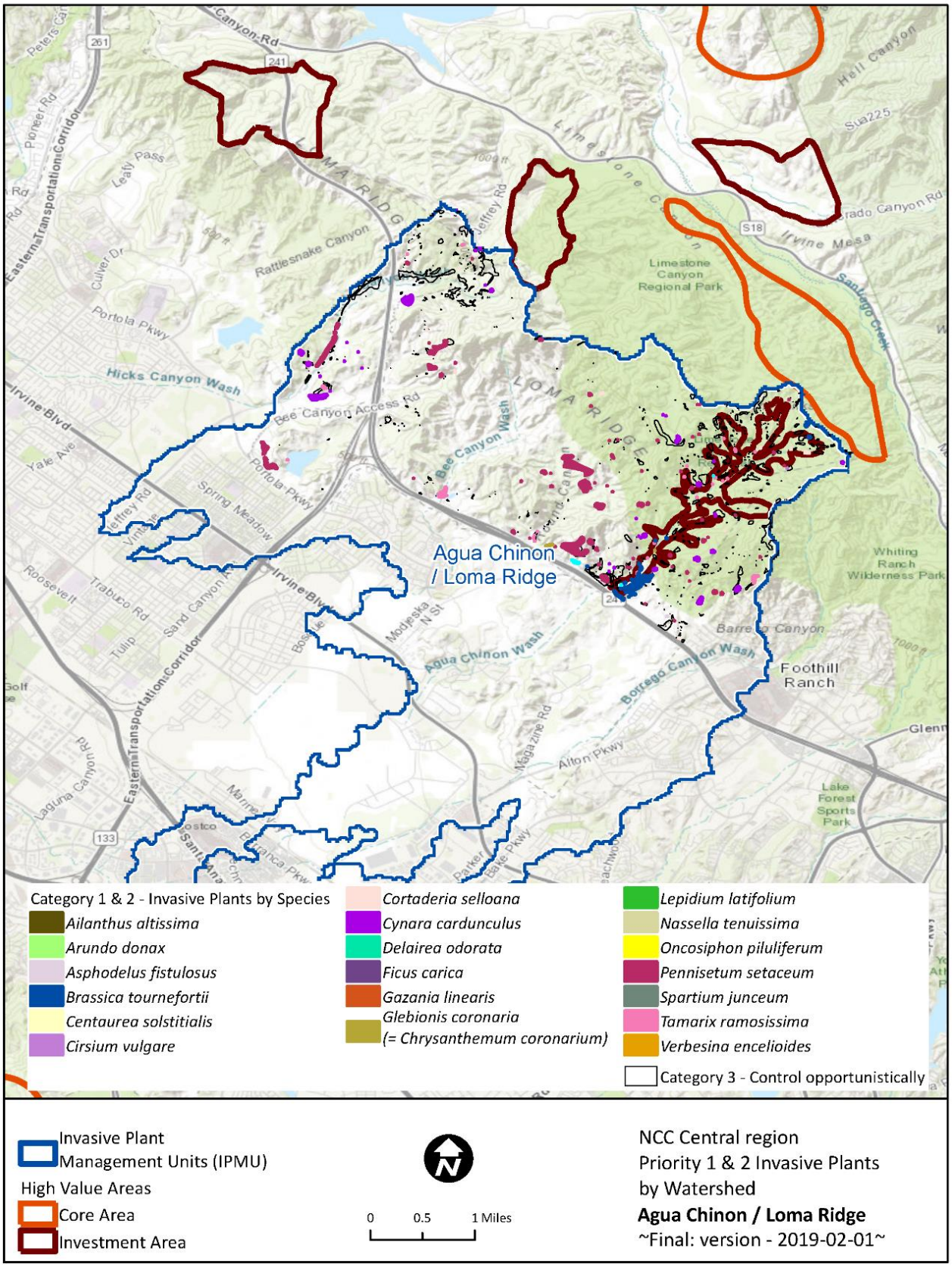


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	3,303	3
Federal Aviation Authority	Other	1,001	1
The Irvine Company	Irvine Ranch Conservancy	980	5
OC Waste	OC Waste	552	173
Irvine Water District	Irvine Water District	276	0
City of Irvine	Irvine Ranch Conservancy	217	0
OC Parks	OC Parks	23	0
Caltrans	Caltrans	15	143
Unknown	To be Developed	6	716
Private	Unmanaged	0	24
Unknown	Developed	0	5,351
Totals		6,373	6,416

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Agua Chinon / Loma Ridge

			TOTALS					BY LANDOWNER / MANAGER					
								COI/	IWD/	OCP/	OCP/	IR Co./	Caltrans/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC	IWD	IRC	OCP	IRC	Caltrans
				(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Oncosiphon piluliferum	1	2.25	2	19	2	-	2	-	-	1	-	1	-
Verbesina encelioides	1	1	1	1,363	1	-	-	-	-	-	-	1	-
Cynara cardunculus	2	3	39	42,932	1,481	-	-	308	-	761	-	412	-
Tamarix ramosissima	2	3	27	10,802	1,347	-	50	9	3	18	1,035	282	-
Cortaderia selloana	2	3	10	389	75	-	58	1	-	74	-	1	-
Pennisetum setaceum	2	2	69	141,440	11,910	-	42	1	1,920	7,400	-	2,590	-
Brassica tournefortii	2	2	28	50,034	787	-	28	-	-	30	-	531	226
Glebionis coronaria	2	2	2	767	4	-	1	-	-	1	-	4	-
Asphodelus fistulosus	2	2	1	60	22	-	-	-	-	-	-	22	-
Cirsium vulgare	2	2	1	1	1	-	-	-	-	1	-	-	-
Nerium oleander	3		1	3	2	-	-	-	-	-	-	2	-
Marrubium vulgare	3		159	147,926	5,657	-	1,241	3	-	5,562	-	92	-
Carduus pycnocephalus	3		40	79,696	1,060	-	584	-	-	1,060	-	-	-
Encelia farinosa	3		75	230,845	29,117	-	-	6,645	11	10,610	-	11,851	-
Ricinus communis	3		28	23,939	3,471	-	2,836	29	53	233	-	3,156	-
Nicotiana glauca	3		528	136,256	9,515	-	852	464	6	4,967	327	3,744	7
Foeniculum vulgare	3		14	36,073	1,110	-	-	-	-	12	-	1,098	-
Washingtonia robusta	3		7	375	5	-	1	-	-	2	-	2	-
Silybum marianum	3		21	84,865	4,276	-	260	-	-	1,297	-	2,979	-
Schinus molle	3		2	154	104	-	-	-	74	-	-	31	-
Conium maculatum	3		1	986	148	-	-	-	-	148	-	-	-
TOTALS			**1,056**	**988,923**	**70,096**	-	**5,953**	**7,461**	**2,066**	**32,177**	**1,362**	**26,800**	**233**
in acres:				244	17	-	1.47	1.8	0.5	8.0	0.3	6.6	0.1
								11%	3%	46%	2%	38%	0%


Agua Chinon / Loma Ridge
Limestone Canyon Regional Park
Whiting Ranch Wilderness Park
Foothill Ranch
Lake Forest Sports Park
Irvine Mesa
Hicks Canyon Wash
Bee Canyon Wash
Agua Chinon Wash
Borrego Canyon Wash
Rattlesnake Canyon
Portola Pkwy
Irvine Blvd
Alton Pkwy
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0 0.5 1 Miles
NCC Central region
Priority 1 & 2 Invasive Plants by Watershed
Agua Chinon / Loma Ridge
~Final: version - 2019-02-01~

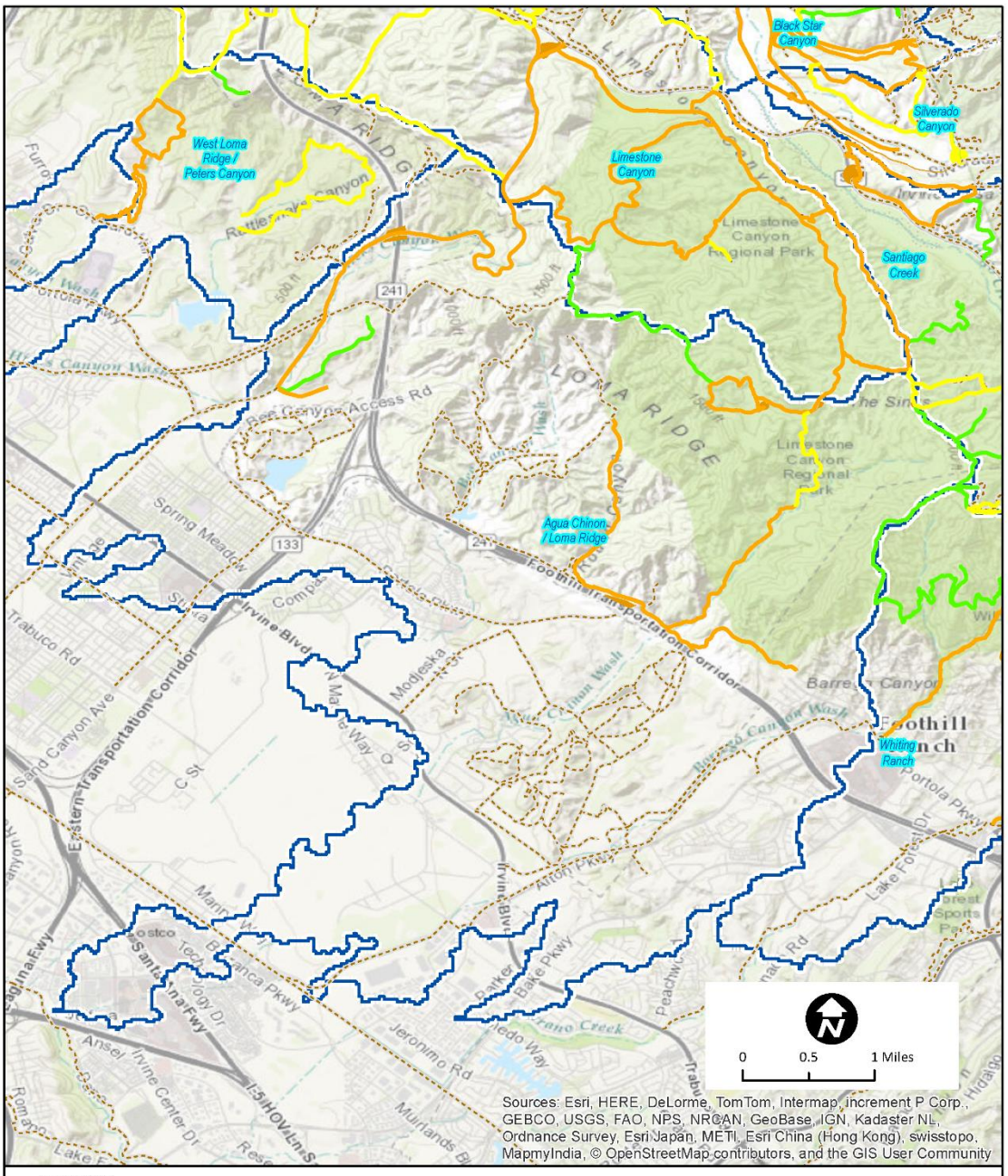
Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Agua Chinon / Loma Ridge

Person-Hours:	Cat.	Impact	COI/ IRC	IWD/ IWD	OCP/ IRC	OCP/ OCP	IR Co./ IRC	Caltrans/ Caltrans	Totals	
Oncosiphon piluliferum	1	2.25	-	-	3	-	2	-	6	0%
Verbesina encelioides	1	1	-	-	-	-	2	-	2	0%
Cynara cardunculus	2	3	22	-	55	-	30	-	107	3%
Tamarix ramosissima	2	3	1	0	1	62	17	-	81	2%
Cortaderia selloana	2	3	0	-	21	-	0	-	22	1%
Pennisetum setaceum	2	2	0	60	232	-	81	-	373	11%
Brassica tournefortii	2	2	-	-	3	-	48	21	72	2%
Glebionis coronaria	2	2	-	-	1	-	4	-	5	0%
Asphodelus fistulosus	2	2	-	-	-	-	2	-	2	0%
Cirsium vulgare	2	2	-	-	2	-	-	-	2	0%
Nicotiana glauca	3		61	1	649	43	490	1	1,244	36%
Encelia farinosa	3		166	0	264	-	295	-	726	21%
Marrubium vulgare	3		0	-	423	-	7	-	431	12%
Silybum marianum	3		-	-	38	-	88	-	127	4%
Ricinus communis	3		1	2	8	-	113	-	125	4%
Carduus pycnocephalus	3		-	-	101	-	-	-	101	3%
Foeniculum vulgare	3		-	-	1	-	50	-	50	1%
Washingtonia robusta	3		-	-	7	-	7	-	14	0%
Schinus molle	3		-	4	-	-	2	-	6	0%
Conium maculatum	3		-	-	5	-	-	-	5	0%
Nerium oleander	3		-	-	-	-	2	-	2	0%
TOTALS			**251**	**68**	**1,816**	**105**	**1,241**	**22**	**3,502**	
			7%	2%	52%	3%	35%	1%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Agua Chinon	1.6	1.0	
Box Springs	0.7		
East Loma	0.8		2.0
Hicks Haul	3.2		
Hicks Trail			0.9
Limestone Ridge		0.3	
Mustard			1.2
Round Canyon	1.9		
unknown	1.5		
Totals	9.7	1.3	4.1
*Agua Chinon / Loma Ridge has an additional 17 acres of high priority (every year) site survey areas, as depicted in the EDRR map.			



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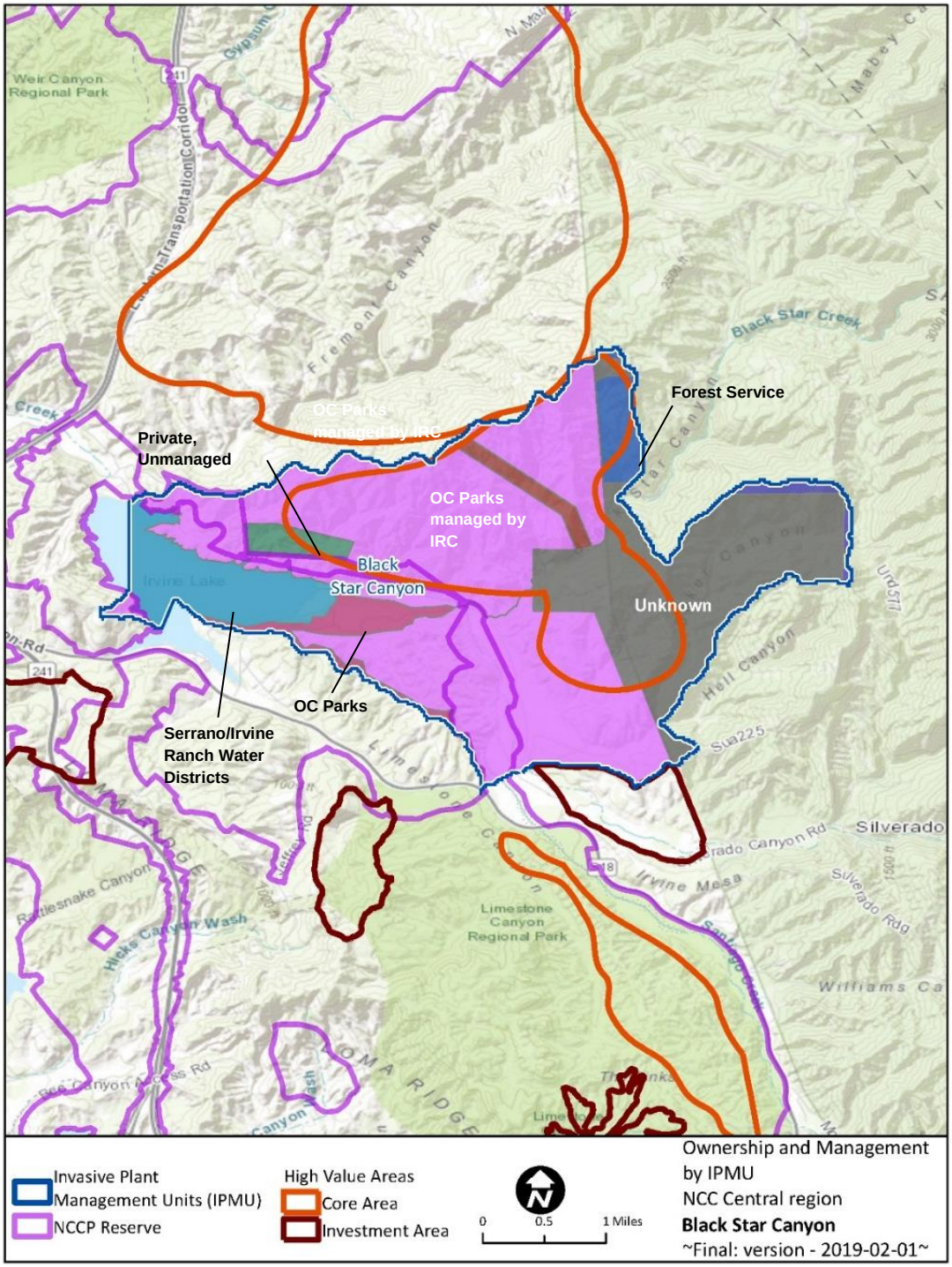
Invasive Plant Management Unit Profile:

Black Star Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

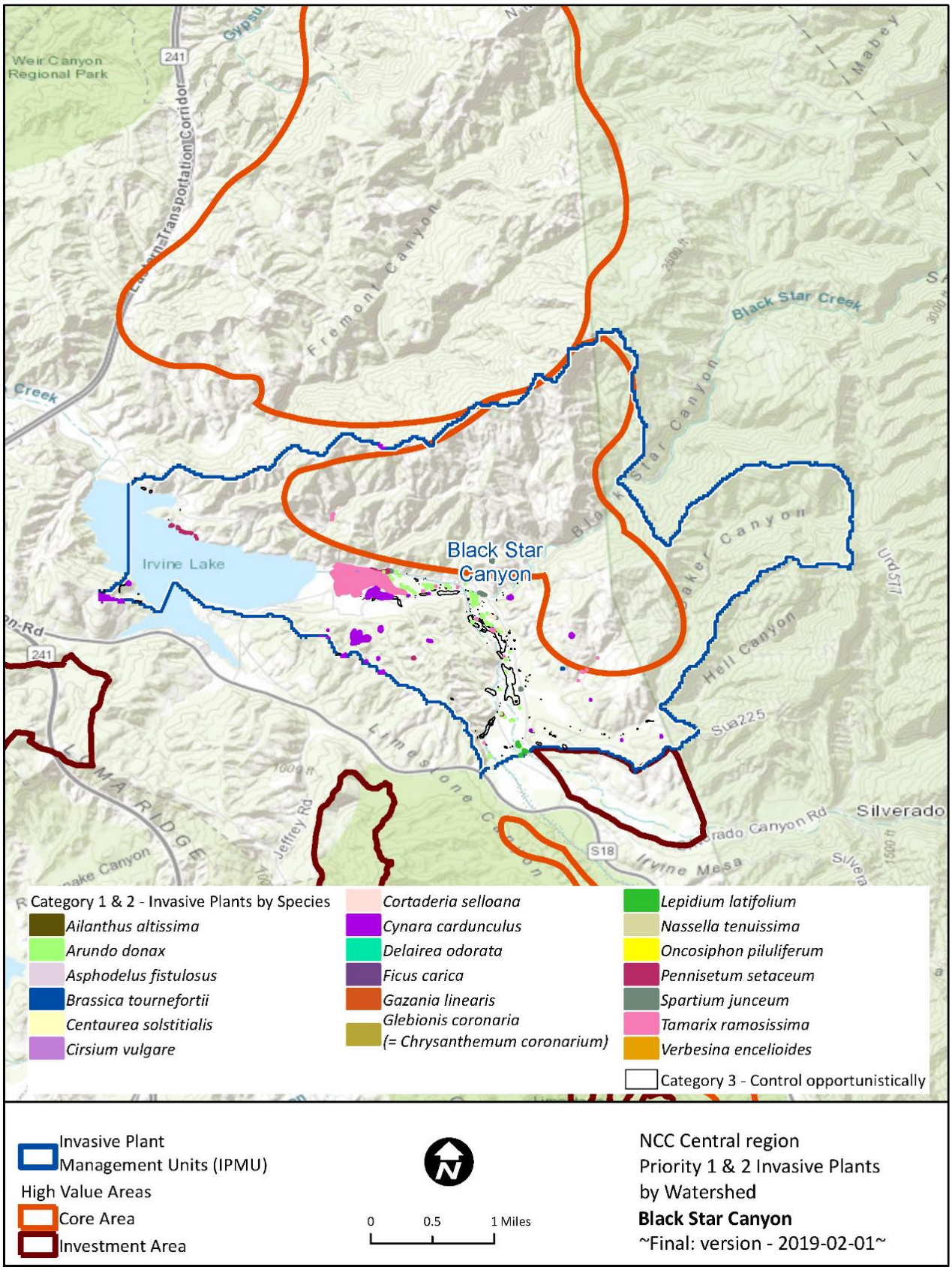


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	507	2,678
Private	Unmanaged	4	96
The Irvine Company	Other	0	0
Serrano/Irvine Ranch Water Districts	Other		464
Forest Service	Unmanaged		79
Southern California Edison	Southern California Edison		91
Unknown	Unmanaged		1,323
OC Parks	OC Parks		224
Forest Service	Forest Service		165
OC Public Works	Other		0
Totals		512	5,119

