# Richmond Research Center Master Plan

## Environmental Impact Report:

## Existing Conditions of Grassland Resources

Prepared For

*Brady and Associates*
*1828 Fourth Street*
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**Richmond Research Center Master Plan**
**Environmental Impact Report:**
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## Introduction

The Physical and Environmental Planning Office of the University of California has prepared a draft master plan for the new Richmond Research Center. As part of the Environmental Impact Report being prepared by Brady Associates, Amme Associates has been contracted to analyze the grassland resources. This report presents the existing conditions of the grasslands within the master plan area and evaluates these grasslands in the context of existing native grasslands in the greater Bay Area.

## Methodology

Authorization to conduct the survey was received on October 11, 1993. Base maps, soil maps (SCS 1977), historical maps and charts, parcel maps, and historical aerial photographs (1939, 1946, 1953), were collected and analyzed. Kevin Hufferd, U. C. Project Planner, provided enlarged scanned images of the aerial photographs of the grassland area west of the eucalyptus grove and a scale transparency of a parcel map (circa after 1915) of the same area. The study site was surveyed during the latter part of October and the first week of November 1993.

Dr. Bill Lidicker, professor at the Museum of Vertebrate Zoology, U.C. Berkeley, provided information on his small mammal enclosure experiments between 1963 and 1988, a review of small mammal/grassland interactions (Lidicker 1989), and written material on the site including a list of flowering plants by J.A. Powell (1992), a list of ecological research programs at Richmond Field Station between 1963 and 1989, and lists of reptiles, amphibians, mammals, and birds (Lidicker 1989). This information is included in the appendix to this report.

## Results

### Soil and Site

The soil belongs to the Clear Lake Series of the Clear Lake-Cropley association (SCS 1977). It is a poorly drained clay soil that often forms a perched water table in the winter rainy season. During the winter water often stands for periods of a week or longer in wet swales. Generally this soil supported dryland small grain, volunteer oat hay, and homesites. Historically the area is an upland that drained to the west (USGS 1915). The site has less than a 1 % slope and represents an alluvium deposit close to the bay shore. The grassland area west of the eucalyptus grove is at the original elevation which is approximately 10 feet above mean high tide. The historical bay shore is approximately on the present chain-link fence line. The old shore escarpment has been covered with broken cement rip-rap and soil fill.

**Vegetation/Land Use History**

The study area can be divided into three discrete grassland areas:
1) The area east of the eucalyptus grove, 2) the area west of the eucalyptus grove, and 3) created land south of the chain-link fence (See Map 1).

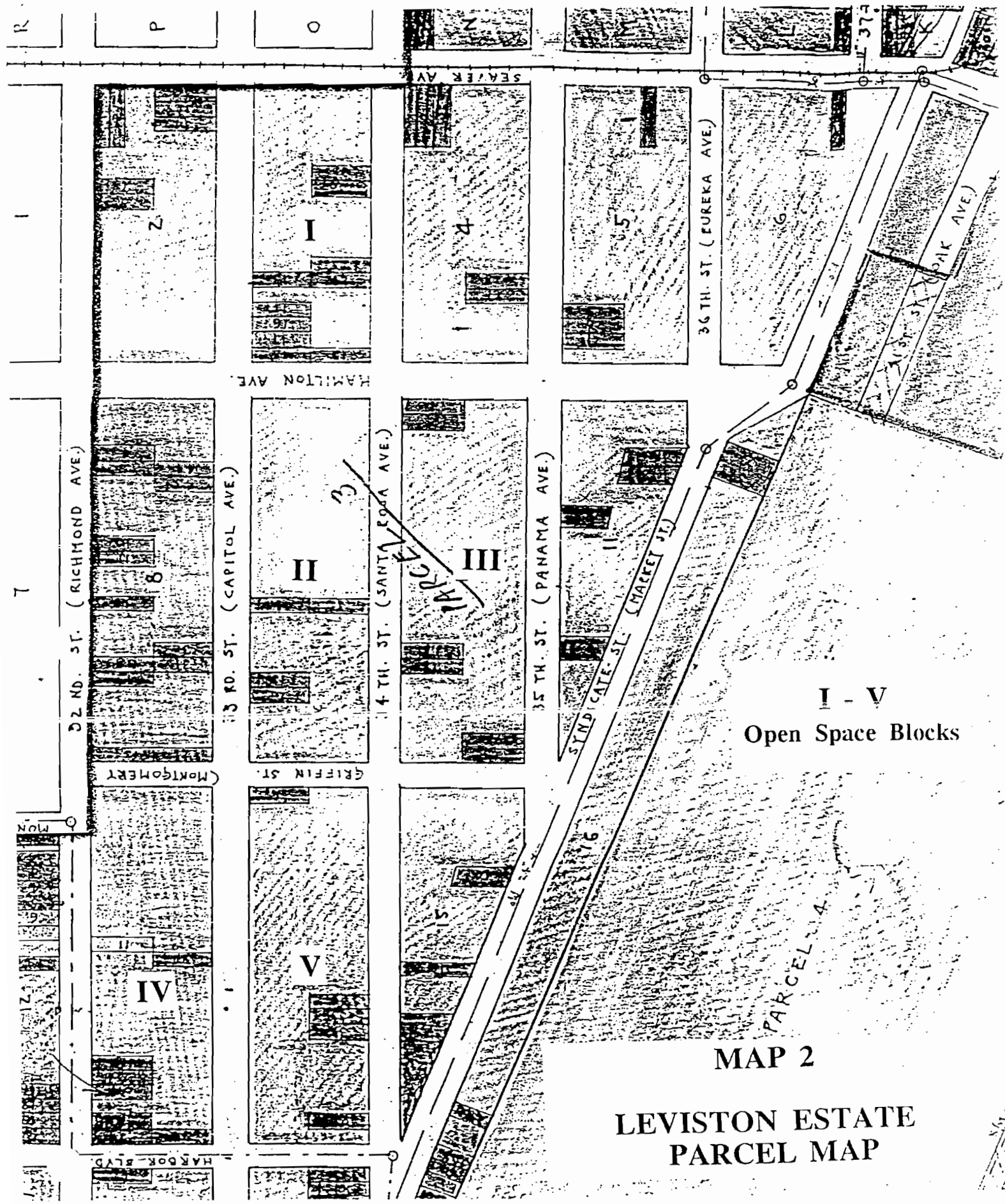
Area 1 has a long history of industrial use and has been thoroughly disturbed since the turn of the century. Area 2 was once the Leviston Estate (77 acres) and was not subdivided until after 1910. There is no evidence that indicates whether or not the Leviston Estate was cultivated before 1910. It is possible Leviston Estates was a development company. There is no evidence if a home ranch occupied the property. Given the size of the estate and the availability of fresh water (possibly a well) the land was probably used for grazing livestock and harvesting volunteer oat hay. Area 3 represents new land fill. The largest open space in this area is the central rounded peninsula south of the chain-link fence close to the shore. Sometime around 1910 a road subdivision was built on the Leviston Estate. Graded dirt roads with redwood curbs and a complete sidewalk system was built.

Map 2 gives the proposed street names and block locations during a period of subdividing small parcels (circa after 1915). Map 2 numbers the key grassland blocks I-V. These five block areas are open space at the original elevation. Aerial photographs taken in 1939, 1946, and 1953 do not show housing development. Photos 1, 2, and 3 show the Leviston parcel area and the block layout. The Lidicker experimental enclosures are in block III. The full 1939 aerial photograph shows the Leviston parcel as part of larger open space that extended north and west. A small settlement existed in the center of this open space, part of which can be seen on the west side (left) of Photo 1 adjacent to the Leviston Parcel. Despite the old road beds and sidewalks during this period, the study area was very likely being grazed by livestock and may have been only a portion of a larger grazed unit. The darker color of the grassland of Photo 1 indicates that the eastern half of the Leviston parcel may have been irrigated.

