

#### April 18, 2025

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| From            | Kolby Lundgren, GHD<br>Botanist/Wetland Scientist                              | Project No. | 12607516               |
| Project<br>Name | Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project |             |                        |
| Subject         | Invasive Plant Management Plan   |             |                        |

#### 1. Introduction

The primary objective of the Wood Creek Phase III - Felt Ranch Off-Channel Rearing Habitat Planning Project (Project) is to restore the historical connectivity and function of the existing freshwater wetlands on the Felt Ranch property to the tidal channels of lower Wood Creek and Freshwater Slough, tributaries to Humboldt Bay (**Attachment A, Figure 1**). Restored conditions are anticipated to dramatically enlarge the existing stream-estuary ecotone of Freshwater Creek and Humboldt Bay to boost the recovery trajectory of threatened Coho populations in Humboldt Bay, as well as providing a measure of resiliency against climate change and sea level rise.

#### 1.1 Purpose of Invasive Plant Management Plan

The purpose of this Invasive Plant Management Plan (Plan) is to clearly identify invasive plant species that should be targeted for control in the northwest corner of the Project Area to prevent their spread during and after Project implementation. Construction of the Project is expected to occur over two years, beginning in the summer of 2025 and continuing through 2026. An overarching goal of the Project is to minimize existing occurrences and potential spread of invasive plant species in the Project Area and to support establishment and expansion of native-dominated plant communities.

The scope of this Plan includes the northwest portion of the Project Area that will receive invasive plant species control treatments, known as the Invasive Plant Control Area (**Attachment A, Figure 2**). All vegetation communities within the Invasive Plant Control Area were mapped during field surveys (**Attachment A, Figure 3**). The strategies outlined in the Plan include removal through mechanical methods and/or management of existing or recurrent future populations through passive physical processes. No chemical control is proposed or will be employed for invasive plant species management. The areas delineated for invasive plant species control include two distinct areas that are separated by an existing ditch that bisects the Project Area from east to west. These areas have been separated into two treatment zones based on the varying density of invasive plant populations present on either side of the existing ditch and the corresponding ingress and egress to these areas, as they are flooded for most of the year. Each portion of the Invasive Plant Control Area is planned for treatment in 2026 and 2027, and the small patch of yellow flag iris outside of the Invasive Plant Control Area is planned for treatment in 2025.

Treatment of species outside of and/or overlapping the Invasive Plant Control Area (i.e. yellow flag iris and reed canarygrass) would be implemented by the selected earthwork contractor in 2025 and 2026 (as shown on Figure 4). Treatment of select infestations of reed canarygrass within the Invasive Plant Control Area would be implemented by the selected revegetation contractor in 2026 and 2027 (as shown on Figure 4).

This Plan clearly delineates the spatial location and extent of invasive plant populations targeted for control and outlines proposed management strategies. Methodology was developed using information about the

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biology of each species and management strategies that have been vetted and proven to be effective for each species.

#### 1.2 Definition of Invasive Species

This Plan used data collected from technical studies conducted in the Project Area and subsequent targeted field surveys of the Invasive Plant Control Area to identify a concise list of invasive plant species that should be prioritized for treatment based on their current and potential ecological impact. Invasive species that will be targeted for treatment and/or removal are species that are known to have detrimental ecological impacts to specific habitats (e.g., wetlands). The species targeted have potential to substantially or severely impact ecological and physical processes and are known to possess attributes conducive to moderate to high rates of dispersal and establishment.

#### 1.3 Best Management Practices

The Project has received numerous environmental approvals and authorizations for construction. These approvals (i.e., permits) require stringent avoidance and minimization measures and/or protection measures to prevent harm or impact to sensitive natural resources. The following are measures (practices) pertinent to vegetation removal that are included as a condition of environmental approvals.

#### 1.3.1.1 General Conservation Measures

- All materials placed in or over streams, rivers or other waters shall be nontoxic. Any combination of wood, plastic, cured concrete, steel pilings, or other materials used for in-channel structures shall not contain coatings or treatments or consist of substances toxic (e.g., copper, other metals, or pesticides, petroleum-based products, etc.) to aquatic organisms that may leach into the surrounding environment in amounts harmful to aquatic organisms.
- Construction supervisors and managers will be educated on weed identification and the importance of controlling and preventing the spread of invasive weeds. Equipment will be cleaned of any sediment or vegetation at designated wash stations before entering or leaving the project area to avoid spreading pathogens or non-native invasive species.