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Black Star Canyon

			TOTALS					BY LANDOWNER / MANAGER	
	Cat.	Impact	Pops	Gross (m2)	Net (m2)	Net, Core (m2)	Net, Inv (m2)	OCP/ IRC (m2)	OCP/ OCP (m2)
Arundo donax	2	3	65	5,594	1,266	-	-	1,177	89
Cynara cardunculus	2	3	30	75,257	3,588	6	-	2,989	599
Tamarix ramosissima	2	3	15	162,757	24,390	79	-	118	24,272
Cortaderia selloana	2	3	6	8	5	1	-	5	-
Pennisetum setaceum	2	2	9	4,984	175	-	-	175	-
Spartium junceum	2	2	8	3,452	29	5	-	29	-
Lepidium latifolium	2	2	4	20,385	7,313	-	-	7,313	-
Cirsium vulgare	2	2	3	4,909	1,837	-	-	1,837	1
Brassica tournefortii	2	2	1	82	7	-	-	7	-
Foeniculum vulgare	3	3	58	46,057	984	-	-	350	631
Ricinus communis	3	2	8	9,781	408	-	-	408	-
Schinus terebinthifolius	3	2	1	5	4	-	-	4	-
Olea europaea	3	1.75	2	2,617	395	-	-	395	-
Nicotiana glauca	3		86	211,273	54,645	-	-	2,826	51,819
Marrubium vulgare	3		17	5,097	273	-	-	273	-
Washingtonia robusta	3		11	13	8	-	-	7	1
Nerium oleander	3		2	55	46	-	-	46	-
Eucalyptus camaldulensis	3		1	639	2	-	-	2	-
Phoenix canariensis	3		1	29	18	-	-	18	-
TOTALS			**185**	**158,084**	**15,321**	**7**	-	**13,953**	**1,319**
in acres:				39	3	0.00	-	2.5	0.2
								91%	9%

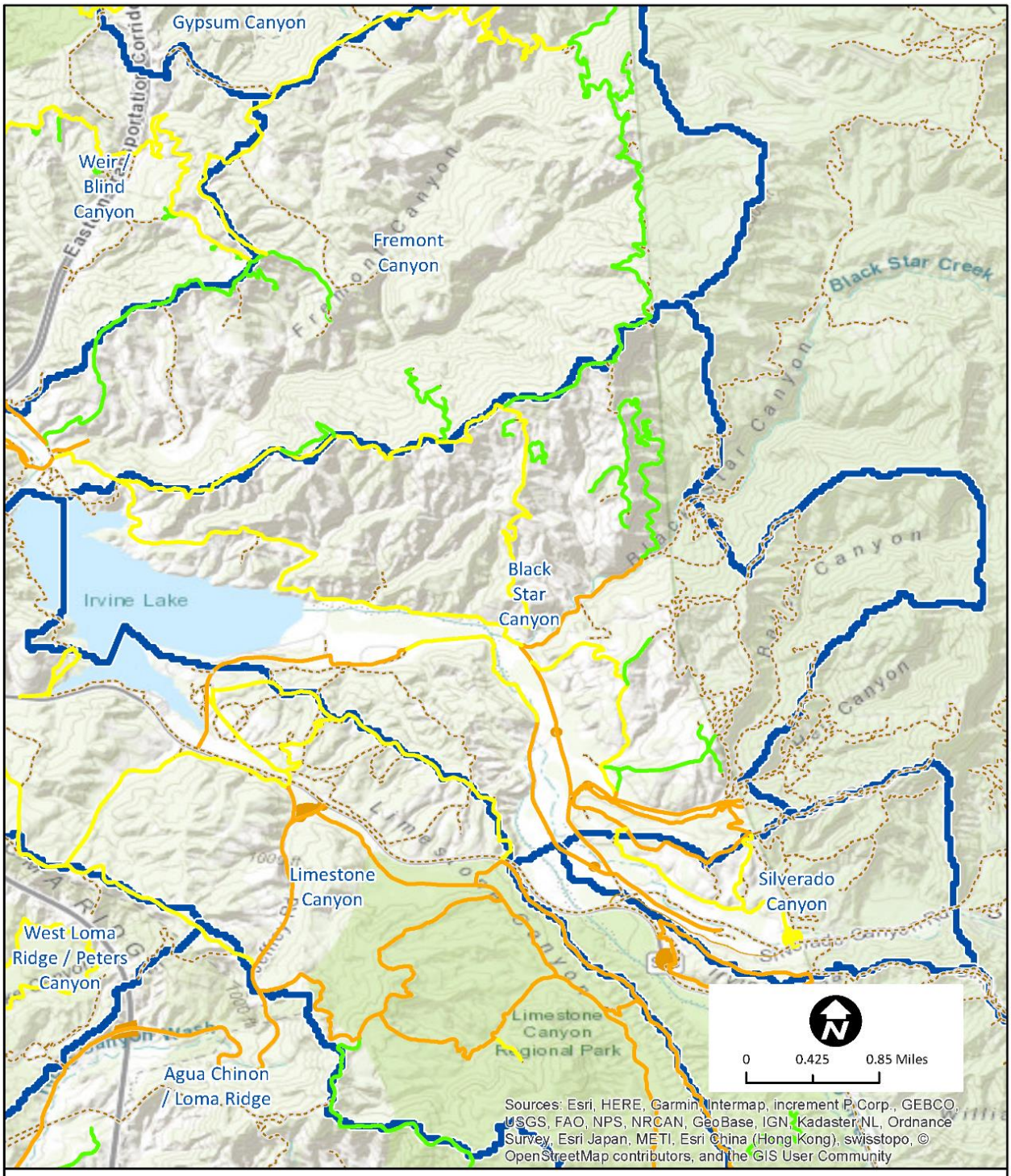

Weir Canyon Regional Park
241
Fremont Canyon
Black Star Creek
Black Star Canyon
Baker Canyon
Hell Canyon
Irvine Lake
Black Star Canyon
Limestone Canyon
Jeffrey Rd
Irvine Mesa
Silverado
S18
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
N
0
0.5
1 Miles
NCC Central region
Priority 1 & 2 Invasive Plants by Watershed
Black Star Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Black Star Canyon						
Person-Hours:			OCP/	OCP/		
	Cat.	Impact	IRC	OCP	Totals	
Tamarix ramosissima	2	3	482	31	514	20%
Arundo donax	2	3	146	9	155	6%
Cynara cardunculus	2	3	121	10	131	5%
Cortaderia selloana	2	3	12	-	12	0%
Lepidium latifolium	2	2	153	-	153	6%
Cirsium vulgare	2	2	42	0	42	2%
Pennisetum setaceum	2	2	21	-	21	1%
Spartium junceum	2	2	17	-	17	1%
Brassica tournefortii	2	2	2	-	2	0%
Foeniculum vulgare	3	3	61	74	135	5%
Ricinus communis	3	2	24	-	24	1%
Schinus terebinthifolius	3	2	2	-	2	0%
Olea europaea	3	1.75	12	-	12	0%
Nicotiana glauca	3		1,089	163	1,252	49%
Marrubium vulgare	3		39	-	39	2%
Washingtonia robusta	3		18	4	22	1%
Nerium oleander	3		5	-	5	0%
Phoenix canariensis	3		2	-	2	0%
Eucalyptus camaldulensis	3		2	-	2	0%
TOTALS			**2,251**	**292**	**2,544**	
			89%	11%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Baker	0.9		
Baker Canyon	0.9		
Black Star	2.6	0.2	
Black Star SCE			3.3
Blue Diamond	1.2		
Hall Canyon	0.4		
Lakeshore		3.2	
Lakeview	1.1	0.5	
Red Rock	1.1	0.3	
SCE 1	0.1		0.9
SilMod		1.7	0.3
State Spur		2.2	
unknown	0.8	2.2	1.3
Totals	7.9	10.2	5.9
*Black Star Canyon has an additional 4 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



LEGEND

EDRR Survey Priority

- High — *Survey every 1 year*
- Medium — *Survey every 2 years*
- Low — *Survey every 3 years*

Other trails

Invasive Plant Management Units (IPMU)

EDRR Routes

NCC Central region

Black Star Canyon

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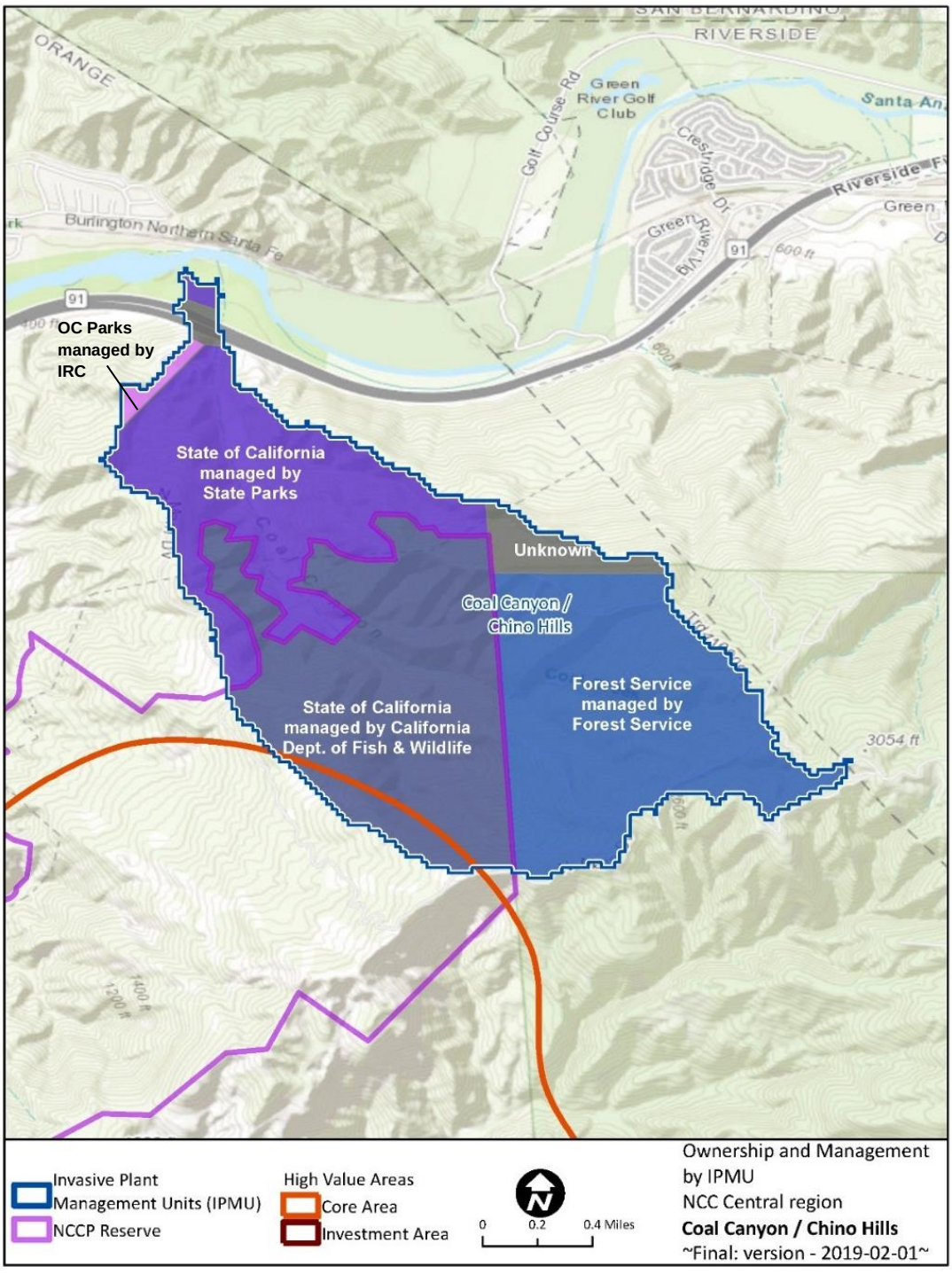
Invasive Plant Management Unit Profile:

Coal Canyon/Chino Hills

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

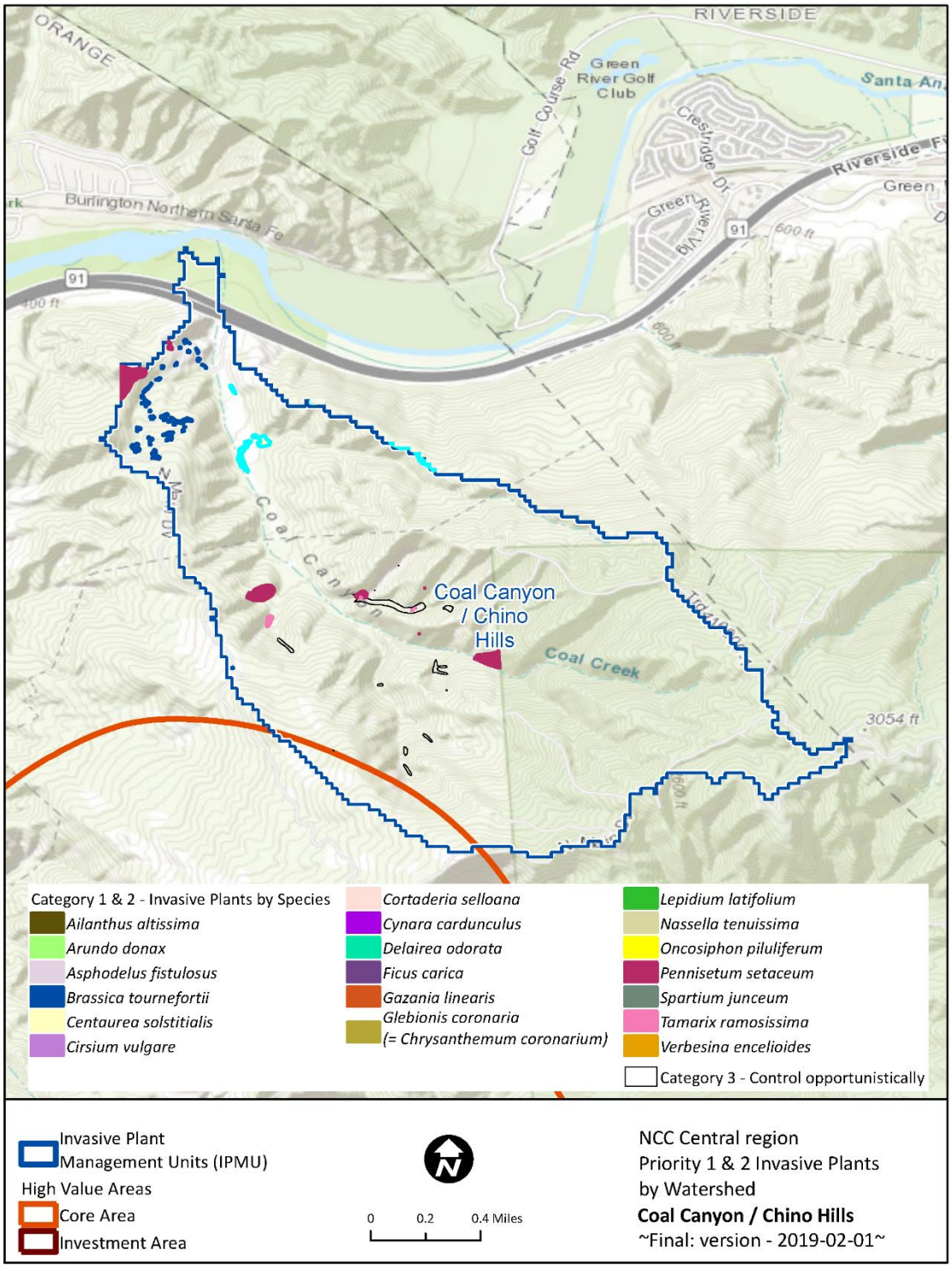


Landowner	Manager	Acres in NCCP	Acres outside NCCP
Cal. Dept. of Fish & Game	Cal. Dept. of Fish & Game	493	
Cal. State Parks	Cal. State Parks		363
Orange County Parks	Irvine Ranch Conservancy		14
US Forest Service	US Forest Service		459
unknown	unknown		58
Totals		493	893

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Coal Canyon / Chino Hills

			TOTALS					BY LANDOWNER / MANAGER		
								OCP/	CA/	CA/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC	DFW	SP
				(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Centaurea solstitialis	1	2.5	5	11,654	171	-	-	-	-	171
Tamarix ramosissima	2	3	4	1,019	36	-	-	-	36	-
Brassica tournefortii	2	2	36	6,889	92	-	-	1	1	92
Pennisetum setaceum	2	2	6	16,387	1,527	-	-	66	1,461	-
Nicotiana glauca	3		11	18,538	2,484	-	-	-	2,484	-
Eucalyptus camaldulensis	3		1	11	4	-	-	-	4	-
TOTALS			**63**	**54,497**	**4,314**	-	-	**67**	**3,986**	**263**
in acres:				13	120	-	-	0.0	1.0	0.1
								2%	92%	6%

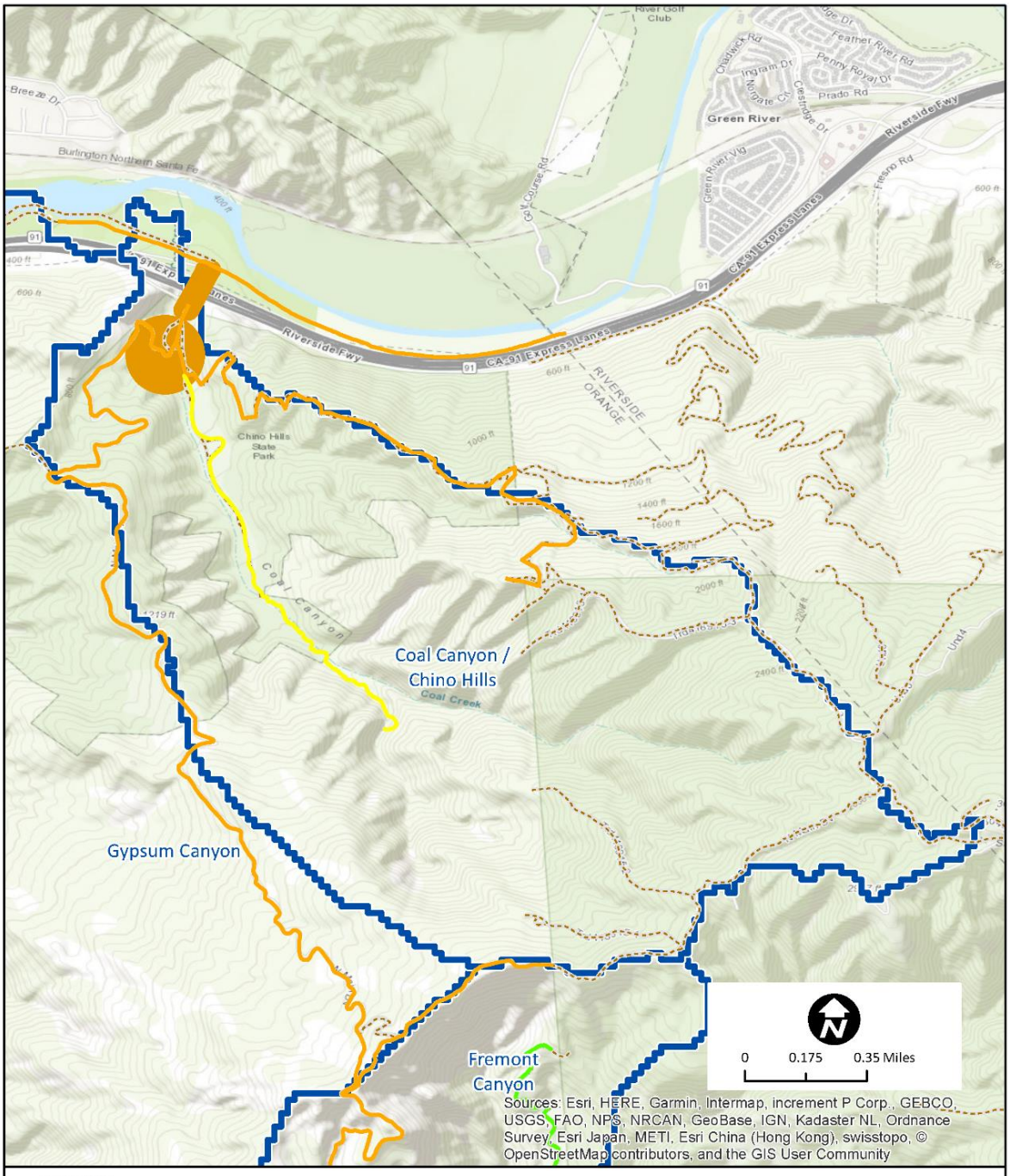

RIVERSIDE
ORANGE
Green River Golf Club
Golf Course Rd
Crestridge Dr
Green River Rd
Riverside Fy
Burlington Northern Santa Fe
91
600 ft
400 ft
Coal Canyon / Chino Hills
Coal Creek
3054 ft
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0
0.2
0.4 Miles
NCC Central region
Priority 1 & 2 Invasive Plants by Watershed
Coal Canyon / Chino Hills
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Coal Canyon / Chino Hills							
Person-Hours:			OCP/	CA/	CA/		
	Cat.	Impact	IRC	DFW	SP	Totals	
Centaurea solstitialis	1	2.5	-	-	13	13	8%
Tamarix ramosissima	2	3	-	9	-		
Brassica tournefortii	2	2	1	1	74	75	47%
Pennisetum setaceum	2	2	2	40	-		
Nicotiana glauca	3	0	-	71	-	71	44%
Eucalyptus camaldulensis	3	0	-	2	-	2	1%
TOTALS			**1**	**74**	**87**	**162**	100%
			0%	46%	54%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Coal Canyon Trail		1.3	
Unnamed trail	4.2		
Totals	4.2	1.3	
* Coal Canyon / Chino Hills has an additional 18 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