The 1946 aerial photograph (Photo 2) shows these same areas with regular east/west lines possibly indicating past irrigation depressions or excavated pipe lines. The paths indicate that grazing or agriculture pursuits on this property have been abandoned by this time. The 1953 aerial photograph (Photo 3) shows a large area of shallow soil disturbance or scraping in block II. Today this area is flat, however the vegetation is almost exclusively native and rich in species diversity. This disturbance may have altered the drainage but was not extensive enough to kill all the native perennial bulbs, forbs, and grasses. None of the aerial photographs show any indication of row crops or uniform cultivation.

**Present Grassland Vegetation**

It is difficult to determine the thoroughness of the plant list compiled by J. A. Powell (1992) since the present survey was conducted in mid-fall. However, the majority of the species listed by Powell were observed in the field during this survey. In addition to the species listed in the Powell plant list, specific names were determined for some of the taxa (Hickman 1993)


I
II
III
IV
V
I - V
Open Space Blocks
MAP 2
LEVISTON ESTATE
PARCEL MAP

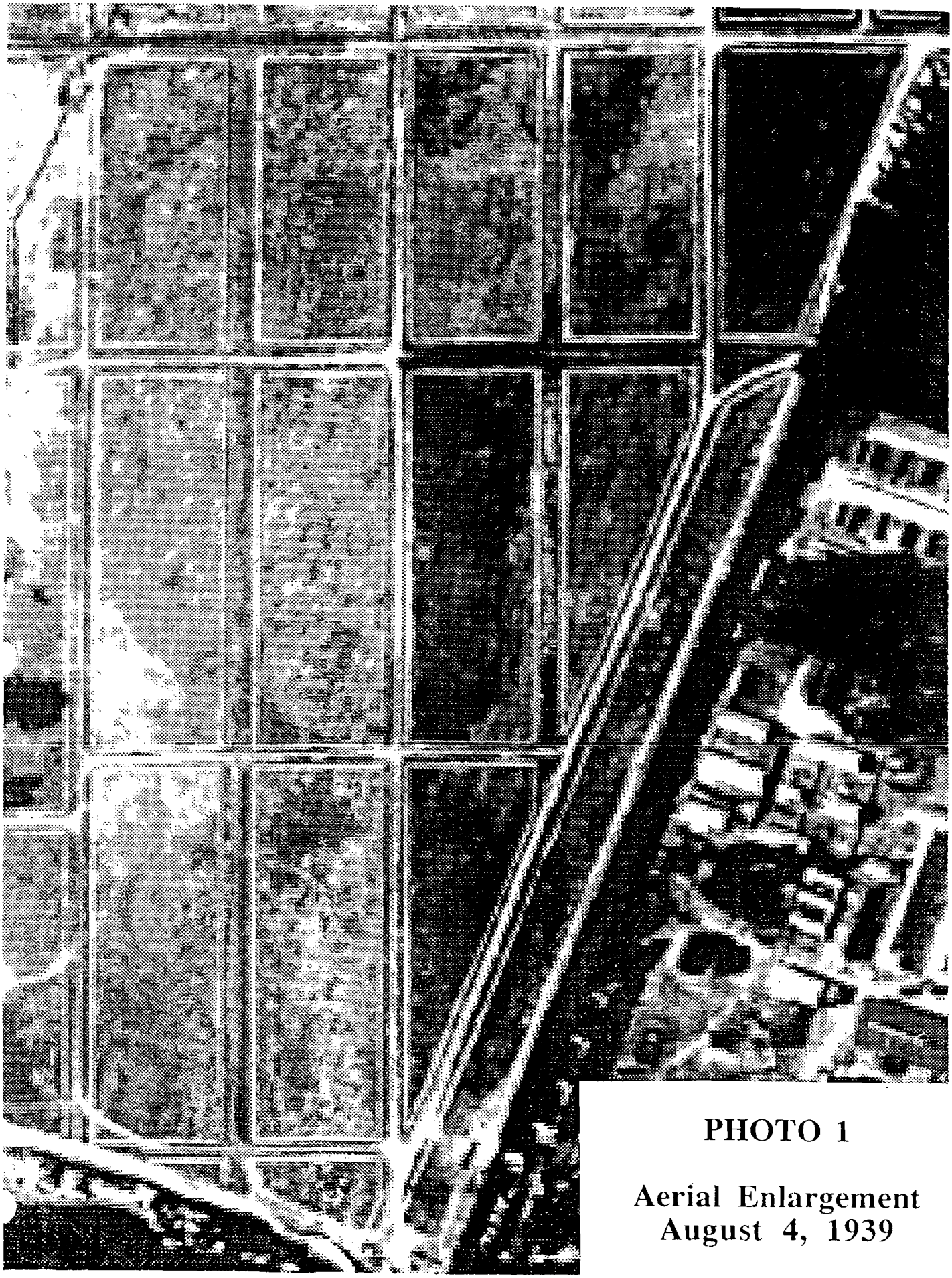


**PHOTO 1**

**Aerial Enlargement**
**August 4, 1939**

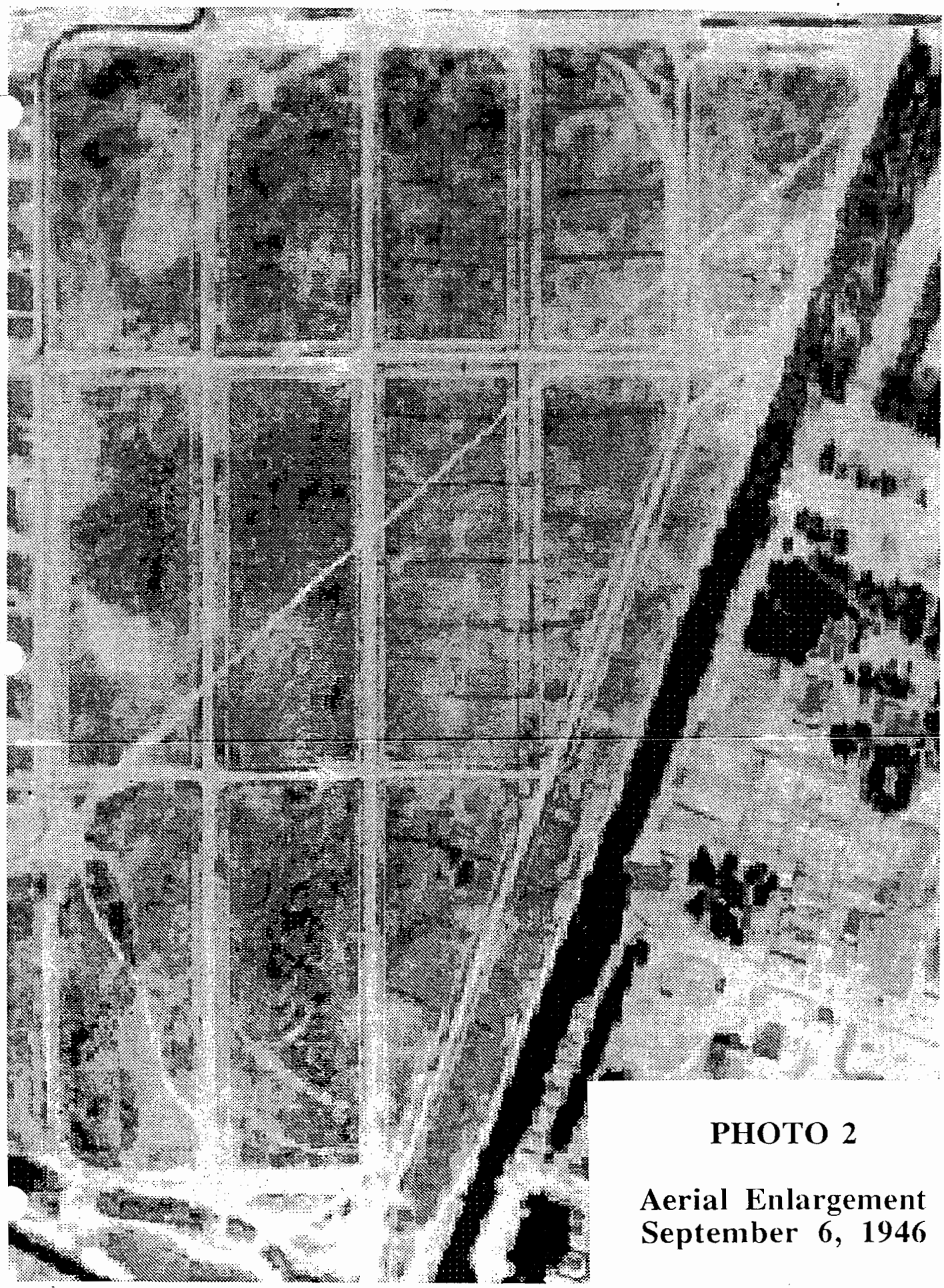


**PHOTO 2**

**Aerial Enlargement**
**September 6, 1946**

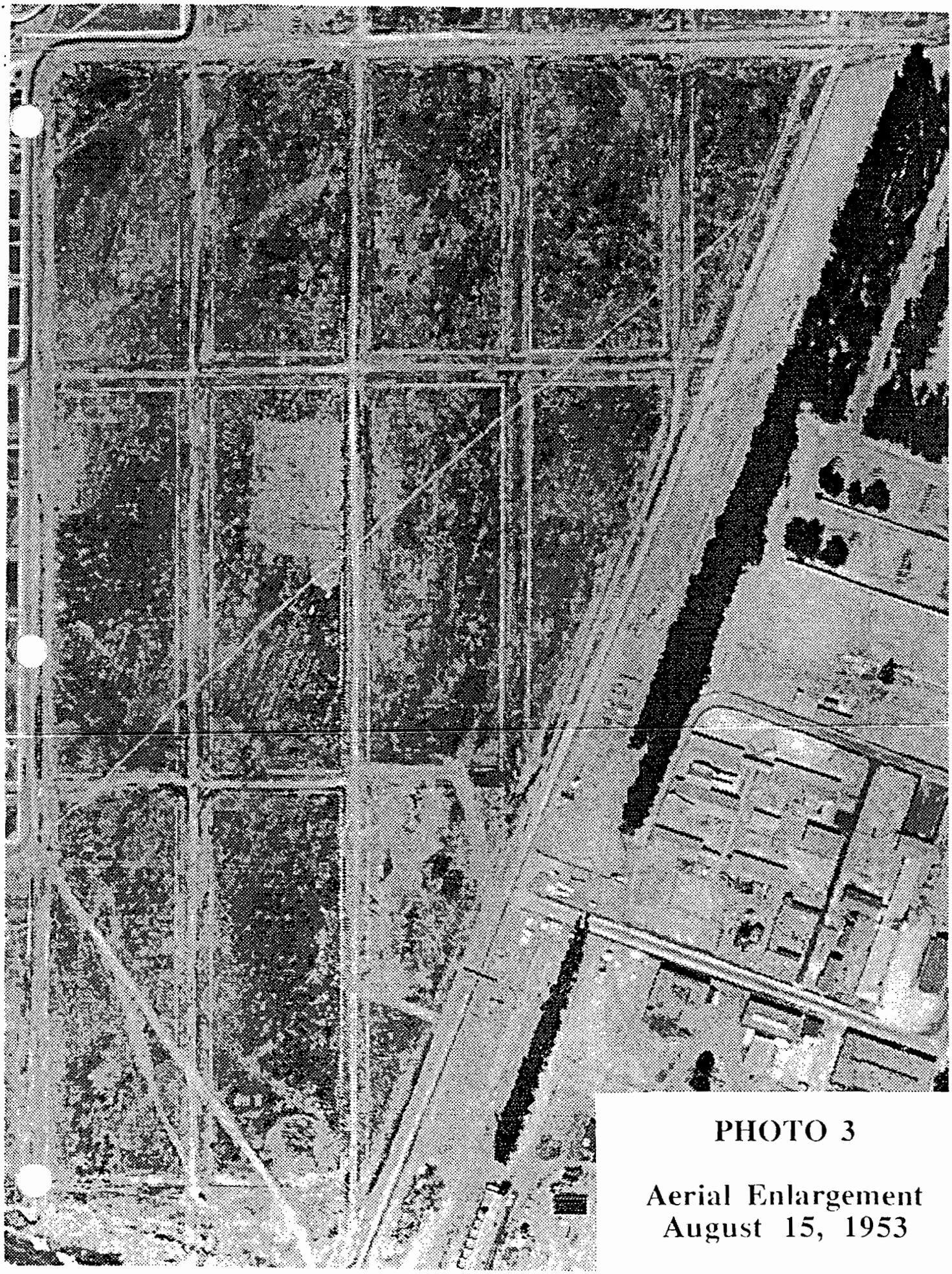


**PHOTO 3**

**Aerial Enlargement**
**August 15, 1953**

including foothill sedge (*Carex tumulicola)*, iris-leaved rush (*Juncus phaeocephalus paniculatus*), western rush (*Juncus occidentalis*), and slender rush (*J. tenuis congestus*). In addition, two native grass taxa (slender wheatgrass, *Elymus trachycaulus*, and blue wildrye, *E. glaucus*), an exotic perennial grass (*Bromus stamineus*), an exotic figwort (*Bellardia trixago*), a native tarweed (*Madia elegans vernalis*), and a native orchid (lady tresses, *Spiranthes* sp.) were added to the list of observed plants.