#### 1.3.1.2 Vegetation/Habitat Disturbance Protection Measures

The following protection measures apply to all project related construction activities where vegetation/habitat disturbance occurs:

- Vegetation disturbance will be avoided and minimized to the extent practicable. Disturbed areas will be revegetated with plant species appropriate to the site.
- Disturbance to existing grades and native vegetation shall be limited to the actual site of the project, necessary access routes, and staging areas. The number of access routes, the size of staging areas, and the total area of the project activity shall be limited to the minimum necessary to achieve the project goal. All roads, staging areas, and other facilities shall be placed to avoid and limit disturbance to streambank or stream channel habitat as much as possible. When possible, existing ingress or egress points shall be used and/or work shall be performed from the top of the creek banks. Following completion of the work, the contours of the creek bed and creek flows shall be returned to preconstruction conditions or improved to provide increased biological functions
- If removal of vegetation is required within project access or staging areas, the disturbed areas shall be replanted with native species, and the area will be maintained and monitored in accordance with the Habitat Mitigation, Monitoring, and Reporting Program prepared for the project. Any non-biodegradable fencing materials shall be removed after plantings are adequately established.
- Prior to construction, locations and equipment access points will be determined to minimize riparian disturbance. Unstable areas will be avoided. Project designs and access points to be used should minimize riparian disturbance without affecting less stable areas, to avoid increasing the risk of channel instability.
- Soil compaction will be minimized by using equipment with a greater reach or that exerts less pressure per square inch on the ground than other equipment, resulting in less overall area disturbed or less compaction of disturbed areas.

### 2. Invasive Species Prioritized for Treatment

The primary invasive species of concern currently observed in the Invasive Plant Control Area is reed canary grass (*Phalaris arundinaceae*), which has native and non-native strains and all of which are considered potentially invasive in wetlands. An isolated dense patch of yellow flag iris (*Iris pseudacorus*) was observed just outside the Invasive Plant Control Area to the east. Both reed canary grass and yellow flag iris are rhizomatous perennials that form dense monocultures in wetlands that can block stream channels and replace native vegetation (USFWS 2018; USFWS 2019). This is the currently observed growth habits of existing populations in each invasive control area (forming dense stands).

Currently, reed canary grass and yellow flag iris are growing intermixed in a matrix of native species assemblages, primarily small-fruited bulrush (*Scirpus microcarpus*) marsh, with Pacific water-parsley (*Oenanthe sarmentosa*) and rush species (*Juncus* sp., primarily *J. balticus* and *J. effuses*) interspersed. Isolated, dense patches of slough sedge (*Carex obnupta*) are also interspersed within this marsh complex. Coastal dune willow thickets (*Salix hookeriana*) line the western fence line and isolated "islands" of individual willows or willow thickets are interspersed in the Invasive Plant Control Area. All vegetation communities within the Invasive Plant Control Area were mapped during field surveys (**Attachment A, Figure 3**).

The entire control area is an inundated persistent freshwater wetland and has seasonally fluctuating water levels, but the area is generally inundated throughout the year. The post-construction condition of each control area is to become drier, as the freshwater source feeding this marsh (an existing ditch that bisects the Project Area called the Felt Ranch Ditch) will be plugged at the eastern and southern edge of the control area with a vegetated hummock to facilitate routing the fresh water into the newly constructed slough channels.

Treatment recommendations are outlined to maximize the outcome of invasive control while considering the challenges of accessing and traversing the site (deep, ponded water).

#### 2.1 Treatment Schedule within Invasive Plant Control Area

The following is an outline of the proposed treatment schedule, starting in the spring of 2026 (i.e. April 1 through 15<sup>th</sup>). All invasive plant populations, and their associated proposed treatment strategies are mapped in **Attachment A, Figure 4**. Treatment strategies are described below by species, as well as plant communities that will not be treated or will be planted with native shrubs according to the Project Wetlands Habitat Mitigation and Management Plan (WHMMP) (GHD 2023).

The following general sequencing will occur in the Invasive Plant Control Area

- All populations of invasive plants scheduled for treatment will have their boundaries delineated and flagged prior to application of recommended treatment (early summer 2025 for yellow flag iris, and late spring 2026 for all reed canary grass stands). Preliminary mapping of these invasive plant populations occurred in March 2025. Boundaries of these populations will be delineated tightly in late spring 2026 during flagging with the exception of yellow flag iris which will already be treated by then.
- All invasive plant treatments in the Invasive Control areas will be dictated by GHD to the contracted revegetation crew and all invasive plant treatments outside of the Invasive Control areas (treatments for portions that overlap hummocks or the grading boundary) will be dictated by the construction contractor (Mike Love & Associates) (see Figure 4). Invasive plant population treatments will commence in 2025 (solely for yellow flag iris) and continue in 2026 through 2027 (for reed canary grass).
- Revegetation of the Invasive Plant Control Area (outside of the reed canary grass treatment areas) will occur in the fall of 2025 and fall of 2026 (Attachment A, Figure 4).
- Reed canary grass treatment in the Invasive Plant Control Area being carried out by the revegetation contractor will include solarization of identified reed canary grass stands. Solarization materials will be installed in spring 2026 and left in place through mid-fall 2026. The same schedule will be utilized for solarization in 2027 (see Section 2.2.2.1 for details).
- Spot treatment and/or modification to the solarization material used on selected reed canary grass
  populations (replacement if torn or trampled by wildlife, etc.) will occur throughout the 2026 and 2027

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seasons when solarization materials are in place. Solarization materials will be removed in mid fall 2027.