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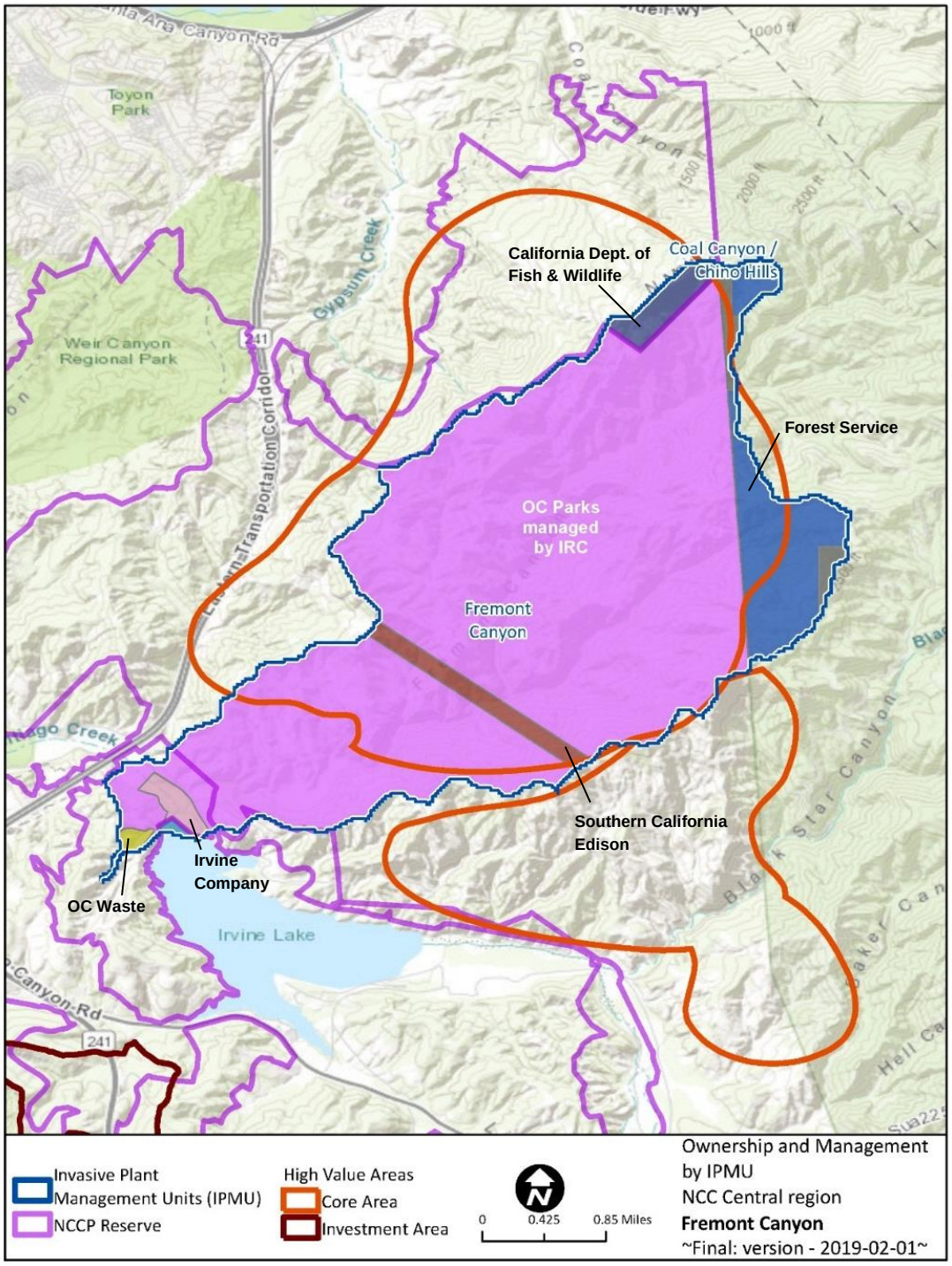
Invasive Plant Management Unit Profile:

Fremont Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

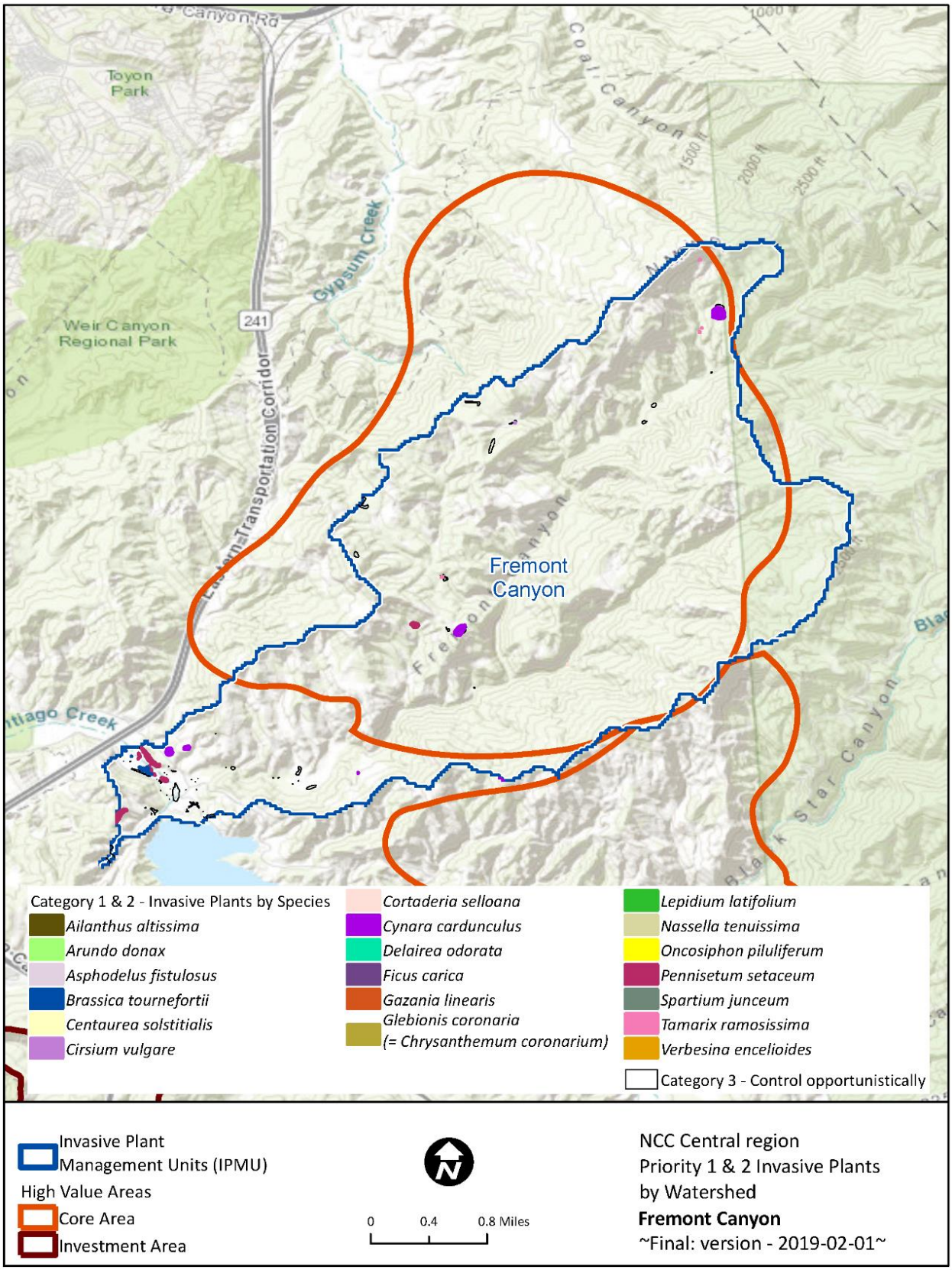


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	137	4,214
State of California	Cal. Dept. of Fish & Wildlife	94	4
The Irvine Company	Other	45	0
OC Waste	OC Waste	25	
Unknown	Unmanaged		64
Forest Service	Forest Service		447
Caltrans	Caltrans		0
Southern California Edison	Southern California Edison		110
Serrano/Irvine Ranch Water Districts	Other		12
Totals		301	4,852

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Fremont Canyon

			TOTALS					BY LANDOWNER / MANAGER	
	Cat.	Impact	Pops	Gross (m2)	Net (m2)	Net, Core (m2)	Net, Inv (m2)	OCP/ IRC (m2)	IR Co./ Other (m2)
Brassica tournefortii	2	2	6	1,061	77	-	-	7	69
Cirsium vulgare	2	2	1	1	1	1	-	1	-
Cortaderia selloana	2	3	2	14	2	2	-	2	-
Cynara cardunculus	2	3	5	20,780	103	90	-	103	-
Encelia farinosa	3		1	17,651	530	-	-	-	-
Foeniculum vulgare	3	3	9	10,563	492	-	-	222	271
Marrubium vulgare	3		26	35,970	1,033	835	-	996	37
Nicotiana glauca	3		34	5,976	1,615	1,183	-	1,566	35
Pennisetum setaceum	2	2	9	14,713	2,008	322	-	1,967	41
Ricinus communis	3	2	3	146	4	-	-	-	4
Schinus molle	3		5	682	400	-	-	-	400
Tamarix ramosissima	2	3	4	53	33	33	-	30	-
Washingtonia robusta	3		3	4	2	-	-	2	-
TOTALS			**108**	**107,613**	**6,300**	**2,467**	-	**4,895**	**858**
in acres:				26.6	1.6	0.6	-	1.2	0.21
								85%	15%

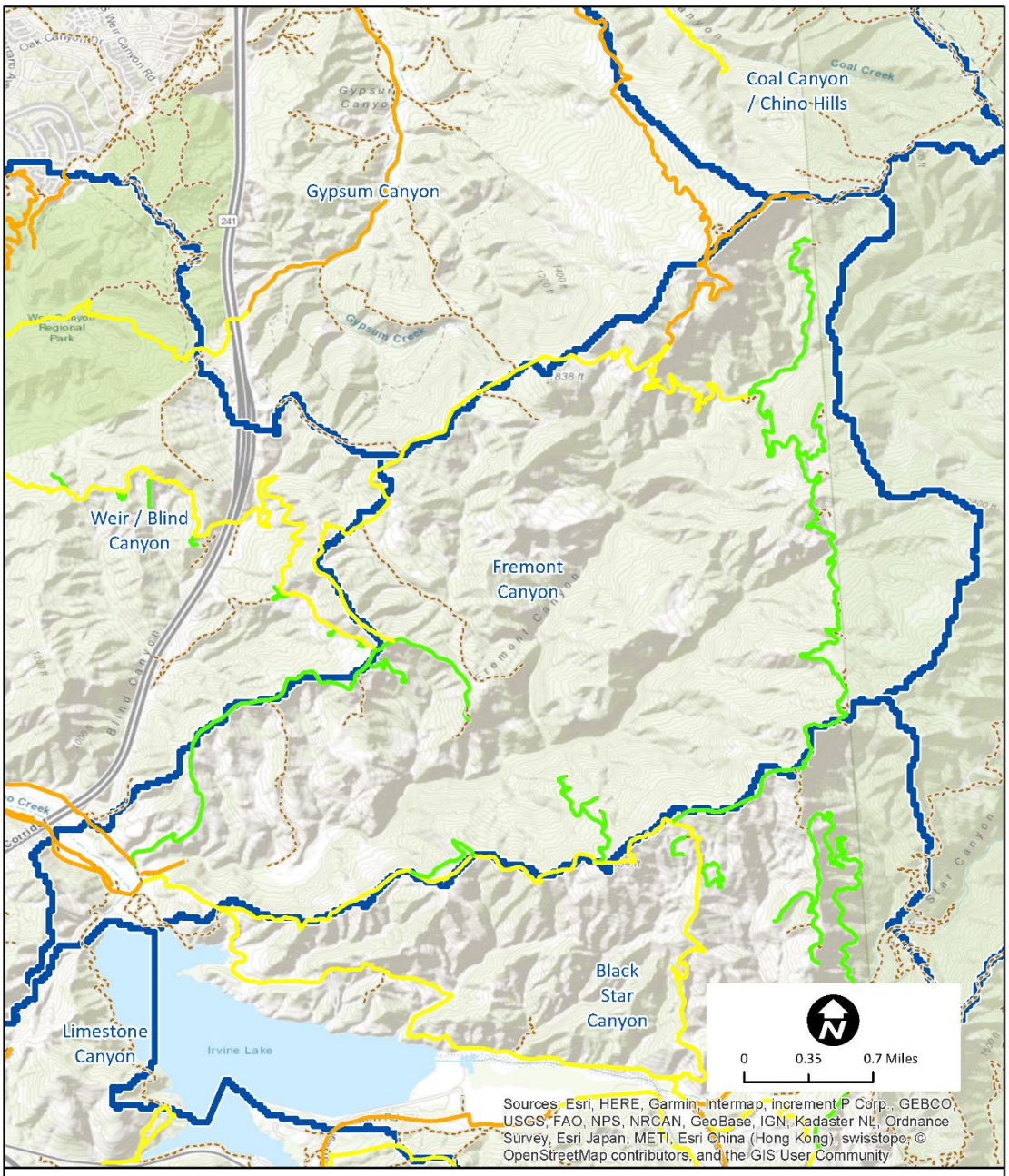

Toyon Park
Weir Canyon Regional Park
Gypsum Creek
241
Fremont Canyon
Coal Canyon
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0 0.4 0.8 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Fremont Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Fremont Canyon							
Person-Hours:			OCP/	CA/	IR Co./		
		Impact	IRC	DFW	Other	Totals	
Cynara cardunculus	2	3	12	-	-	12	4%
Tamarix ramosissima	2	3	8	1	-	9	3%
Cortaderia selloana	2	3	4	-	-	4	1%
Pennisetum setaceum	2	2	57	-	1	58	18%
Brassica tournefortii	2	2	1	-	12	14	4%
Cirsium vulgare	2	2	2	-	-	2	1%
Foeniculum vulgare	3	3	13	-	15	28	8%
Ricinus communis	3	2	-	-	6	6	2%
Nicotiana glauca	3		97	-	2	99	30%
Marrubium vulgare	3		70	-	3	73	22%
Schinus molle	3		-	-	18	18	5%
Washingtonia robusta	3		6	-	-	6	2%
Encelia farinosa	3		-	-	-	-	0%
TOTALS			**269**	**1**	**57**	**327**	
			82%	0%	18%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Black Star SCE		1.4	4.2
Coal Mine			0.5
Donaldson's Camp			1.2
Lakeview		2.2	0.7
MOFRE	0.2		
MWD		0.4	
Windy Ridge	0.3	2.1	0.2
unknown			2.5
Totals	0.6	6.1	9.2



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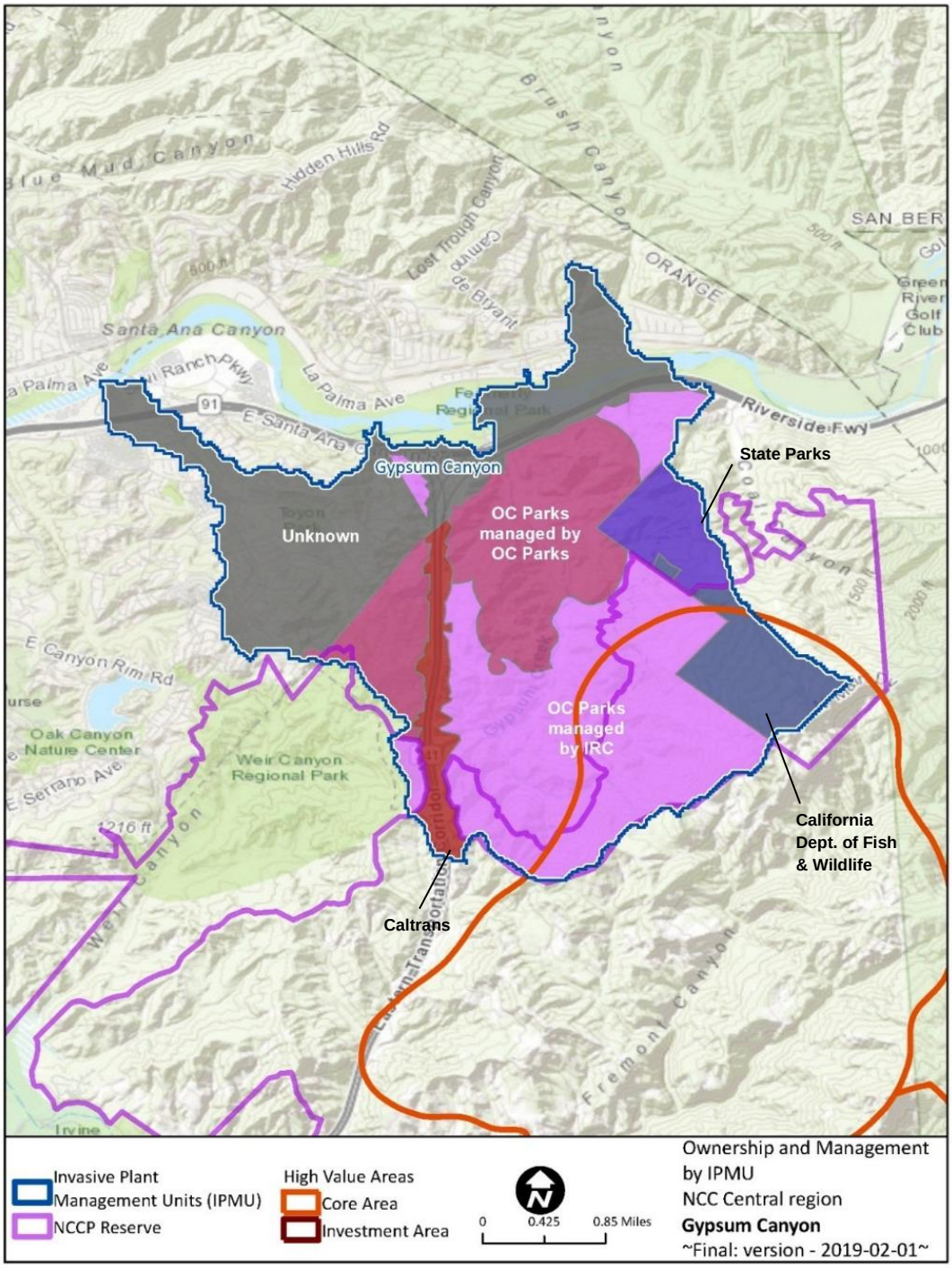
Invasive Plant Management Unit Profile:

Gypsum Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

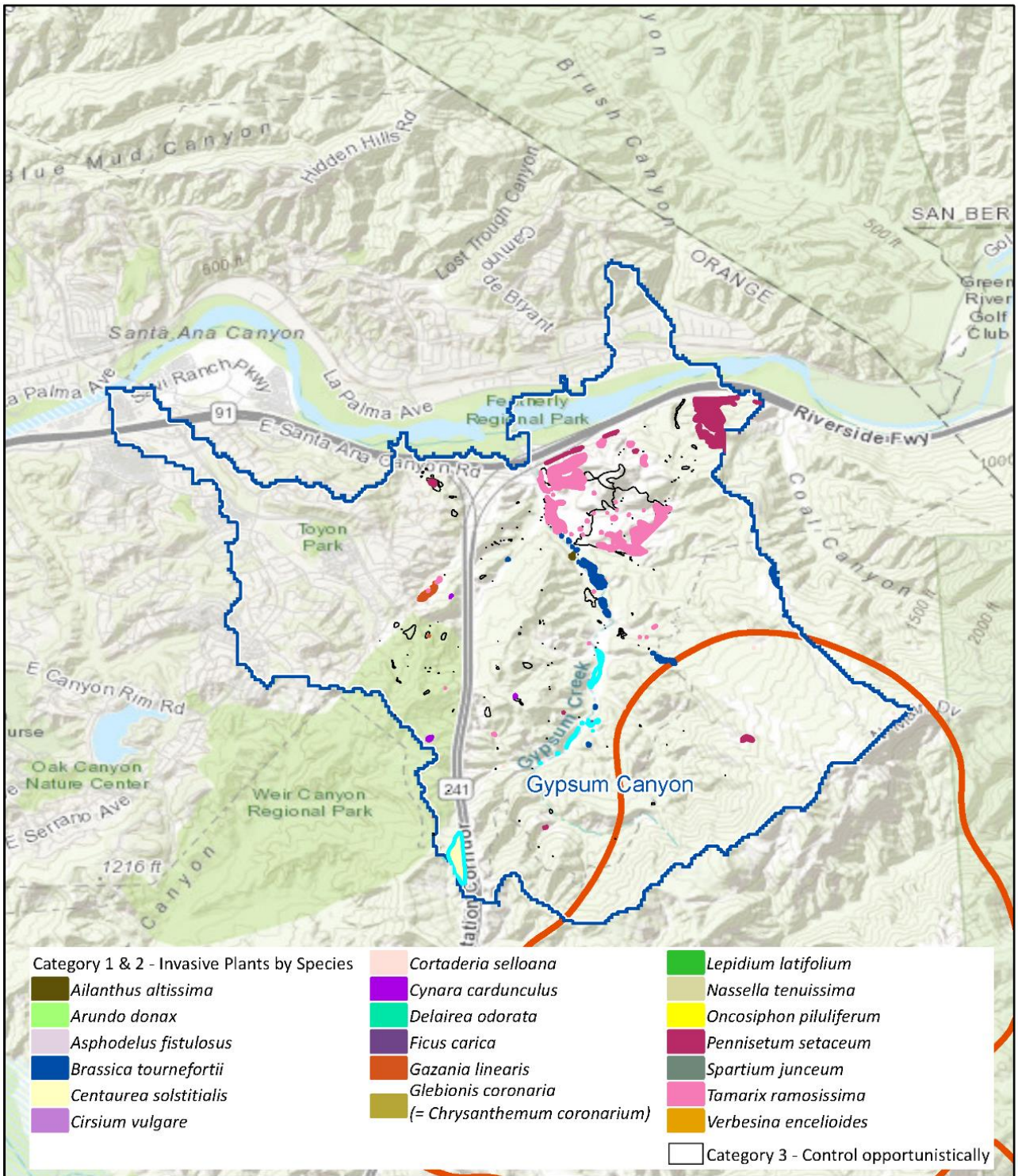


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	922	918
State of California	Cal. Dept. of Fish & Wildlife	330	10
OC Parks	OC Parks	11	1,044
Caltrans	Caltrans		225
Unknown	Developed		1,493
State of California	State Parks		238
Totals		1,263	3,929

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Gypsum Canyon

			TOTALS					BY LANDOWNER / MANAGER	
	Cat.	Impact	Pops	Gross (m2)	Net (m2)	Net, Core (m2)	Net, Inv (m2)	OCP/ IRC (m2)	OCP/ OCP/ (m2)
Centaurea solstitialis	1	2.5	9	14,829	68	-	-	65	-
Tamarix ramosissima	2	3	39	172,423	17,271	-	-	35	17,235
Cortaderia selloana	2	3	7	67	27	3	-	4	21
Cynara cardunculus	2	3	5	1,385	74	-	-	39	35
Ailanthus altissima	2	3	1	1,105	15	-	-	-	15
Brassica tournefortii	2	2	20	32,521	494	-	-	110	368
Pennisetum setaceum	2	2	15	113,673	16,731	462	-	16,281	450
Gazania linearis	2	2	2	8,623	261	-	-	-	261
Foeniculum vulgare	3	3	5	5,224	123	-	-	76	47
Ricinus communis	3	2	7	2,223	18	-	-	12	6
Nicotiana glauca	3		167	144,783	4,548	54	-	2,601	1,947
Marrubium vulgare	3		16	16,256	121	16	-	49	72
Washingtonia robusta	3		11	13	8	-	-	-	8
Schinus molle	3		4	997	623	-	-	623	-
Encelia farinosa	3		3	348,014	51,237	-	-	-	51,237
Silybum marianum	3		1	6	2	-	-	2	-
TOTALS			**312**	**862,143**	**91,621**	**534**	-	**19,898**	**71,703**
in acres:				213	23	0.1	-	4.9	17.7
								22%	78%

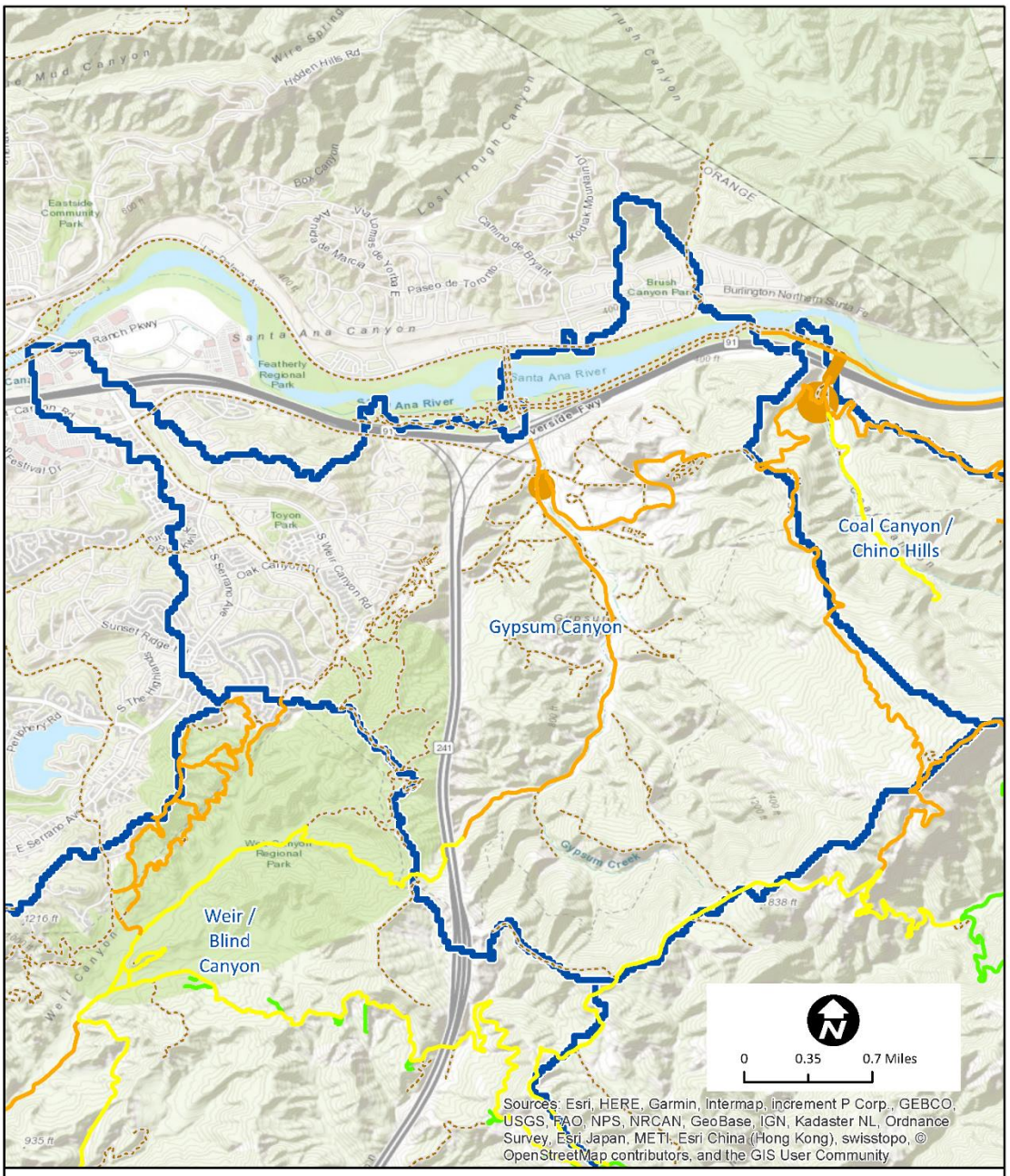

Blue Mud Canyon
Hidden Hills Rd
Brush Canyon
Lost Trough Canyon
Camino de Bryant
ORANGE
SAN BER
Green River Golf Club
Santa Ana Canyon
La Palma Ave
Ranch Pkwy
91
E Santa Ana Canyon Rd
Fairmont Regional Park
Riverside Fwy
Toyon Park
Coal Canyon
E Canyon Rim Rd
Oak Canyon Nature Center
Weir Canyon Regional Park
E Serrano Ave
1216 ft
241
Gypsum Creek
Gypsum Canyon
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0
0.4
0.8 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Gypsum Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Gypsum Canyon						
Person-Hours:			OCP/	OCP/		
	Cat.	Impact	IRC	OCP	Totals	
Centaurea solstitialis	1	2.5	19	-	19	1%
Tamarix ramosissima	2	3	1	419	419	17%
Cortaderia selloana	2	3	2	11	14	1%
Cynara cardunculus	2	3	6	5	11	0%
Ailanthus altissima	2	3	-	2	2	0%
Pennisetum setaceum	2	2	351	10	361	15%
Brassica tournefortii	2	2	11	37	48	2%
Gazania linearis	2	2	-	9	9	0%
Foeniculum vulgare	3	3	8	5	12	1%
Ricinus communis	3	2	10	5	14	1%
Encelia farinosa	3	0	-	1,019	1,019	42%
Nicotiana glauca	3	0	243	182	424	17%
Marrubium vulgare	3	0	14	20	34	1%
Washingtonia robusta	3	0	-	22	22	1%
Schinus molle	3	0	20	-	20	1%
Silybum marianum	3	0	2	-	2	0%
TOTALS			**686**	**1,746**	**2,433**	
			28%	72%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Gypsum canyon	2.7	2.7	
Main Divide	0.7	0.7	
Windy ridge		1.0	1.0
unknown	1.7	1.9	0.3
Totals	5.0	6.3	1.2
* Gypsum Canyon has an additional 11 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



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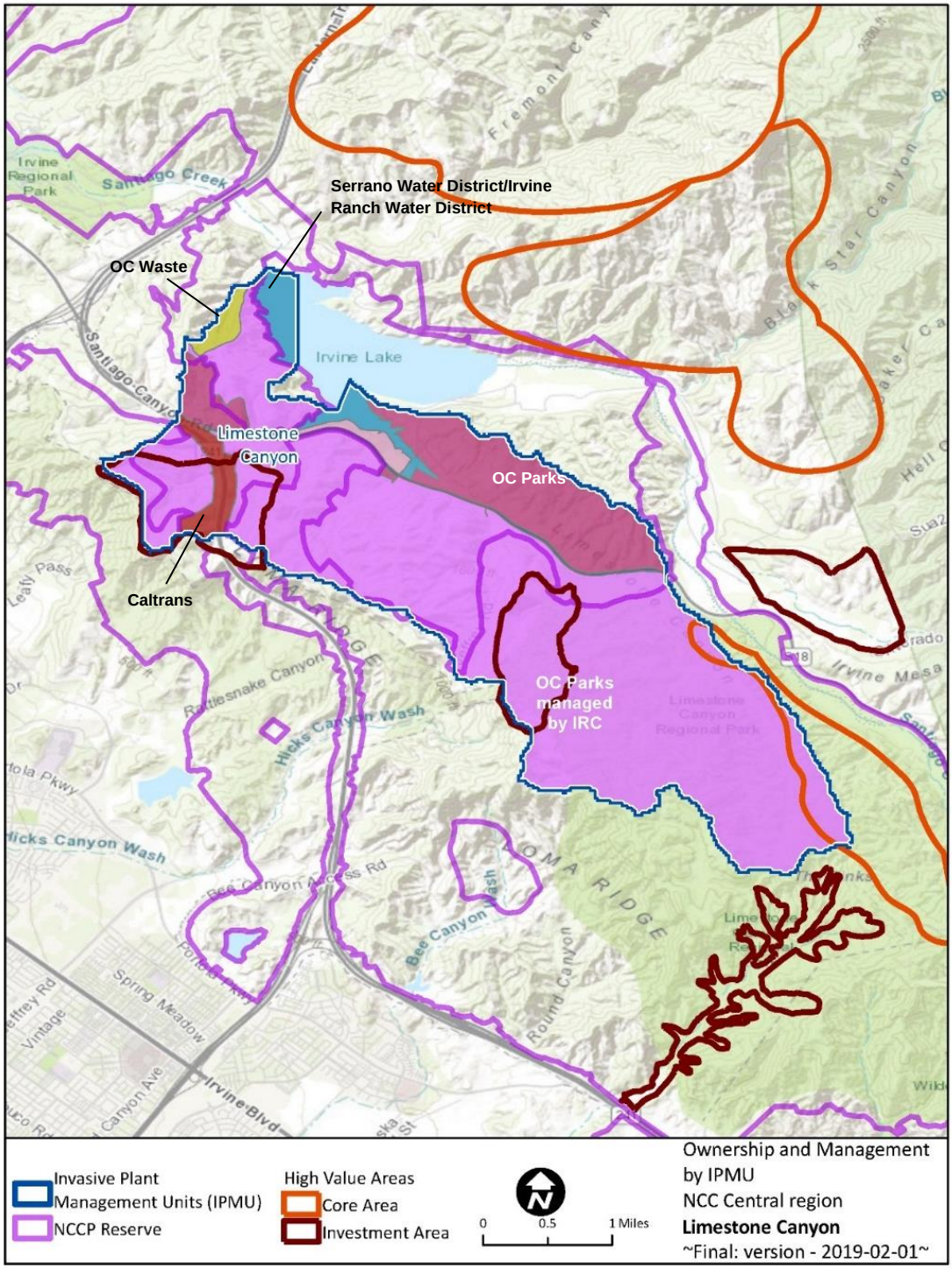
Invasive Plant Management Unit Profile:

Limestone Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

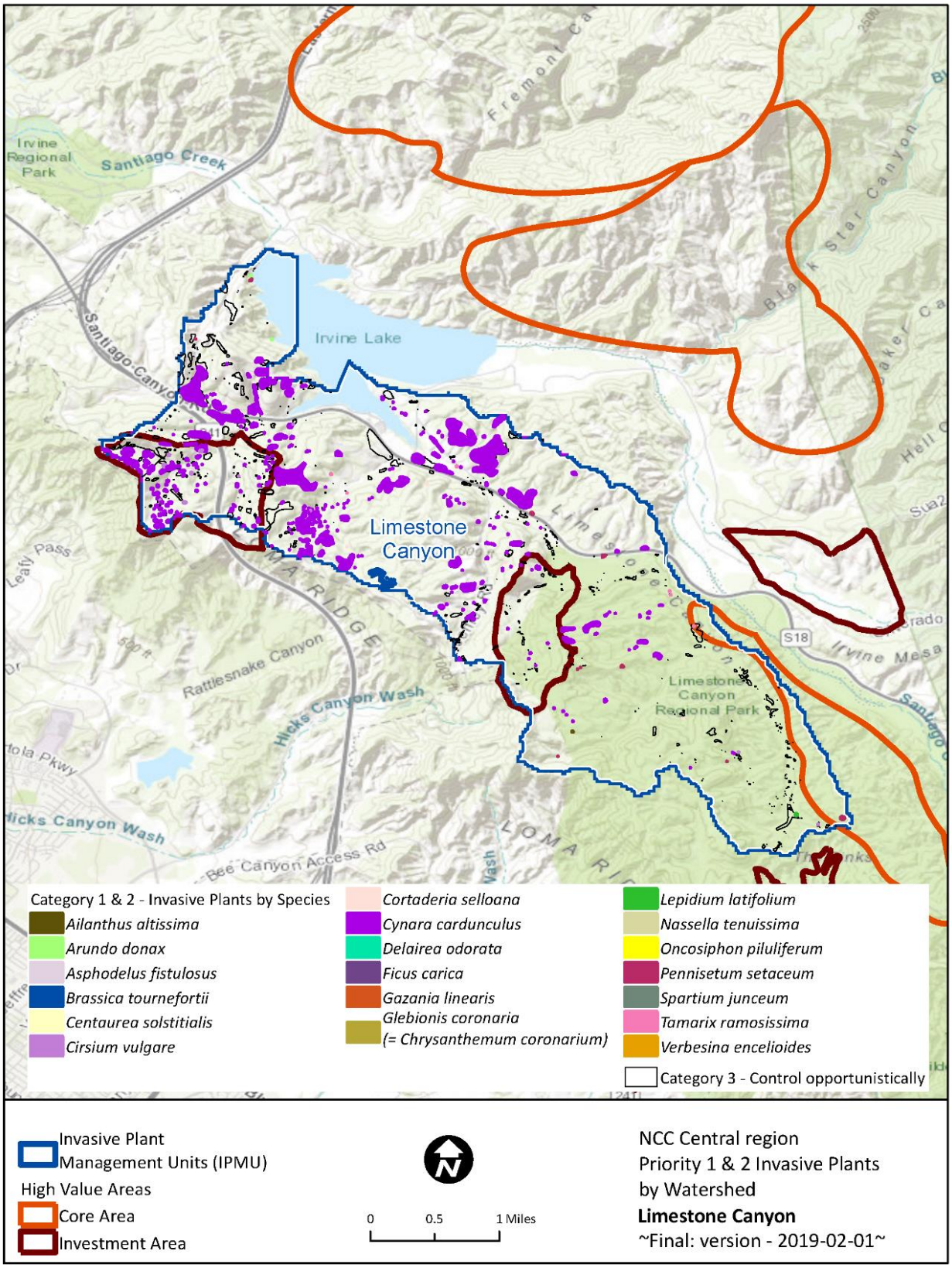


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	2,876	1,059
OC Waste	OC Waste	56	
OC Parks	OC Parks	21	718
OC Sheriff	OC Sheriff	3	
City of Irvine	Irvine Ranch Conservancy	1	
Serrano/Irvine Ranch Water Districts	Other		186
Caltrans	Caltrans		112
The Irvine Company	Other		44
OC Public Works	Other		35
Totals		2,957	2,153

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Limestone Canyon

			TOTALS					BY LANDOWNER / MANAGER	
								OCP/ OCP	OCP/ IRC
	Cat.	Impact	Pops	Gross (m2)	Net (m2)	Net, Core (m2)	Net, Inv (m2)	(m2)	(m2)
Cynara cardunculus	2	3	356	574,207	10,811	-	1,069	5,959	4,853
Cortaderia selloana	2	3	6	14	9	-	-	-	9
Tamarix ramosissima	2	3	6	66	52	9	-	3	50
Ailanthus altissima	2	3	2	129	2	-	-	-	2
Arundo donax	2	3	2	137	28	-	-	-	9
Brassica tournefortii	2	2	15	17,407	271	-	9	-	271
Cirsium vulgare	2	2	13	1,402	18	-	17	-	9
Pennisetum setaceum	2	2	10	2,019	205	145	-	42	163
Lepidium latifolium	2	2	1	247	37	-	-	-	37
Foeniculum vulgare	3	3	172	211,312	4,802	-	175	1,386	3,415
Ricinus communis	3	2	5	3,796	343	-	-	265	78
Marrubium vulgare	3		312	328,321	9,696	1	1,204	1,004	8,693
Nicotiana glauca	3		86	18,545	1,051	11	17	184	857
Silybum marianum	3		43	27,601	1,531	-	486	18	1,509
Carduus pycnocephalus	3		20	22,515	412	-	165	-	412
Encelia farinosa	3		14	36,692	3,391	-	-	107	2,885
Schinus molle	3		9	1,308	903	-	-	296	607
Washingtonia robusta	3		8	7,145	219	-	-	215	4
Parkinsonia aculeata	3		1	24	20	-	-	20	-
Phoenix canariensis	3		1	11	7	-	-	-	7
Tragopogon porrifolius	3		1	559	1	-	1	-	1
TOTALS			**1,083**	**1,253,456**	**33,810**	**166**	**3,144**	**9,499**	**23,871**
in acres:				310	8	0.04	0.8	2.3	5.9
								28%	72%

