

**Invasive Plant Management
Protocols and Procedures
for the
Nature Reserve of Orange County (NROC)**



April, 2018

Board of Directors approved March 15, 2018

Supported by the **U.S. Fish and Wildlife Service**, and the **California Department of Fish and Wildlife**, April 17, 2018

Supported by the **California Invasive Plant Council**, June 7, 2018

(Letters attached)



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In Reply Refer To:
FWS/CDFW-OR-18B0167-18CPA0187

April 17, 2018
Sent by Email

Mr. Jim Sulentic
Executive Director
Natural Communities Coalition
13042 Old Myford Road
Irvine, California 92602

Subject: Support for Best Practices for Invasive Plant Control in the Nature Reserve of Orange County, Orange County, California

Dear Mr. Sulentic:

This letter is in response to your request, on behalf of the Natural Communities Coalition (NCC), to review and approve the “Best Practices for Implementation of Invasive Plant Control for Resource Management on the Nature Reserve of Orange County” and the associated “Invasive Plant Management Protocols and Procedures.” These documents were approved by the NCC Board of Directors on March 15, 2018.


Recent restrictions on the use of synthetic herbicides within local jurisdictions of Orange County prompted NCC, in collaboration with its partners, to develop a strategy that is consistent with local policies while enabling signatory jurisdictions and participating landowners to meet their management obligations under the County of Orange Central and Coastal Subregion Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP).

The U. S. Fish and Wildlife Service (Service) and California Department of Fish and Wildlife (Department), collectively referred to as the “Wildlife Agencies,” issued permits to participating jurisdictions and participating landowners for implementation of the NCCP/HCP, which addresses development, conservation, and land management activities throughout much of central and coastal Orange County. The permits authorize impacts to covered species from development and land management activities in exchange for commitments by permittees to conserve and manage covered species’ habitat in the NCCP/HCP reserve system (also referred to as the Nature Reserve of Orange County). One of the primary commitments made by permittees is to maintain the long-term habitat value of the reserve system and its ability to support viable populations of covered species (Section 4.4 NCCP/HCP Implementation Agreement; Section 5.2 NCCP/HCP). Control of non-native invasive plant species is essential to maintain the long-term habitat value of the reserve system.

The Wildlife Agencies previously reviewed the above referenced documents and submitted comments and recommendations that have been incorporated into the final Board approved versions. We conclude that, although the proposed approach is conservative with respect to potential use of synthetic herbicides, it incorporates sufficient flexibility to meet the permittees' commitments under the NCCP/HCP, and we support the use of these documents by land owners within the plan area to guide the control of non-native species. We recommend that future annual reports by participating landowners implementing the proposed strategy explicitly address the effectiveness of the strategy and include recommendations for improvements to the strategy, if necessary. We appreciate NCC's ongoing coordination and partnership and their work to successfully implement the NCCP/HCP. If you have any questions, please contact Jonathan Snyder of the Service at (760) 431-9440, extension 307, or David Mayer of the Department at (858) 467-4234.

Sincerely,

Karen A. Goebel
Assistant Field Supervisor
U.S. Fish and Wildlife Service



Gail K. Sevens
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[Affiliations for identification only]

June 7, 2018

Mr. Jim Sulentich, Executive Director
Natural Communities Coalition
13042 Old Myford Rd.
Irvine, CA 92602

Dear Mr. Sulentich,

I am writing on behalf of Cal-IPC to support NCC's recently adopted documents on invasive plant control using IPM (integrated pest management). These documents—"Best Practices for Implementation of Invasive Plant Control for Resource Management on the Nature Reserve of Orange County" and "Invasive Plant Management Protocols and Procedures"—outline an effective and safe IPM approach for controlling invasive plants, including the judicious use of herbicides.

Controlling invasive plants is an essential part of meeting the conservation goals set out for the Reserve. Thank you for NCC's leadership in environmental stewardship.

Sincerely,

Doug Johnson
Executive Director

Purpose

Control and/or elimination of invasive plant species is a very high priority management action for lands enrolled in the Orange County Central and Coastal NCCP/HCP. Controlling certain invasive species, including annual non-native grasses, also reduces fire danger in high-risk areas such as the Wildland Urban Interface.

The following Best Practice protocols and methodologies should be employed on the Nature Reserve of Orange County (NROC) to comply with habitat management and restoration mandates in the NCCP/HCP and remain consistent with established Standards of Care for the land while minimizing public health risk and meeting fiscal and fiduciary priorities.