There are four distinct grassland vegetation types on the study site (See Map 3):

- Disturbed/Closely Mowed Grassland,
- Disturbed/Exotic Grassland,
- Disturbed Coastal Prairie, and
- Least Disturbed Coastal Prairie.

Disturbed/Closely Mowed Grassland. This is a unique vegetation type related directly to the present mowing regime. The dominant grass is the native perennial, California oatgrass (*Danthonia californica*). Oatgrass does well on compacted soils, grows close to the ground, and spreads by seed with close, late-spring mowing. The native perennial, purple needlegrass (*Nassella pulchra*) is also present in fewer numbers. The introduced perennial canarygrass (*Phalaris aquatica*) is unable to spread in this area with such close cropping. Associated exotic plants include the introduced plantain (*Plantago lanceolata*), bristly oxtongue (*Picrus echioides*), annual grasses (*Lolium multiflorum*, *Hordeum leporinum*, *Bromus hordeaceus*, etc.), and thistle species. Localized areas within this vegetation type are dominated by the exotic perennial grasses, kikuyu grass (*Pennisetum clandestinum*) and Bermudagrass (*Cynodon dactylon*) which spread by rhizomes in more mesic sites. Freshwater wetland vegetation in mowed drain ditches is dominated by dallisgrass (*Paspalum dilatatum*).

Disturbed Exotic Grassland. This vegetation type is dominated by exotic grasses and weeds and exists where recent soil disturbance and compaction has taken place. The dominant exotic annual grasses include *Lolium multiflorum*, *Hordeum leporinum*, *Bromus hordeaceus*, *B. diandrus*, and *Avena* spp. The robust canarygrass grows with the annual grasses and sometimes dominates small areas. Native coyote bush (*Baccharis pilularis*), exotic fennel (*Foeniculum vulgare*), canarygrass, and pampasgrass (*Cortaderia selloana*) are dominant in various locations, especially on the land south of the chain-link fence close to the shore.