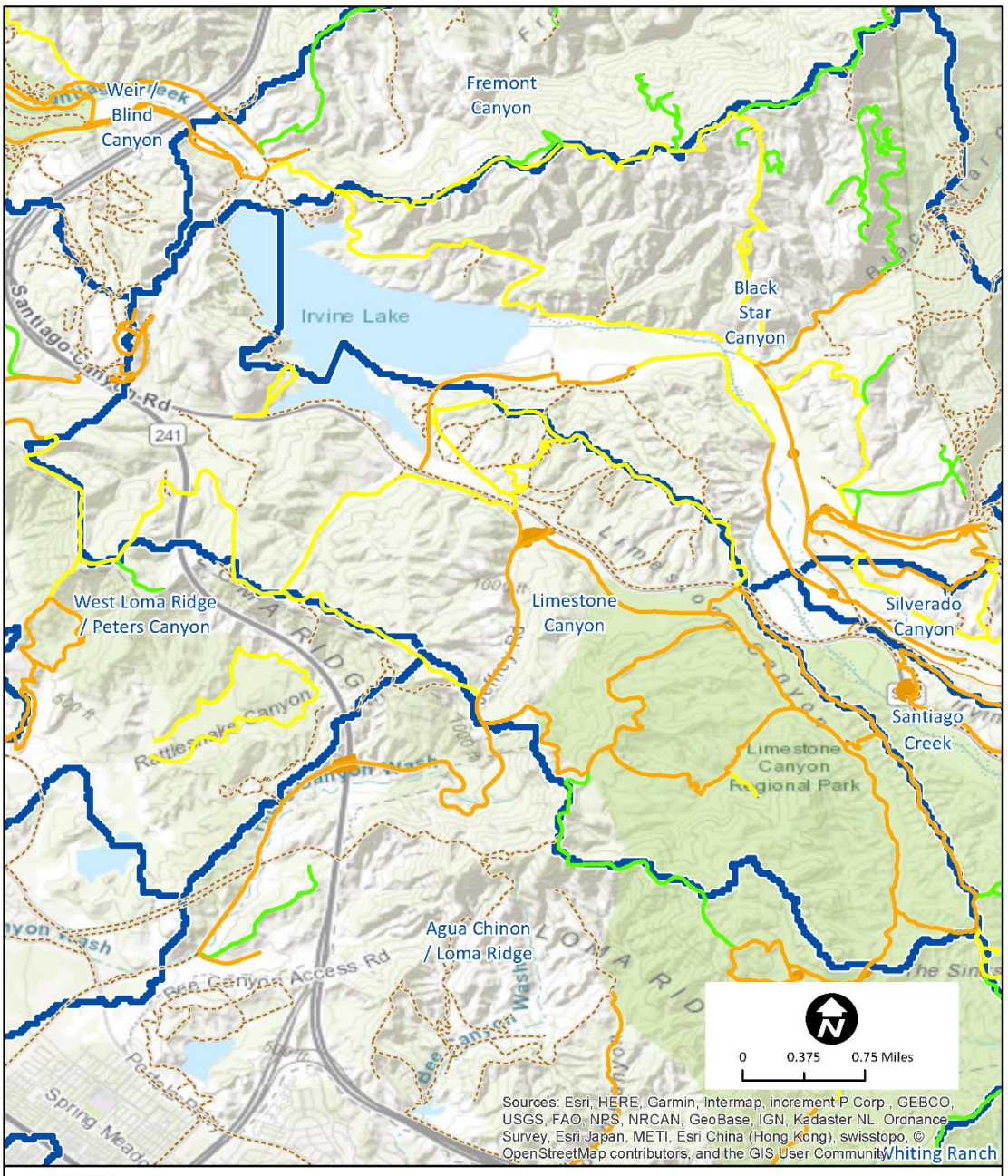

Irvine Regional Park
Santiago Creek
Irvine Lake
Limestone Canyon
Limestone Canyon Regional Park
Rattlesnake Canyon
Hicks Canyon Wash
Bee Canyon Access Rd
Irvine Mesa
S18
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0
0.5
1 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Limestone Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Limestone Canyon						
Person-Hours:			OCP/	OCP/		
	Cat.	Impact	OCP	IRC	Totals	
Cynara cardunculus	2	3	511	416	927	33%
Tamarix ramosissima	2	3	1	12	13	0%
Cortaderia selloana	2	3	-	12	12	0%
Ailanthus altissima	2	3	-	4	4	0%
Arundo donax	2	3	-	2	2	0%
Brassica tournefortii	2	2	-	35	35	1%
Pennisetum setaceum	2	2	5	19	24	1%
Cirsium vulgare	2	2	-	13	13	0%
Lepidium latifolium	2	2	-	3	3	0%
Foeniculum vulgare	3	3	127	313	439	16%
Ricinus communis	3	2	13	4	17	1%
Marrubium vulgare	3		85	732	817	29%
Nicotiana glauca	3		34	157	191	7%
Silybum marianum	3		1	115	116	4%
Encelia farinosa	3		3	81	84	3%
Carduus pycnocephalus	3		-	48	48	2%
Schinus molle	3		12	24	36	1%
Washingtonia robusta	3		20	0	20	1%
Parkinsonia aculeata	3		2	-	2	0%
Phoenix canariensis	3		-	2	2	0%
Tragopogon porrifolius	3		-	2	2	0%
TOTALS			**813**	**1,994**	**2,808**	
			29%	71%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site survey area.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Cactus Canyon	0.5		
Dripping Springs	1.5		
Dripping Spur		0.2	
East Loma	1.0		
Hicks Haul	1.6	0.8	
Limestone Canyon	2.6		
Limestone Meadow	1.2		
Limestone Ridge	2.4		
Limestone Spur	0.2		
Raptor	0.3		
Sand Trap	1.7		
Shoestring		1.7	
West Loma		3.3	
unknown	1.3	2.9	
Totals	14.5	8.9	
* Limestone Canyon has an additional 11 acres of high priority (every year) site survey areas, as depicted in the EDRR map.			



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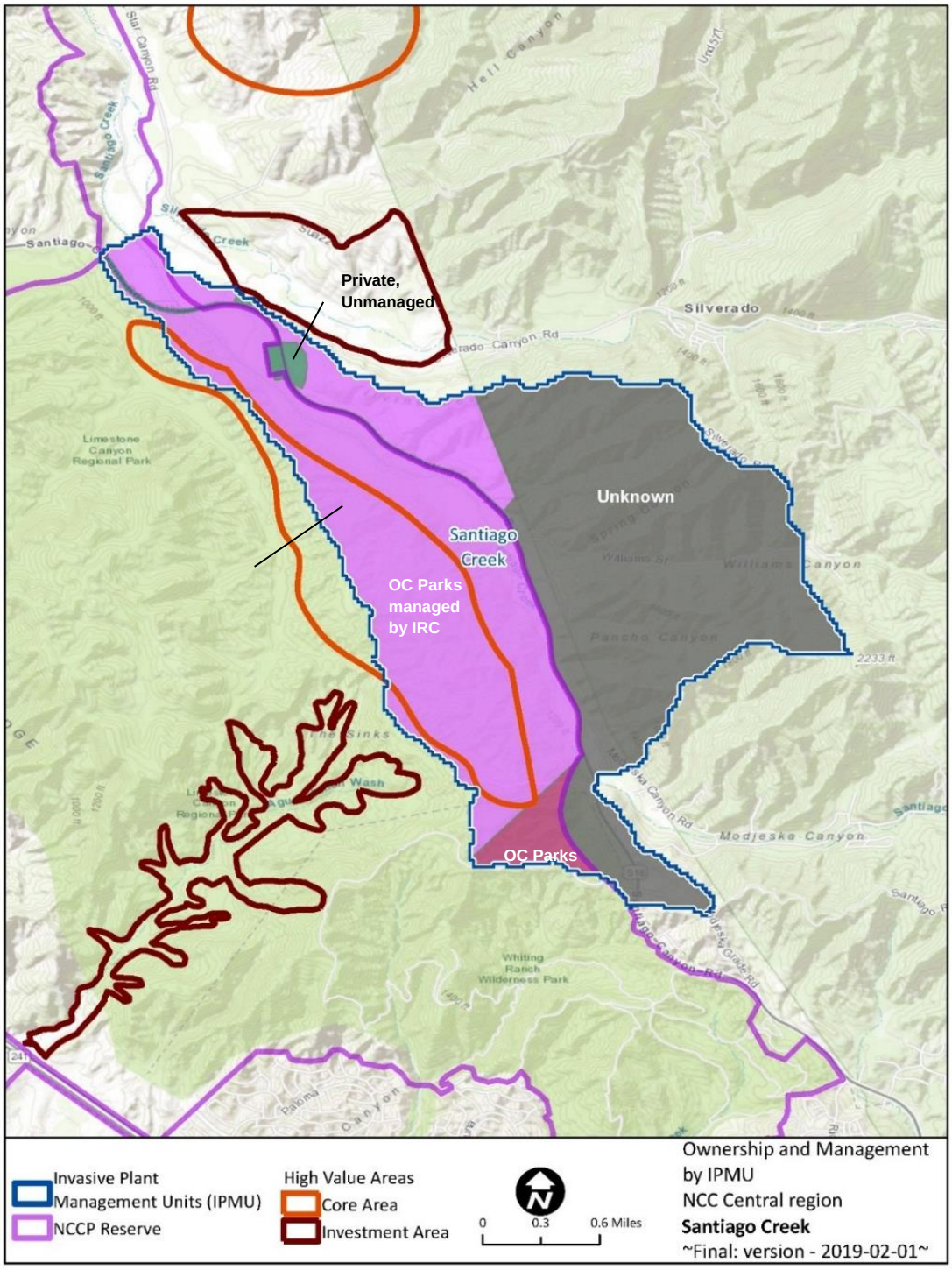
Invasive Plant Management Unit Profile:

Santiago Creek

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

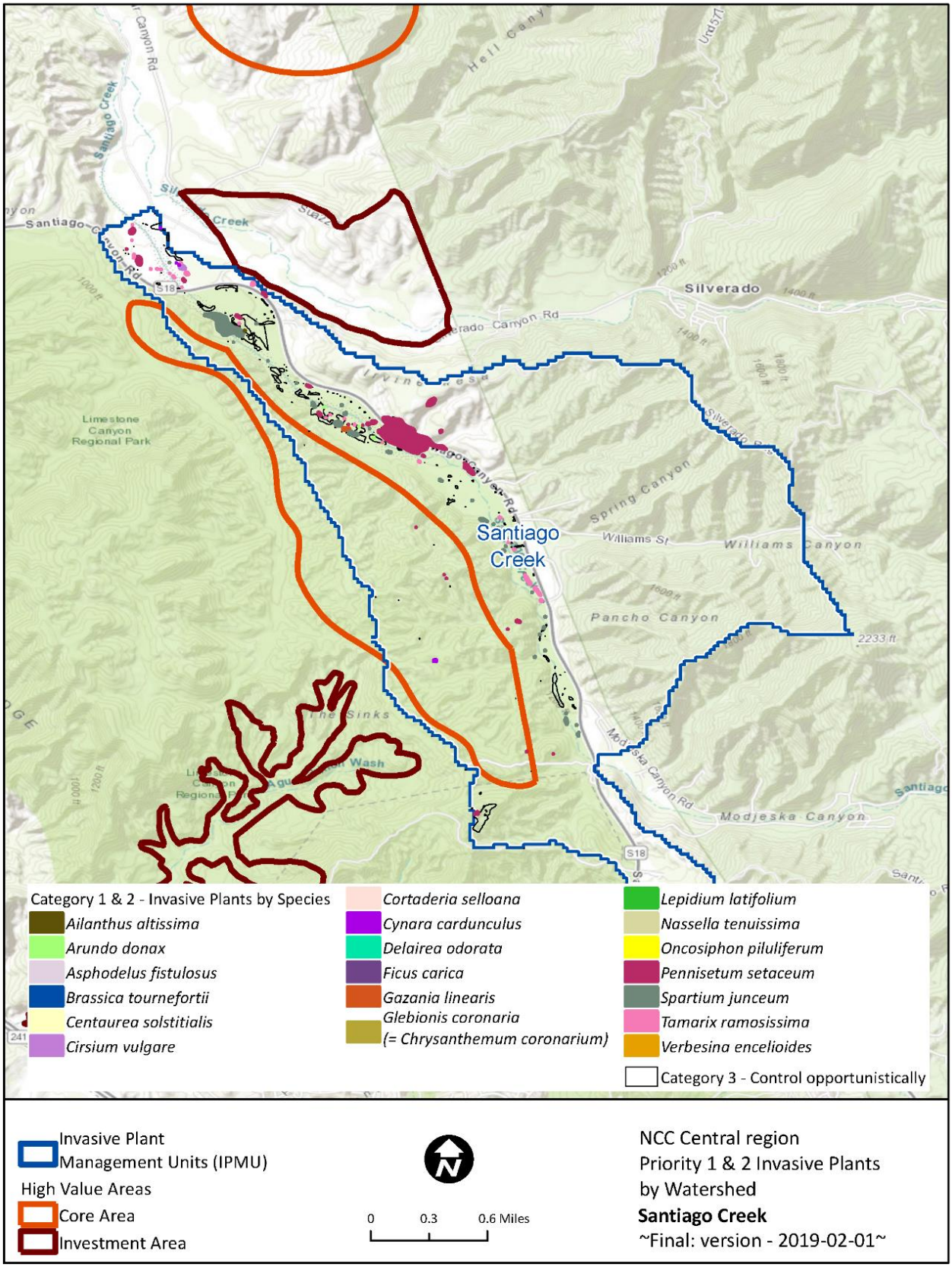


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	1,087	213
OC Parks	OC Parks	79	0
OC Public Works	Other	7	19
Private	Unmanaged	1	20
Unknown	Unmanaged		1,318
Totals		1,173	1,570

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Santiago Creek

			TOTALS					OWNER / MANAGER
	Cat.	Impact	Pops	Gross (m2)	Net (m2)	Net, Core (m2)	Net, Inv (m2)	OCP/ IRC (m2)
Tamarix ramosissima	2	3	26	2,209	518	-	-	518
Arundo donax	2	3	4	34	21	-	-	21
Cynara cardunculus	2	3	4	186	7	6	-	7
Ailanthus altissima	2	3	1	19	1	-	-	1
Spartium junceum	2	2	34	24,780	210	-	-	210
Pennisetum setaceum	2	2	27	61,020	4,629	1	-	4,629
Asphodelus fistulosus	2	2	1	99	2	-	-	2
Cirsium vulgare	2	2	1	875	131	-	-	131
Gazania linearis	2	2	1	691	21	-	-	21
Foeniculum vulgare	3	3	56	26,318	542	-	-	542
Ricinus communis	3	2	22	28,611	1,006	-	-	1,006
Olea europaea	3	1.75	38	1,200	576	-	-	495
Nicotiana glauca	3		66	30,266	2,968	25	-	2,968
Schinus molle	3		28	1,437	1,207	-	-	1,179
Washingtonia robusta	3		4	31	2	-	-	2
Marrubium vulgare	3		3	14,873	463	1	-	463
Encelia farinosa	3		1	378	11	-	-	11
Nerium oleander	3		1	3	2	-	-	2
TOTALS			**72**	**43,476**	**1,201**	**7**	-	**1,199**
in acres:				11	0.3	0.002	-	0.3
								100%

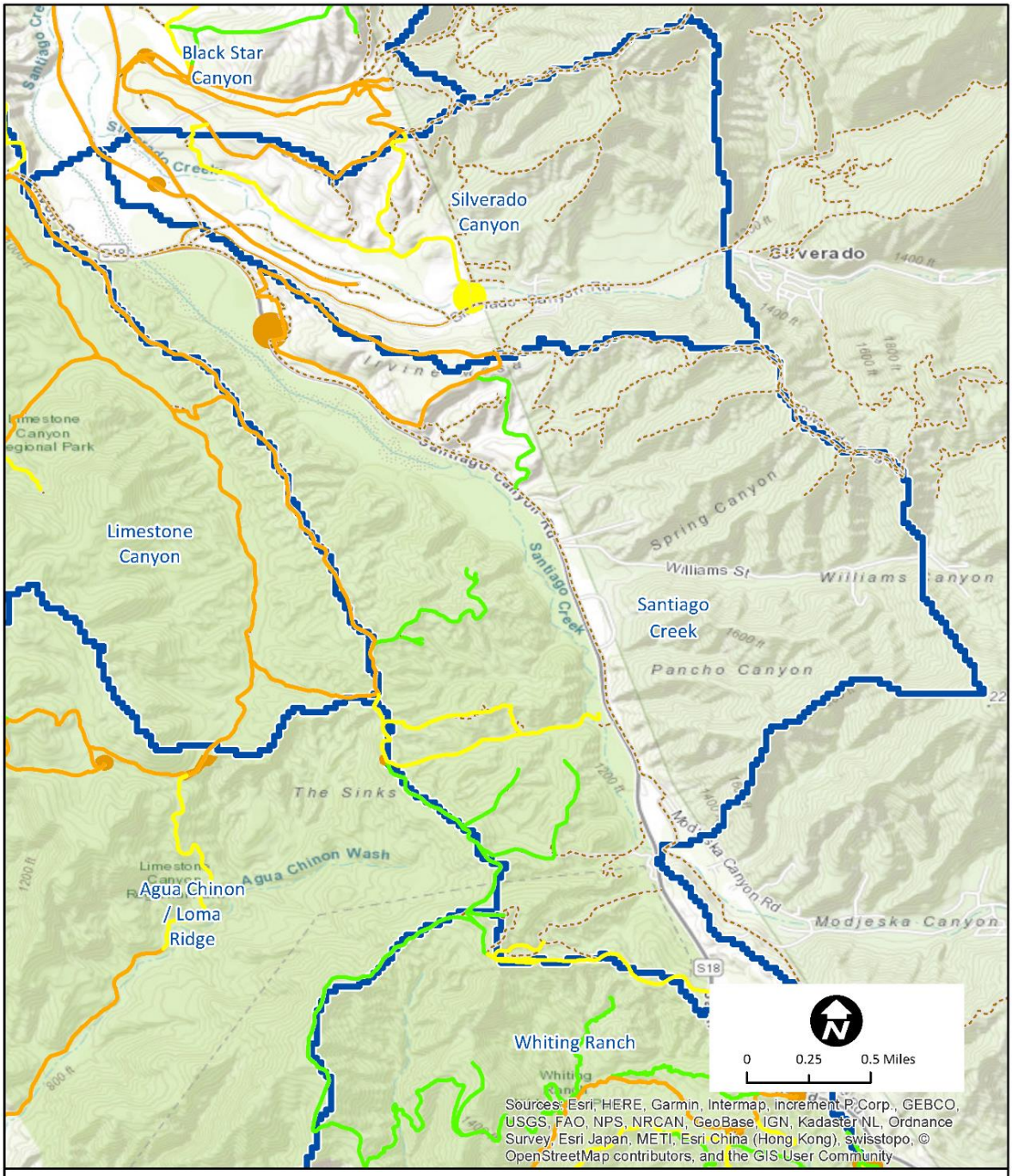

Santiago Creek
Silverado
Limestone Canyon Regional Park
Spring Canyon
Williams St
Williams Canyon
Pancho Canyon
Modjeska Canyon Rd
Modjeska Canyon
Santiago Canyon Rd
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0 0.3 0.6 Miles
NCC Central region
Priority 1 & 2 Invasive Plants by Watershed
Santiago Creek
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Santiago Creek				
Person-Hours:			OCP/	
	Cat.	Impact	IRC	
Tamarix ramosissima	2	3	62	7%
Arundo donax	2	3	8	1%
Cynara cardunculus	2	3	8	1%
Ailanthus altissima	2	3	2	0%
Pennisetum setaceum	2	2	146	17%
Spartium junceum	2	2	72	8%
Cirsium vulgare	2	2	5	1%
Gazania linearis	2	2	2	0%
Asphodelus fistulosus	2	2	2	0%
Foeniculum vulgare	3	3	123	14%
Ricinus communis	3	2	64	7%
Olea europaea	3	1.75	75	9%
Nicotiana glauca	3		191	22%
Schinus molle	3		78	9%
Marrubium vulgare	3		15	2%
Washingtonia robusta	3		8	1%
Encelia farinosa	3		2	0%
Nerium oleander	3		2	0%
TOTALS			**866**	

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Adkins Rd.			0.8
Hangman's Tree		0.8	
Library	1.2		
Limestone Ridge	0.2		0.8
Markel Spur		0.6	
Mesa	1.2		
One Power Spur			0.7
Truck			0.7
Two Power Spur			0.3
unknown		1.2	0.2
Totals	2.6	2.6	3.5
* Santiago Creek has an additional 11 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