Standards of Care Established in the NCCP/HCP

The NCCP/HCP is a regional conservation and development permit issued in 1996 by federal and state regulatory agencies that allows development to proceed on certain lands in exchange for protection and permanent management of native habitats and rare species in the NROC.

Permittees and signatories agreed to enroll their lands in the NROC and to provide protection and long-term management of those lands to meet the Standards of Care mandated in the NCCP/HCP Plan and Implementing Agreement. These include adaptive management of lands to maintain No Net Loss of Habitat Value over time, and management to ensure the long-term health and viability of the Reserve (see NCCP/HCP Plan, Chapters 4 & 5).

In addition, the NCCP/HCP permit, which specifies the long-term commitment to continued viability, and in some cases improvement of habitat conditions over time, is required to obtain regulatory approval and permitting of habitat loss through development elsewhere. These ecologically-based performance standards are mandatory for permittees and signatories.

Each reserve area in the NROC is also subject to approved Resource and Recreation Management Plans (RRMPs) that establish specific conditions and performance obligations for those areas. Certain RRMPs contain requirements and standards beyond the base requirements of the NCCP/HCP permit— such as stipulated habitat restoration or invasive species removal goals – in exchange for impacts allowed under the RRMP, including trail and visitor infrastructure development.

Best Practices for Integrated Invasive Plant Management and Control

Effective control is generally considered to be greater than 80% kill of target invasive species, although certain invasive plant species may demand higher control rates due to prolific reproductive output, extended dormancy, or other special life history characteristics.

Invasive plant control methods should follow generally established Integrated Pest Management (IPM) protocols. Collectively, these practices maximize the effectiveness of invasive plant control activities while balancing other management priorities. They include:

1. Prevent transfer and establishment of invasive plant species by practices such as cleaning field equipment and vehicles and using invasive seed-free materials (e.g. gravel, soil, straw wattles, etc.)
2. Use of manual, mechanical, or cultural control methods where practical, cost-effective, and able to achieve control mandates.
3. Where manual, mechanical, or cultural control methods are impractical, not cost-effective, or do not achieve control mandates, preference should be given to EPA Level III "Caution" label herbicides that achieve effective (80% or better for most species) control. As a result of cultural or other considerations, managers may prioritize non-synthetic herbicides that achieve control mandates.
4. Where EPA Level III "Caution"-label non-synthetic herbicides are used and do not achieve control mandates or are not practical or cost-effective, EPA Level III "Caution" label synthetic herbicides may be used, with preference given to herbicides not listed on CA Prop 65.
5. EPA Level III "Caution"-label synthetic herbicides listed under CA Prop 65 may be used when other herbicides as described are not effective in achieving control objectives.
6. EPA Level II "Warning"-label herbicides (synthetic and non-synthetic) may be used if the other methods above do not adequately achieve control objectives and use of these herbicides can achieve the desired level of control over that of herbicides used in (4) and (5).
7. EPA Level I "Danger"-label herbicides may be used in circumstances where all other methods of control are ineffective and habitat health is critically at risk and use of these herbicides can achieve the desired level of control.
8. In all cases, the use of herbicides should not be a substitute for maintaining the practices described in (1) and (2) above.

When determining which herbicides to use under the above protocols, managers should also consider the risk vs. benefit of EPA label warnings in the context of wildland applications. Many herbicides labeled as EPA Level I "Danger" are in that category because of acute risk of irreversible eye damage to the applicator, not because they are systemic toxicants or a danger to habitats or wildlife. Triclopyr (Garlon®) for example, comes in two forms: Garlon 3A®,

labeled “Danger” because of applicator eye risk and Garlon 4®, labeled Level III “Caution”, though it poses greater ecological risk under certain conditions than the Level I “Danger” form of the chemical.

It should be noted that there is no relationship between an herbicide’s toxicity rating (e.g. EPA level I, II, III or Danger, Warning, Caution) and the level of efficacy of an herbicide in controlling invasive plant species. This is in large part due to the different mechanisms by which various herbicides work; e.g. *systemic* vs. *non-systemic* action, and the fact that herbicides target plants and not animals. In general prioritizing Caution or EPA level III herbicides presents less acute toxicity danger to the applicator and others from inadvertent exposure. There is also no inherent difference in toxicity to humans between *systemic* herbicides that are translocated through a plant and *non-systemic* ones that kill tissue on contact.

All herbicides, whether synthetic or non-synthetic, should be applied only by a CA Department of Pesticide Regulation licensed business or an organization with a certified or licensed applicator to supervise the application. Managers should also obtain herbicide use recommendations from state-licensed Pest Control Advisors. All required reports of herbicide use must be submitted to appropriate oversight and regulatory authorities and be described in required annual reports under the NCCP/HCP as well as in required reports to county and state pesticide regulatory authorities, including amounts, concentrations and application methods. Individual land owners may have additional or more frequent reporting needs or requirements.