 Revegetation of the reed canary grass populations treated through solarization will be re-planted with native willow stakes in the fall of 2027 following removal of solarization materials.

#### 2.2 Species Descriptions and Treatments

#### 2.2.1 Yellow flag iris (Iris pseudacorus)

Yellow flag iris is a showy perennial flower that was introduced as an ornamental plant in gardens (USFWS 2019). This escaped cultivar is a high priority species for control in the Project Area due to its highly prolific seed production and rhizomatous growth habit. Yellow flag iris is growing in an isolated dense patch just outside of the Invasive Plant Control Area to the east.

This occurrence is outside of the Invasive Plant Control Area and will be treated by the earthwork contractor. It is recommended to be treated using the following strategy.

#### 2.2.1.1 Recommended Treatment Plan

The yellow flag iris population to the east of Invasive Plant Control Area should be excavated and buried concurrently with Project excavation activities in that portion of the Project Area due to its proximity to proposed hummocks that are going to be constructed.

Yellow flag iris rhizomes can extend vertically 4 to 6 inches deep, with fleshy roots up to 12 inches long (USFWS 2019). Rhizomes branch and form extensive clumps. The existing patch should be excavated to a depth of at least 12 inches to ensure rhizomes are fully collected, and the rhizomes along with the entire length of the above-ground growth removed and buried in a pit at least three feet deep, to be covered with an additional one foot of material in a location of hummock creation. In total, yellow flag iris should be buried approximately four feet deep.

It should be noted that caution should be used when handling yellow flag iris, as it can cause skin irritation (USFWS 2019).

#### 2.2.2 Reed canary grass (Phalaris arundinacea)

Reed canary grass occurs within and outside of the Invasive Plant Control Area (see **Figure 4**). It is a high priority species for treatment. Reed canary grass occurs along the northwest fence line that borders the Invasive Plant Control Area and has primarily spread south of the Felt Ranch Ditch, where there are several dense stands established. The dense patches are often adjacent to and intergrading with cattails. The western fence line has dense coastal dune willow thickets, which appear to be suppressing the growth and spread of reed canary grass in its understory herb layer. This observation has informed a method of control for reed canary grass that is outlined below.

#### **Species Biology & Ecological Impact**

Reed canary grass has been widely cultivated for forage and seed production and planted for erosion control (Wisconsin Reed Canary Grass Management Working Group 2009). Although this species is currently considered native in California, much of the literature about this species presumes that current populations may include non-native strains or hybrids between native and non-native strains as a result of the widespread cultivation of this species.

Reed canary grass can quickly invade disturbed areas and is capable of reproduction by rhizome, seed, or stem fragments. The spread of reed canary grass is intensified along waterways where vegetative fragments and seeds may be carried by water. Humans and animals are additional seed vectors and seeds can adhere easily to clothing, tools, or equipment (Wisconsin Reed Canary Grass Management Working Group 2009).

Reed canary grass is one of the first plants to emerge in the spring enabling it to shade out native species that emerge later in the growing season. The growth and productivity of this species peak twice during the growing season, with leaf and inflorescence growth occurring in spring and stem and rhizome growth

occurring during late summer. Rapid clonal growth is enhanced by both high nutrient and light availability (Wisconsin Reed Canary Grass Management Working Group 2009). Rhizomes form dense mats in the upper soil.

Reed canary grass has bimodal seed germination and seed production occurs between March-May and again during June-July. One plant can produce several hundred seeds. Seeds of reed canary grass germinate immediately after ripening and have no dormancy requirements. Seeds may remain viable in the soil for several years (Wisconsin Reed Canary Grass Management Working Group 2009).

## 2.2.2.1 Recommended Treatment Plan in Invasive Plant Control Area by Revegetation Contractor

Reed canary grass is best managed by using a long term, integrated approach. There is no immediate oneyear treatment for reed canary grass. Persistent and multi-faceted management is the most effective way to control reed canary grass. The recommended approach for management at the Project site is to use a combination of solarizing and shading.