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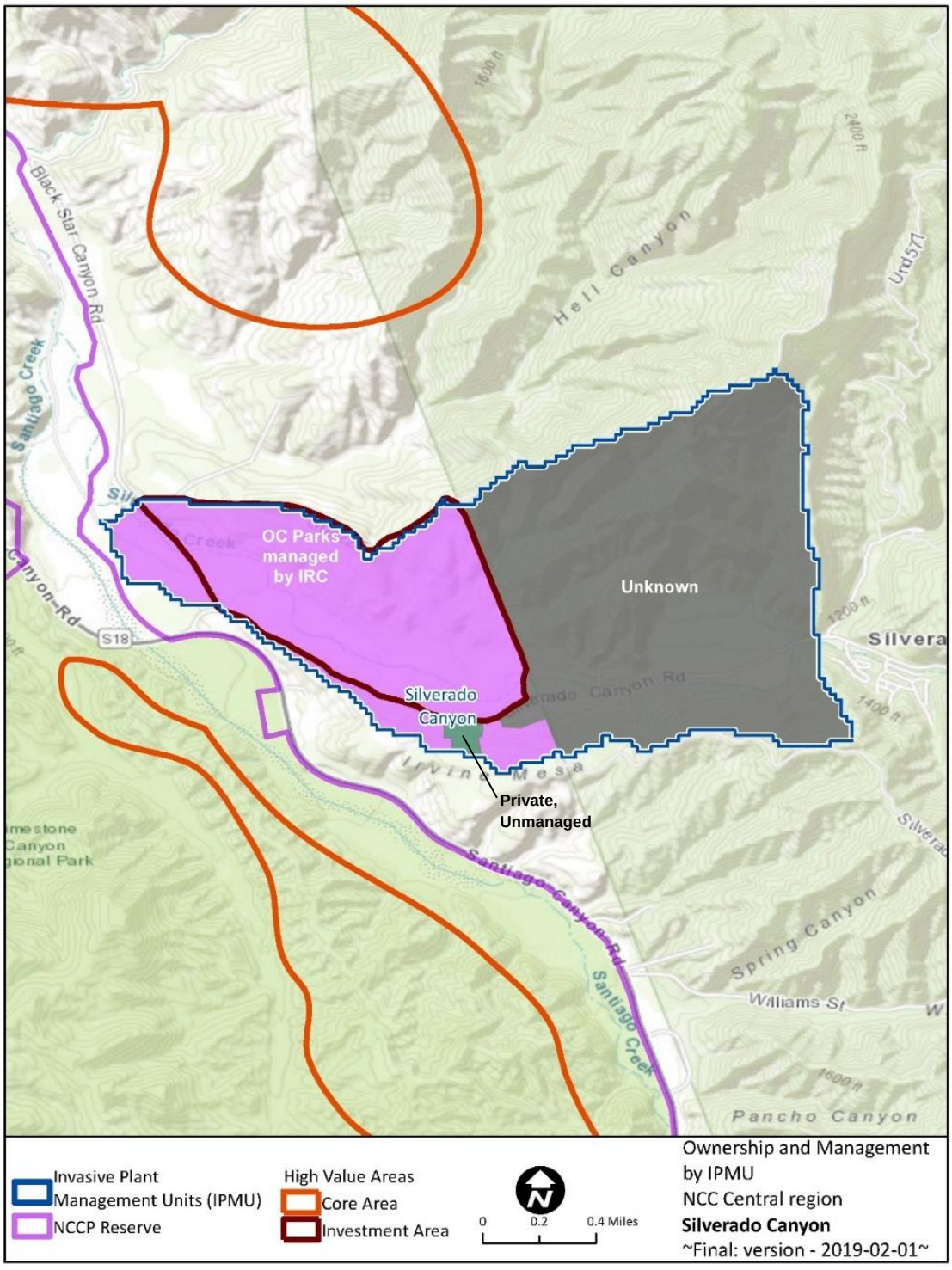
Invasive Plant Management Unit Profile:

Silverado Canyon

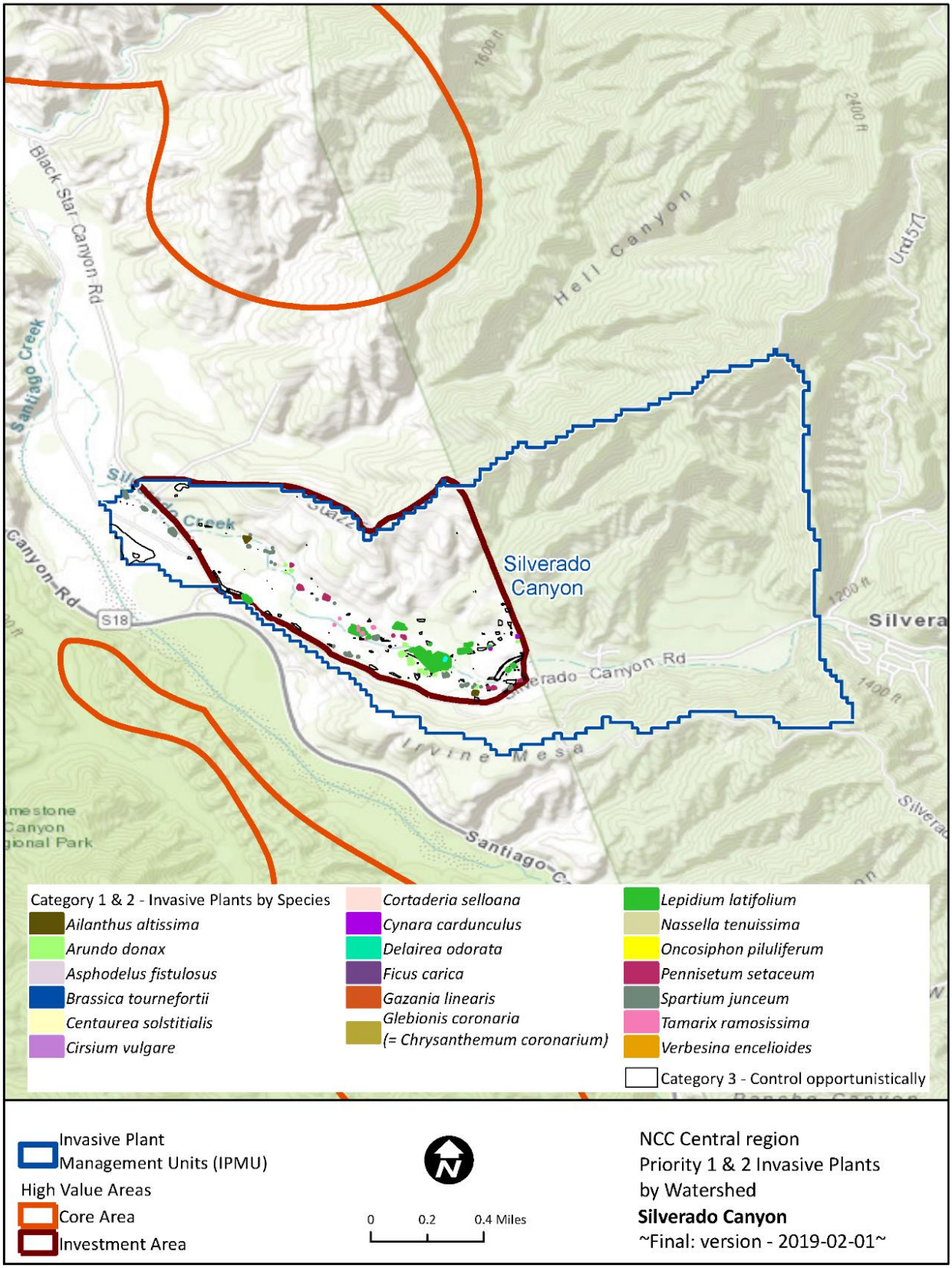
Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.



Landowner	Manager	Acres in NCCP
OC Parks	Irvine Ranch Conservancy	418
Private	Unmanaged	8
Unknown	Unmanaged	684
Totals		1,109

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

			TOTALS					OWNER / MANAGER
								OCP/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC
				(m2)	(m2)	(m2)	(m2)	(m2)
Delairea odorata	1	2.5	1	30	3	-	3	3
Arundo donax	2	3	20	1,154	326	-	326	326
Tamarix ramosissima	2	3	8	101	22	-	22	22
Ailanthus altissima	2	3	2	671	11	-	11	11
Cynara cardunculus	2	3	2	31	1	-	1	1
Cortaderia selloana	2	3	1	1	1	-	1	1
Spartium junceum	2	2	33	2,089	47	-	26	47
Lepidium latifolium	2	2	17	17,924	892	-	892	892
Pennisetum setaceum	2	2	9	994	5	-	5	5
Asphodelus fistulosus	2	2	1	1	1	-	1	1
Nassella tenuissima	2	2	1	5	3	-	3	3
Foeniculum vulgare	3	3	62	43,104	241	-	85	241
Ricinus communis	3	2	27	20,025	79	-	58	76
Olea europaea	3	1.75	1	95	36	-	-	36
Conium maculatum	3	1	1	1	1	-	1	1
Silybum marianum	3		10	2,657	18	-	18	18
Carduus pycnocephalus	3		7	1,534	18	-	18	17
Marrubium vulgare	3		7	1,802	50	-	50	50
Nicotiana glauca	3		5	1	1	-	1	1
Schinus molle	3		3	114	96	-	96	96
Eucalyptus camaldulensis	3		1	3,578	1,342	-	1,342	1,342
Nerium oleander	3		1	3	2	-	-	2
Washingtonia robusta	3		1	1	1	-	1	1
TOTALS			**221**	**95,915**	**3,195**	-	**2,961**	**3,193**
in acres:				24	0.8	-	0.7	0.8
								100%

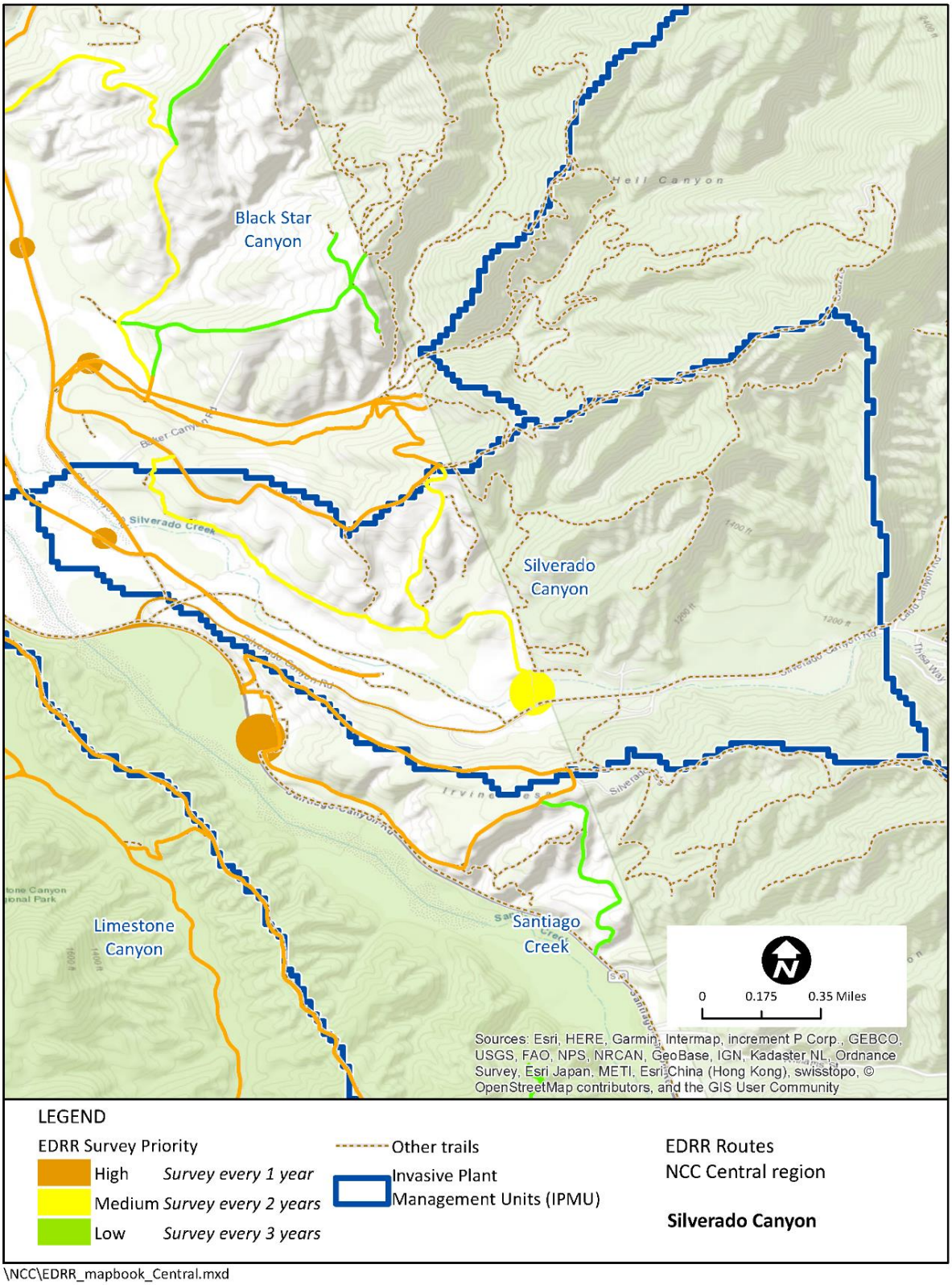

Silverado Canyon
Hell Canyon
Black Star Canyon Rd
Santiago Creek
Canyon Rd
S18
Irvine Mesa
Silverado Canyon Rd
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0
0.2
0.4 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Silverado Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Silverado Canyon				
Person-Hours:			OCP/	
		Impact	IRC	
Delairea odorata	1	2.5	2	0%
Arundo donax	2	3	46	9%
Tamarix ramosissima	2	3	16	3%
Ailanthus altissima	2	3	4	1%
Cynara cardunculus	2	3	4	1%
Cortaderia selloana	2	3	2	0%
Spartium junceum	2	2	67	13%
Lepidium latifolium	2	2	52	10%
Pennisetum setaceum	2	2	18	4%
Nassella tenuissima	2	2	2	0%
Asphodelus fistulosus	2	2	2	0%
Foeniculum vulgare	3	3	129	26%
Ricinus communis	3	2	54	11%
Olea europaea	3	1.75	3	1%
Conium maculatum	3	1	2	0%
Eucalyptus camaldulensis	3		29	6%
Silybum marianum	3		20	4%
Marrubium vulgare	3		15	3%
Carduus pycnocephalus	3		14	3%
Nicotiana glauca	3		10	2%
Schinus molle	3		8	2%
Nerium oleander	3		2	0%
Washingtonia robusta	3		2	0%
TOTALS			503	

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Hell Canyon		1.1	
Helo	1.3		
Red Rock	0.1		
Silverado Creek	0.7	1.0	
Totals	2.1	2.1	
* Silverado Creek has an additional 16 acres of high (every year) and 9 acres of medium (every 2 years) priority site survey areas, as depicted in the EDRR map.			



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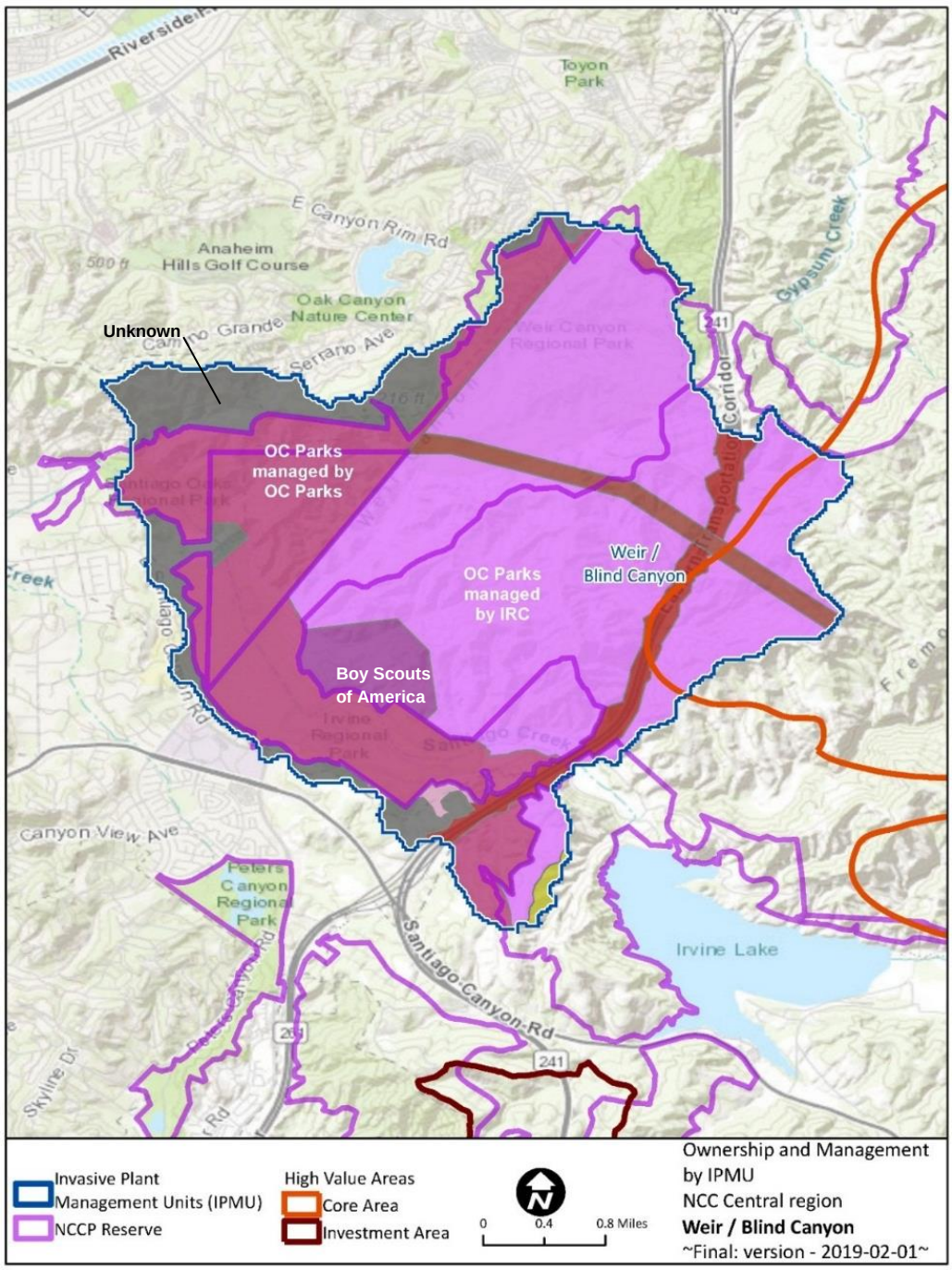
Invasive Plant Management Unit Profile:

Weir / Blind Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

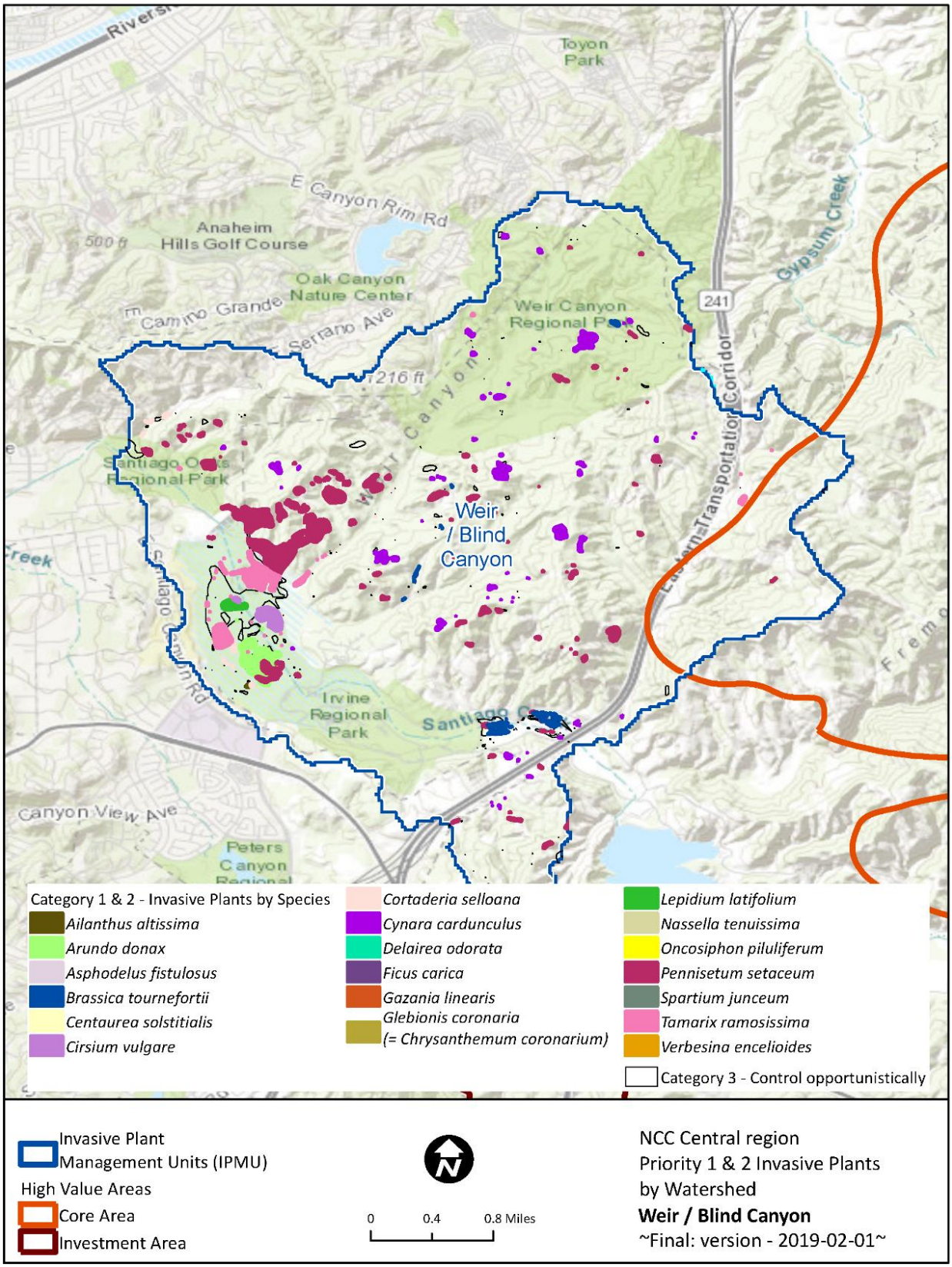


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	Irvine Ranch Conservancy	1,532	1,898
OC Parks	OC Parks	1,080	706
Southern California Edison	Southern California Edison	76	112
OC Waste	OC Waste	31	
Boy Scouts of America	Other		210
Caltrans	Caltrans		257
The Irvine Company	Other		28
Unknown	Developed		703
Unknown	Unmanaged		1
Totals		2,720	3,915

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Weir/Blind Canyon

			TOTALS				BY L	OWNER / MANAGER	
								OCP/	OCP/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC	OCP
				(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Centaurea solstitialis	1	2.5	1	51	2	-	-	2	-
Cynara cardunculus	2	3	62	95,433	2,388	-	554	1,353	1,022
Tamarix ramosissima	2	3	28	104,710	11,889	-	-	1,348	10,541
Cortaderia selloana	2	3	12	4,582	723	-	-	1	722
Arundo donax	2	3	4	98,333	3,017	-	-	-	3,017
Ailanthus altissima	2	3	1	1,127	422	-	-	-	422
Pennisetum setaceum	2	2	88	373,840	41,243	12	1,578	4,960	36,188
Brassica tournefortii	2	2	23	23,852	799	-	-	799	-
Cirsium vulgare	2	2	2	36,404	5,461	-	-	-	5,461
Lepidium latifolium	2	2	1	16,950	2,543	-	-	-	2,543
Foeniculum vulgare	3	3	22	6,447	907	-	-	16	891
Ricinus communis	3	2	27	354,347	10,969	-	-	1,349	9,537
Nicotiana glauca	3		96	132,486	2,812	-	245	654	2,158
Marrubium vulgare	3		29	7,667	515	-	29	511	1
Washingtonia robusta	3		13	15	9	-	-	4	5
Encelia farinosa	3		5	1,387	316	-	-	316	-
Phoenix canariensis	3		5	272	170	-	-	-	170
Schinus molle	3		3	15,481	476	-	-	-	476
Silybum marianum	3		3	226	29	-	-	29	-
TOTALS			**425**	**1,273,610**	**84,689**	**12**	**2,407**	**11,342**	**73,154**
in acres:				315	21	0.003	0.6	2.8	18.1
								13%	87%

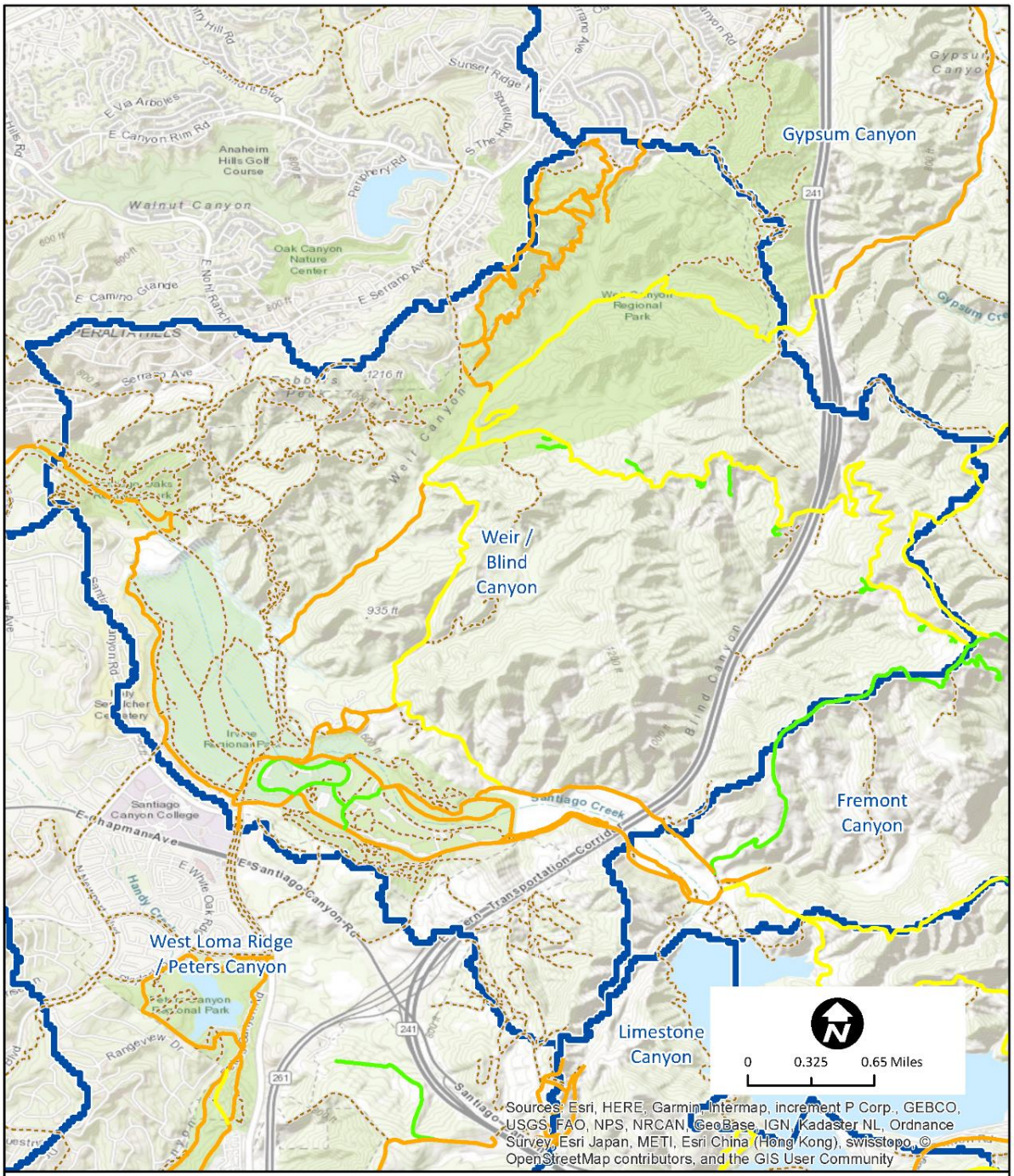

Toyon Park
E Canyon Rim Rd
Anaheim Hills Golf Course
500 ft
Oak Canyon Nature Center
Camino Grande
Serrano Ave
1216 ft
Weir Canyon Regional Park
241
Gypsum Creek
Weir / Blind Canyon
Irvine Regional Park
Canyon View Ave
Peters Canyon Regional
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0
0.4
0.8 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Weir / Blind Canyon
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Weir/Blind Canyon						
Person-Hours:			OCP/	OCP/		
		Impact	IRC	OCP	Totals	
Centaurea solstitialis	1	2.5	2	-	2	0%
Tamarix ramosissima	2	3	33	258	291	12%
Cynara cardunculus	2	3	97	73	171	7%
Arundo donax	2	3	-	68	68	3%
Cortaderia selloana	2	3	0	38	38	2%
Ailanthus altissima	2	3	-	10	10	0%
Pennisetum setaceum	2	2	119	870	989	39%
Cirsium vulgare	2	2	-	112	112	4%
Brassica tournefortii	2	2	62	-	62	2%
Lepidium latifolium	2	2	-	52	52	2%
Foeniculum vulgare	3	3	1	61	62	2%
Ricinus communis	3	2	33	237	270	11%
Nicotiana glauca	3		58	190	248	10%
Marrubium vulgare	3		68	0	68	3%
Washingtonia robusta	3		12	14	26	1%
Encelia farinosa	3		16	-	16	1%
Schinus molle	3		-	15	15	1%
Phoenix canariensis	3		-	13	13	1%
Silybum marianum	3		7	-	7	0%
TOTALS			**508**	**2,013**	**2,521**	
			20%	80%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Coal Mine			1.9
Dam	1.2		
Jamboree Rd.	0.3		
Lower Weir Canyon	1.1		
MWD	1.1	0.7	
OEC	0.4		
Rifle Range		1.5	
Santiago Creek	0.7		
Upper Blind Canyon		4.5	
Upper Weir Canyon		2.5	
Waterworks	1.0		
Windy Ridge		0.3	
unknown	12.4	0.5	2.5
Totals	18.4	10.0	4.4



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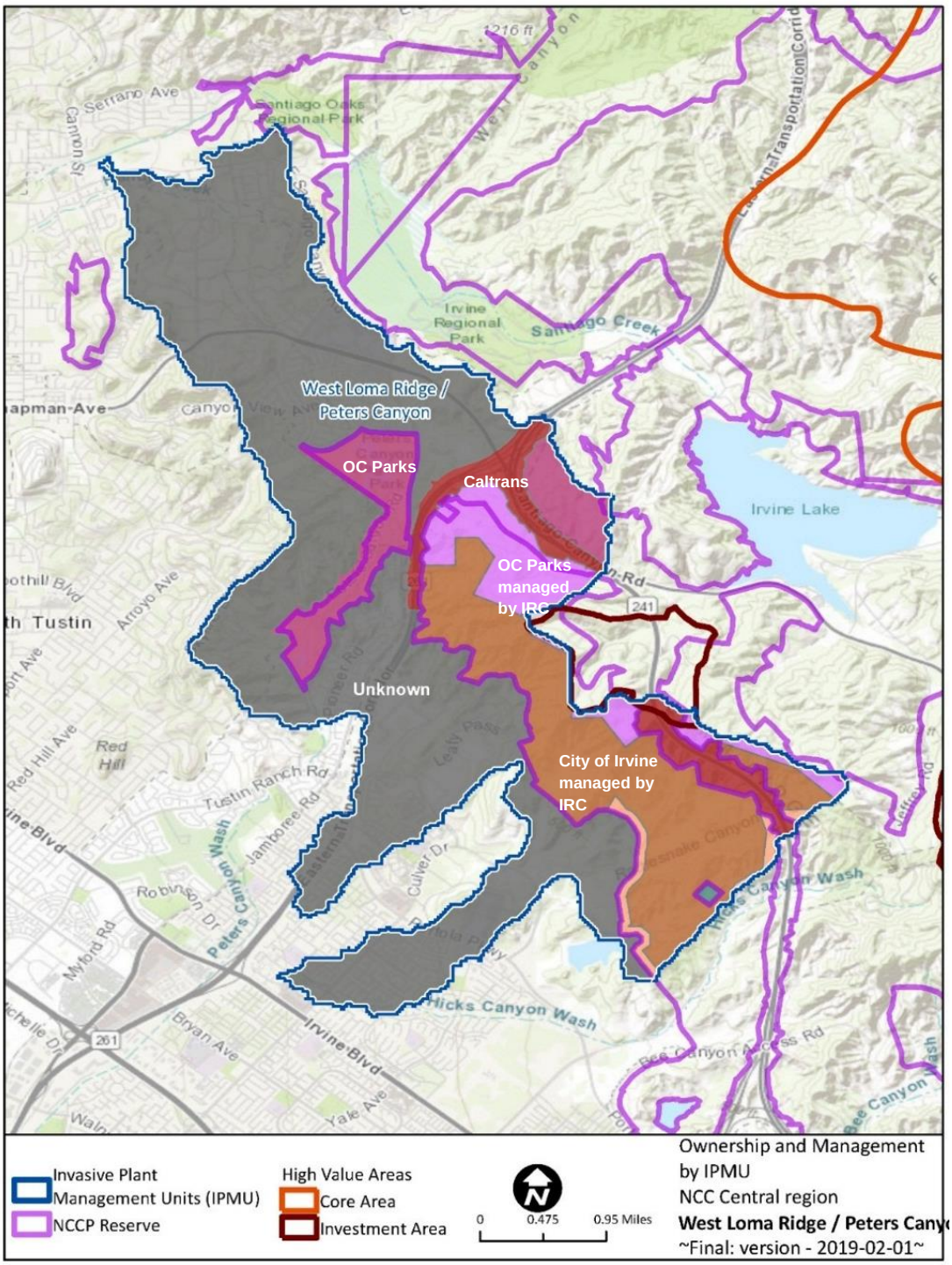
Invasive Plant Management Unit Profile:

West Loma Ridge / Peters Canyon

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

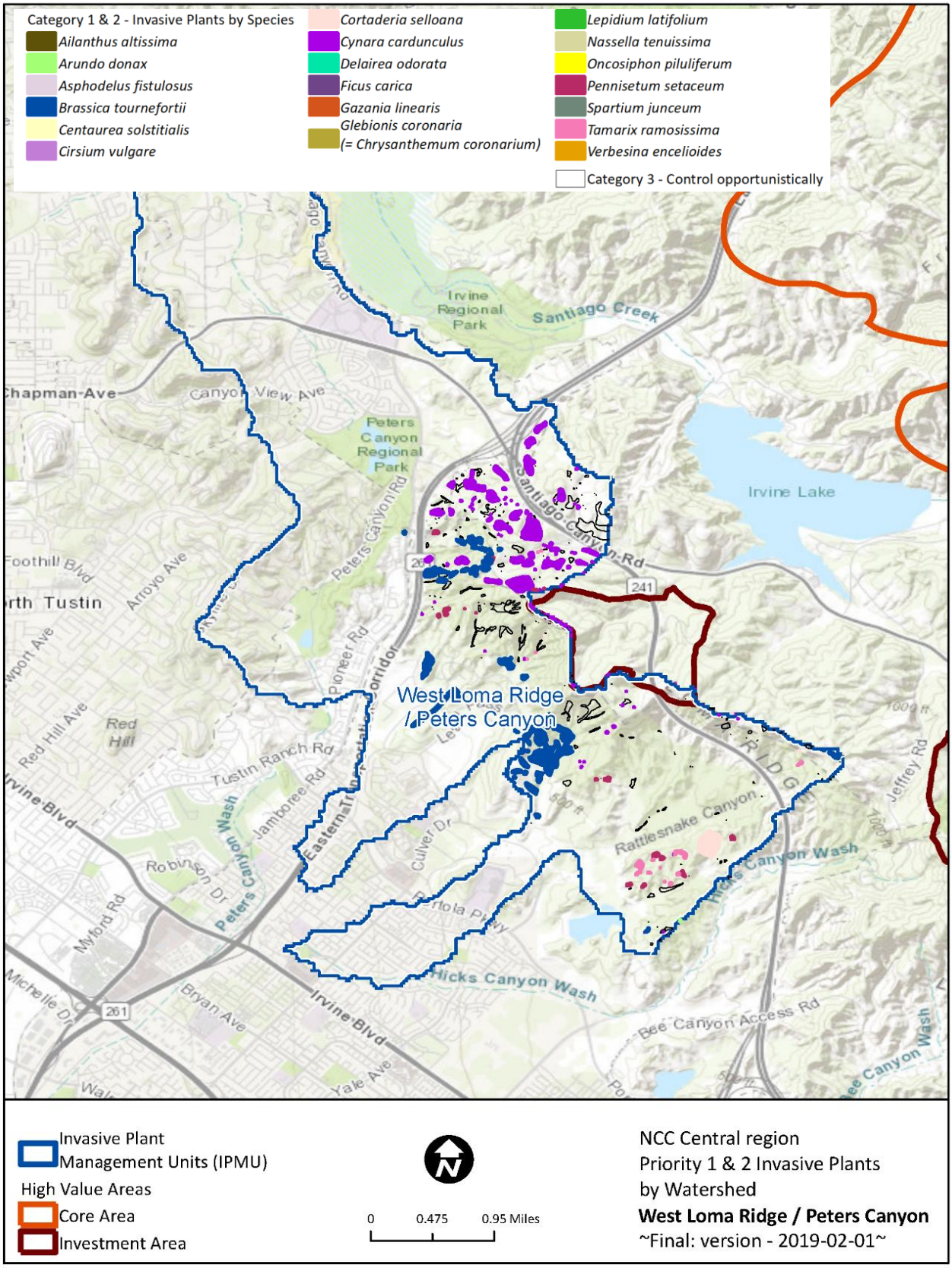


Landowner	Manager	Acres in NCCP	Acres outside NCCP
City of Irvine	Irvine Ranch Conservancy	1,301	1
OC Parks	Irvine Ranch Conservancy	403	71
OC Parks	OC Parks	325	230
The Irvine Company	Irvine Ranch Conservancy	102	0
OC Sheriff	OC Sheriff	3	
Caltrans	Caltrans	1	410
(blank)		0	6
Private	Unmanaged		10
Unknown	Developed		4,758
Totals		2,134	5,487

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

West Loma Ridge/Peters Canyon

			TOTALS					LANDOWNER / MANAGER			
								COI/	OCP/	OCP/	Unkn/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC	IRC	OCP	Devel
				(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Cynara cardunculus	2	3	91	208,651	3,843	-	5	84	2,960	799	-
Tamarix ramosissima	2	3	15	9,406	1,331	-	-	1,305	26	-	-
Cortaderia selloana	2	3	3	49,815	7,479	-	-	7,479	-	-	-
Arundo donax	2	3	1	156	97	-	-	97	-	-	-
Brassica tournefortii	2	2	88	255,295	8,173	-	-	6,211	281	50	1,468
Pennisetum setaceum	2	2	17	13,450	1,322	-	-	1,091	231	-	-
Foeniculum vulgare	3	3	96	174,897	3,829	-	1	136	728	2,964	-
Ricinus communis	3	2	10	13,137	205	-	-	193	11	-	-
Nicotiana glauca	3		104	126,711	9,495	-	-	8,031	486	179	609
Marrubium vulgare	3		17	7,630	1,055	-	2	25	754	276	-
Schinus molle	3		6	2,473	1,546	-	-	-	1,546	-	-
Phoenix canariensis	3		3	541	415	-	-	366	49	-	-
Silybum marianum	3		2	355	9	-	9	-	9	-	-
Washingtonia robusta	3		2	15	9	-	-	-	8	1	-
Nerium oleander	3		1	124	121	-	-	-	-	121	-
TOTALS			**456**	**862,655**	**38,928**	-	**17**	**25,018**	**7,090**	**4,390**	**2,077**
in acres:				213	9.6	-	0.004	6	1.8	1	0.5
								69%	19%	12%	6%


Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Irvine Regional Park
Santiago Creek
Peters Canyon Regional Park
Irvine Lake
West Loma Ridge / Peters Canyon
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0 0.475 0.95 Miles
NCC Central region
Priority 1 & 2 Invasive Plants by Watershed
West Loma Ridge / Peters Canyon
~Final: version - 2019-02-01~