Common exotic weeds in this vegetation type include Italian thistle (*Carduus pycnocephalus*), *Cirsum* spp., bristly oxtongue, sowthistle (*Sonchus arvensis*), mustards (*Brassica* spp.), teasel (*Dipsacus fullonum*), filaree (*Erodium cicutarium*), mallow (*Malva* spp.), and dock (*Rumex* spp.). French broom (*Genista monspessulanus*)and cotoneaster (*Cotoneaster* spp.) are also found scattered in this vegetation type.

Disturbed Coastal Prairie. This vegetation type has between 10 to 50 % cover of native prairie plant species mixed with exotic weeds and grasses depending on the site, moisture regime, or recent mowing frequency. The ground is irregular with local areas showing signs of vernal standing water. Small mounds of deposited soil are evident within this vegetation type, however, these mounds have many native perennial grasses and forbs growing on them. The disturbed exotic grassland surrounds and penetrates the disturbed coastal prairie vegetation. The most

common native prairie plants found in the disturbed coastal prairie include California oatgrass, purple needlegrass, squirreltail (*Elymus multisetus*), gumplant (*Grindelia hirsutula*), foothill sedge, western rush, slender rush, and coast aster (*Aster chilensis*). Occasional robust canarygrass, coyote bush, and toyon (*Heteromeles arbutifolia*) plants are found scattered in this vegetation type. Closer to the shore among old soil piles and coyote bush are found small isolated pockets of native slender wheatgrass (*Elymus trachycaulus*) and California brome (*Bromus carinatus*). The presence of the slender wheatgrass is a significant botanical discovery. Lowland ecotypes of slender wheatgrass are very rare. In the greater Bay Area, slender wheatgrass is found only in the Berkeley-Oakland Hills on clayey serpentinite soils.

Within the Lidicker enclosure plots in block III there are local areas dominated by tall weedy annuals such as teasal, bristly oxtongue, wild lettuce (*Lactuca serriola*), and the native coast tarweed *Madia sativa*. The dominance of taller weedy vegetation in the disturbed coastal prairie may be a function of infrequent mowing or an absence of mowing. It is also known that some of the enclosures were purposely overgrazed by rodents in the experiments (Bartolome pers. com.). Until recently, the areas inside the Lidicker enclosures never had any mechanical mowing and the two most southern plots have a high percentage of annual weeds. The experiments conducted inside the individual enclosures may have had a long-term effect on the native perennial vegetation. It is not known if the grassland outside the enclosures was mowed or how frequently it may have been mowed. Invading shrubs and the large size of the grasses, including the Hardingrass plants on the perimeter, indicate that the area was not mowed often and certainlay never on a reliable annual basis nor at the height the Disturbed/Closely Mowed Grassland received.

Least Disturbed Coastal Prairie. This vegetation has over 50% cover of native prairie plant species. In some areas the native vegetation constitutes up to 100 % of the vegetation cover. In addition to the native plants mentioned in the disturbed coastal prairie, the least disturbed coastal prairie has pure stands of blue wildrye (*Elymus glaucus*), muleears (*Wyethia angustifolia*) and iris-leaved rush. Other native prairie plants include meadow barley (*Hordeum brachyantherum*), hayfield tarweed (*Hemizonia conjesta*), buttercup (*Ranunculus californica*), blue-eyed grass (*Sisyrinchium bellum*), *Eryngium arnatum*, morning glory (*Calystegia occidentalis*), sun cup (*Camissonia ovata*), blackberry (*Rubus procerus*), and lady tresses (*Spiranthes* sp.). The *Spiranthes* is a significant find and normally grows in undisturbed native perennial grasslands. Five plants were observed in the upper portion of block II.

The cover of exotic plants in this vegetation type is low. Teasel is occasionally present on rodent-disturbed sites. The most common exotic plants associated with the coastal prairie grassland are hairgrass (*Aira caryophyllea*), catsear (*Hypochoeris radicata*), and plantain which are found between the clumps of perennial grasses.

## Discussion

Coastal prairie grassland by definition is a mesic grassland. Annual rainfall is generally between 25 and 60 inches per year. The coastal prairie grassland exists within the coastal fog belt where summer evapotranspiration rates are low. Coastal prairie grassland exists in California intermittently along the coast from the Oregon border to San Simeon, San Luis Obispo County (Heady *et al* 1977). The largest expanses (prairies) of this vegetation type once existed on clay

loam soils in west Marin County, the central East Bay lowlands (Alameda Island to southern San Pablo Bay), the coastal lowlands of Monterey Bay, and the coastal lowlands in the vicinity of San Simeon below Hearst Ranch. Cultivation (associated with growing potatoes, silage, and vegetable crops), overgrazing (associated with dairy farming and sheep grazing), and urbanization has almost completely eliminated this vegetation type. Today, only a few remnant stands of coastal prairie remain. Perhaps the largest expanse of coastal prairie remaining today is the grazed grassland of Hearst Ranch.

Only a few remnant stands of coastal prairie remain in the greater East Bay area. These stands include isolated patches in Point Pinole Regional Park, at the study site at Richmond Field Station, on isolated hillsides on the Potrero Hills (Point Richmond), on grazed grasslands in the Wildcat canyon watershed in Wildcat Canyon Regional Park, and on the East Bay Municipal District lands above San Pablo Reservoir (Edwards 1992). Most of these stands are on well-drained, upland soils on Los Osos-Millsholm-Los Gatos and Gilroy-Vallecitos soil associations. The grassland open space (blocks I-V) at the study site is unique and represents the only coastal prairie grassland on lowland clay soils (Clear Lake-Cropley and Capay-Rincon soil associations) in the greater East Bay Area.

It is difficult to determine if the coastal prairie community at Richmond Field Station is missing certain plant components. For example, coastal prairie habitat on more well-drained soils of upland sites on the nearby Potrero Hills has a richer assortment of native grasses and perennial broadleaf plants including: junegrass (*Koeleria macrantha*), California melic (*Melica californica*), red fescue (*Festuca rubra*), squaw root (*Perideridia kelloggii*), acaena (*Acaena californica*), blue dicks (*Dichelostemma capitatum*), etc. However, many of these plants are not found on the clayey lowland soils and may not have been on the site originally. A good spring and summer survey will likely add more native prairie plants to the plant palette.

If the soil had been badly disturbed, plowed, or disked the following plants would not be found in any abundance at the site: *Stipa pulchra*, *Elymus glaucus*, *E. trachycaulus*, *Hordeum brachyantherum*, *Wyethia angustifolia*, *Achillea millefolium*, *Orthocarpus* sp., *Spiranthes romanzoffiana*, *Carex tumulicola*, *Juncus phaeocephalus paniculatus*, *Juncus occidentalis*, and *J. tenuis congestus*.

Based on this fall survey it can be stated that:

- The soil has been disturbed to some extent, especially in the areas close to the boundaries and within the road and sidewalk areas.
- Some areas have not been disturbed or only lightly disturbed.
- The coastal prairie vegetation is still more or less intact in areas delineated in Map 3 as Disturbed Coastal Prairie and Least Disturbed Coastal Prairie.

## Mitigation Concerns

In order to achieve compliance with the California Environmental Quality Act (CEQA) there is increasing reliance on transplantation and translocation of rare plants and plant associations. These types of schemes do not recreate the function of the ecosystems in which target plants are found (Skinner 1993). One of the most obvious plant community resources, the soil horizon, is rarely considered in the mitigation process. It should be asked, how can a soil profile that took millions of years to evolve be recreated on an adjacent disturbed site? Can the obvious above-ground prairie vegetation exist on a new site without the below-ground structure and biological relationships that are associated with the soil profile? Grassland prairie restoration in California is a new discipline (Amme and Pitschel 1989). While it is true that native prairie plants are found on disturbed mounds at the study site these specific sites are not high quality prairie. Today virtually all prairie restoration projects are concerned with enhancing existing sites by killing noxious weeds or managing ecosystem processes such as fire, grazing, and rest (Amme 1992). In California, a prairie grassland has never been created on a new site. The life cycles, germination requirements, and management processes of native prairie plants is poorly understood.