Management Activities Requiring Invasive Plant Control in the NROC

There are four basic types of management activities that involve invasive plant control in the NROC: trail maintenance, habitat restoration, control of identified target invasive plant species, and infrastructure maintenance activities covered by the permit. Infrastructure maintenance is not specifically described below as it generally falls in developed areas and may be covered by other protocols. However, the invasive species control mandates in the NCCP apply equally to infrastructure maintenance, and these areas may be especially significant vectors of non-native species into wildlands.

For all the following protocols, applications should be done using methods that avoid contact of the herbicide to non-target plant species, or movement of herbicide outside of the targeted area. Examples are use of low-drift nozzles, spray shields, and not using spray wands above chest height. For woody plants, cut stump, frill, or similar application method can be used with systemic herbicides, to eliminate drift, overspray or environmental exposure.

Protocols include:

Trail Maintenance

Trails are the primary means of public access to NROC. There are generally two kinds of trails, those open to daily self-guided access and those with managed access. Landowner ordinances and signage typically require visitors to remain on trails at all times, so the potential for public exposure to herbicides applied off-trail is negligible. Public, daily-use trailheads and staging areas are considered infrastructure and their maintenance is described further below.

1. Trails should be maintained on a routine basis by mowing and manual trimming or pulling.
2. When manual techniques are not effective at maintaining trails, herbicides should be used in those trail sections with persistent invasive plant encroachment, or when specific trail sections are identified as pathways of invasive plant invasion into habitat.
3. Non-synthetic herbicides may be given preference for cultural considerations if practical, cost-effective, and control mandates are achieved. If control mandates cannot be achieved using non-synthetic herbicide, EPA "Caution"-label synthetic herbicides should be applied using the lowest possible effective application rate to achieve control. Priority may be given to synthetic herbicides not listed under CA Prop 65.
4. Trails or trail sections may be closed and signed for 48 hours following the application of herbicides. Individual land owners may require managers to provide advance notification prior to application of herbicide on trails including the location and application rate of herbicide used.

Habitat Restoration

Habitat restoration is a management priority for the NCCP/HCP. It may also be a compliance requirement of approved RRMPs under the NCCP/HCP by providing restoration acres to offset trail, trailhead, and other visitor infrastructure construction in the Reserve. Restoration generally takes place away from trails.

1. Areas subject to habitat restoration and enhancement activities located less than 15 feet from trail edges should be prepared and maintained by hand weeding, mowing, or other methods of mechanical removal if effective in achieving control mandates.
2. When mechanical methods do not achieve control mandates for areas less than 15 feet from trail edges, EPA "Caution"-label herbicides should be used. Non-synthetic herbicides may be preferred for cultural considerations if they are practical, cost-effective, and control mandates are achieved. If control cannot be achieved by non-synthetic herbicides, EPA "Caution"-label synthetic herbicide should be applied using

the lowest possible effective application rate to achieve control. Priority may be given to herbicides not listed under CA Prop 65.

3. Habitat restoration areas more than 15 feet from trail edges, trailheads, or other visitor facilities should be prepared and maintained primarily by manual removal or other mechanical methods, and, when necessary to achieve control mandates, application of EPA “Caution”-label synthetic herbicide in the lowest possible effective application rate to achieve control. Priority may be given to herbicides not listed under CA Prop 65.
4. Application methods shall be used at all times that minimize or eliminate overspray, drift, environmental exposure, and risk to the applicator.
5. Where habitat restoration activities using herbicides occur less than 15 feet from trail edges, trailheads, or other visitor facilities, the area may be closed and signed for 48 hours following application. Individual land owners may require managers to provide advance notification prior to application including the location and application rate of herbicide used.

Target Invasive Plant Control

Control and/or elimination of specific invasive plant species is a very high priority management action for lands enrolled in the NCCP/HCP. Controlling certain species also reduces fire danger in high-risk areas such as the Wildland Urban Interface. Control activities may occur adjacent to or away from trails. The list of Target Invasive Plant Species in the NROC is included in Table 1.