- Between April 1-15, 2026, the reed canary grass stand delineated for treatment will be surveyed for amphibians or other animals by a qualified biologist. Wildlife will be relocated out of the treatment area.
- After the wildlife relocation survey is completed, the reed canary grass stand will be tamped down as tightly to the ground as is feasible using manual methods (plank of wood or comparable tool).
- Immediately after tamping, the patch of reed canary grass will be covered with a solarizing material (black visqueen plastic of at least 4 mil thickness) to the edge of the patch and at least one foot beyond the boundary and tightly secured at the edges with sandbags and nails. The central portions of the covered area should also be strategically covered with sandbags in such a way to keep the material from ripping in wind events. The covering by the solarization material will deprive the stand of light, killing the adult plant and rhizomes.
- Starting November 1 and finishing up to November 15, 2026, solarization materials will be removed from the site.
- The same schedule will be implemented in 2027: wildlife relocation survey, installation of solarization materials around stands between April 1-15, 2027, and removal of solarization materials between November 1-15, 2027.
- Solarization materials will be checked periodically between installation and removal in 2026 and 2027 and replaced as needed.
- Following solarization of each reed canary grass stand selected for this treatment, each stand will be densely revegetated with native Hooker's willow stakes in the fall of 2027 to shade out the populations over time. Willow stake spacing should be 10 feet apart.
- To minimize the spread of reed canary grass during construction it will be necessary to clean clothes, equipment and footwear when working at the site.

Reed canary grass is generally intolerant of year-round shade, so planting fast growing woody species is a good strategy for continuing to control this species. Sitka spruce stands will be planted in the hummock adjacent to the control area, which is anticipated to help create dense evergreen canopy at the eastern edge of the control area that will suppress migration and re-establishment of the species in other portions of the Project site.

The Invasive Plant Control Area outside of the treated reed canary grass stands will be vegetated with a variety of native shrubs. It is anticipated that by 2027, the native shrubs planted around the treatment populations will be well established and will increasingly create a canopy cover that shades out reed canary grass. The shrub species chosen are conducive to sustaining the existing native plant communities (slough sedge and small-fruited bulrush marsh) that are currently growing in the matrix of invasive plant populations within the control area. These herbaceous assemblages have been observed naturally growing beneath the canopy of coastal dune willow along the western fence line that borders the invasive control area; therefore, the native plant communities established will expand the forested wetland that likely once inhabited the entire Invasive Plant Control Area prior to agriculture and grazing.

#### 2.2.2.2 Earthwork-recommended Treatment Plan by Earthwork Contractor

An effective treatment for reed canary grass includes burial. The stands of reed canary grass to be treated by the earthwork contractor (as shown on Figure 4) should be excavated and buried concurrently with Project excavation activities in that portion of the Project Area due to its proximity to proposed hummocks that are going to be constructed.

Excavate delineated reed canary grass stands to a depth of at least four feet. Collect all below-ground and above-ground plant material and place in a pit excavated to at least four feet and bury with an additional one to two feet of uncontaminated fill material, totalling five to six feet of cover.

#### 3. Scope and limitations

This technical memorandum has been prepared by GHD for the Wood Creek Phase III – Felt Ranch Off-Channel Rearing Habitat Planning Project to foster contractor discussions as they relate to Project bid documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out. It is assumed that the contractor is liable for complying with Project environmental approval conditions.

#### 4. References

GHD. 2023. Wetland Habitat Mitigation and Monitoring Plan, Felt Ranch Restoration Project. Prepared for the Buckeye Conservancy. Eureka, California.

U.S. Fish and Wildlife Service (USFWS). 2018. Reed Canarygrass (*Phalaris arundinaceae*) Ecological Risk Screening Summary. Web version. https://www.fws.gov/sites/default/files/documents/Ecological-Risk-Screening-Summary-Reed-Canarygrass.pdf

U.S. Fish and Wildlife Service (USFWS). 2019. Yellow Flag Iris (*Iris pseudacorus*) Ecological Risk Screening Summary. Web version. https://www.fws.gov/sites/default/files/documents/Ecological-Risk-Screening-Summary-Yellow-Flag-Iris.pdf

Wisconsin Reed Canary Grass Management Working Group. 2009. Reed Canary grass (Phalaris arundinacea). Management Guide: Recommendations for Landowners. PUB-FR-428 2009, Wisconsin Department of Natural Resources, Madison, WI.

# Attachment 1 Figures









Northcoast Regional Land Trust Felt Ranch Restoration Project

Revision No. -Date April 2025

FIGURE 1

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Northcoast Regional Land Trust Felt Ranch Restoration Project

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FIGURE 2

#### **Project Study Boundary**

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**Existing Plant Populations** in Invasive Plant Control Area Revision No. Date April 2025

FIGURE 3

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Revision No. Date April 2025

**Proposed Invasive Plant Treatments** 

FIGURE 4