## Conclusion

It is the conclusion of this study that the remnant coastal prairie grassland at Richmond Field Station is scientifically and ecologically invaluable, and virtually impossible to recreate.

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# APPENDIX

# A LIST OF FLOWERING PLANTS OBSERVED AT THE UNIVERSITY OF CALIFORNIA, RICHMOND FIELD STATION, AT RICHMOND, CONTRA COSTA COUNTY, CA, 1989-1992

Compiled by J. A. Powell

University of California, Berkeley

10 November 1992

This report gives the names of flowering plants that were recorded in the "Biological Study Areas" (remnant prairie grasslands and Salt Marsh area) and excludes landscaped, mowed, and other weedy areas of the Richmond Field Station. The taxa are listed in alphabetical order within the Dicotyledonae and Monocotyledonae.

The list is compiled from four sources:

1) (JG) Report by Joyce Gutstein (1989), to the Sanitary Engineering and Environmental Health Research Lab, Richmond Field Station. Identifications of grassland plants by James Bartolome, Forest and Research Management, U.C. Berkeley (JB); of salt marsh area plants by Barbara Ertter, U.C. Herbarium (BE).
2) (EIR) Environmental Impact Report (1991), prepared by University of California, Berkeley, Physical and Environmental Planning Group, and EIP Associates, San Francisco, CA.
3) (WL) A list prepared by W. Lidicker, Integrative Biology, U.C. Berkeley, of plants not in Table 1 or Table 6 of the Gutstein report (which he refers to as the Wallace, Roberts and Todd Report).

(I) = introduced exotic species or California natives that are planted

(N) = native species assumed to be growing natually at RFS

4) (JAP) Plants observed by J. A. Powell (1992), that are additions to or in a few cases confirm identifications of the above lists. IDs by Barbara Ertter (BE) where sheet numbers are given, others by JAP.

The list contains 132 names that represent about 121 species, although in several instances names cannot be reconciled between the former lists, such as those identified only to genus. Misidentifications and misspellings have been corrected where recognized. Several entries on the EIR list appear not to be plants of this region and/or are so severely misspelled that I did not comprehend them.

There are 31 families of dicots with about 85 species, and 4 families of monocots represented by about 36 species (the one pine was destroyed in clearing the land for the EPA Lab in October, 1992). About 36 of the dicots and 18 of the monocots are native species; the remainder are introduced exotics. Moreover, several of the native plants were observed growing only on the railroad bed that crosses the salt marsh (*Artemisia californica, Gnaphalium ?californicum, Lupinus arboreus, Phacelia californica, Rhus diversiloba*), and most of them are not growing in natural situations nearby.

A few species were eradicated by grading the land for the EPA building in early October, 1992 (*Pinus radiata, Euphorbia oblongata, Rubus procerus, Cotoneaster* sp., most of the *Heteromeles arbutifolia*).

## GYMNOSPERMAE

| | | |
|---|---|---|
| PINACEAE | | |
| *Pinus radiata* | I | EIR |
| (destroyed by grading Oct. 1992) | | |

## ANGIOSPERMAE

## DICOTYLEDONAE

| | | |
|---|---|---|
| AIZOACEAE | | |
| *Carpobrotus edule* | I | EIR |
| *Tetragonia expansa* | I | JAP |
| ANACARDIACEAE | | |
| *Rhus diversiloba* | N | JG, BE |
| APIACEAE | | |
| *Eryngium* sp. | N | WL |
| *Foeniculum vulgare* | I | EIR |
| ASTERACEAE | | |
| *Achillea millefolium* | I | JAP |
| *Ambrosia chamissonis* | N | JAP |
| *Anthemis cotula* | I | JAP #1652, BE |
| *Artemisia californica* | N | JG, BE |
| *Artemisia douglasiana* | N | JAP |
| *Aster chilensis* | N | JAP #1646, BE |
| *Aster exilis* | N | JG, JB |
| *Baccharis pilularis* | N | JG, BE |
| *Carduus pycnocephalus* | I | JG, JB |
| *Chamomilla suaveolens* | I | JAP |
| *Cirsum vulgare* | I | JAP |
| 2nd Species of Thistle | I | JAP |

| | | |
|---|---|---|
| *Eriophyllum staechadifolium* | N | JG, BE |
| *Gnaphalium luteo-album* | I | JAP |
| *Gnaphalium ?californicum* | N | JAP |
| *Gnaphalium* sp. (= *?californicum?*) | | JG, BE |
| *Grindelia hirsutula* | N | JAP #1647, BE |
| *Grindelia humilis* | N | JG, BE |
| *Hemizonia congesta* ssp. *luzulifolia* | N | JAP #1649, BE |
| *Hemizonia corymbosa* | N | JAP #1648, BE |
| *Hemizonia luzulaefolia* (= *congesta?*) | N | JG, JB |
| *Hypochoeris radicata* | I | EIR |
| *Lactuca serriola* | I | EIR |
| *Lagophylla ramosissina* | N | EIR |
| *Madia sativa* | I | EIR |
| *Picris echioides* | I | JG, JB |
| *Sonchus* sp. | I | JG, BE, JAP #1676, 1679 (two spp.) |
| *Wyethia augustfolia* | N | EIR |
| BRASSICACEAE | | |
| *Brassica geniculata* | I | EIR |
| *Brassica rapa* (= *campestris*) | I | JAP #1618, BE |
| *Cakile maritima* | N | JAP #1677 |
| *Cardamine* (*Dentaria*) *integrifolia* | N | JAP |
| *Lepidium latifolium* | I | JAP |
| *Rhaphanus sativa* | I | EIR |
| CARYOPHYLLACEAE | | |
| *Spergularia marina* | N | JG, BE |
| CHENOPODIACEAE | | |
| *Atriplex semibaccata* | I | JAP #1681 |

| | | |
|---|---|---|
| *Salicornia pacifica* | N | JG, BE |
| (= *virginica*, a syn. in Munz) | | |
| *Chenopodium* sp. | | JAP #1672 |
| CONVOLVULACEAE | | |
| *Calystegia occidentalis* | N | EIR |
| *Convolvulus arvensis* (?) | I | JAP |
| DIPSACACEAE | | |
| *Dipsacus fullonum* | I | JG, JB |
| EUPHORBIACEAE | | |
| *Euphorbia crenulata* | N | EIR |
| *Euphorbia oblongata* | I | JAP #1636, BE |
| (colony destroyed Oct. 1992) | | |
| FABACEAE | | |
| *Cytisus monspessulanus* | I | JG, BE |
| *Lotus corniculatus* | I | EIR, JAP #1650, BE |
| *Lupinus "albifrons"* | N | JAP #1651, BE |
| (This differs from *L. albifrons* of Berkeley Hills) | | |
| *Lupinus arboreus* | N | JAP |
| *Lupinus* sp. (prob. = *arboreus* of JAP) | | JG, BE |
| *Medicago hispida* | I | JAP |
| *Melilotus alba* | I | JAP |
| *Melilotus indica* | I | JAP |
| *Trifolium dubium* | I | EIR |
| *Vicia sativa* | I | JG, JB |
| *Vicia* sp. | | JG, BE |
| GERANIACEAE | | |
| *Erodium cicutarium* | I | EIR |
| *Geranium dissectum* | I | EIR |