1. Invasive plant species that have high potential for ecological impact and spread located less than 15 feet from trails should be controlled by manual removal if practical, cost-effective, and control mandates can be achieved. When mechanical methods do not achieve control mandates for target species less than 15 feet from trail edges, EPA “Caution”-label herbicides should be used. Non-synthetic herbicides may be preferred for cultural considerations if they are practical, cost-effective, and control mandates are achieved. If control mandates cannot be achieved by non-synthetic herbicide, EPA “Caution” label synthetic herbicide should be applied using the lowest possible effective application rate to achieve control. Priority should be given to synthetic herbicides not listed under CA Prop 65.
2. Target invasive plant species greater than 15 feet from trail edges or in remote areas should be treated manually (pulling, mowing, cutting) where possible to achieve control mandates, or by application of EPA “Caution”-label herbicide in the lowest possible effective application rate if manual methods are ineffective, impractical or not cost-effective. Use of EPA “Warning” or “Danger”-label herbicides may be considered

according to the protocols described above if “Caution”-label herbicides are ineffective in achieving control mandates.

3. Extensive research and field experience demonstrate that certain persistent, perennial invasive plant species are not possible to control effectively or economically with manual methods or currently-available non-systemic herbicides. These species are indicated on the list of Target Invasive Plant Species in Table 1 below. Individual plants of these species should be controlled using direct, spot applications of systemic herbicide with the lowest possible application rate to achieve control mandates. The preferred and most effective methods of control for woody species are either basal bark treatment or manual cutting of individual plants and direct application of systemic herbicide to the cut stump.
4. At all times, application methods shall be used that minimize or eliminate overspray, drift, environmental exposure and risk to the applicator. Priority may be given to synthetic herbicides not listed under CA Prop 65.
5. Where target invasive plant species control activities using herbicides occur less than 15 feet from trail edges, trailheads, or other visitor facilities, the area may be closed and signed for a period of 48 hours following application. Individual land owners may require managers to provide advance notification prior to application including the location and application rate of herbicide used.

Evaluation of New Control Methods

New methods of invasive plant control and chemical compounds are continually emerging for potential use in natural land management. Concurrent with implementing an IPM Best Practices program with the procedures identified here, managers should regularly field test and evaluate new methods and products to improve control and Standards of Care over time. Changes in herbicide regulations, labeling and application methods should be actively monitored and incorporated into IPM Best Practices.

There is an extensive group of managers in California and elsewhere who are developing and refining Best Practices and collaborating on invasive plant control methods for natural lands and habitat reserves. Their broad field experience, as well as the research of other practitioners, is highly relevant and should always be integrated into control decisions, herbicide selection, planning, and field practices. The non-profit California Invasive Plant Council (www.cal-ipc.org) is a statewide clearinghouse of information on invasive plant control with extensive resources for land managers. The University of California Division of Agriculture and Natural Resources (UC ANR) also develops and provides information on invasive plant control (www.ipm.ucanr.edu and wric.ucdavis.edu).

Table 1. Priority Target Invasive Plant Species from NCC Invasive Plant Management Program.
Priority 1: Eradicate reserve-wide. Priority 2: Eradicate in certain sub-watersheds. Priority 3: Control opportunistically. Managers should continually update the list of target species for each reserve area with particular attention to newly discovered or emergent invasive species.

Species	CommonName	Priority
<i>Aegilops triuncialis</i>	barbed goatgrass	1
<i>Ageratina adenophora</i> †	sticky eupatorium	1
<i>Arctotheca calendula</i> (= <i>Arctotheca calendula fertile</i>)	fertile capeweed	1
<i>Cenchrus longispinus</i>	sandbur	1
<i>Cenchrus echinatus</i>	sandbur	1
<i>Centaurea solstitialis</i>	yellow starthistle	1
<i>Chrysanthemoides monilifera</i> ssp. <i>Monilifera</i> *	bitou bush	1
<i>Delairea odorata</i> *	Cape-ivy	1
<i>Dittrichia graveolens</i>	Stinkwort	1
<i>Ehrharta longiflora</i> †	longflowered veldtgrass	1
<i>Euphorbia terracina</i> †	carnation spurge	1
<i>Euphorbia virgata</i> (= <i>Euphorbia esula</i>) †	leafy spurge	1
<i>Galenia pubescens</i>	coastal galenia	1
<i>Hypericum canariense</i> *	Canary Island St. Johnswort	1
<i>Iris pseudacorus</i> †	yellow flag iris	1
<i>Kochia scoparia</i>	summer cypress	1
<i>Ligustrum japonicum</i> *	Japanese privet	1
<i>Limonium ramosissimum</i> †	Algerian sea lavender	1
<i>Melinis repens</i>	natalgrass	1
<i>Oncosiphon piluliferum</i>	Stinknet	1
<i>Parthenium hysterophorus</i> †	Santa Maria feverfew	1
<i>Rubus armeniacus</i> *	Himalayan blackberry	1
<i>Senecio linearifolius</i> v. <i>linearifolius</i>	linear-leaved Australian fireweed	1
<i>Verbesina encelioides</i> *	golden crownbeard	1
<i>Volutaria tubuliflora</i>	Moroccan knapweed	1
<i>Ailanthus altissima</i> *	tree-of-heaven	2
<i>Araujia sericifera</i> *	bladderflower	2
<i>Arundo donax</i> *	giant reed	2
<i>Asphodelus fistulosus</i> *	onionweed	2
<i>Brassica tournefortii</i>	Sahara mustard	2
<i>Centaurea diluta</i>	North African knapweed	2
<i>Cirsium vulgare</i>	bull thistle	2
<i>Ehrharta calycina</i> †	perennial veldt grass	2
<i>Emex spinosa</i> †	spiny emex	2
<i>Glebionis coronaria</i> (= <i>Chrysanthemum coronarium</i>)†	garland chrysanthemum	2
<i>Lepidium appelianum</i> †	hairy whitetop	2