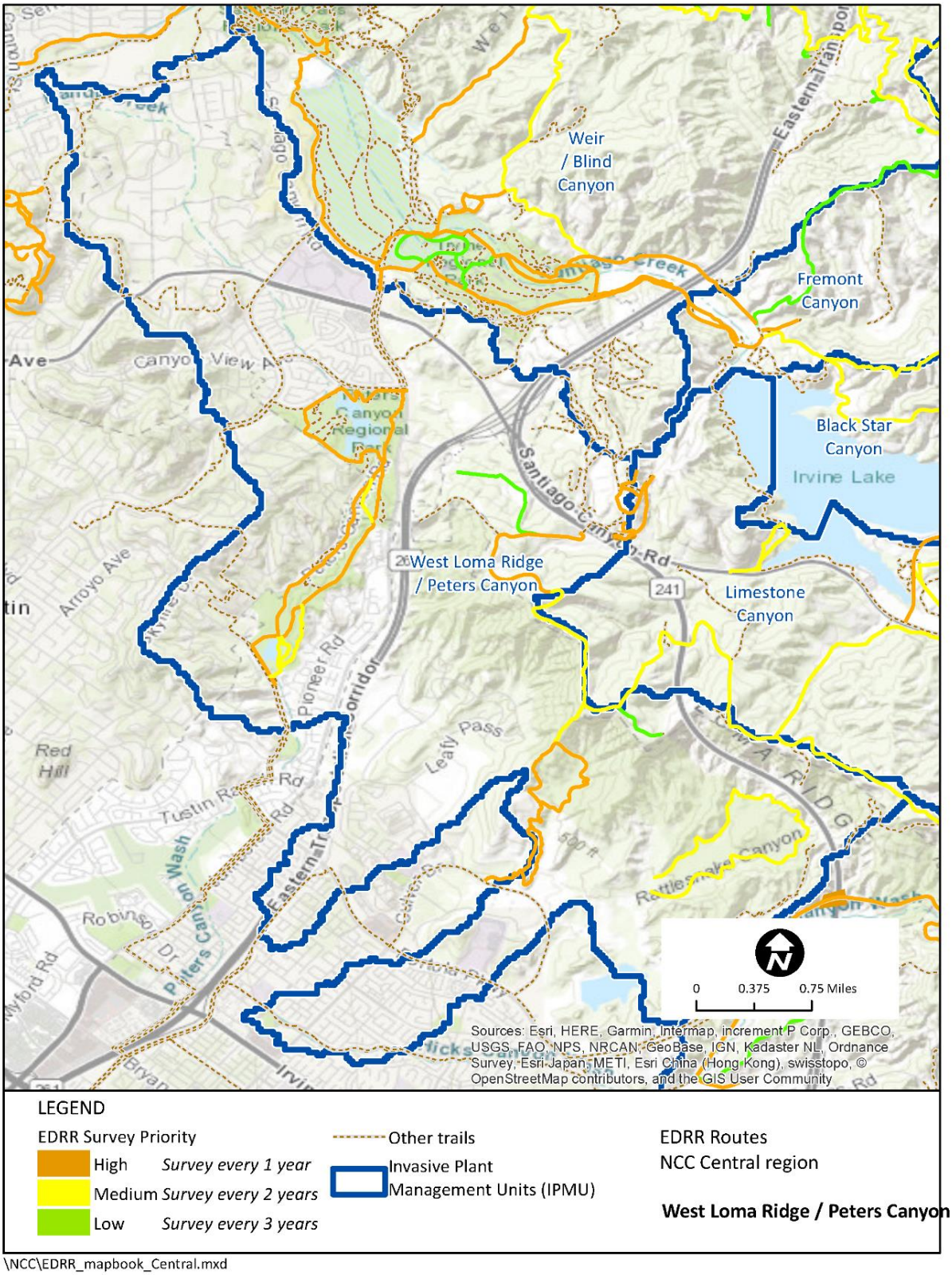
Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

West Loma Ridge/Peters Canyon

Person-Hours:		Impact	COI/ IRC	OCP/ IRC	OCP/ OCP	Totals	
Cynara cardunculus	2	3	6	199	54	258	16%
Cortaderia selloana	2	3	154	-	-	154	10%
Tamarix ramosissima	2	3	55	1	-	56	4%
Arundo donax	2	3	4	-	-	4	0%
Brassica tournefortii	2	2	257	12	2	271	17%
Pennisetum setaceum	2	2	50	11	-	60	4%
Foeniculum vulgare	3	3	10	51	208	268	17%
Ricinus communis	3	2	23	1	-	24	2%
Nicotiana glauca	3		335	20	7	362	23%
Marrubium vulgare	3		1	39	14	55	3%
Schinus molle	3		-	43	-	43	3%
Phoenix canariensis	3		13	2	-	14	1%
Nerium oleander	3		-	-	4	4	0%
Washingtonia robusta	3		-	4	0	4	0%
Silybum marianum	3		-	4	-	4	0%
TOTALS			**906**	**386**	**290**	**1,583**	
			57%	24%	18%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Changala's Pass		0.3	
Loma Spur			0.3
Loma Valley			0.8
Lower Loop	1.1		
Sheriff's Rd/	1.2		
Upper Loop	1.3		
West Loma		1.2	
unknown	5.3	4.0	
Totals	9.0	5.6	1.1
* West Loma Ridge / Peters Canyon has an additional 3 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



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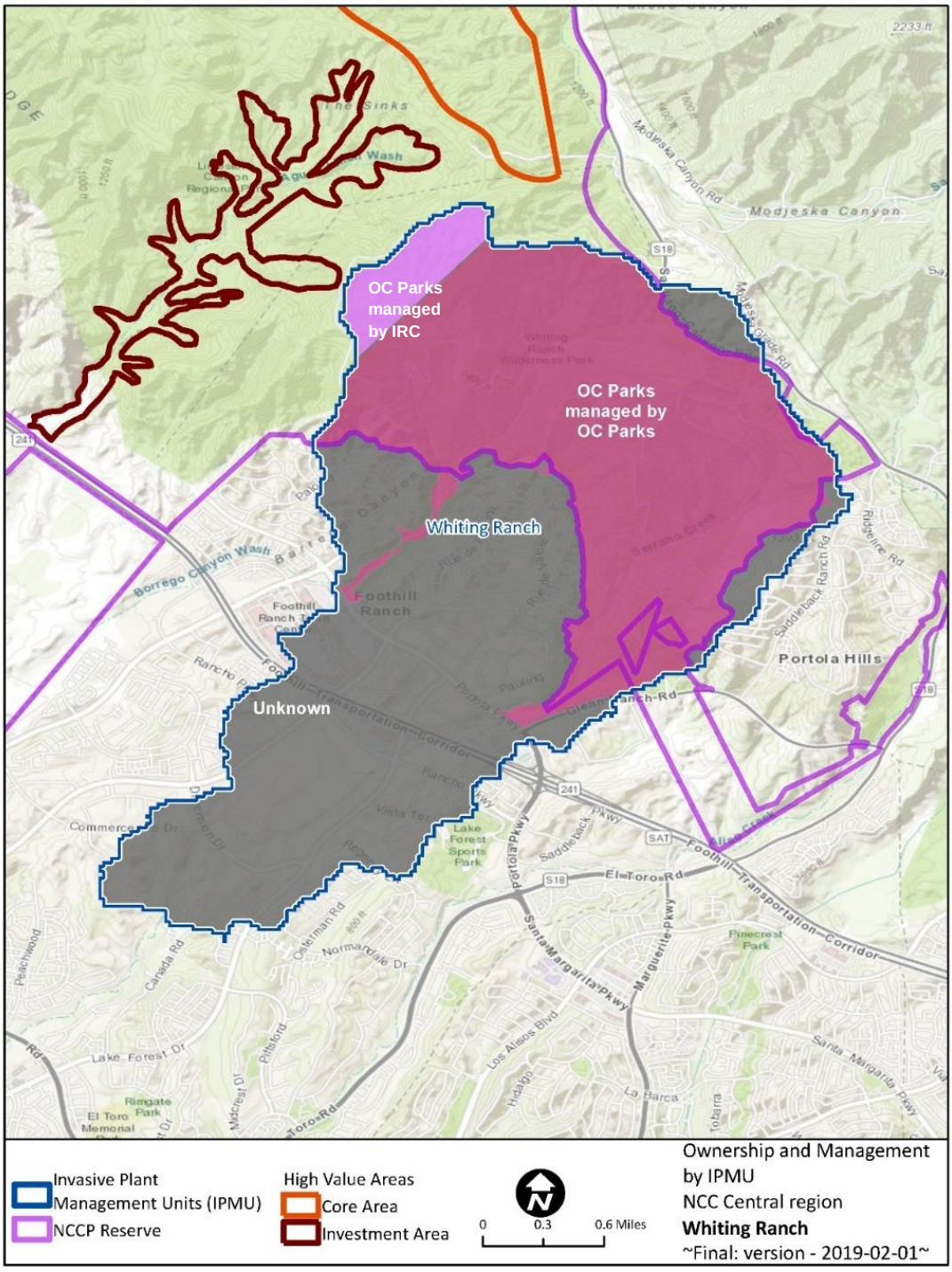
Invasive Plant Management Unit Profile:

Whiting Ranch

Ownership and Management: The map below shows ownership for this Invasive Plant Management Unit (IPMU), with acreage shown in the following table.

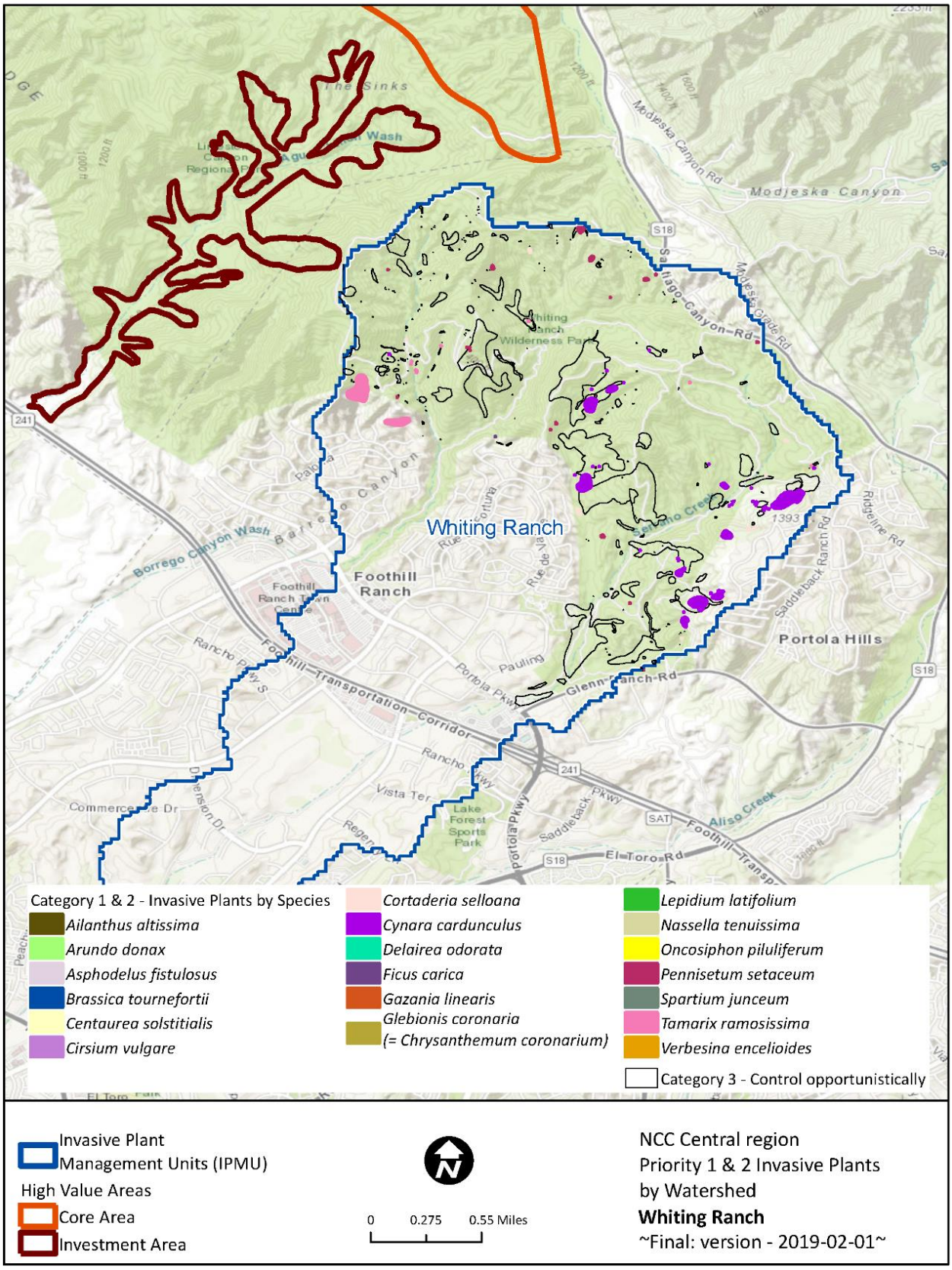


Landowner	Manager	Acres in NCCP	Acres outside NCCP
OC Parks	OC Parks	1,463	93
OC Parks	Irvine Ranch Conservancy	133	1
Unknown	Developed		1,721
Unknown	Unmanaged		66
Totals		1,596	1,880

Management Priorities: Invasive plants in the IPMU are shown in the table and map below. The table notes the plant's category (1=eradicate reserve-wide, 2=eradicate locally where possible, 3=control opportunistically) and impact (higher numbers indicate higher impact). Columns at right divide invasive plants by landowner and management entity. The map focuses on populations of Cat. 1 and 2 species, with populations of Cat. 3 species shown in outline with no fill color.

Whiting Ranch

			TOTALS				BY LA	OWNER / MANAGER	
								OCP/	OCP/
	Cat.	Impact	Pops	Gross	Net	Net, Core	Net, Inv	IRC	OCP
				(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Cynara cardunculus	2	3	45	47,997	1,659	-	-	-	1,659
Cortaderia selloana	2	3	10	616	307	-	-	-	307
Tamarix ramosissima	2	3	9	23,200	2,830	-	-	-	2,830
Pennisetum setaceum	2	2	17	2,289	97	-	-	1	97
Ficus carica	2	2	1	5	3	-	-	-	3
Nassella tenuissima	2	2	1	11	2	-	-	-	2
Foeniculum vulgare	3	3	17	30,577	356	-	-	-	356
Ricinus communis	3	2	1	1	1	-	-	-	1
Nicotiana glauca	3	0	224	159,244	10,696	-	-	3,218	7,478
Marrubium vulgare	3	0	92	690,674	25,226	-	-	1	25,225
Encelia farinosa	3	0	9	103	19	-	-	-	19
Washingtonia robusta	3	0	5	6	4	-	-	-	4
Albizia lophantha	3	0	3	649	99	-	-	-	99
Schinus molle	3	0	3	342	291	-	-	-	291
TOTALS			**437**	**955,712**	**41,589**	-	-	**3,220**	**38,370**
in acres:				236	10	-	-	1	9.5
								8%	92%

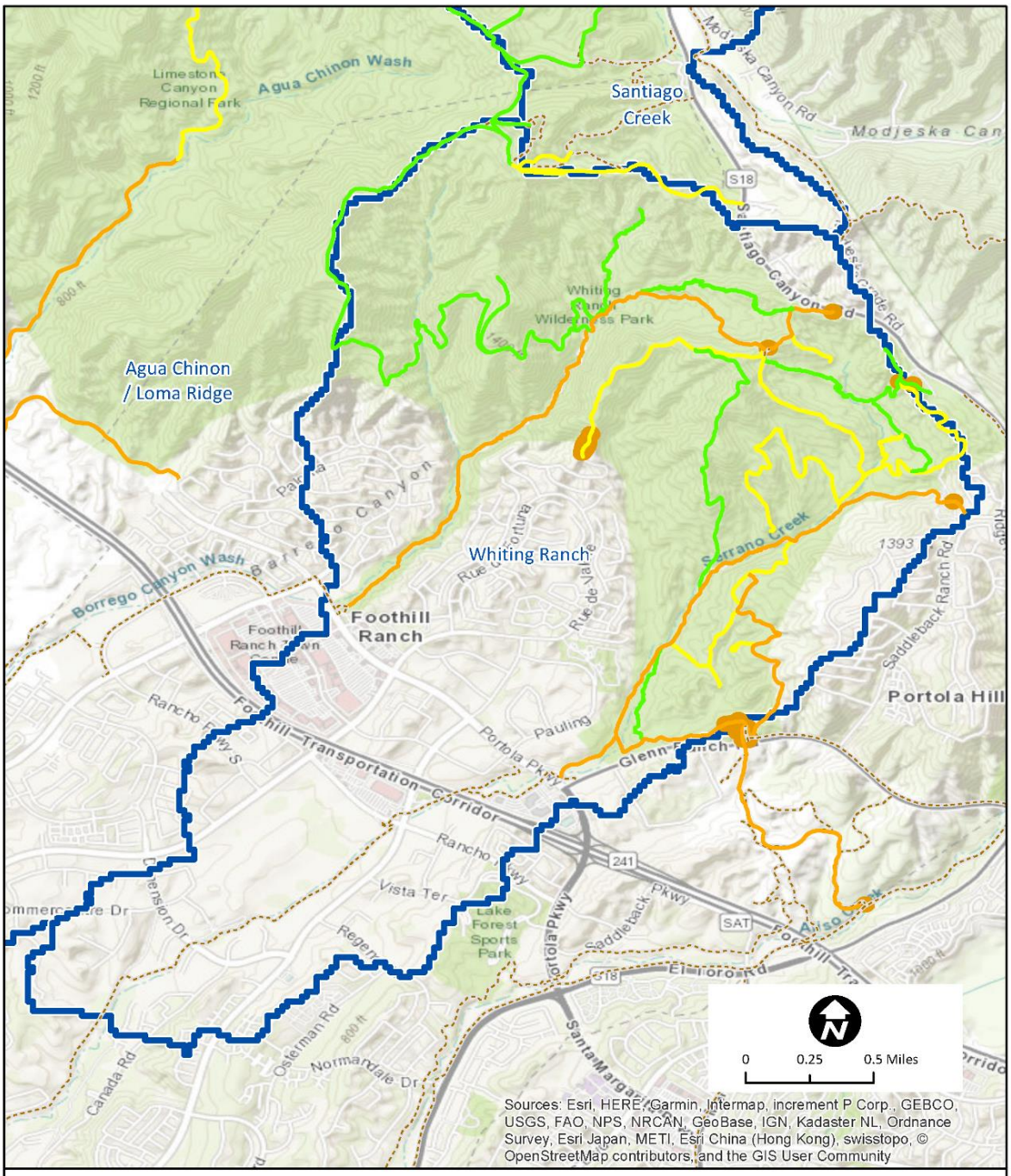

Whiting Ranch
Foothill Ranch
Portola Hills
Modjeska Canyon
Modjeska Canyon Rd
Santiago Canyon Rd
Glenn Ranch Rd
Foothill Transportation Corridor
El Toro Rd
Aliso Creek
Saddleback Ranch Rd
Ridgeline Rd
Portola Pkwy
Rancho Pkwy
Lake Forest Sports Park
Borrego Canyon Wash
Category 1 & 2 - Invasive Plants by Species
Ailanthus altissima
Arundo donax
Asphodelus fistulosus
Brassica tournefortii
Centaurea solstitialis
Cirsium vulgare
Cortaderia selloana
Cynara cardunculus
Delairea odorata
Ficus carica
Gazania linearis
Glebionis coronaria
(= Chrysanthemum coronarium)
Lepidium latifolium
Nassella tenuissima
Oncosiphon piluliferum
Pennisetum setaceum
Spartium junceum
Tamarix ramosissima
Verbesina encelioides
Category 3 - Control opportunistically
Invasive Plant Management Units (IPMU)
High Value Areas
Core Area
Investment Area
0 0.275 0.55 Miles
NCC Central region
Priority 1 & 2 Invasive Plants
by Watershed
Whiting Ranch
~Final: version - 2019-02-01~

Labor Estimate: The table below shows annual labor estimates to control the Cat. 1 and Cat. 2 invasive plant species in the IPMU. Methodology for estimates is described in the body of the Management Plan.

Whiting Ranch						
Person-Hours:			OCP/	OCP/		
		Impact	IRC	OCP	Totals	
Cynara cardunculus	2	3	-	123	123	7%
Tamarix ramosissima	2	3	-	74	74	4%
Cortaderia selloana	2	3	-	26	26	2%
Pennisetum setaceum	2	2	0	36	36	2%
Ficus carica	2	2	-	2	2	0%
Nassella tenuissima	2	2	-	2	2	0%
Foeniculum vulgare	3	3	-	41	41	2%
Ricinus communis	3	2	-	2	2	0%
Marrubium vulgare	3		0	686	686	40%
Nicotiana glauca	3		198	461	659	39%
Encelia farinosa	3		-	18	18	1%
Schinus molle	3		-	12	12	1%
Washingtonia robusta	3		-	10	10	1%
Albizia lophantha	3		-	8	8	0%
TOTALS			**199**	**1,501**	**1,700**	
			12%	88%		

Early Detection Surveys: The following table and map show miles of trails, roads and acreage of sites for early detection surveys by priority. We estimate one hour of field time for each mile of road or trail and one hour of field time for each 5 acres of a site.

Feature	High (every year)	Medium (every 2 years)	Low (every 3 years)
Bolero Lookout			0.2
unknown	6.2	5.2	6.8
Totals	6.2	5.2	7.1
* Whiting Ranch has an additional 13 acres of high (every year) priority site survey areas, as depicted in the EDRR map.			



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