| | | |
|---|---|---|
| HYDROPHYLLACEAE | | |
| *Phacelia californica* | N | JG, BE |
| LINACEAE | | |
| *Linum perenne* | I (?) | EIR |
| MALVACEAE | | |
| *Lavatera assargentiflora* (?) | I | JAP #1673 |
| *Malva neglecta* | I | EIR |
| *Malva parviflora* | I | JAP |
| *Sida hederacea* | N | JG, JB |
| (JAP could not find this, not a likely habitat) | | |
| ONOGRACEAE | | |
| *Epilobium brachycarpum* | N | JAP #1669, BE |
| *Epilobium* sp. [= *brachycarpum*?] | | WL |
| *Oenothera* (*Camissonia*) *ovata* | N | JAP |
| OXALIDACEAE | | |
| *Oxalis corniculata* | I | JAP |
| PAPAVERACEAE | | |
| *Eschscholzia californica* | N | EIR |
| PLANTAGINACEAE | | |
| *Plantago lanceolata* | I | JG, JB |
| PLUMBAGINACEAE | | |
| *Limonium californicum* | N | JG, BE |
| PORTULACEAE | | |
| *Montia perfoliata* | I | JAP |
| POLYGONACEAE | | |
| *Rumex acetosella* | I | JAP #1635, BE |
| *Rumex angiocarpus* | I | EIR |
| *Rumex crispus* | I | JAP |

| | | |
|---|---|---|
| *Rumex crispus* "var. *divaricatus*" | | EIR |
| (Name not in Munz) | | |
| PRIMULACEAE | | |
| *Anagallis arvensis* | I | EIR |
| RANUNCULACEAE | | |
| *Ranunculus californica* | N | JAP |
| ROSACEAE | | |
| *Cotoneaster* sp. | I | EIR |
| (destroyed Oct. 1992) | | |
| *Heteromeles arbutifolia* | N | JG, BE |
| *Rubus procerus* | I | EIR |
| (destroyed Oct. 1992) | | |
| SCROPHULARIACEAE | | |
| *Mimulus* sp. | | EIR |
| *Orthocarpus purpurascens* | N | JAP |
| *Orthocarpus* sp. [= *purpuracens*?] | | WL |
| SALICACEAE | | |
| *Salix lasiolepis* | N | JG, BE |
| SCROPHULARIACEAE | | |
| *Scrophularia californica* | N | JAP |
| "*Serophularia* (?)" | | JG, BE |
| (misspelled *Scrophularia*?) | | |
| VALERIANACEAE | | |
| *Centranthus ruber* | I | JAP |
| SOLANACEAE | | |
| *Solanum ?umbelliferum* | N | JAP #1671 |

## MONOCOTYLEDONAE

| | | |
|---|---|---|
| **CYPERACEAE** | | |
| *Carex* sp. | N | JG, JB |
| *Cyperus eragrostis* | N | EIR |
| *Cyperus* sp. | | JG, JB |
| *Scirpus* sp. | | JG, BE |
| **IRIDACEAE** | | |
| *Iris* sp. | I | EIR |
| *Sisyrinchium bellum* | N | JG, JB |
| **JUNCACEAE** | | |
| Eleocharis sp. | | WL |
| *Juncus bufonicus* | I | JG, JB |
| *Juncus effusus* | N | EIR |
| *Juncus* sp. | N | JG, JB |
| *Luzula* sp. | N | WL |
| **POACEAE** | | |
| *Aira caryophyllea* | I | JG, JB |
| *Avena barbata* | I | EIR |
| *Avena fatua* | I | JG, JB |
| *Briza minor* | I | JG, JB |
| *Bromus carinatus* | N | JG, JB |
| *Bromus diandrus* | I | JG, JB |
| *Bromus mollis* | I | JG, JB |
| *Bromus rigidus* | I | WL |
| *Cortaderia selloana* | I | JG, JB, BE |
| *Danthonia californica* | N | JG, JB |
| *Deschampsia* sp. | N | EIR |
| *Distichlis spicata* | N | JG, BE |

| | | |
|---|---|---|
| *Festuca megalura* | N ? | WL |
| *Festuca* (= *Vulpia*) *myuros* | N | EIR, WL |
| *Heleocharis* sp. | N | JG, JB |
| *Hordeum brachyantherum* | N | JG, JB |
| *Hordeum geniculatum* (= *hystrix*) | I | EIR, WL |
| *Hordeum leporinum* | I | JG, JB |
| *Lolium multiflorum* | I | WL |
| *Parapholis incurva* | I | JG, JB |
| *Paspalum* ("*diatichum*") *distichum* | N | EIR |
| *Pennisetum clandestinum* | I | WL |
| (= "Ku Kuyu grass" = Kikuyu grass) | | |
| *Phalaris tuberosa* | I | JG, JB |
| *Phalaris tuberosa* var. *stenoptera* | I | EIR |
| *Sitanion hystrix* | N | JG, JB |
| *Sitanion jubatum* | N | EIR |
| *Spartina foliosa* Trin. | N | JG, BE |
| *Stipa pulchra* | N | JG, JB |
| *Vulpia bromoides* | I | JG, JB |
| "*Cotadaria jubata*" (= *Cortaderia*?) | | EIR |
| (Name not in Munz) | | |

# Ecological Research Programs at RFS 1963 to 1989

There has been no centralized record keeping, but from memory and the notes that I have, these are the projects carried out in the grasslands at the Richmond Field Station. I have few records of funding sources, but most projects did not have extra-mural support. One project was supported by the Atomic Energy Commission (O. H. Paris), and I have had NIH (Bio-med program) support for a number of small projects on the Site. Unless otherwise stated, dissertation projects were in the former Department of Zoology.

DeLong, K. T. (1963-1965) - PhD dissertation: Ecology and social behavior of feral populations of the house mouse (Mus musculus). Additional project: Affect of supplemental food on California vole populations.

Krebs, C. J. (1963-1965) - Miller Postdoctoral Fellow: Population dynamics of the California vole (Microtus californicus).

Paris, O. H. (1960-1964) - PhD dissertation: Trophic ecology of the isopod Armadalidium.
(1964-1967) - faculty research (Zoology Dept.): Radiotracer analysis of the trophic dynamics of natural isopod populations.

Quadagno, D. (1965-1967) - MS thesis research (San Francisco State Univ.): Ecology of feral house mice (Mus musculus).

Batzli, G. O. (?1965-1970) - PhD dissertation: The nutritional ecology of the California vole.

Pitelka, F. A. (1965-1978) - faculty research (Zoology Dept.): Studies on nutritional ecology of California voles and the impact of vole numbers on productivity of the vegetation.

Kishler, C. L. (1970-1972) - MA thesis: Some behavioral and metabolic comparisons of the California vole from different phases of the population cycle.

Ford, R. G. ( 1974-1976) - PhD dissertation: Computer enhancement of mark-recapture data and its application to the role of food supply in declining populations of Microtus californicus.

Arnold, S. J. (?1975-1978) - PhD dissertation: Feeding ecology of two species of garter snakes (Thamnophis).

Bowen, B. S. (1975-1978) - Phd dissertation (Genetics Group): Changes in genetic structure through the multi-annual cycle of the California vole.

Yang, S. Y. (1978) - Assoc. Research Zoologist (Mus. Vert. Zool.): The genetic basis of allozyme variants in the California vole.

McCollum, F. C. (?1973-1978) - PhD dissertation: Studies on seasonal changes in the frequencies of various blood isozymes and their habitat correlations in the California vole.

Riggs, L. A. (1976-1979) - PhD dissertation: Experimental studies on dispersal in the California vole, Microtus californicus.

Hestbeck, J. B. (1978-1981) - PhD dissertation (UC Davis, Zoology): Population regulation of cyclic mammals: the social fence hypothesis.

Heske, E. J. (1982-1986) - PhD dissertation: Social organization in the California vole, Microtus californicus.

Ostfeld, R. S. (1982-1986) - PhD dissertation: Population ecology, behavior, and social organization of the California vole.