<i>Lepidium draba</i> †	whitetop	2
<i>Lepidium latifolium</i> *	perennial pepperweed	2
<i>Lonicera japonica</i> *	Japanese honeysuckle	2
<i>Nassella tenuissima</i> †	Mexican feather grass	2
<i>Spartium junceum</i> *	Spanish broom	2
<i>Tamarix ramosissima</i> *	tamarisk	2
<i>Cortaderia selloana</i> *	pampas grass	2
<i>Cynara cardunculus</i> †	artichoke thistle	2
<i>Echium candicans</i> †	pride of madeira	2
<i>Ficus carica</i> *	common fig	2
<i>Gazania linearis</i>	Gazania	2
<i>Leucanthemum vulgare</i>	ox-eye daisy	2
<i>Pennisetum setaceum</i> †	fountain grass	2
<i>Phalaris aquatica</i> †	hardinggrass	2
<i>Plantago arenaria</i>	Indian plantain	2
<i>Robinia pseudoacacia</i> *	black locust	2
<i>Salpichroa organifolia</i> †	lily-of-the-valley vine	2
<i>Ulmus parvifolia</i> *	Chinese elm	2
<i>Acacia cyclops</i> *	cyclops acacia	3
<i>Acacia redolens</i> *	coastal wattle	3
<i>Albizia lophantha</i> *	stink bean	3
<i>Conium maculatum</i> †	poison hemlock	3
<i>Foeniculum vulgare</i> †	Fennel	3
<i>Malephora crocea</i> †	coppery mesembryanthemum	3
<i>Melia azedarach</i> *	Chinaberry tree	3
<i>Olea europaea</i> *	Olive	3
<i>Parkinsonia aculeata</i> *	Jerusalem thorn	3
<i>Parthenocissus quinquefolia</i> †	Virginia creeper	3
<i>Ricinus communis</i> †	castor bean	3
<i>Schinus molle</i> †	Peruvian pepper tree	3
<i>Schinus terebinthifolius</i> †	Brazilian pepper tree	3
<i>Tropaeolum majus</i> †	garden nasturtium	3
<i>Vinca major</i> †	periwinkle	3
<i>Washingtonia filifera</i> †	California fan palm	3
<i>Washingtonia robusta</i> †	Mexican fan palm	3
<i>Agave americana</i> †	century lant	3
<i>Atriplex semibaccata</i> †	Australian saltbush	3
<i>Brachypodium distachyon</i> †	purple false brome	3
<i>Carduus pycnocephalus</i> †	Italian thistle	3
<i>Encelia farinosa</i>	brittlebush	3
<i>Eucalyptus camaldulensis</i> *	red gum	3
<i>Eucalyptus sp.</i> *	Eucalyptus	3

<i>Limonium perezii</i> †	statice	3
<i>Marrubium vulgare</i> †	horehound	3
<i>Myoporum laetum</i> *	lollypop tree	3
<i>Nerium oleander</i> *	oleander	3
<i>Nicotiana glauca</i> †	tree tobacco	3
<i>Phoenix canariensis</i> †	Canary Island date palm	3
<i>Silybum marianum</i>	milk thistle	3
<i>Tragopogon porrifolius</i>	purple salsify	3

*Use of systemic herbicides is necessary to achieve control mandates.

†Use of systemic herbicides significantly improves ability to achieve control mandates.

NOTE: Systemic herbicides may also be necessary for other species if population size is too large for manual methods and/or non-systemic herbicides to achieve control mandates.