Salvioni, M. (1987-1988) - Post-doctoral Fellow: Seasonal shifts in territorial behavior, with special reference to females, in the California vole.

Lidicker, W. Z. (1963-1988) - Faculty sponsor of various student and post-doc projects.
(1987-1989) - faculty research: Causes and fitness consequences of extra-large body size in California voles; impacts of vertebrates on California grasslands; seasonal and sexual effects on territoriality in the California vole.

In addition to the above 18 invidivuals, I have records of three undergraduates who did individual research projects at RFS (J. Repp, E. Steinberg, and M. Williams), and there undoubtedly were more.

Compiled by W. Z. Lidicker, Jr.
Professor of Integrative Biology
26 April 1991

Reptiles and Amphibians of the Richmond Field Station

REPTILES

Thamnophis elegans (western terrestrial garter snake) - Uncommon

Thamnophis sirtalis (common garter snake) - Uncommon

Pituophis melanoleucus (gopher snake) - Common

Coluber constrictor (racer) - Moderately common

Diadophis punctatus (western ring-necked snake) - Probably occurs; known from Point Pinole.

Sceloporus occidentalis (western fence lizard) - Moderately common.

Elgaria multicarinata (southern alligator lizard) - Possibly present; known from Point Pinole.

Elgaria coerulea (northern alligator lizard) - Not recorded from the Station, but known from nearby Brooks Island.

AMPHIBIANS

Hyla regilla (Pacific treefrog) - Common

Batrachoseps attenuatus (slender salamander) - Uncommon; usually found near edges of saltmarsh.

This list includes 10 species, only 7 of which are definitely known to be present at the Richmond Field Station.

compiled by
W. Z. Lidicker, Jr.
in consultation with
H. W. Greene

April, 1989

Mammals of the Richmond Field Station

The following list includes 26 species, only 8 of which are definitely known to occur at the Station at the present time. The known status of each species is given.

Didelphis virginiana (Virginia opossum) - Probably occurs; introduced species.

Sorex vagrans halicoetes (vagrant shrew) - Known from the San Pablo Creek marshes to the north and the Oakland Airport to the south, although Hall (1981:34) records this subspecies from Berkeley. It probably was originally distributed along the entire East Bay shoreline.

Scapanus latimanus (broad-footed mole) - Widespread in East Bay and possibly occurs at Station.

The following species of bats all occur in the East Bay and could be found at RFS. The only ones likely to be permanent residents there are the big-brown bat and the hoary bat.

Myotis californicus
Myotis yumanensis
Myotis volans
Myotis thysanodes
Myotis evotis
Lasionycteris noctivagans
Eptesicus fuscus (big-brown bat)
Lasiurus borealis
Lasiurus cinereus (hoary bat)
Plecotus townsendii
Tadarida brasiliensis

Lepus californicus (black-tailed jackrabbit) - Uncommon

Thomomys bottae (valley pocket gopher) - Common in grasslands

Spermophilus beecheyi (California ground squirrel) - Small population mainly on dikes around salt marshes.

Reithrodontomys megalotis (western harvest mouse) - Not known from the Station, but has been recorded from Pt. Isabel and the San Pablo Creek marshes.

Reithrodontomys raviventris raviventris (saltmarsh harvest mouse) - This federally and state listed endangered species has not been recorded from the Station. Nearest specimen records are from San Pablo Creek salt marsh to the north and Oakland airport area to the south. D. Olson in the 1982 report of the Environmental Sciences Group Major reports the capture of three adult males in the Emeryville Crescent. It therefore seems plausible that this species was at one time distributed all along the East Bay shore line. Furthermore, the RFS saltmarshes look like suitable habitat for the

species.

Microtus californicus (California vole) - Common in grasslands and extending into saltmarsh. The demographic pattern exhibited by this species at RFS is unlike populations either in the Berkeley Hills or on Brooks Island in the Bay.

Mus musculus (house mouse) - Common, especially in areas adjacent to salt marshes; introduced.

Rattus rattus (roof rat) - Probably occurs; introduced. A carcass of a Rattus sp. was found along the edge of the marsh by J. Gutstein.

Procyon lotor (raccoon) - Common in nearby residential areas, and part of a dead specimen found on the Station.

Vulpes fulva (red fox) - Two probable sightings reported for winter, 1989 by J. Gutstein; introduced species.

Mephitis mephitis (striped skunk) - Definite sign recorded.

Mustela frenata (long-tailed weasel) - Probably occurs. One possible sighting reported by J. Gutstein, and possible scat seen in March, 1989.

compiled by
W. Z. Lidicker, Jr.

April, 1989

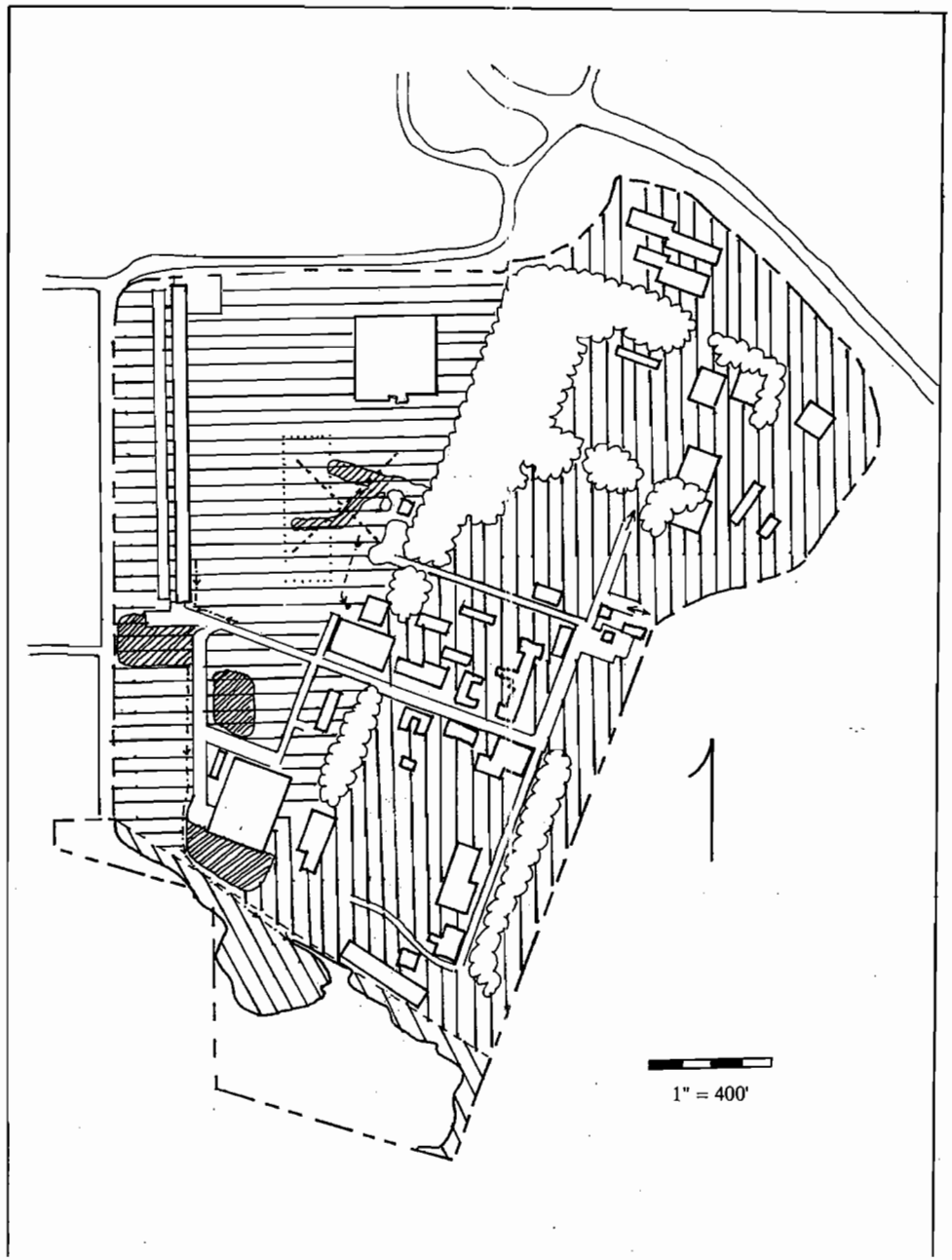
# BIRDS RECORDED IN THE GRASSLANDS AT THE UC RICHMOND FIELD STATION
Based on documented observations, January 1987-March 1989

Legend: r = resident at RFS; n = nests seen at RFS
Sp = Spring; Su = Summer; F = Fall; W = Winter

| Species | Sp | Su | F | W |
|---|---|---|---|---|
| Great Blue Heron | | | X | X |
| Mallard (r) (n) | X | X | X | X |
| Killdeer (r) | X | X | X | X |
| Turkey Vulture (r) | X | X | X | X |
| Black Shouldered Kite (n) | X | | X | X |
| Northern Harrier | X | X | X | X |
| Cooper's Hawk | | | | X |
| Sharp-shinned Hawk | | | | X |
| Red-tailed Hawk (r) (n) | X | X | X | X |
| American Kestrel (r) | X | X | X | X |
| California Quail | X | | | X |
| Ring-necked Pheasant | X | | | |
| Rock Dove (r) | X | X | X | X |
| Mourning Dove (r) (n) | X | X | X | X |
| Great-horned Owl (r?) (n) | X | X | | |
| Anna's Hummingbird (r) | X | X | X | X |
| Allen's Hummingbird | X | X | | |
| Northern Flicker | | | X | X |
| Black Phoebe (r) | X | X | X | X |
| Says Phoebe | | | X | X |
| Western Flycatcher | | | X | |
| Northern Rough-winged Swallow | | X | | |
| Barn Swallow | X | X | | |
| American Crow (r) | X | X | X | X |
| Bushtit (r) (n) | X | X | X | X |
| Hermit Thrush | X | | X | X |
| American Robin (r) (n) | X | X | X | X |
| Loggerhead Shrike | X | | X | X |
| Northern Mockingbird (r) | X | X | X | X |
| Water Pipit | | | | X |
| European Starling (r) (n) | X | X | X | X |
| Yellow-rumped Warbler | | | X | X |
| Common Yellowthroat | | | | X |
| Brown Towhee (r) | X | X | X | X |
| Savannah Sparrow | | | X | X |
| Song Sparrow (r) (n) | X | X | X | X |
| Golden-crowned Sparrow | | | X | X |
| White-crowned Sparrow | | | X | X |
| Lincoln's Sparrow | | | X | X |
| Red-winged Blackbird (r) | X | X | X | X |
| Brewer's Blackbird | X | | | |
| Brown-headed Cowbird | X | | | |
| Western Meadowlark | | | X | X |
| House Finch (r) | X | X | X | X |
| American Goldfinch | X | X | X | X |
| Lesser Goldfinch | | X | | |
| House Sparrow | X | X | | |

NOTE: Species observed fewer than four times in any year are considered 'accidentals,' and are not included in this list.

Prepared by Kay Loughman, NRLF, 400 RFS, April 13, 1989



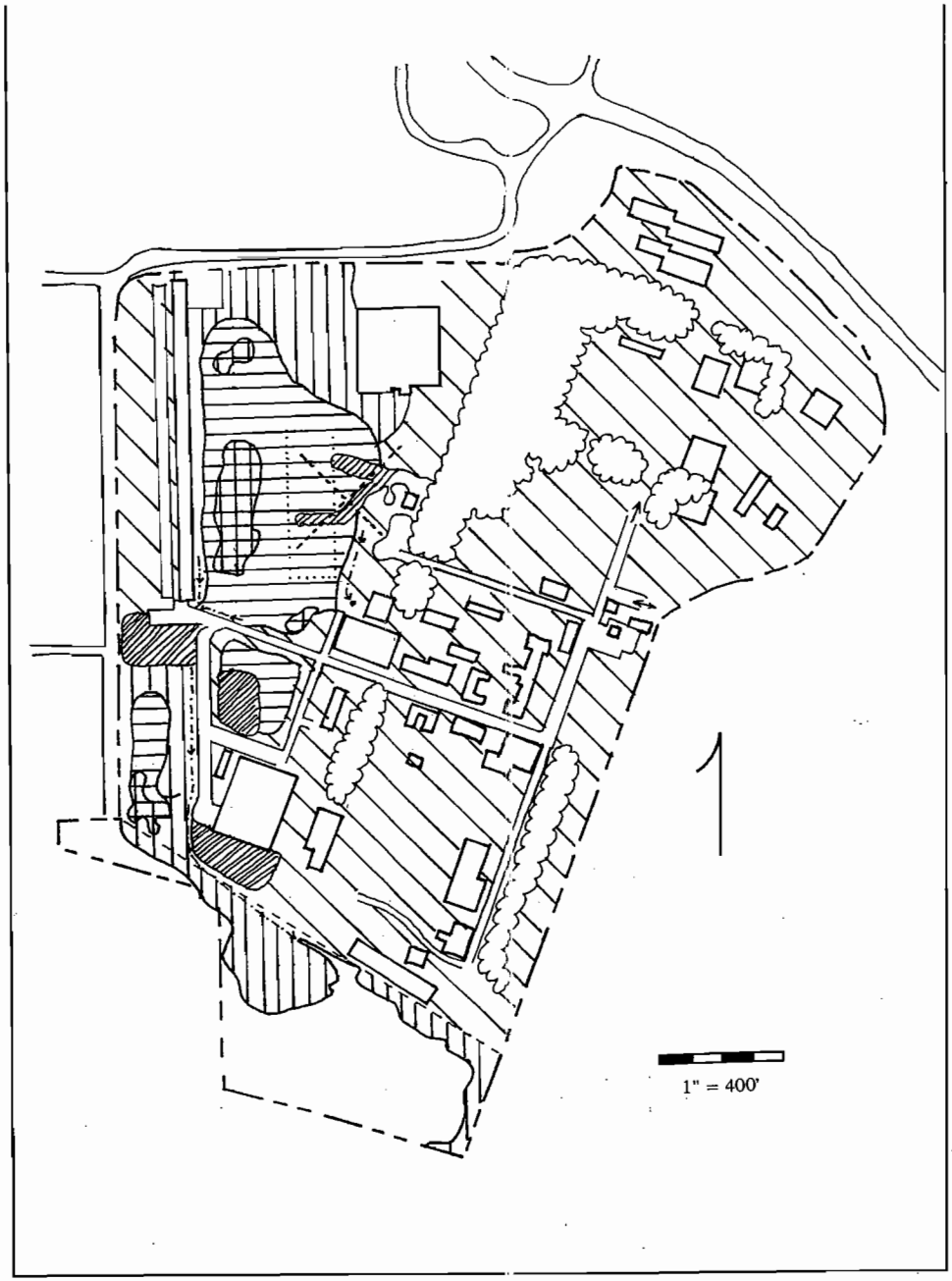

AREA 1 Disturbed Industrial

AREA 2 Leviston Estates

AREA 3 New Fill

**MAP 1**

**GRASSLAND AREAS**




Disturbed/Closely Mowed Grassland

Disturbed/Exotic Grassland

Disturbed Coastal Prairie

Least Disturbed Coastal Prairie

Recent Disturbance

Lidicker Enclosures

**MAP 3**

**GRASSLAND VEGETATION TYPES**